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ACEP RESEARCH FORUM
October 26-27, 2015
Boston Convention Exhibition Center
Boston, MA

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S156 Teaching Fellowship Abstracts

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ACEP
RESEARCH FORUM
October 26-27, 2015
Boston Convention Exhibition Center
Boston, Massachusetts

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Muhammad Waseem, MD, FACEP
Lori Weichenthal, MD, FACEP
Matthew Wheatley, MD
Noah White, MD, FACEP
Richard Wolfe, MD, FACEP
### 10:30 AM - 11:30 AM
**ORAL PRESENTATIONS - Emergency Department-Based Clinical Trials** – Judd Hollander, MD, FACEP - Moderator

#### Public Health
1. **Emergency Department Stopping Elderly Accidents, Deaths and Injuries (ED STEADI)** Program  
   Greenberg MR, Lehigh Valley Hospital, Allentown, PA

#### Pain Management
2. **Ketamine as an Adjunct to Opiates for Acute Pain in the Emergency Department**  
   Bowers KJ, Virginia Tech Carilion School of Medicine, Roanoke, VA

#### Infectious Diseases
3. **Single-dose Oritavancin Treatment of Acute Bacterial Skin and Skin Structure Infections in Intravenous Drug Users: Results from SOLO Trials**  
   Pollack CV, Jr., Thomas Jefferson University, Philadelphia, PA

#### Geriatrics
4. **Initial Experience With Idarucizumab in Dabigatran-Treated Patients Presenting With Acute Gastrointestinal Hemorrhage: Interim Results From the RE-VERSE AD Study**  
   Pollack CV, Jr., Thomas Jefferson University, Philadelphia, PA

#### Cardiovascular
5. **Where Do Freestanding Emergency Departments Choose to Locate?: A Socio-Demographic Analysis in Three States**  
   Schuur JD, Brigham and Women’s Hospital, Boston MA

#### Administration
8. **Simple Interventions Positively Affect Emergency Physician Blood Culture Orders**  
   Ahlers E, Christiana Care Health System, Newark, DE

### 11:30 AM - 12:30 AM
**State-of-the Art: Resuscitation Goals or Chaos?** Jay L Falk, MD, FACEP and Emanuel Rivers, MD

### 2:00 PM - 3:00 PM
**ORAL PRESENTATIONS - Evidence-Based Practice in Emergency Medicine** – Chris Carpenter, MD, FACEP

#### Pediatrics
6. **Incidence of Adverse Events in Pediatric Procedural Sedation in the Emergency Department: A Systematic Review and Meta-Analysis**  
   Barrionuevo P, Mayo Clinic, Rochester, MN

7. **Reduced Head Computed Tomography Utilization for Pediatric Mild Head Injury After Implementation of Decision Support Tools and Shared Decisionmaking**  
   Engineer R, The Cleveland Clinic Foundation, Cleveland, OH

### 10:00 AM - 10:30 AM
**State-of-the Art: Books, Blogs and The Diamond Age of Emergency Medicine** - Judith Tintinalli, MD, MS, FACEP and Scott Weingart, MD, FACEP

**ORAL PRESENTATIONS - Get Your Geek On! Transforming Emergency Care With Technology** – Megan Ranney, MD, MPH, FACEP

### 11:30 AM - 12:30 PM
**State-of-the Art: Books, Blogs and The Diamond Age of Emergency Medicine -** Judith Tintinalli, MD, MS, FACEP and Scott Weingart, MD, FACEP

**Keynote Session: Disseminating Your Research in the Age of Open Access: Coping with the Evolution of Medicine’s Traditional Modes of Scientific Communication**  
Michael L. Callaham, MD, Editor in Chief, *Annals of Emergency Medicine*

### TUESDAY, OCTOBER 27, 2015

9:00 AM - 10:00 AM
**ORAL PRESENTATIONS - Get Your Geek On! Transforming Emergency Care With Technology** – Megan Ranney, MD, MPH, FACEP

### 9:00 AM - 10:00 AM
**ORAL PRESENTATIONS - Get Your Geek On! Transforming Emergency Care With Technology** – Megan Ranney, MD, MPH, FACEP

#### Airway
11. **The Use of a GlideScope Video Laryngoscope is Associated With a Higher First Pass Success than a Direct Laryngoscope in the Presence of a Bloody Airway**  
   Corn GJ, University of Arizona, Tucson, AZ

#### Emergency Medical Services
12. **Intraosseous Vascular Access Catheter Appears Safe During Extended Dwell: A Preliminary Report**  
   Overbaugh R, ICON, San Antonio, TX

13. **A Probabilistic Match of Cardiac Arrest Patients in Michigan**  
   Swor RA, William Beaumont Hospital, Royal Oak, MI

#### Injury Prevention
14. **A Pilot Application of Automatic Tweet Detection of Alcohol Use at a Music Festival**  
   Smith SW, NYU School of Medicine, New York, NY

#### Emergency Medical Services
15. **Accuracy of Out-of-Hospital Automated ST Segment Elevation Myocardial Infarction Detection by LIFEPAK 12 and 15 Devices: The Los Angeles Experience**  
   Sanko S, Keck School of Medicine of the University of Southern California; and Los Angeles Fire Department, Los Angeles, CA
Best Practices for the Use of Prescription Drug Monitoring Programs in the Emergency Department
Greenwood-Ericksen M, Harvard Medical School, Boston, MA

Geriatrics

Inter-Hospital Transfer Is Associated With Increased Mortality in Severe Sepsis: An Instrumental Variables Approach
Mohr NN, University of Iowa Carver College of Medicine, Iowa City, IA

International/Global

Mechanisms of Injury and Implants Used in Physical Elder Abuse: Preliminary Findings from a Pilot Study of Highly Adjudicated Cases
Rosen T, Weill Cornell Medical College, New York, NY

Characterization of Emergency Presentations at Regional Referral Hospital in a Low-Income Country
Bisanzo M, UMASS, Worcester, MA

2:00 PM - 3:00 PM
ORAL PRESENTATIONS - Little People, Big Results - The Best Pediatric Research – Paul Ishimine, MD, FACEP

Pediatrics

Ooral Dexamethasone Is as Effective as Oral Short Acting Corticosteroids in Preventing Relapse to the Emergency Department in Pediatric Patients With Acute Asthma Exacerbations
Watnick C, Vanderbilt University School of Medicine, Nashville, TN

The Effect of Age on the First Pass Success of Pediatric Intubations in the Emergency Department
Dickson JM, University of Arizona, Tucson, AZ

Airway

Factors Associated With First-Pass Success in Pediatric Intubation in the Emergency Department: An Analysis of Multicenter Prospective Observational Study
Goto T, University of Fukui Hospital, Fukui, Japan, Kurume University, Fukuoka, Japan, Tokyo Metropolitan Children’s Medical Center, Tokyo, Japan, Mayo Clinic, Rochester, MN, Massachusetts General Hospital, Boston, MA, Brigham and Women’s Hospital, Boston, MA

Pediatrics

Children Hospitalized With Rhinovirus Bronchiolitis Have Asthma-Like Characteristics
Mansbach J, Boston Children’s Hospital, Boston, MA

A Description of Pediatric Frequent Users of Emergency Department Resources
Brennan JJ, University of California, San Diego, CA

3:00 PM - 4:00 PM
Prime Time Practice-Changers: Highlights of the 2015 Research Forum - Phillip Levy, MD, FACEP, Moderator, Chris Barton, MD, FACEP and Alex Limkakeng, MD, FACEP
MONDAY, OCTOBER 26, 2015 —cont’d

36 Comparison of the Videodenscopy With the Videolaryngoscopy and Direct Laryngoscopy in Simulated Difficult Airway Scenario: A Manikin Study
Ferretti C, Bellvitge Universitary Hospital, L’Hospitalet de Llobregat, Barcelona, Spain

37 Emergency Department Hospitalization Practices for Community-Acquired Pneumonia Encounters: Validating CURB-65 for Discharged Patients
Sharp AL, Kaiser Permanente Department of Research and Evaluation, Pasadena, CA

38 The Relationship Between Emergency Department Utilization and Health Care Professional Referrals
Fertel BS, Cleveland Clinic Foundation, Cleveland, OH

39 Withdrawn

40 An Emergency Department-Based Community Health Worker and Care Coordination Intervention for Frequent Emergency Department Users
Lin MP, Brigham and Women’s Hospital, Boston, MA

41 Pilot Study of Telemedicine in a County Jail to Assess and Treat Acutely Ill Inmates
Vilke GM, University of California San Diego, San Diego, CA

42 Impact of a Novel Volunteer-Run Discharge Planning Program on Follow-Up Appointment Adherence
Shung D, Yale University School of Medicine, New Haven, CT

43 Describing the Evolution of Mobile Technology Usage for Latino Patients and Comparing Findings to National Mobile Health Estimates
Ford K, USC Keck School of Medicine, Los Angeles, CA

44 Identifying Best Practices and Barriers to Improving Emergency Department Admissions for Patients With Chest Pain
Lin MP, Brigham and Women’s Hospital, Boston, MA

45 Remote Device Interrogation in the Emergency Department Study Shows Decreased Time to Interrogation and Disposition Decision Neuenschwander JF II, Genesis Healthcare Systems, Zanesville, OH

46 Characteristics of Patients With Hypotensive Acute Heart Failure Presenting to the Spanish Emergency Departments: An Analysis From the “Epidemiology of Acute Heart Failure in Emergency Departments” Registry
Ferre C, Bellvitge Universitary Hospital, L’Hospitalet de Llobregat, Barcelona, Spain

47 Correlation of Troponin With a Novel Cardiac Electrical Biomarker in Detection of Acute Myocardial Infarction
Schreck DM, Summit Medical Group, Summit, NJ

48 Validation of the Erlanger Chest Pain Protocol
Whittle JS, UT-Chattanooga/Erlanger Hospital, Chattanooga, TN

49 Validation of the Modified Sgarbossa Criteria for Acute Coronary Occlusion in the Setting of Left Bundle Branch Block: Retrospective Case-Control Study
Meyers HP III, Duke University School of Medicine, Durham, NC

50 Withdrawn

51 Early Discharge With Next Day Stress Testing in Low Risk Chest Pain Patients Presenting to the Emergency Department Is Feasible Zwank MD, Regions Hospital, Saint Paul, MN

52 Comparison of Clinical Scoring Systems in Low to Intermediate Risk Chest Pain Patients in the Emergency Department
Whittle JS, UT-Chattanooga/Erlanger Hospital, Chattanooga, TN

Quality and Patient Safety

53 Objective Assessment and Thematic Categorization of Patient-Audible Information in an Emergency Department
Zhang XC, Alpert Medical School of Brown University, Providence, RI

54 The Impact of a Follow-Up Clinic on Unscheduled Return Visits to an Emergency Department
Grasso MA, University of Maryland School of Medicine, Baltimore, MD

55 Emergency Medicine Malpractice Claims: One Medical Group’s Experience
Nauss M, Henry Ford Hospital, Detroit, MI

56 Should We Regularly Collect Sexual Orientation and Gender Identity Data in the Emergency Department? The Divide Between Patient and Provider Perspectives
Peterson S, Johns Hopkins University School of Medicine, Baltimore, MD

57 Improving Fracture Care in an Emergency Department
Callahan JM, The Children’s Hospital of Philadelphia and the Perelman School of Medicine of the University of Pennsylvania, Philadelphia, PA

58 Does a Visual Cue Checklist Improve Communication and Adherence to Best Practices in the Emergency Critical Care Setting? Haydar S, Maine Medical Center, Portland, ME

59 Are There Gaps Between Patients’ Perceptions and Standard of Care in the Emergency Department? Campbell M, Texas A&M/Christus Spohn Memorial Hospital, Corpus Christi, AZ

60 Intravenous Ondansetron and the QT Interval in Adult Emergency Department Patients: An Observational Study
Molett P, Virginia Commonwealth University Health System, Richmond, VA

61 Can an “Ultrasound First” Policy Reduce Incidence of Computed Tomography Scan Use and Radiation Exposure in Pediatric Patients Presenting to the Emergency Department for Evaluation of Abdominal Pain?
Behan L, New York Methodist Hospital, Brooklyn, NY

Diagnostics

62 A Retrospective Chart Review of the Management of 370 Patients Who were Admitted to the Hospital With a Diagnosis of Small Bowel Obstruction
Frasure SE, Brigham and Women’s Hospital, Boston, MA

63 Quantitative Radiographic Correlates of Acute Failure
Kapustin A, DMC/WSU, Detroit, MI

64 Comparison of Total Turnaround Times for Urine versus Whole Blood Point-of-Care Pregnancy Testing Using a Nursing Protocol
Gottlieb M, Cook County (Stroger) Hospital, Chicago, IL

65 Diagnosis of Sepsis Using Micro Ribonucleic Acids
Sooh CHW, National University Hospital, Singapore, National University of Singapore, Singapore

66 Use of Plasma Collection Tubes With Smaller Volumes And Decreased Vacuum Significantly Reduces Hemolysis in Emergency Department Blood Samples
Berriochoa JP, MetroHealth Medical Center, Cleveland, OH
MONDAY, OCTOBER 26, 2015 —cont’d

67 Predictive Value of Abnormal Signs of Vitality on Transfer to the Intensive Care Unit Within 24 Hours of Admission Olderoy SH, Kaweah Delta Health Care District, Visalia, CA

68 Utility of Mediastinal Width Measurements on Chest Radiography in Suspected Acute Thoracic Aortic Dissection Plewa MC, Mercy St. Vincent Medical Center, Toledo, OH

69 Quality of Research and Level of Evidence in Point-of-Care Ultrasound Literature: Where Are We Now? Adhikari S, Banner University Medical Center, Tucson, AZ

Disaster Medicine

70 A Cost Analysis of a County Hospital Emergency Department’s Ebola Virus Disease Preparedness Abraham N, LAC+USC, Los Angeles, CA

71 Had the Time Square Bomb Exploded: What Would Your Emergency Department Have Done? Flamm A, New York Institute of Technology College of Osteopathic Medicine, Brooklyn, NY

72 Impact of Hurricane Sandy on the Staten Island University Hospital Emergency Department Greenstein J, Staten Island University Hospital, Staten Island, NY

73 Effect of Mass Casualty Incident on 72-Hour and 30-Day Return Rates to Carilion Roanoke Memorial Hospital Emergency Department Liu M, Virginia Tech School of Medicine, Roanoke, VA

74 Tourniquet Use in a Civilian Out-of-Hospital Setting: The Los Angeles Experience Mindlin D, Keck School of Medicine of the University of Southern California, Los Angeles, CA

75 Perception of Community Risk of Ebola and Its Effects on Volume in a Pediatric Emergency Department Jones PW, Scott and White, Temple, TX

76 Patterns of Pediatric Injury in the Setting of Armed Conflict: Results of a Randomized Cluster Survey in Baghdad, Iraq Carlson LC, Harvard Affiliated Emergency Medicine Residency, Brigham and Women’s Hospital and Massachusetts General Hospital, Boston, MA

Education

77 Perceived Retaliatory Evaluations of Faculty by Learners and Their Effect on the Culture of Feedback Vora S, University of Illinois at Chicago, Chicago, IL

78 A Novel Teaching Model: Intubation in a Simulated Angioedema Airway Using a Fresh Frozen Cadaver Walsh RM, Madigan Army Medical Center, Tacoma, WA

79 Computer-Based Format Facilitates the Provision of Feedback During Mini-Cex Assessments in the Emergency Department Chaou CH, Chang-Gung Memorial Hospital and Chang-Gung University, Taipei, Taiwan

80 Utilization Of Interpreter Services in the Emergency Department by Emergency Medicine Residents O’Shea S, Einstein Medical Center, Philadelphia, PA


82 Experiential Value of Emergency Medicine Resident Membership on Hospital Rapid Response Team Evans D, St. Luke’s University Health Network, Hellertown, PA

83 Using Standardized Patients to Evaluate Medical Students’ Evidence-Based Medicine Skills Amini R, University of Arizona, Tucson, AZ

84 Do Reflective Students Learn More in the Emergency Department? Hu K, Icahn School of Medicine at Mount Sinai, New York, NY

Emergency Medical Services

85 Prevalence and Survival Impact of Bystander Cardiopulmonary Resuscitation in Sudden Cardiac Arrest Victims Treated by a Large, Urban Emergency Medical Services System in North America Goodloe J, University of Oklahoma School of Community Medicine, Tulsa, OK

86 Recredentialing in Out-of-Hospital Care: Are We as Good as We Once Were? Escott MEA, Baylor College of Medicine/EMS Collaborative Research Group, Houston, TX

87 Comparing Pressures for Improved Wound Irrigation Devices Spaso S, University of California, San Francisco, Fresno, CA

88 Comparison of Emergency Medical Services and Emergency Department Provider’s Clinical Impressions and Time to Disposition Siegler JE, Upstate Medical University, Syracuse, NY

89 Out-of-Hospital Ketamine for Pain, Agitation, and Airway Intervention Is Safe and Effective Berg C, North Memorial Health Care, Robbinsdale, MN

90 Characterization of Pediatric Out-Of-Hospital Cardiac Arrests After Implementation of a Pit Crew Approach to Resuscitation Friesen PA, Dell Medical School, Austin, TX

91 Unscheduled Return Visits to the Emergency Department: 9 Years On Soh CHW, National University Hospital, Singapore

92 Multicenter, Prospective Study of Out-of-Hospital Administration of Analgesia in the Combat Theater in Afghanistan Schauer SG, United States Army Institute for Surgical Research, San Antonio, TX

1:00 PM - 2:00 PM

Administration

93 The Safety and Efficacy of Emergency Department Holding Orders Traub SJ, Mayo Clinic Arizona, Phoenix, AZ

94 Barriers to Safety in the Emergency Department: The Resident Experience Shah AD, Mount Sinai, New York, NY

95 Rotational Patient Assignment versus Physician in Triage: A Comparison of Two Emergency Department Front-End Process Redesigns Traub SJ, Mayo Clinic Arizona, Phoenix, AZ

96 Improving Physician Order Practices and Cost Savings By Changing the Electronic Medical Records Sofis D, Mt. Sinai St. Lukes Roosevelt Hospital, New York, NY

97 A Two-Pronged Intervention to Improve 48-Hour Chart Closure Podolsky SR, Cleveland Clinic, Cleveland, OH

98 The Cost of Safety: Implementation, Maintenance, and Patient Care Expenses of an Emergency Department Ebola Extended Treatment Area Ripper J, Rutgers New Jersey Medical School, Newark, NJ

99 Does the Choice of Vascular Access Device Delay Appropriate Emergency Department Resuscitation of Adult Out-Of-Hospital Cardiac Arrest Patients? Paxton JH, Wayne State University, Detroit, MI
MONDAY, OCTOBER 26, 2015 —cont’d

Compliments, Complaints, and Claims: An Alternative Model for Scoring Patient Satisfaction
Janssens K, St Vincent’s University Hospital Group Dublin, Dublin, Ireland

Comparison of the FlexView Video Laryngoscope, Macintosh Blade Direct Laryngoscope, and the Glidescope Video Laryngoscope
Adams J, Georgia Regents University, Augusta, GA

STABCric 2: Surgical Technique Against Bougie Cricothyrotomy
Layng E, St Luke’s University Hospital, Bethlehem, PA

Does Video-Assisted Laryngoscopy Improve Outcomes in Cardiac Arrest Patients Who Are Intubated Out-of-Hospital?
Walsh B, Morristown Memorial Hospital, Morristown, NJ

Complications Related to Multiple Endotracheal Intubation Attempts in the Emergency Department
Zhang MG, University of British Columbia, Vancouver, BC

A Systematic Review and Meta-analysis of First Pass Success Rates in Emergency Department Intubations: Creating a Benchmark for Quality Emergency Airway Care
Park LJ, Middlemore Hospital, Auckland, New Zealand

Video Laryngoscopy Does Not Improve the First Pass Success Rate During Cardiopulmonary Resuscitation in the Emergency Department: An Analysis of Multicenter Observational Study
Shirakura Y, Kurashiki Central Hospital, Kurashiki, Okayama, Japan

The FLAMBE (Factors Leading to Airway Management in Burn Emergencies)
Benaron D, UCSD, San Diego, CA

Ketamine as an Induction Agent in Emergency Department Intubation: Prospective Observational Multi-Center Study in Japan
Okubo M, Mayo Clinic, Rochester, MN

Delayed Stress Delta N-Terminal Pro-B Type Natriuretic Peptide Is Significantly Higher With Myocardial Ischemia
Limkakeng AT, Duke University Medical Center, Durham, NC

Initial Urine Output and Pro-BNP Independently Predict Hospital Length of Stay in Acute Heart Failure
Lardo ON, Johns Hopkins University School of Medicine, Baltimore, MD

Delayed Stress-Delta High Sensitivity Troponin Does Not Elevate With Myocardial Ischemia
Limkakeng AT, Duke University Medical Center, Durham, NC

A Descriptive Analysis of Right Ventricular Echocardiogram Parameters in Patients Successfully Resuscitated from Cardiac Arrest
Darocki M, UCSD, San Diego, CA

Comparison of Three Objective Methods of Classifying the History Component of the HEART Score
Marchick M, University of Florida, Gainesville, FL

T-Wave Changes Aid in the Electrocardiographic Diagnosis of Acute Coronary Occlusion in Left Bundle Branch Block
Elm KD, University of Minnesota Medical School, Minneapolis, MN

The Prognostic Value of ST-Depression in Lead aVL in Patients With Inferior ST-Segment Elevation Myocardial Infarction
Fu J, UCSF, San Francisco, CA

Acute Care Diagnostic Collaboration: Assessment of Diagnostic Quality of TIMI versus HEART Risk Score Integrating Coronary Computed Tomography Angiography in a Bayesian Statistical Model
Cochon L, Universidad de Barcelona, Barcelona, Spain

Comparison of Three Objective Methods of Classifying the History

Education

Scholarship and the Emergency Medicine Educator: A Workforce Study
Jordan J, Harbor-UCLA Medical Center, Torrance, CA

High Efficiency Linguistics Program for Spanish: A Cyclic Curriculum for Improving Spanish Language Capacity Among Resident Physicians
Silber J, University of Virginia, Charlottesville, VA

Pragmatic Value of a Novel Emergency Medicine Resident “Resuscitation” Rotation
Oleksiaik MA, William Beaumont Hospital, Royal Oak, MI

Perceptions Matter: Evaluating Medical Student and Parental Comfort and Satisfaction in the Pediatric Emergency Department
Morrissey K, NY Methodist Hospital, Brooklyn, NY

Emergency Medicine Ultrasound Milestones: Resident Opinion and Perceptions of the Guidelines
Stolz L, University of Arizona, Tucson, AZ

Video-Assisted Endotracheal Intubation via Direct Laryngoscopy Using Google Glass: A Pilot Study
Kim J, The University of Toledo Medical Center, Toledo, OH

Lessons Learned: Developing an Education Format for Disseminating Clinical Pearls Gleaned from Adverse Event Review
Thomas JF, Mayo Clinic, Rochester, MN

Diagnostics

Optimizing a Rational Departmental Protocol for Diagnosing Pulmonary Embolism: Adjusting d-Dimer Cutoffs for Age Can Further Reduce Computed Tomography Use With an Acceptable Miss Rate
Fried J, Hartford Hospital/University of Connecticut, Hartford, CT

Does Educational Intervention Improve Physician Adherence to Wells’ Score for Diagnosis of Deep Venous Thrombosis?
Boyd MA, University of Michigan/ST. Joseph Mercy Hospital Emergency Medicine Residency Program, Ann Arbor, MI

Determining the Usage of Imaging Modality in Management of Adult Patients Presenting to Emergency Department With Foreign Body Sensation in Throat/Neck
Garg N, New York Hospital Queens, Flushing, NY

Utility of Hepatic Function Testing in Emergency Department Patients With Abdominal or Epigastric/Right Upper Quadrant Pain
Driver B, Hennepin County Medical Center, Minneapolis, MN

The Diagnosis and Management of Patients With Renal Colic Across a Sample of US Hospitals: Computed Tomography Scan Utilization, Admission Rates, and Inpatient Urologic Procedures
Schoenfeld EM, Baystate Medical Center, Springfield, MA
MONDAY, OCTOBER 26, 2015 —cont’d

130  The Sensitivity of Combined Revised Geneva Rule Risk Stratification and D-Dimer Testing in Excluding Acute Pulmonary Embolism
Borough WJ, Einstein Medical Center, Philadelphia, PA

131  Evaluating the Need for Computed Tomographic Pulmonary Angiography in Patients With Low Pre-Test Probability and Slightly Elevated Quantitative D-Dimer: A Retrospective Chart Review
Burkett J, Michigan State University/Sparrow Health Systems, Lansing, MI

132  Performance of the Four-Way Range of Motion Test for Radiographic Injuries After Blunt Elbow Trauma
Panacek EA, University of South Alabama Medical Center, Mobile, AL

Emergency Medical Services

133  Intraosseous Infusions from the Proximal Humerus Reach the Heart in Less Than 3 Seconds in Human Volunteers
Montez DF, Teleflex Incorporated, Shavano Park, TX

134  Causes of False Positive and False Negative Software Interpretation of ST-Elevation Myocardial Infarction in Out-of-Hospital Electrocardiograms
Bowen N, Los Angeles County EMS Agency, Los Angeles, CA

135  Sternal Flow Rates and Insertion Success Using a Multi-site Intraosseous Device
Philbeck TE, Teleflex Inc, Shavano Park, TX

136  Retrospective Application of a Low Acuity Emergency Medical Services Triage Protocol to Identify Patients Appropriate for Urgent Care
Munjal KG, Icahn School of Medicine at Mount Sinai, New York, NY

137  Frequent Emergency Department Users: Describing Care Coordination Services
Zhao J, Denver Health Medical Center, Denver, CO

138  Out-of-Hospital Pediatric Cardiac Arrest
Laskowski-Kos U, Newark Beth Israel Medical Center, Newark, NJ

139  Differences In Out-of-Hospital Electrocardiogram Test Characteristics by Patient Gender and Ethnicity in a Large Urban Area
Sanko S, Keck School of Medicine of the University of Southern California, Los Angeles, CA

140  Impact of a New Dispatch System on 911 Call Processing Time for Confirmed Time-Critical Emergencies
Sanko S, Keck School of Medicine of the University of Southern California, Los Angeles, CA

Quality and Patient Safety

141  A Qualitative Study of Patients’ Perspectives on Outcomes of Emergency Department Care
Vaillancourt S, St. Michael’s Hospital, Toronto, ON

142  Emergency Medicine Pharmacist Interventions and Clinical Activities in a Tertiary Academic Medical Center
Wells EJ, Cleveland Clinic, Cleveland, OH

143  Viral Signs as Predictors of Rapid Response Team Activations Within Twelve Hours of Admission from the Emergency Department
Walston J, Mayo Clinic, Rochester, MN

144  Effect of Nursing Patient Flow Coordinators on Length of Stay of Boarded Patients in Emergency Department

Health Care Policy

149  Impact of Frailty and Sociodemographic Factors on Hospital Admission From an Emergency Department Observation Unit
Zdradzinski MJ, Cleveland Clinic Lerner College of Medicine, Cleveland, OH

150  High Utilization of Emergency Department Services
Heidt JW, University of Missouri-Columbia, Columbia, MO

151  The Effect of Helmet Use on Emergency Department Costs in Central Florida
Vaizer J, University of Central Florida College of Medicine, Orlando, FL

152  Applying Network Adequacy Standards to Emergency Medicine
Dorner SC, Harvard T.H. Chan School of Public Health, Boston, MA

153  Patient Length of Stay in the Context of the “2-Midnight Rule”: Assessing the Accuracy of Attending Providers’ Predictions
Lindor RA, Mayo Clinic College of Medicine, Rochester, MN

154  Hospitalization Rates for Syncope Trend Higher in States With Higher Malpractice Rates
Allegra JR, Morristown Medical Center, Morristown, NJ

155EMF Moved to 5EMF

156  Survey of Patient Knowledge and Expectations About Freestanding Emergency Departments
Payton T, University of Florida, Gainesville, FL

Health Services Research

157  You Googled What? Describing Online Health Information Search Patterns of Emergency Department Patients and Correlation With Final Diagnoses
Scott G, Northwestern University, Chicago, IL

158  Hypertensive Patient Characteristics, Knowledge, and Barriers and Facilitators to Improve Transitional Care for Hypertension in the Emergency Department
Heinert S, University of Illinois at Chicago, Chicago, IL

159  Understanding What Patients Need to Stay Healthy: The Perspectives of Community- and Hospital-Based Caregivers
Rising KL, National Academic Center for Telehealth, Thomas Jefferson University, Philadelphia, PA
MONDAY, OCTOBER 26, 2015—cont’d

160 “Sometimes You Get to Feel Like the Freak Show”: Transgender and Gender-Non-Conforming Patient Experiences and Barriers to Emergency Care
Samuels EA, Brown University, Providence, RI

161 Hospital Characteristic-Specific Cost-to-Charge Ratios Can Be Used to Estimate National Costs of Emergency Department Care and Determine the Most Expensive Diagnoses
Slutzman JE, University of Massachusetts Medical School, Worcester, MA

162EMF Characterizing Hospital-Level Variation in Emergency Department Visitation After Hospital Discharge for Medicare Beneficiaries
Venkatash AK, Yale University School of Medicine, New Haven, CT

163EMF Eliciting Individually Defined Outcomes and Interventions Upon Discharge from the Emergency Department
Rising KL, National Academic Center for Telehealth, Thomas Jefferson University, Philadelphia, PA

164EMF Factors Influencing Emergency Department Service Times
Hoot NR, University of Texas Health Science Center, Houston, TX

3:00 PM - 4:00 PM

Education

165 Assessment of Emergency Medicine Resident Skill in Determining Diagnosis and Management for Emergent Electrocardiograms: A Multi-Center Study
Hartman OD, Wake Forest University School of Medicine, Winston-Salem, NC

166 Prompted Post-Resuscitation Formal Feedback Improves Clinician Satisfaction Without Distracting from Other Duties
Drake AB, Mount Sinai St. Luke’s-Roosevelt Hospital Center, New York, NY

167 Factors Important To Underrepresented Minority Applicants When Selecting an Emergency Medicine Program
Druck J, University of Colorado, Aurora, CO

168 SNAPPY Teaching and Assessing Medical Students: Sonographic Assistance for Procedures in Preclinical Years
Amini R, Banner University Medical Center, Tucson, AZ

169 Billing and Coding Shift for Emergency Medicine Residents: A Win-Win-Win Proposition
Takacs ME, University of Iowa, Iowa City, IA

170 Risk-Management and Medical Malpractice Curriculum for Emergency Medicine Residency
Amin DP, University of Southern California, Los Angeles, CA

171 At the Bedside: Developing a Resource for New Resident Teachers and Exploring Its Impact
Montano M, LAC-USC Medical Center, Los Angeles, CA

172 Bridging the Gap Between Milestones and the Emergency Medicine Model: Incorporation of Patient Encounter Types into Residency Training
Manning JD, Virginia Tech Carilion Emergency Medicine Residency Program, Roanoke, VA

Emergency Medical Services

173 Prevalence of Out-of-Hospital Cardiac Arrest Presenting as a Seizure
Sanko S, Keck School of Medicine of the University of Southern California, Los Angeles, CA

174 Comparing Emergency Physicians’ Emergency Anaesthesia Performance In and Out-of-Hospital: Apples and Oranges?
Corfield A, Royal Alexandra Hospital, Paisley, United Kingdom

175 Does Knowing Hands-Only Cardiopulmonary Resuscitation Improve Willingness to Use It?
Bahdur N, The University of Toledo Medical Center, Toledo, OH

176 Out-of-Hospital En Route Care and Life-Saving Interventions of Traumatically Injured Combat Patients Transported by MEDEVAC From Point of Injury
Maddy J, 59th MDW/ST-USAFISR, Fort Sam Houston, TX

177 Analysis of MEDEVAC Providers and Procedures Performed En Route from Point of Injury to a Military Treatment Facility in Combat
Maddy J, 59th MDW/ST Air Force Enroute Care Research Center, Fort Sam Houston, TX

178 Increasing Prevalence of Senior Citizen Frequent Users of Emergency Medical Services in Large, Urban Area
Sanko S, Keck School of Medicine of the University of Southern California, Los Angeles, CA

179 STEMI and Out-of-Hospital Cardiac ARresT (START) Registry: Preadmission Characteristics of Survivors
Zareh M, LAC+USC Medical Center, Los Angeles, CA

Health Care Policy

180 National Shortages of Drugs Used in the Emergency Department, 2002-2014
Chen SL, Yale School of Medicine, New Haven, CT

181 Patterns in EMTALA Enforcement: Temporal and Regional Variation Between 2004 and 2014
Menchine M, USC Keck School of Medicine, Los Angeles, CA

182 Assessing Economic and Health Care Access Social Determinants of Health in the Emergency Department
Park AM, University of Colorado, Denver, Aurora, CO

183 The Affordable Care Act: Disparities in Emergency Department Use for Mental Health Diagnoses in Young Adults
Yanuck J, University of California, Irvine, Irvine, CA

184 Racial Disparities in the Frequency of Workplace Injuries
Seabury S, USC Keck School of Medicine, Los Angeles, CA

185 A Community Health Worker Intervention for Emergency Department Super-Utilizers
Kalwani RM, Temple University School of Medicine, Philadelphia, PA

186 The Use of TeleSurgical Consultation to Expand Access to Acute Surgical Care: A Pilot Trial of Feasibility
Holena DN, University of Pennsylvania, Philadelphia, PA

187 Inter-Physician Variability in Emergency Department Length of Stay for Discharged Patients
Traub SJ, Mayo Clinic-Arizona, Phoenix, AZ

Health Services Research

188 Costs Attributable to Emergency Department Care by Diagnosis
Slutzman JE, University of Massachusetts Medical School, Worcester, MA

189 Incidence and Cost of Hypertensive Emergencies in United States Emergency Departments
Janke AT, Wayne State University School of Medicine, Detroit, MI
MONDAY, OCTOBER 26, 2015 —cont’d

190 What Limits Participation in Mobile Health Programs for Urban Patients With Diabetes?
Hicks B, USC Keck School of Medicine, Los Angeles, CA

191 Exploring Perspectives on Home-Based Health Care as an Alternative to Hospital Admission After Emergency Department Treatment
Stuck AR, West Health Institute, La Jolla, CA

192 Variability in Survival from Emergency Care Sensitive Conditions Across Emergency Care Service Regions in Pennsylvania
Karp DN, Perlman School of Medicine, University of Pennsylvania, Philadelphia, PA

193 Mobile Health Capacity Amongst Emergency Department Inner-City Patients With Risky Alcohol Use and Satisfaction With a Text Message Based Intervention
Zhang M, USC Keck School of Medicine, Los Angeles, CA

194 Cost-Effective Analysis of Emergency Department Utilization for Dental Pain
Brody A, Wayne State University-Detroit, MI, Detroit, MI

195 Increasing Non-Targeted HIV Testing in the Emergency Department: Which Method Is Most Effective?
Arora S, USC Keck School of Medicine, Los Angeles, CA

Infectious Diseases

196 Prevalence, Clinical Characteristics, and Outcomes of Adults Hospitalized With Staphylococcus Aureus Community-Acquired Pneumonia
Casimir G, Vanderbilt University, Nashville, TN

197 An Analysis of Factors Associated With Ciprofloxacin-Resistant Escherichia coli Caused Urinary Tract Infections in Patients Discharged from the Emergency Department
Kratohlwill L, Allegheny General Hospital, Pittsburgh, PA

198 Urinalysis Findings Associated With a Low Risk of Urinary Tract Infection in Adult Emergency Department Patients: An External Validation Study
Hertz JT, Vanderbilt University, Nashville, TN

199 Urinary Squamous Epithelial Cells Do Not Accurately Predict Urine Culture Contamination
Mohr NM, University of Iowa Carver College of Medicine, Iowa City, IA

200 Is There an Association Between Trichomoniasis and Other Sexually Transmitted Infections in Adolescent versus Adult Emergency Department Patients?
Eischens K, Michigan State University, Grand Rapids; Grand Rapids Medical Education Partners, Grand Rapids, MI

201 Community-Based Study of Untreated Cervical Infections in Adolescent and Adult Females Presenting to the Emergency Department
Rutterath L, Michigan State University, Grand Rapids; Spectrum Health Department of Emergency Medicine; Grand Rapids Medical Education Partners, Grand Rapids, MI

202 The Utility of the Emergency Department Observation Unit for Community-Acquired Pneumonia
Lin Z, National University Health Systems, Singapore

Quality and Patient Safety

203 Initiating Workups in the Waiting Room Decreases Emergency Department Bed Time and Left Before Completion of Service Rate
Begaz T, Olive View-UCLA, Sylmar, CA

204 MedLibs: A Mobile Application for Facilitating Emergency Department Consultation Requests
Riordan J, UVA, Charlottesville, VA

205 Rapid Assessment and Treatment of Category 2 Patients in the Emergency Department
Rahmatullah SH, AlFaisal University, Riyadh, Saudi Arabia

206 Quarterly Reporting of Computed Tomography Ordering History Reduces the Use of Imaging in an Emergency Department
Ehrlichman RS, University of Maryland School of Medicine, Baltimore, MD

207 Emergency Department Revisit Rates for Patients With Abdominal Pain Decreased After the Introduction of Observation Units
Reid K, Morristown Medical Center, Morristown, NJ

208 Electronic Health Record-Based Sepsis Protocol Effectively Lowers Time to Antibiotics and Time to Intravenous Fluids in Emergency Department Patients
Hayden GE, Medical University of South Carolina, Charleston, SC

209 Trends in Rapid Response Team Activations Within 24 Hours of Admission: A Follow-Up Study
Malik DS, Mt Sinai St Lukes Roosevelt Hospital Center, New York, NY

210 Increased Identification of Emergency Department 72-hour Returns With Health Information Exchange Data
Kim E, Icahn School of Medicine at Mount Sinai, New York City, NY

International/Global

211 Assessing US Clinician Gestalt in the Diagnosis of Malaria in a High-Prevalence Area of Sub-Saharan Africa
Menkin L, MUSC, Charleston, SC

212 The Refugee Cascade of Care: Prospective Assessment Reveals Attrition From HIV Care in Nakivale Refugee Settlement in Uganda
O’Laughlin KN, Brigham and Women’s Hospital, Boston, MA

213 Derivation and Internal Validation of the DHAKA Score and DHAKA Tree For Predicting Dehydration Severity in Children With Acute Diarrhea
Levine AC, Warren Alpert Medical School of Brown University, Providence, RI

214 Traumatic Injuries at an Emergency Department in Central Haiti
Rouhani S, Brigham and Women’s Hospital, Boston, MA

215 Implementation of a Pediatric Emergency Medicine Protocol and Curriculum in the Dominican Republic
Leader A, Eastern Virginia Medical School, Norfolk, VA

216 Emergency Scene Responses by African Community-Based Emergency First Aid Responders
Mould-Millman N-K, University of Colorado, Aurora, CO

217 Assessing the Need for Protocolized Observation Care for Stroke and Asthma in Rural Haiti
Rouhani S, Brigham and Women’s Hospital, Boston, MA

218 Withdrawn

Palliative and End of Life Care

219 The Recognition of Hospice Eligible Patients in the Emergency Department: A Missed Opportunity
Bacci M, The University of Iowa Carver College of Medicine, Iowa City, IA
TUESDAY, OCTOBER 27, 2015

8:00 AM - 9:00 AM
Electronic Presentations

Neurology

227 Risk-Benefit Analysis of Lumbar Puncture to Evaluate for Nontraumatic Subarachnoid Hemorrhage in Adult Emergency Department Patients With Headache
Migdal V, Vanderbilt University, Nashville, TN

228 Withdrawn

229 External Validation of a Clinical Prediction Rule for the Differentiation of Traumatic Lumbar Punctures from Aneurysmal Subarachnoid Hemorrhage
Jones JS, Michigan State University, Grand Rapids; Spectrum Health Department of Emergency Medicine; Grand Rapids Medical Education Partners, Grand Rapids, MI

230 Vertigo, Ataxia, and Strokes: An Emergency Department Study
Chen SB, Presence Resurrection Medical Center, Chicago, IL

231 Development and Psychometric Properties of the Stroke Assessment and Treatment Intent Scale
Davis S, West Virginia University, Morgantown, WV

232 Disparities in Emergency Department Wait Time Among Patients With Traumatic Brain Injury
He S, University of Southern California, Los Angeles, CA

233 Administration of Adipose-Derived Mesenchymal Stem Cells After Transient Global Cerebral Ischemia has an Additory Stimulating Effect on Intrinsic Neurogenesis
Ryu H, Cha University Bundang Medical Center, Gyeonggi-Do, Korea

Health Services Research

242 Triage of Low Acuity Emergency Department Patients to a Primary Care Clinic and Medical Home: A Utilization and Cost Effectiveness Analysis
Liferidge A, George Washington University School of Medicine, Washington, DC

243 Exploring Patient Characteristics and Potential Cost Savings for Home Health as an Alternative to Hospital Admission After Emergency Department Treatment
Crowley C, West Health Institute, La Jolla, CA

244 Independent Pharmacies: Where Are They Located and Does Location Influence Price?
Tep S, USC Keck School of Medicine, Los Angeles, CA

245 Why Do Patients Come to the Emergency Department After Receiving Care for the Same Problem in Other Health Care Settings?
Burner E, USC Keck School of Medicine, Los Angeles, CA

246 Admissions Within Seven Days of an Emergency Department Discharge
Castillo EM, University of California, San Diego, San Diego, CA

247 Emergency Physician X-Ray Ordering as a Function of the Patient’s Primary Language
Bilal S, Baylor College of Medicine, Houston, TX

248 Can Data From a Health Information Exchange Be Used to Describe Frequent Emergency Department Users Within a Region?
Sendor AB, Medical University of South Carolina, Charleston, SC

249EMPF Usability of the Massachusetts Prescription Drug Monitoring Program in the Emergency Department
Poon SK, Harvard Medical School, Boston, MA

Infectious Diseases

250 Derivation of a Decision Instrument to Determine Which Patients With Skin and Soft Tissue Infections are Appropriate for Discharge
Kadera SP, UCLA, Los Angeles, CA

PEDIATRICS

234 Emergency Department Pediatric Transfers to Acute Care Facilities: An HCUP Analysis
Barata IA, North Shore University Hospital, Manhasset, NY

235 Predictive Variables for Abnormal Comprehensive Metabolic Panel Testing and Potential Cost Savings in Children Receiving Pediatric Emergency Department Care
Huckaby MD, Louisiana State University Health Science Center Shreveport, Shreveport, LA

236 Withdrawn

237 Retrospective Review of Symptoms and Signs of Intussusception Present on Initial Evaluation
Wolford RW, OSF Saint Francis Medical Center, Peoria, IL

238 Moved to 16

239 The Accuracy of the Yale Observation Scale Score and Unstructured Clinician Suspicion to Identify Febrile Infants Aged ≤60 Days With Serious Bacterial Infections
Nigrovic LE, Boston Children’s Hospital, Boston, MA

240 An Observational Review of Pediatric Intravenous Needle Placement in the Pediatric Emergency Department
Pifko EL, Medical University of South Carolina, Charleston, SC

241 Ketamine Dosing in Overweight Pediatric Patients: Is Standard Dosing Too Much?
Grant KL, The Children’s Hospital at the University of Oklahoma, Oklahoma City, OK

MONDAY, OCTOBER 26, 2015 —cont’d

220 Targeted Palliative Care Initiative in the Emergency Department
Sorge R, Icahn School of Medicine at Mount Sinai, New York, NY

221 Utility of the Modified “Surprise Question” for Predicting Inpatient Mortality in Emergency Department Patients
Strout TD, Maine Medical Center, Portland, ME

222 Teaching Delivery of Difficult News in Trauma: Simulated Resuscitations With Structured Communication for Emergency Medicine and Surgery Residents
Lamba S, Rutgers New Jersey Medical School, Newark, NJ

223 Acceptability and Reliability of a Novel Palliative Care Screening Tool Among Emergency Department Providers During Pre-Implementation Testing
Bowman J, Brown University, Providence, RI

224 Palliative Care Screening and Assessment in the Emergency Department: A Systematic Review
George N, Brown University, Providence, RI

225 Palliative Performance Scale on Admission Is a Predictor of Mortality in Hospitalized Patients Admitted Through the Emergency Department
Kuntz J, UCONN Health, Farmington, CT

226 Palliative Care Domains for Emergency Medicine Resident Training: An Expert Consensus
Goett R, Rutgers: New Jersey Medical School, Newark, NJ
### Trauma

| 254 | Identification of Adults With Cerebrospinal Fluid Pleocytosis at Low Risk For Bacterial Meningitis
| 255 | Effect of Antimicrobial Disinfectant Wipes on Bacteria on Computer Equipment in the Emergency Department
| 256 | A Descriptive Analysis of Patients Who Opt Out of Routine HIV Screening in the Emergency Department
| 257 | Sodium Zirconium Cyclosilicate for Patients With Severe Hyperkalemia: Subgroup Analysis of the Phase 3, International, Multicenter, Randomized, Double-Blind, Placebo-Controlled HARMONIZE Trial

### Inadequate Immune Response to *Staphylococcus Aureus* in Complicated Abscess Infections

_Femling J, University of New Mexico, Albuquerque, NM_

### Comparison of Clinical Characteristics and Outcomes of Medical versus Surgical Management of Peritonsillar Abscess

_Cabrera D, Mayo Clinic, Rochester, MN_

### Identification of Adults With Cerebrospinal Fluid Pleocytosis at Low Risk For Bacterial Meningitis

_McArthur R, Beth Israel Deaconess Medical Center, Boston, MA_

### Effect of Antimicrobial Disinfectant Wipes on Bacteria on Computer Equipment in the Emergency Department

_Glenn A, St Lukes University Health Network, Bethlehem, PA_

### A Descriptive Analysis of Patients Who Opt Out of Routine HIV Screening in the Emergency Department

_Mauntel-Medici C, University of Illinois Hospital, Chicago, IL_

### Effect of Antimicrobial Disinfectant Wipes on Bacteria on Computer Equipment in the Emergency Department

_Glenn A, St Lukes University Health Network, Bethlehem, PA_

### Initial Experience with Idarucizumab in Dabigatran-Treated Patients Presenting With Acute Traumatic Injuries: Interim Results From the RE-VERSE AD Study

_Pollack CV, Jr., Thomas Jefferson University, Philadelphia, PA_

### Out-of-Hospital Needle Thoracostomy: Does Changing the Length of the Needle and the Location of the Procedure Change Patient Outcome?

_Weichenthal LA, UCSF-Fresno, Fresno, CA_

### Application of the Canadian Computed Tomography Head Rule to a Very Low Risk Minor Head Injury Population

_Davey K, Mt Sinai St Luke’s Roosevelt, New York, NY_

### Intramedullary Effects of Power-Infused Contrast by Intrathecal Access

_Puga T, Teleflex Inc, Shavano Park, TX_

### Impact of an Asthma Care Pathway on the Emergency Department Management of Asthma

_Wood B, University of Toronto, Toronto, ON_

### Patients’ Attitudes Regarding Tattooed Physicians: The ART study

_Cohen M, St. Luke’s University Health Network, Bethlehem, PA_

### Qualitative Study: Cost of Emergency Care From the Providers’ Perspective

_Gilbert SK, George Washington University, Washington, DC_

### Contrast Extravasation Prevalence in Emergency Department Patients With Ultrasound-Guided Peripheral Intravenous Catheters

_Rupp JD, Vanderbilt University, Nashville, TN_

### The Impact of Computerized Provider Order Entry on Emergency Department Flow

_Gray A, London Health Sciences Centre, London, ON_

### The Operational Effects of Implementing Electronic Provider Documentation in the Emergency Department

_Flewlowitz JC, Harvard Medical School, Boston, MA_

### Predicting Emergency Department Patient Throughput Times Utilizing Machine Learning

_Oltes E, UW-Madison, Madison, WI_

### Single-Item Health Literacy Screening Validation in Predicting Limited Health Literacy in an Academic Emergency Department

_Crum A, University of New Mexico School of Medicine, Albuquerque, NM_

### Effect of Electronic Medical Record Transition on Emergency Department Length of Stay

_Didehban R, Mayo Clinic, Scottsdale, AZ_

### Post-Intubation Care in the Emergency Department Remains Sub-Optimal Despite the Introduction of an Electronic Order Set

_Tainter C, University of California San Diego, San Diego, CA_

### Improved Documentation and Coding Utilizing Technological Reminders Within the Electronic Medical Record

_Podolsky S, Cleveland Clinic, Cleveland, OH_

### Integrating Environmental Data into a Personal Health Record for Asthma Patients

_Killeen JP, University of California, San Diego, San Diego, CA_

### NESTED: National Trauma Registry Study of Deprivation

_Corfield A, Royal Alexandra Hospital, Paisley, United Kingdom_

### The Creation of the Maricopa Integrated Health System Disease Surveillance Project

_Kannan V, Maricopa Medical Center, Phoenix, AZ_

### Survey of Barriers to Ebola Preparedness in Washington State Emergency Departments

_Wong CH, University of Washington, Seattle, WA_

### Increasing Intention to Learn Hands-Only Cardiopulmonary Resuscitation Through an Extended Parallel Process Model-Based Brochure

_Cuário RL, St. Luke’s Medical Center, Quezon City, Philippines_

### A Systematic Review of Clinician Attitudes, Screening Practices, and Interventions to Reduce Firearm-Related Injury

_Ameli J, Brown University/Rhode Island Hospital, Providence, RI_

### Electronic Best Practice Advisories

_Francis Medical Center, Peoria, IL_

### Improved Documentation and Coding Utilizing Technological Reminders Within the Electronic Medical Record

_Baliga S, Henry Ford Health System, Detroit, MI_

### Limiting Health Literacy in an Academic Emergency Department

_Podolsky S, Cleveland Clinic, Cleveland, OH_

### Post-Intubation Care in the Emergency Department Remains Sub-Optimal Despite the Introduction of an Electronic Order Set

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_Podolsky S, Cleveland Clinic, Cleveland, OH_

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### A Systematic Review of Clinician Attitudes, Screening Practices, and Interventions to Reduce Firearm-Related Injury

_Ameli J, Brown University/Rhode Island Hospital, Providence, RI_
TUESDAY, OCTOBER 27, 2015 —cont’d

287  Homeless Patients in France: A National Case-Cohort Prospective Study
Freund Y, Groupe Hospitalier Pitié-Salpêtrière, APHP, Paris, France

288  Chest X-Ray Findings in Emergency Department Patients Evaluated For Pulmonary Tuberculosis: The Experience of a Large Urban Academic Emergency Department
Bowman A, LAC+USC, Los Angeles, CA

289  A Telephone Intervention for Risky Alcohol Use With Injured Emergency Department Patients
Mello MJ, Brown University, Providence, RI

Ultrasound

290  Carotid Flow Time as a Predictor of Volume Responsiveness
Jelic T, Sunnybrook Health Sciences Centre, Toronto, ON

291  Effect of Ultrasound-Guided Peripheral Intravenous Catheter Placement by Nurses and Paramedics on Central Line Placement in the Emergency Department
Cappa AR, University of Arizona, Tucson, AZ

292  A Cross-Sectional Study on the Correlation and Validity of Inferior Vena Cava and Internal Jugular Vein Ultrasound Measurements in Predicting Central Venous Pressure in Spontaneous Breathing Patients
Parenti N, Santa Maria della Scaletta Hospital, Bologna, Italy

293  Emergency Medicine Sonographers Can Obtain Similar Doppler Measurements and Have High Inter-Rater Reliability for Overall Function in Diastolic Cardiac Evaluation
Saul T, Mount Sinai St. Luke’s Mount Sinai Roosevelt Hospital, New York, NY

294  A Comparison of Ultrasound-Guided and Palpation-Guided Identification of Lumbar Puncture Needle Entry Site in Patients as Body Mass Index Increases
Jeanmonod D, St. Luke’s University Health Network, Bethlehem, PA

295  Emergency Physician Performed Bedside Ultrasound in Patients With Undifferentiated Abdominal Pain
Kurkowski E, New York University School of Medicine, New York, NY

296  An Evidence-Based Lung Ultrasound Scanning Protocol for Diagnosing Pediatric Pneumonia
Milliner BHA, Icahn School of Medicine at Mount Sinai, New York City, NY

297  Evaluation of the Diagnostic Accuracy of a Lung Ultrasound-Implemented Approach for the Diagnosis of Acute Dyspnea in the Emergency Department: A Randomized Controlled Trial
Pivetta EE, University of Turin, Turin, Italy

10:30 AM - 11:30 AM

Resuscitation

298  End-Tidal Carbon Dioxide Monitoring and the Possibility of Return of Spontaneous Circulation During Out-of-Hospital Cardiac Arrest: a Population-based Study
Su Y-C, Dalin Tzu Chi Hospital, Buddhist Tzu Chi Medical Foundation, Chiayi, Chiayi County, Taiwan

299  Repeat Lactate Value, Not Lactate Clearance, Best Predicts 24-Hour Mortality in Injured Patients
Dezman ZDW, University of Maryland School of Medicine, Baltimore, MD

300  Focused Cardiac Sonography During Resuscitation of Cardiac Arrest Patients in the Emergency Department
Luna AC, St. Luke’s Medical Center, Quezon City, Philippines

301  Effect of Adipose-Derived Mesenchymal Stem Cells and Therapeutic Induction of Mild Hypothermia on Transient Global Cerebral Ischemia
Chung TN, CHA University Bundang Medical Center, Gyeonggi-Do, Korea

302  Transthoracic Hypothermia With Cooled Oxygen Inhalation versus Current Techniques: A Randomized-Controlled Experimental Study
Acar YA, Etimesgut Military Hospital, Ankara, Turkey

303  The “Golden Hour” of Volume Resuscitation: Pilot Data From the Shock Access For Emergent Resuscitation (SAFER) Study
Stimac D, Detroit Receiving Hospital, Detroit, MI

304  Predictors of Survival Among Traumatic Cardiopulmonary Arrest Victims in a Combat Theater
Anderson K, Baylor College of Medicine, Houston, TX

305  Cardiopulmonary Resuscitation for Trauma Patients in the Combat Theater: An Assessment for Survivors
Anderson KL, Baylor College of Medicine, Houston, TX

Neurology

306  Health Disparities in Emergency Department Wait Time Among Pediatric Traumatic Brain Injury
He S, University of Southern California, Los Angeles, CA

307EMF  First Time Seizure Focus Group Study
Beverly SK, Carolinas Medical Center, Charlotte, NC

308EMF  Utility of a Brief Training Module on Improving Emergency Physicians’ Ability to Identify Non-Convulsive Seizure on Emergent Electroencephalography Performed in Patients With Altered Mental Status
Sergot P, Baylor College of Medicine, Houston, TX

309  Predictors of Neurosurgical Interventions in Low Risk Patients With Isolated Traumatic Subarachnoid Hemorrhage
Sawas A, Stony Brook University, Stony Brook, NY

310  Prospective Double-Blinded Randomized Field-Based Clinical Trial of Metoclopramide and Ibuprofen for the Treatment of Acute Mountain Sickness
Irons HR, Massachusetts General Hospital, Boston, MA

311  Transient Ischemic Attack “Bouncebacks”: Emergency Department Discharges Who Return as Admissions Within Seven Days
Castillo EM, University of California, San Diego, San Diego, CA

312  Timing of Consent Into a Multicenter Randomized Controlled Traumatic Brain Injury Clinical Trial Conducted Under Exception From Informed Consent
Saltzman JG, Regions Hospital, St. Paul, MN

Pain Management

313  Prescription Database Monitoring in Emergency Department Patients With Back Pain
Dorfman M, Presence Resurrection Medical Center, Chicago, IL

314  Using Saline Injections to Treat Myofascial Pain Syndromes
Bakuras C, University of Texas Health Science Center at Houston, Houston, TX

315  Complementary Interventions for Emergency Department Patients With Acute or Sub-Acute Mechanical Low Back Pain
Rothberg S, Albert Einstein College of Medicine, Bronx, NY, NY
316  Pill Counts in Opioid Prescriptions by Specialty in Ohio, 2012-2014
Weiner SG, Brigham and Women’s Hospital, Boston, MA

317  Trial of Ultrasound-Guided Femoral Nerve Block for Isolated Femur Fractures Using Echogenic Needles
Leoni J, Jr., University of Texas Health Science Center at Houston, Houston, TX

318  The 1 Plus 1 Hydromorphone Pain Protocol Has Similar Efficacy as Physician Discretion Analgesia and Is Less Safe in Older Adults: A Randomized Trial
Deitich K, Einstein Medical Center, Philadelphia, PA

319  Systematic Review: Tamsulosin in the Management of Distal Ureteric Colic
Furk JS, The Townsville Hospital, Townsville, Australia

320  Effects of Intravenous Oxycodone Alone or in Combination With Naltrexone on End-Tidal Carbon Dioxide: A Randomized, Controlled Study
Bass A, Pfizer Inc, Durham, NC

Pediatrics

321  Is Serum Bicarbonate Level Associated With Adverse Outcomes in Pediatric Patients?: A Retrospective Cohort Study
Mainprize DG, Western University, London, ON

322  Publishing Trends in the Field of Pediatric Emergency Medicine From 2004 to 2013
Spurkeland N, Penn State University College of Medicine, Harrisburg, PA

323  The Effect of Intravenous Infusion Dead Space on Time to Drug Administration in Infants
Gregerson B, Baylor Scott and White, Temple, TX

324  Pediatric Laryngospasm and Airway Interventions During Ketamine Procedural Sedation in the Emergency Department
Anderson JL, Mayo Clinic, Rochester, MN

325  Variations in Emergency Department Pediatric Conussion Discharge Instruction Practices
Wang-Flores H, University of Michigan Health System, Ann Arbor, MI

326  How Definitive Is Ultrasound for the Diagnosis of Appendicitis in Children and Is Confirmatory Advanced Imaging Necessary?
Berdahl C, LA County + USC Department of Emergency Medicine, Los Angeles, CA

327  Does a Single Dose of Desmethazone for Croup Cause Adrenal Suppression?: A Prospective Study
Gill N, Children’s Hospital, London Health Sciences Center, London, ON

328  An Analysis of Predictors for Pediatric Orbital Wall Fracture in the Emergency Department
Paek SH, Seoul National University Hospital, Seoul, Korea

Geriatrics

331  Sex Differences in Emergency Department Utilization Involving Illicit Drug Use and Referral to Detox
Ryoo H-J, The Warren Alpert Medical School of Brown University, Providence, RI

332  Patient Acuity: Disparity Between Patients and Clinicians
Lightbody A, Cleveland State University, School of Health Sciences, Cleveland, OH

333  Preliminary Evaluation of the Lifespan Opioid Overdose Prevention Program
Samuels EA, Brown University, Providence, RI

334  Feasibility of Using a Novel Text Messaging Program to Improve Linkage to Outpatient Services for Emergency Department Patients Seeking Treatment for Opioid Abuse
Yanta JH, University of Pittsburgh, Pittsburgh, PA

335  Effectiveness of the Center for Disease Control and Prevention’s “Heads Up!” to Youth Sports Campaign on Coaches of Pediatric Sports
Steard TS, NFSG VAMC, Gainesville, FL

336  Opioid Prescribing in the Emergency Department
Moretti K, University of Pittsburgh, Pittsburgh, PA

Public Health

329  Specialty-Specific Prescribing Patterns to Patients Who Die From Prescription Drugs: How Do Emergency Physicians Compare?
Lev R, Scripps Mercy Hospital, San Diego, CA

330  Bidirectional Relationship Between Diabetes and Acute Pancreatitis: A Population-Based Cohort Study in Taiwan
Su Y-C, Dalin Tzu Chi Hospital, Buddhist Tzu Chi Medical Foundation, Chiayi, Chiayi County, Taiwan

333  Systematic Review: Tamsulosin in the Management of Distal Ureteric Colic
Furk JS, The Townsville Hospital, Townsville, Australia

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Yanta JH, University of Pittsburgh, Pittsburgh, PA

336  Opioid Prescribing in the Emergency Department
Moretti K, University of Pittsburgh, Pittsburgh, PA

337  Then and Now: Psychosocial Emergencies in the Elderly
Halasa R, Michigan State University, Grand Rapids; Spectrum Health Department of Social Work, Spectrum Health Hospitals, Grand Rapids, MI

338  Effect of Geriatric-Specific Trauma Triage Criteria in Injured Older Adults
Hamilton MW, Ohio State University, Columbus, OH

339  Unplanned Early Return to the Emergency Department By Older Patients: Safe Elderly Emergency Department Discharge Project
Lowthian JA, Monash University, Melbourne, Australia

340  Cognition and Risk of Revisits to an Emergency Department in Ambulatory Geriatric Patients
Pimentel L, University of Maryland School of Medicine, Cockeysville, MD

341  GEDI WISE: Association Between Abnormal Geriatric Assessments in the Emergency Department and Subsequent Hospitalization
Dresden SM, Northwestern University Feinberg School of Medicine, Chicago, IL

342  Cognitive Impairment Among Community-Dwelling Older Adult Emergency Department Patients
Roth JM, University of Pittsburgh, Pittsburgh, PA

343  Sex Differences in Study Enrollment for a Mechanical Fall Prevention Study
Greenberg MR, Lehigh Valley Hospital, Allentown, PA

344  Serum Microparticle Concentration: A Novel Marker of Moderate and Severe Traumatic Brain Injury
Dezman ZDW, University of Maryland School of Medicine, Baltimore, MD

345  Bicyclists Struck by Motor Vehicles: Impact of Bike Lanes and Protected Paths on Injury Severity
Wall SP, Bellevue Hospital Center, NYU School of Medicine, New York, NY

346  Anterior Shoulder Dislocation Reduction in the Emergency Department: Is There a Best Technique?
Zwank MD, Regions Hospital, Saint Paul, MN
Detecting Occult Shock in Trauma Patients: A Comparison of Serum Lactate versus Shock Index
Arslan A, Lincoln Medical and Mental Health Center, Bronx, NY

Bougie-Assisted Tube Thoracostomy Placement: A Novel Technique
Gottlieb M, Cook County (Stroger) Hospital, Chicago, IL

High Risk Potential in Stable Pelvic Fractures Among Patients of Sub-Geriatric Age
Gray C, JPS, Fort Worth, TX

The Acute Care Diagnostics Collaboration: Performance Assessment of Contrast-Enhanced Ultrasound Compared to Computed Tomography and Conventional Ultrasound in an Emergency Trauma Score Bayesian Clinical Decision Scheme
Baez AA, Jackson Memorial Hospital, Miami, FL

Mothers’ Empowerment as a Mitigator of Pediatric Scald Risk in the Latino Community
Taia BR, Olive View-UCLA Medical Center, Sylmar, CA

Prevalence of Horizontal Violence Among Emergency Attendings, Residents, and Mid-Level Providers
Volz NB, Oakland University William Beaumont School of Medicine, Rochester, MI

Echocardiography for the Diagnosis of Pulmonary Embolism: A Meta-analysis
Davis JJ, Thomas Jefferson University, Philadelphia, PA

Emergency Medicine Bedside Ultrasound Utilization in the Diagnostic and Therapeutic Approach to Peritonsillar Abscesses
Gibbons R, Temple University Hospital, Philadelphia, PA

B-lines on Lung Ultrasound in End Stage Renal Disease Patients Post Hemodialysis: Accuracy and Precision-Interim Analysis
Saad M, Staten island University hospital, staten island, NY

Emergency Physician-Performed Echocardiography as a Predictor of Cardiac Events in Patients Presenting With Symptoms of Acute Coronary Syndrome
Chandras A, New York University, New York, NY

Effect of Ultrasound as an Initial Imaging Modality in Children With Appendicitis
Alehand S, Icahn School of Medicine at Mount Sinai, New York, NY

Point-of-Care Ultrasound for Ankle Injuries in the Pediatric Emergency Department
Smith KM, Maricopa Medical Center, Phoenix, AZ

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Kenez EL, MedStar Washington Hospital Center, Washington, DC

Emergency Department Triage Nurse Inter-Rater Reliability of Bedside Point-of-Care Clinical Ultrasound Imaging to Assess Skin and Soft Tissue Infection in Light-Skinned and Dark-Skinned Patients
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Podolsky SR, Cleveland Clinic, Cleveland, OH

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Knies J, C, Einstein Healthcare Network, Philadelphia, PA

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Hughes GB, University of Illinois at Chicago, Chicago, IL

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Adams A, University of Maryland School of Medicine, Baltimore, MD

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Kotini-Shah P, University of Illinois at Chicago, Chicago, IL

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Venkat A, Allegheny General Hospital, Pittsburgh, PA

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Ostrovsky G, New York Presbyterian Hospital, New York, NY

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Silverman RA, North Shore-LIJ Health System, New Hyde Park, NY

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Ramich JL, Albany Medical Center, Albany, NY

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Saltarelli NA, Vanderbilt University School of Medicine, Nashville, TN

Spinal Pathology as Assessed by Ultrasound Before, During, and After Long Duration Space Flight
Harrison MF, Henry Ford Hospital, Detroit, MI

Comparison of Nurse-Performed Ultrasound-Guided versus Standard of Care Intravenous Access in Emergency Department Patients With Difficult Access
Bagan M, William Beaumont Hospital, Royal Oak, MI

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Lech C, Mount Sinai, New York, NY

Prospective Randomized Crossover Study Evaluating the Comparative Effectiveness of Telimulsion versus Standard Simulation for Teaching Medical Students the Assessment and Management of Critically Ill Patients
McCoy CE, University of California, Irvine, CA

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Grubish LK, Madigan Army Medical Center, Tacoma, WA

The Death in Simulation Randomized Trial: Effect of Simulated Patient Death on Emergency Worker’s Anxiety
Philippon A-L, Groupe Hospitalier Pitié-Salpêtrière, APHP, Paris, France

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Carbon Monoxide Levels Induced by Cigarette Smoking Outdoors in Typical Smokers
George N, Brown University, Providence, RI

Isopropyl Alcohol Nasal Inhalation Intervention for Nausea in the Emergency Department: A Randomized Placebo-Controlled Human Trial
Love S, SAMMC, San Antonio, TX

Clinical Characteristics of Pediatric Patients With Carbon Monoxide Toxicity
Douglas T, University of Maryland School of Medicine, Baltimore, MD

Hypoglycemia in Acetaminophen-Induced Hepatic Failure: What Is the Significance?
Levine M, University of Southern California, Los Angeles, CA

Long Acting Death: Methadone
Egnatios J, UC San Diego School of Medicine, San Diego, CA

Electronic Cigarette Vapor Exposure and Symptoms: Hey Doc, Is that E-Cig Making Me Sick?
Gartner M, Celerion, Lincoln, NE

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Gerardo CJ, Duke University School of Medicine, Durham, NC

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Tadros A, West Virginia University, Morgantown, WV

Utility of Ultrasoundography as Adjuncts in Risk Stratification for Pediatric Septic Arthritis
Patel PS, University of Florida, Gainesville, FL

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Jung JH, Seoul National University Hospital, Seoul, Korea

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Wu V, Massachusetts General Hospital, Boston, MA

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Agoritsas K, SUNY Downstate Medical Center, Brooklyn, NY

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DeGeorge L, Virginia Tech Carilion School of Medicine, Roanoke, VA

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Pepin LC, Hofstra North Shore-LIJ School of Medicine, Hempstead, NY

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Tadros A, West Virginia University, Morgantown, WV

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Emergency Department Visits for Mental Illness: Evaluation of Patterns and Risk Factors of Return Visits from Claim Database: 2005-2013
Lee S, Mayo Clinic Health System, Mankato, MN

The Virtual Cutting Edge: Adolescent Self-injury and YouTube
Garthe C, College of Human Medicine, Michigan State University, Grand Rapids, MI

Agitation in the Emergency Department: Importance of Schizophrenia and Related Disorders
Strout TD, Maine Medical Center, Portland, ME

Reduced Length of Stay With Inhaled Loxapine: A Retrospective Comparison Study
Kulstad E, Advocate Christ Medical Center, Chicago, IL

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Wilson MP, University of California San Diego, San Diego, CA

Do Emergency Department Patients Seeking Treatment for Opioid Addiction Get Treatment?
Tadros A, West Virginia University, Morgantown, WV

Racial and Ethnic Differences in Behavioral Risk Factors Among Young Adult Male Emergency Department Patients
Chaudhary F, University of North Carolina at Chapel Hill School of Medicine, Chapel Hill, NC
Identification of Emergency Medicine Fatigue At-Risk Periods Using Actigraphy and Computer Modeling: A Pilot Study
Fox C, OSF Saint Francis Medical Center, Peoria, IL

Comparison of Non-Invasive Methods of Assessing Fluid Responsiveness in Critically Ill Patients
Cragar S, Ronald Reagan UCLA Medical Center, Los Angeles, CA

Increased Mortality Demonstrated in Hemodynamically Stable Septic Patients Who Develop Hypotension After Antibiotic Administration and Hospital Admission
Maier R, Jr., Michigan State University/Sparrow Health Systems, Lansing, MI

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Levine M, University of Southern California, Los Angeles, CA

Intraosseous Pressure Monitoring in Critical Care Patients
Salzman JG, Regions Hospital, St. Paul, MN

Is Routine Chest Radiography Necessary After Ultrasound-Guided Right Internal Jugular Vein Catheterization?
Hournozdzl JJ, Henry Ford Hospital, Detroit, MI

Supra-Physiologic Tidal Volumes Delivered by Mechanical Ventilation After Emergency Department Intubation
Prekker ME, Hennepin County Medical Center, Minneapolis, MN

Time Is of the Essence: Early Intravenous Fluid Resuscitation in Patients With Severe Sepsis and Septic Shock
Leisman D, North Shore University Hospital, Manhasset, NY

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Williams M, The University of Toledo, Toledo, OH

False Negative Point-of-Care Urine Pregnancy Results in the Emergency Department: Quantifying a Needle in the Haystack in the Clinical Setting
Woo K-M, Mount Sinai Beth Israel, New York, NY

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Iordanova R, Henry Ford Hospital, Detroit, MI

HealthCare Effectiveness Data and Information Set Criteria for Lower Back Pain Imaging in Emergency Department Observation Unit Patients: Compliance and Association With Early Intervention
Richmond L, St. John Hospital and Medical Center, Detroit, MI

Hypoglycemia in the Emergency Department: Rate of Iatrogenic Eiologi and Treatments Administered
Driver B, Hennepin County Medical Center, Minneapolis, MN

Social Work Screening Identifies Unmet Psychosocial Needs Amongst Sickle Cell Patients in the Emergency Department: A Qualitative Study
Freiermuth C, Duke University, Durham, NC

A Multicenter Study on the Comparison of Inter-Rater Reliability Between a Four and a Five Level In-Hospital Triage Scales
Parenti N, Santa Maria della Scaletta Hospital, Bologna, Italy

Nailing the First Poke: A Systematic Review and Meta-Analysis of Randomized Controlled Trials of Peripheral Intravenous Catheterization Interventions
Parker SIA, University of Calgary, Calgary, AB

Factors Associated With Clinical Course in Mild Traumatic Brain Injury With Intracranial Hemorrhage
Kretzner N, University of Cincinnati, West Chester, OH

Cost Analysis of Diagnosing Clinically Important Traumatic Brain Injury in the Pediatric Patient
O'Connor A, Johns Hopkins Hospital, Baltimore, MD

Angel Dust Trauma: Do Trauma Patients With Phencyclidine Positive Urine Drug Screens have Increased Morbidity Or Mortality?
Gallagher R, University of Kansas Hospital, Kansas City, KS

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Bedolla J, University of Texas at Austin, Austin, TX

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Versmée G, Pellegrin University Hospital, Bordeaux, France

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Holden J, University of Mississippi Medical Center, Jackson, MS

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Shah K, Icahn School of Medicine at Mount Sinai & Elmhurst Hospital Center, New York, NY

Effects of Burn Location and Investigator on Burn Depth in a Porcine Model
Singer AJ, Stony Brook University, Stony Brook, NY

“From Head To Toe!” Developing Competency in Adult Trauma Resuscitations
Stobart-Gallagher M, Einstein Medical Center Philadelphia, Philadelphia, PA

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Walsh SJ, Einstein Medical Center, Huntingdon Valley, PA

Medic 5 Calling: Teaching On-Line Medical Direction via Simulation
Nable JV, MedStar Georgetown University Hospital, Washington, DC

Understanding and Navigating the Emergency Medicine Job Market: A Community Practice Perspective
Uller JK, UCSF-Fresno Medical Education Program, Fresno, CA

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Boyle KL, University of Massachusetts Medical School, Worcester, MA
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| TF7 | An Enhanced Deliberate Practice Approach to a Simulation-Based Learning Module  
Rice JC, Johns Hopkins Hospital, Baltimore, MD |
| TF8 | A Team-Based Learning Curriculum Incorporating Simulation for Emergency Medicine Residents  
Desmond C, University of Chicago, Chicago, IL |
| TF9 | Simulation X-Craze: An Innovative, Problem-Based, Online Curriculum to Teach Plain Film Radiology Interpretation in Emergency Medicine  
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| TF10 | Resident Teaching Skills for a New Era  
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| TF11 | Emergency Department Scribes: A Two-Step Training Program  
Heaton HA, Mayo Clinic, Rochester, MN |
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Pitotti C, San Antonio Military Medical Center, San Antonio, TX |
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Research Forum Abstracts

From the American College of Emergency Physicians
2015 Research Forum
October 26-27, 2015
Boston Convention Exhibition Center, Boston, MA

The presenting author’s name is listed in italic type.

1 Emergency Department Stopping Elderly Accidents, Deaths and Injuries (ED STEADI) Program
Greenberg MR, Jacoby JL, Barraco RD, Moore EC, Berk S, Chow R, Remaley TS, Rios RE, Surmaitis R, Kane BG/Lehigh Valley Hospital, Allentown, PA

Study Objective: The Centers for Disease Control (CDC) reports that among older adults (≥65), falls are the leading cause of injury-related death. We set out to examine whether a bedside decision aid for mechanical fall prevention could increase patient participation in management options that decrease their fall risk.

Methods: After institutional review board (IRB) approval, this prospective randomized control study was conducted at a Level 1 trauma center emergency department (ED) with approximately 75,000 annual adult visits in northeastern Pennsylvania. English-speaking patients who were ≥65, being discharged home and reported to have fallen in the last year, reported they worried about falling, or admitted that they felt unsteady when walking or standing were approached. After informed consent was obtained, subjects in both the control and active arm had baseline demographics collected. The research team then advised both groups they had a risk of falling as identified by inclusion criteria (adopted from CDC screening recommendations) and were advised to take action to prevent future falls. Control arm subjects were given a CDC brochure with standardized information about controlling risk for falls. Active arm participants additionally received personalized assessment of their fall risk with use of a bedside decision aid indicating what specific activities they could do to decrease their risk. Subjects had the opportunity to discuss what outcomes were most important to them and chose management options from a standardized list provided. The active arm subjects were given the original copy of their decision aid with their agreed-upon selected treatment options. Both groups had phone follow-up at six weeks post ED visit to assess by self-report what actions they had taken to mitigate their personal fall risk.

Results: From June 2014-February 2015, 52 subjects were enrolled (27 [51.9%] in the active arm and 25 [48.1%] in the control arm). The mean age of the enrollee was 74.3; 26 (50%) were female. No statistically significant differences in age or sex were observed between the arms of the study. At the six-week follow-up 50 of the 52 participants (96.1%) responded to the follow-up evaluation. Twenty-two of the 26 subjects in the active arm (84.6%) and six of the 24 subjects in the control arm (25.0%) reported choosing a fall prevention strategy (P < .001). Of the 24 evaluable subjects in the control arm none reported beginning a regular exercise program, having their medications reviewed by a health care provider (HCP), or taking steps to make their home safer. Only two participants in the control arm reported having their vision checked (8.3%). Of the 26 evaluable subjects in the active arm 3 (11.5%) reported they began a regular exercise program, three (11.5%) reported they reviewed their medications with a HCP, six (23.1%) reported they had their vision checked, and seven (26.9%) reported they made their home safer. Only having a home safety evaluation was significantly different between the arms (P = .009).

Conclusions: Subjects who had their fall risk intervention facilitated by a decision tool were more likely to self-report participation in actions that might mitigate their personal fall risk. This pilot study suggests an important opportunity for a public health initiative in the ED setting. Further research to determine the impact of these interventions on actual fall risk is necessary.

2 Ketamine as an Adjunct to Opiates for Acute Pain in the Emergency Department
Bowers KJ, McAllister KB, Ray M, Heitz CR/Virginia Tech Carilion School of Medicine, Roanoke, VA; Carilion Clinic, Roanoke, VA; University of Memphis, Memphis, TN

Study Objectives: Ketamine has emerged as a potential adjunct to opiate therapy, with potential to reduce the dose of opiate required to treat painful conditions. The primary objectives of this study were to evaluate whether patients who receive ketamine as adjunctive treatment to opiates in the emergency department experience effective pain control, better satisfaction with their pain control or lower total opiate dosage compared to patients who receive only opiate therapy.

Methods: This was a randomized, double-blinded, placebo-controlled trial which evaluated the use of ketamine in conjunction with opioid analgesic versus placebo in conjunction with opioid analgesic for moderate to severe pain in the emergency department. Upon enrollment, subjects were randomly assigned to receive either ketamine or placebo followed by protocol-based dosing of morphine or an alternate opiate. Subjects were assessed at an initial evaluation, and subsequently evaluated every 30 minutes over the course of 2 hours for their pain as rated on a scale of 0-10,

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satisfaction with pain control as rated on a scale of 0-3, presence of side effects, redation level and need for additional pain medication. Total opiate dosage was calculated.

Results: One hundred sixteen subjects were enrolled, 63 in the placebo group and 53 in the ketamine group. There were no statistically significant differences between the two groups across demographic variables. Patients who received ketamine reported lower average pain scores over the 120 minute study period than patients who received placebo ($P = .015$). Total opiate dosage was lower in the ketamine group versus the standard treatment ($P = .02$). Patient-reported satisfaction with their pain control was not statistically significantly different between the two groups. Proportionally fewer patients in the ketamine group required additional doses of analgesia, and of those patients, fewer patients required two or more additional doses than in the placebo group. More patients reported light-headedness and dizziness in the ketamine group versus the placebo group; the most common unique side effect in the ketamine group was light-headedness.

Conclusion: Ketamine, dosed at 0.1 mg/kg, as an adjunct to opiate therapy was more effective at reducing pain over the 120 minute study period, and resulted in a lower total dosage of opiate analgesia as well as fewer repeat doses of analgesia. While more side effects were reported in the ketamine group versus placebo (51% vs 19%), the side effect profile still appears to be tolerable for this treatment.

### 3 Single-Dose Ortitavancin Treatment of Acute Bacterial Skin and Skin Structure Infections in Intravenous Drug Users: Results from SOLO Trials

Pollack CV, Jr., Good S, Wikler M; Thomas Jefferson University, Philadelphia, PA; The Medicines Company, Parsippany, NJ

**Study Objectives:** Treatment of acute bacterial skin and skin structure infections (ABSSSI) in intravenous drug users (IVDU) presents unique challenges. Ortitavancin (ORI), a lipoglycopeptide antibiotic, offers single-dose IV therapy for treatment of ABSSSI. In this post-hoc analysis we examine the efficacy and safety of a single 1200 mg dose of ORI compared to 7-10 days of vancomycin (VAN) for the treatment of ABSSSI in IVDUs.

**Methods:** ORI was studied in the Phase 3 SOLO trials (global, multicenter, 3×2 factorial design) in IVDUs. Patients were 18 years of age or older, with ABSSSI (wound infection, cellulitis, major cutaneous abscess) suspected or known to be caused by a gram-positive pathogen, assessed at presentation as requiring at least 7 days of IV antimicrobial therapy. Qualified lesions had at least 75 cm² of erythema, edema, and/or induration, and patients were required to present with evidence of systemic inflammation. Patients were randomized 1:1 to either a single 1200 mg IV dose of ORI or IV VAN (1 g or 15 mg/kg every 12 hours) for 7-10 days. The primary efficacy endpoint was a composite outcome (cessation of spread or reduction in lesion size, adequate, no rescue antibiotic) at 48-72 hours (ECE). Secondary efficacy endpoints were (1) decrease in lesion size of at least 20% at ECE, and (2) investigator-assessed clinical cure at 14-24 days (PTE). Patients were followed for 60 days for safety.

**Results:** Of the 1959 patients enrolled in the SOLO trials, 568 (29%); 286 ORI, 282 VAN were documented IVDUs. Patients were predominately white (92%) males (69%) with a median age in the mid-40s. Wound infections accounted for 45%, abscess, 34%, and cellulitis, 21%, with median lesion size of 287.3 cm². A history of hepatitis or other hepatic conditions was present in 335 (59%) of infected patients. The most common unique side effect in the ketamine group versus placebo (51% vs 19%), the side effect profile still appears to be tolerable for this treatment.

### 4 Initial Experience With Idarucizumab in Dabigatran-Treated Patients Presenting With Acute Gastrointestinal Hemorrhage: Interim Results from the RE-VERSE AD Study

Pollack CV, Jr., Gruenenfelder F, Eikelboom J, Hylek E, Mills M, Huisman M, Levy J, Reilly P, Kreuzer J, Weitz J; Thomas Jefferson University, Philadelphia, PA; Boehringer Ingelheim, Ingehelm, Germany; McMaster University, Hamilton, ON, Canada; Boston University School of Medicine, Boston, MA; Boehringer Ingelheim, Ridgefield, CT; Leiden University Medical Center, Leiden, Netherlands; Duke University Medical Center, Durham, NC; Boehringer Ingelheim Pharma GmbH & Co. KG, Ingehelm, Germany; McMaster University and Thrombosis and Atherosclerosis Research Institute, Hamilton, ON, Canada

**Study Objectives:** Dabigatran, an oral thrombin inhibitor, is widely used in the US for stroke prevention in atrial fibrillation and is also indicated in treatment of venous thromboembolism. Dabigatran is one of a class of drugs called NOACs (non-Vitamin K antagonist oral anticoagulants) that has improved stroke outcomes compared with warfarin, but with a higher rate of major gastrointestinal (GI) bleeding. Dabigatran’s anticoagulant effect can be countered with established treatment algorithms, but a specific reversal agent could further facilitate management of patients with acute GI bleeds. Idarucizumab, a humanized Fab fragment directed specifically against dabigatran, rapidly reverses its anticoagulant effect in healthy volunteers and attenuates bleeding in various animal models. Therefore, idarucizumab has the potential to improve the management of dabigatran-treated patients who present to the emergency department (ED) with a major GI bleed.

**Methods:** In the ongoing phase III RE-VERSE AD study (NCT02104947), dabigatran-treated patients with life-threatening or uncontrolled bleeding or who require emergency surgery are given intravenous idarucizumab 5 g as two 2.5 g bolus infusions administered no more than 15 min apart. The primary endpoint is the maximum reversal of the anticoagulant effect of dabigatran, based on central laboratory determination of the dilute thrombin time or ecarin clotting time. Secondary endpoints for bleeding patients include clinical outcomes, extent and duration of bleeding, measured dabigatran levels, local aPTT values, use of other reversal or hemostatic therapies, surgical and other interventional management, and blood product transfusions.

**Results:** Of the first 90 patients given idarucizumab in RE-VERSE AD study (NCT02104947), dabigatran-treated patients with life-threatening or uncontrolled bleeding or who require emergency surgery are given intravenous idarucizumab 5 g as two 2.5 g bolus infusions administered no more than 15 min apart. The primary endpoint is the maximum reversal of the anticoagulant effect of dabigatran, based on central laboratory determination of the dilute thrombin time or ecarin clotting time. Secondary endpoints for bleeding patients include clinical outcomes, extent and duration of bleeding, measured dabigatran levels, local aPTT values, use of other reversal or hemostatic therapies, surgical and other interventional management, and blood product transfusions.

**Conclusion:** Idarucizumab is a rapid acting, specific reversal agent for dabigatran. It has the potential to streamline and improve the management of dabigatran-treated patients with GI bleeding in the ED.
agencies and searched the internet for 2015. We requested lists of FSEDs from Departments of Health and other state of FSEDs we compared demographic, insurance, and health services characteristics of number and location of FSEDs across the U.S. In three states with the highest number emergency care remote from an acute care hospital. We aimed to determine why differences across states exist and how growth of FSEDs will impact access, quality, and cost of emergency care.

Study Objectives: Freestanding emergency departments (FSEDs) provide emergency care remote from an acute care hospital. We aimed to determine the number and location of FSEDs across the U.S. In three states with the highest number of FSEDs; we compared demographic, insurance, and health services characteristics of areas with and without FSEDs.

Methods: We conducted a systematic inventory of U.S. FSEDs, as of March 31, 2015. We requested lists of FSEDs from Departments of Health and other state agencies and searched the internet for “freestanding” or “satellite” ED by state. For the three states with the highest number of FSEDs we linked demographic, insurance and health services data using 5-digit ZIP Code corresponding to FSED’s location. To eliminate differences in population and land area between ZIP Codes with and without FSEDs we matched FSED and non-FSED ZIP Codes within each state on land and eliminated differences in population and land area between ZIP Codes with and without FSEDs. We used weighted two-sided t-tests to compare matched ZIP Code-level averages.

Results: We identified 360 FSEDs in the US, located in 30 states. The three states with the highest number of FSEDs account for 66% of all FSEDs: TX (181), OH (34), and CO (24). We matched 187 FSED to 1048 non-FSED ZIP Codes. Population density in the matched sample was not statistically different between FSED and non-FSED groups. Across all three states, FSEDs are located in ZIP Codes that have higher incomes and have a lower proportion of the population with Medicaid. In Texas and Ohio, FSEDs are located in ZIP Codes with a higher proportion of population with private insurance. Additionally, in Texas FSEDs are located in ZIP Codes that are less racially diverse, have a greater number of physician offices, and have more doctor visits and medical spending per year than ZIP Codes without a FSED. While non-significant, in Ohio and Colorado, FSEDs were located in ZIP Codes that had fewer physician offices than in non-FSED ZIP Codes. In Texas absolute differences are greater than in Ohio and Colorado (Table).

Conclusion: Freestanding EDs are heavily concentrated in several states. In these states FSEDs appear to locate in areas with a better payer-mix, and not in areas with fewer health services. Ohio and Colorado have fewer FSEDs than Texas, and in Ohio and Colorado there is less difference than in Texas along socio-economic indicators and insurance status between ZIP Codes with and without FSEDs. Further research is needed to determine why differences across states exist and how growth of FSEDs will impact access, quality, and cost of emergency care.

5 EMF Where Do Freestanding Emergency Departments Choose to Locate?: A Socio-Demographic Analysis in Three States Schuur JD, Baker O, Wilson M, Cutler D/Brigham and Women’s Hospital, Boston, MA; Harvard University, Cambridge, MA

Study Objectives: Freestanding emergency departments (FSED) provide emergency care remote from a acute care hospital. We aimed to determine the number and location of FSEDs across the U.S. In three states with the highest number of FSEDs; we compared demographic, insurance, and health services characteristics of areas with and without FSEDs.

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Study Objective: We conducted a systematic review and meta-analysis to evaluate the incidence of adverse events in the emergency department (ED) during procedural sedation in the pediatric population.

Methods: We searched multiple electronic databases including MEDLINE, EMBASE, EBCSCO, CINAHL, CENTRAL, Cochrane Database of Systematic Reviews, Web of Science and Scopus from inception through June 2014 without language restrictions. Randomized controlled trials and observational studies of procedural sedations in the ED were included. Data were extracted by independent pairs of reviewers and risk of bias was assessed using the Cochrane risk of bias tool for trials and the Newcastle-Ottawa Scale for observational studies. Meta-analysis was performed using a random-effects model and reported as incidence rate and 95% confidence intervals (CI).

Results: A total of 1,177 studies were retrieved for title and abstract screening and 271 of them were selected for full-text review. Ninety-three studies reporting on 24,441 procedural sedations were included. The most common adverse events (all reported per 1,000 sedations) were vomiting 51.4 (95% CI 44.3 to 58.6), followed by hypotension 41.2 (95% CI 29.4 to 52.9), and hypoxia 18.7 (95% CI 15.1 to 22.3). The incidence of agitation was 16.3 (95% CI 12.8 to 19.8) and 0.5 (95% CI 0 to 12) required treatment. The incidence of laryngospasm was 1.5 (42 of the 45 cases of laryngospasms were in patients who received ketamine). There were 4 intubations in 14,600 sedations with an incidence of 0.5 intubations per 1,000 sedations.

Conclusion: Serious adverse events such as requiring intubation and aspiration are very rare in pediatric procedural sedation in the ED. The results of this study provide quantitative risk estimates to facilitate shared decision making, risk communication, informed consent and resource allocation in the ED.

Table. Demographic, Insurance and Health Services Factors in Matched ZIP Codes with and without FSEDs

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<th>Variable</th>
<th>TX FSED</th>
<th>TX No FSED</th>
<th>TX diff</th>
<th>OH FSED</th>
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<th>CO FSED</th>
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<td>58,482</td>
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<td>70,604</td>
<td>59,831</td>
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<td>76.9</td>
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<td>19,973</td>
<td>3,356*</td>
<td>17,774</td>
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<td>Medical care ($ spent / yr)</td>
<td>37,800,000</td>
<td>22,800,000</td>
<td>14,000,000*</td>
<td>24,500,000</td>
<td>20,600,000</td>
<td>3,900,000</td>
<td>23,000,000</td>
<td>19,800,000</td>
<td>3,200,000</td>
</tr>
<tr>
<td>Offices of Physicians</td>
<td>54.3</td>
<td>31.6</td>
<td>22.7*</td>
<td>26.6</td>
<td>32.0</td>
<td>-5.4</td>
<td>18.1</td>
<td>26.8</td>
<td>-8.7</td>
</tr>
</tbody>
</table>

*P < 0.05.
Reduced Head Computed Tomography Utilization for Pediatric Mild Head Injury After Implementation of Decision Support Tools and Shared Decisionmaking

Engineer R, Ferguson S, Podolsky S, Jimenez H, Grover P, Fertel BS/The Cleveland Clinic Foundation, Cleveland, OH

Study Objectives: Literature suggests that radiation causes iatrogenic cancer in 1:1500 to 1:3000 pediatric patients undergoing head computed tomography (CT). While many of these head CTs are clinically necessary, research from the PECARN study suggests that clinicians may over-utilize head CT in pediatric patients with mild head injuries. We sought to determine whether a pediatric mild head injury care path, focused on implementing the PECARN decision rule through physician education, shared decisionmaking, and clinical decision support tools, can reduce head CT utilization.

Methods: We conducted a quality improvement project to reduce inappropriate head CT utilization through five interventions: (1) Engagement of emergency department (ED) nurse and physician leadership explaining the rationale and proposed interventions; (2) Physician education through on-site presentation, distributed Power Point slides, and face-to-face support; (3) Incorporation of a parent/patient shared decisionmaking model into the ED visit; (4) Clinical decision support tool (CDST) embedded into the electronic medical record (EMR); (5) Importation of all data into the clinical note to reduce keystrokes and drive compliance. The study was conducted at two sites, a pediatric ED based in a large community hospital and a freestanding ED. Participants included all pediatric patients with a chief complaint of minor head injury or associated ICD-9 codes, as determined by the care path committee prior to launch. Data was collected for a predetermined 9-week period after implementation. This was compared to baseline data from the preceding year. Targets for care path utilization were set at 28% in pediatric patients presenting to the ED with mild head injury.

Results: Prior to implementation, 29% of ED patients with a mild head injury had a head CT ordered. Over the 9-week implementation period, head CT utilization decreased to 14%. This represents a 51% reduction in head CTs ordered for pediatric patients with mild head injuries. Post-intervention, 227 patients were evaluated over the nine-week pilot. Standard deviation was ±15%. Adherence to CDST recommendations was 98% with one head CT obtained on a low risk patient. Head CT utilization decreased to 21% representing a relative risk reduction of 75% and an absolute reduction of 7%

Conclusion: Shared decisionmaking and decision support tools can significantly reduce head CT utilization in pediatric patients presenting to the ED with mild head injury.

8 Simple Interventions Positively Affect Emergency Physician Blood Culture Orders

Powell J, Ahlers E/Cristiana Care Health System, Newark, DE

Study Objectives: Primary Objective: To determine if evidence-based blood culture ordering guidelines reduce the total number of blood cultures generated in the emergency department (ED) without negatively affecting patient care. Secondary Objectives: Does the intervention affect hospital length of stay (LOS) and laboratory quality measures, such as contaminated blood cultures? What is the sensitivity of the blood culture ordering guidelines?

Methods: This is a prospective observational study performed at a health system that comprises a tertiary care level 1 trauma center with a large residency program, an urban hospital and rural freestanding emergency department. Inclusion criteria consist of all patients age 18 and older for whom blood cultures were obtained in the emergency department and analyzed in the lab. Prior to the introduction of ED blood culture ordering guidelines in August 2014, a review of patients who had blood cultures obtained in the ED were analyzed for demographics, blood culture results, length of ED stay, ED disposition, and vital signs. The ED blood culture ordering guidelines were then implemented into the ED computerized physician-ordering entry, and staff was educated regarding the guidelines. After introduction of the guidelines, a review of patients who had blood cultures ordered in the ED was again performed. The primary outcome was the change in the number of blood cultures ordered in the emergency department before and after implementation of the blood culture ordering guidelines. Secondary outcomes included the change in number of contaminated blood cultures, the sensitivity of the blood culture ordering guidelines and the difference in hospital length of stay and ED disposition.

Results: Prior to blood culture ordering guideline implementation, an average of 1,668 blood cultures were obtained monthly at our institution. Following implementation, as of March 2015, we decreased ED generated blood cultures to an average of 1,190, which is a 43% reduction. Blood culture contamination rates remained unchanged during the intervention. Analysis of secondary outcomes is ongoing.

Conclusion: We developed simple and effective ED blood culture ordering guidelines that reduce unnecessary blood culture ordering in the ED without negatively affecting contamination rate of blood cultures. Analysis of secondary outcomes will delineate effects on hospital length of stay and determine if ED providers failed to order blood cultures when indicated.

9 Acute Care Diagnostic Collaboration: Nasogastric Lavage Assessment of Patients at Low Risk by the Glasgow Blatchford Score and AIMS65 Scoring Systems in Patients With Upper Gastrointestinal Bleeding

Perlini E, Cochon L, Deshpande A, Sussman D, Baez AA/Jackson Memorial Hospital, Miami, FL; Universidad de Barcelona, Barcelona, Spain

Study Objectives: Upper gastrointestinal bleeding (UGIB) is an important contributor to emergency department presentations and subsequent hospital admissions. Scoring systems like the Glasgow Blatchford Score (GBS) and the AIMS65 have been developed to predict the need for endoscopic intervention and mortality; these scoring systems can be used to significantly decrease health care expenditure. Prior studies have revealed nasogastric (NG) lavage has low sensitivity and poor negative likelihood ratio (LR) in UGIB; others have demonstrated no association between the presence of bile and the location of bleeding. One study showed that a negative NG aspiration provided little information as to the source of GI bleeding in patients without hematemesis, with a negative LR of 0.6. Other groups have published on the usefulness of a simple ratio of heart rate to systolic blood pressure as an accurate
predictor of those needing urgent endoscopy. All of these data highlight the need to identify those with UGIB who do not need urgent endoscopy or even inpatient evaluation. We sought to determine if the addition of nasogastric lavage results would augment risk assessment achieved by non-invasive means with scoring systems like GBS and AIMS65 in acute UGIB.

Methods: Sensitivity and specificity for NG lavage was obtained from several comparable studies on non-varical UGIB. Due to the wide range of data, sensitivity and specificity for NG lavage was divided into low and high range and likelihood ratio (LR) was calculated. Percentage risk used as pretest probability and LR for NG lavage were inserted into the Bayesian nomogram to obtain posttest probabilities. Absolute (ADG) and relative diagnostic gains (RDG) were then calculated. ANOVA was used to evaluate strength of association with a P value set at .05.

Results: Sensitivity of 0.42 and specificity of 0.54 for low range with a LR of 0.91 and 0.84 and 0.91, LR + 9.33 for high range respectively. Using low range values for NG lavage and AIMS65 low risk resulted in a post test probability of 3% and ADG and RDG of 0.0%. Low range NG lavage and GBS low risk population resulted in a post test probability of 5% with 0% ABDC and RDG. High range values for NG lavage and AIMS65 low risk pretest probability yielded a post test probability of 22%, ADG of 19% and RDG of 633.5%. For high range NG lavage and low risk GBS post test probability was 53%, ADG of 28% and RDG 560%. ANOVA for low range NGlavage P = 1.0, for high range P = .95.

Conclusion: After combining the LR.s for NG lavage from several comparable studies on non-varical UGIB and using the low end LR (0.91) with both the GBS and AIMS65 scores, there was zero absolute or relative gain in post-test probability for those with low-risk as determined by the non-invasive scoring systems. On ANOVA analysis, there was no incremental benefit of NG lavage to non-invasive scoring systems for low-risk patients even when using the high end of LR (9.33). For patients with low-risk of need for endoscopic intervention or mortality based on the GBS or AIMS65 scoring systems, nasogastric lavage provides no additional yield in predicting these poor outcomes. In patients with a low score on GBS or AIMS65, nasogastric lavage should not be performed.

10 Emergency Medicine Clinical Practice Guidelines: Evidence Based or Expert Consensus?
Savage DF, Sandefur B, Bernard K, Schuur JD, Venkatesh MA/Yale-New Haven Hospital, New Haven, CT; Mayo Clinic, Rochester, MN; Brigham and Women’s Hospital-Boston, MA; Brigham and Women’s Hospital, Boston, MA

Background: The Institute of Medicine’s 2011 report, Clinical Guidelines We Can Trust, noted substantial variability in the strength of evidence used to support clinical practice guidelines. These guidelines are increasingly being used as the foundation for evidence-based practice and national quality metrics; however, recent work in cardiology, obstetrics, and infectious diseases has shown that the majority of guidelines are based on expert consensus. To date the strength of evidence used to support recommendations found in the emergency medicine clinical practice guidelines is not known.

Study Objectives: To describe the level of recommendations, and the strength of evidence on which these recommendations are made, in emergency medicine clinical practice guidelines.

Methods: Systematic review of clinical practice guidelines published by the American College of Emergency Physicians (ACEP) from March 1993 to January 2015. A standardized data collection instrument was used to abstract the number and level of recommendations, the reported class of evidence, and the year of publication for each guideline. The primary outcomes were the proportion of Class III equivalent evidence and Level C equivalent recommendations. Because the evidence and recommendation grading scheme was changed slightly in 2001, we developed standard definitions for evidence and recommendation grading for this study. Class III equivalent evidence was defined as reports of descriptive cross-sectional studies, observational studies including case reports or case studies, or consensus statements. Level C equivalent recommendations were defined as those based on preliminary or inconclusive evidence, committee consensus, or limited-research-based evidence. We defined current guidelines as those published on the ACEP Web site for dissemination and use as of April 1, 2015, which included 19 guidelines. The oldest current guideline was published in 2001. We report descriptive statistics, and chi-square test for trend was used to assess changes in the proportion of Level C equivalent recommendations over time.

Results: A total of 51 guidelines including 436 recommendations, with an average of 8.5 recommendations per guidelines (range: 0-55), were identified. The median number of guidelines published per year was 2 (range 2-4). A total of 2571 references were classified within all clinical guidelines of which 261 (10.2%) were Class I equivalent, 1071 (41.6%) Class II equivalent, and 1239 (48.2%) Class III equivalent. Of all recommendations, 37 (8.3%) of recommendations were Level A equivalent, 192 (44.0%) were level B equivalent, and 207 (47.5%) were Level C equivalent. Between 1997 and 2015, in years in which complete recommendation data exist, there was no statistical trend in the proportion of recommendations with Level A (P = .051), B (P = .312) or C equivalent ratings (p=0.864). For the ACEP guidelines published as current (n=19), 67 recommendations (48.91%) were Class C equivalent, and 417 Class III references (60.97%) were used in these guidelines.

Conclusion: Emergency medicine clinical practice guidelines are largely based on lower classes of evidence and a majority of recommendations are consensus based. These findings demonstrate an evidence gap that the emergency care research agenda should address.
I.O. catheters. The I.O. aspirate culture reports have shown no growth of microorganisms associated with osteomyelitis; there has been no radiographic evidence of osteomyelitis or other abnormalities associated with the I.O. catheter. Pain associated with I.O. catheter dwell and infusion has been well managed with the additional medications (acetaminophen, Toradol, and hydrocodone/acetaminophen); a finding previously unreported.

Conclusion: Preliminary results indicate that IO vascular access can be safely maintained for a period up to 48 hours without risk of osteomyelitis or other serious adverse events. Extended dwell time and increased IO access utilization could result in avoidance of serious complications and costs associated with peripherally inserted central catheters (PICC lines), as well as femoral, subclavian, and internal jugular central venous catheters being placed due to difficult vascular access, when central venous access may not be clinically necessary. Using additional analogues for IO infusion pain management may be more effective than the current standard of only administering lidocaine into the IO space.

Methods: The initial dataset contained all Tweets and Instagrams geotagged within 5 miles of Randall’s Island, covering all event days from August 29-31, 2014. Two authors independently reviewed Tweets for drug- or alcohol-related content. 10% of the Tweets were randomly selected for dual independent review to determine agreement using a weighted Cohen’s kappa. Identified Tweets were then jointly reviewed to determine those indicative of alcohol use according to previous definitions. Tweets and Instagrams were considered indicators of alcohol use if they referred to: intention to drink, the act of drinking, location at a bar or liquor store, mention of a specific brand, drinking paraphernalia (eg, flask), consequences from drinking (eg, drunk, wasted, tipsy), or alcohol-related hashtags. Our Bayesian logistic regression machine learned model, which had been derived only from Twitter, was applied to a restricted dataset excluding Instagrams.

Results: The complete geo-located collection included 11,971 Tweets and Instagrams. The restricted dataset containing only Tweets consisted of 2,928 elements, of which 82 Tweets were classified as drug- or alcohol-related (weighted kappa = 0.92). Of these, 23 Tweets explicitly referenced alcohol use (eg, “Wine at Zoo is the right play. Instadrunk.” “Wow. I am not sober,” “#dr3kfriday #livesummer #Eexox #wetordial #addntrk”). The model achieved an AUROC of 0.87 when applied to this independent Tweet validation set.

Conclusion: Our machine-learned model automatically identified alcohol use at Electric Zoo with high discriminatory power. Differences between the previous estimated AUROC performance and the validated AUROC performance are likely due to language variation. A machine-learned approach may identify approaches to improve model performance. The ability to automate social media geosurveillance of substance behavior at events could be coupled with real-time data feeds. Model automation would allow these real-time data feeds to be analyzed for potential public health interventions (including messaging, Tweet geosociality-dependent medical presence, or other measures) to further reduce harm.
1.8% (767 ECGs) required review for final classification. The overall prevalence of STEMI was 1.2%. The LP15 had a significantly greater sensitivity (87.4% vs. 74.2%, P < .001), lower specificity (98.4% vs. 99.2%, P < .001), lower positive predictive value (43.1% vs. 54.4%, P < .001) and greater negative predictive value (99.8% vs. 99.4%, P < .001), compared to the LP 12.

Conclusions: Important differences exist in the ECG machine algorithms used by LP 12 and LP 15 which need to be taken into account in designing systems and optimizing patient selection for urgent catheterization.

16 Oral Dexamethasone Is as Effective as Oral Short Acting Corticosteroids in Preventing Relapse to the Emergency Department in Pediatric Patients With Acute Asthma Exacerbations

Watnick C, Fabbri D, Arnold D/Vanderbilt University School of Medicine, Nashville, TN; Vanderbilt University, Nashville, TN

Study Objective: We sought to compare relapse rates for patients presenting to a pediatric emergency department (ED) with acute asthma exacerbations who received oral dexamethasone (Dex) versus an oral short acting corticosteroid (s-CCS) during their initial ED visit.

Methods: We extracted data from electronic medical records on all patients aged 3-17 years who presented to our urban tertiary care pediatric ED from January 2006 to December 2014, with acute asthma exacerbations who received oral Dex during their initial ED visit. There were 143 (2.01%) relapses within 72 hours were identified in that group those that returned within a 72-hour period with continued asthma related complaints. For patients with multiple visits in the 72-hour period, the first two visits were analyzed. Patients must have received a corticosteroid (CCS) during the initial ED visit for study inclusion. Patients who did not have CCS treatment or who were given CCS at another facility were excluded. We compared relapse rates of those patients receiving oral Dex to those receiving an oral s-CCS (prednisone or prednisolone). We used a chi-square test to compare the relapse rates between oral s-CCS and oral Dex, and multiple logistic regression to examine whether any demographic variables were predictive of relapse.

Results: Data on 13,518 unique patient visits to the ED including 183 patients with asthma related complaints. For patients with multiple visits in the 72-hour period, the first two visits were analyzed. Patients must have received a corticosteroid (CCS) during the initial ED visit for study inclusion. Patients who did not have CCS treatment or who were given CCS at another facility were excluded. We compared relapse rates of those patients receiving oral Dex to those receiving an oral s-CCS (prednisone or prednisolone). We used a chi-square test to compare the relapse rates between oral s-CCS and oral Dex, and multiple logistic regression to examine whether any demographic variables were predictive of relapse. Results: Data on 13,518 unique patient visits to the ED including 183 patients with relapse within 72 hours were identified. Demographic information for patients is presented in Table 1. We identified 7,130 (52.7%) patients who received an oral s-CCS and 1,639 (12.1%) who received oral Dex during their initial ED visit. There were 143 (2.01%) relapses among patients treated with an oral s-CCS and 21 (1.28%) relapses among those treated with oral Dex (P = .05, chi-square). No demographic characteristics predicted relapse.

Conclusions: Oral dexamethasone is as effective as oral prednisone and prednisolone in preventing ED relapse of pediatric patients with acute asthma exacerbations. Although statistically significant, the absolute risk reduction of 0.73% for oral Dex treatment in comparison with oral s-CCS treatment is likely not clinically meaningful. Overall relapse rates for both forms of oral corticosteroid are very low.

17 The Effect of Age on the First Pass Success of Pediatric Intubations in the Emergency Department

Dickens JM, Viscusi C, Bradshaw H, Pacheco G, Patanwala A, Sakles J/C/University of Arizona, Tucson, AZ

Study Objectives: To determine the effect of age on the first pass success (FPS) of pediatric patients intubated in the emergency department (ED).

Methods: This was an analysis of all pediatric rapid sequence intubations (RSI) prospectively recorded into a continuous quality improvement (CQI) database at an urban academic pediatric ED over the 5-year period from July 1, 2009 to June 30, 2013. All intubations were performed by a physician with either a direct or video laryngoscope. After each intubation operators filled out a CQI form with multiple patient, operator and intubation characteristics. Data collected included age of the patient, operator post-graduate year and specialty, reason for intubation, device(s) used, method of intubation, difficult airway characteristics (DACs), number of intubation attempts and complications. The primary outcome measure was the FPS by age. Pediatric patients were grouped as follows: Group 1: 0-1 yrs, Group 2: 2-5 yrs, Group 3: 6-17 yrs. A multivariate regression analysis was performed to control for potential confounders and obtain an adjusted odds ratio (aOR) for FPS. The secondary outcome measure was the incidence of hypoxemia during intubation.

Results: A total of 215 RSIs were attempted on pediatric patients during the 5-year study period (results in Table).

Conclusions: In this observational study of pediatric patients intubated in the ED, we found that decreasing age was strongly associated with a decrease in the first pass success. The youngest patients also experienced an increased incidence of hypoxemia during intubation. Educational training programs for pediatric airway management should focus on the very young (<1 year old).

Table. Results By Age Group

| Group 1 (0-1 yrs) | 51.1% | 36.1%-65.9% | reference | - | 44.7% |
| Group 2 (2-5 yrs) | 70.2% | 56.6%-81.6% | 2.5 | 1.1-5.9 | 17.5% |
| Group 3 (6-17 yrs) | 82.9% | 74.6%-89.4% | 4.7 | 2.1-10.4 | 15.3% |

18 Factors Associated With First-Pass Success in Pediatric Intubation in the Emergency Department: An Analysis of Multicenter Prospective Observational Study

Goto T, Gibo K, Hagiwara Y, Okubo M, Brown DFM, Brown CA III, Hasegawa K/Y University of Fukui Hospital, Fukui, Japan; Kurume University, Fukuoka, Japan; Tokyo Metropolitan Children’s Medical Center, Tokyo, Japan; Mayo Clinic, Rochester, MN; Massachusetts General Hospital, Boston, MA; Brigham and Women’s Hospital, Boston, MA

Study Objectives: To investigate the factors associated with first-pass success in pediatric intubation in the emergency department (ED).

Methods: Analysis of the data from two multicenter prospective studies of ED intubation in 17 EDs between April 2010 and September 2014. Study prospectively measured patient’s age, sex, intubator’s level of training and specialty, principal indication for intubation, methods (eg, rapid sequence intubation [RSI]), and devices. To evaluate independent predictors of first-pass success, we fit logistic regression model with generalized estimating equations. In sensitivity analysis, we repeated the analysis in children <10 years.

Results: A total of 293 children aged ≤18 years who underwent ED intubation were eligible for the analysis. The overall first-pass success rate was 60% (95% CI, 54%-66%). In multivariable model, age ≥20 years (adjusted odds ratio [aOR], 2.45; 95% CI, 1.23-4.87), use of RSI (aOR, 2.17; 95% CI, 1.31-3.57), and intubation attempt by an emergency physician (aOR, 3.21; 95% CI, 1.78-5.83) were significantly associated with a higher chance of first-pass success. Likewise, in sensitivity analysis, the use of RSI (aOR, 3.05; 95% CI, 1.63-5.70), and intubation attempt by an emergency physician (aOR, 4.08; 95% CI, 1.92-8.63) were significantly associated with a higher chance of first-pass success.

Table 1: Demographic Information for Patients Preventing with Asthma Exacerbations

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>All Asthma Patients</th>
<th>n = 13,518</th>
<th>Relapsed Patients</th>
<th>n = 183</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sex</td>
<td>Male</td>
<td>6,109 (45.8%)</td>
<td>Female</td>
<td>7,409 (54.2%)</td>
</tr>
<tr>
<td>Race</td>
<td>White</td>
<td>11,052 (82.4%)</td>
<td>Black</td>
<td>1,042 (7.7%)</td>
</tr>
<tr>
<td></td>
<td>Asian</td>
<td>779 (5.7%)</td>
<td>Native American Indian Alaskan</td>
<td>62 (0.5%)</td>
</tr>
<tr>
<td></td>
<td>Pacific Islander</td>
<td>28 (0.2%)</td>
<td>Underweight Declined</td>
<td>878 (7.1%)</td>
</tr>
<tr>
<td></td>
<td>Overweight Declined</td>
<td>878 (7.1%)</td>
<td>Underweight Declined</td>
<td>878 (7.1%)</td>
</tr>
<tr>
<td>Insurance</td>
<td>Medicaid</td>
<td>12,565 (92.8%)</td>
<td>Commercial</td>
<td>953 (7.2%)</td>
</tr>
<tr>
<td></td>
<td>Uninsured</td>
<td>353 (2.6%)</td>
<td>Military</td>
<td>35 (2.6%)</td>
</tr>
<tr>
<td></td>
<td>Other</td>
<td>214 (1.6%)</td>
<td>Unknown</td>
<td>21 (1.6%)</td>
</tr>
<tr>
<td>Age (years)</td>
<td>Median (interquartile range)</td>
<td>7 (4-10)</td>
<td>Median (interquartile range)</td>
<td>7 (4-11)</td>
</tr>
</tbody>
</table>
Conclusion: In this analysis based on two large multicenter prospective studies of ED airway management, we found that older age, use of RSI, and intubation by emergency physicians were the independent predictors of a higher first-pass success in children. Our findings should facilitate investigations to develop optimal airway management strategies in critically-ill children in the ED.

19 Children Hospitalized With Rhinovirus Bronchiolitis Have Asthma-Like Characteristics

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Study objectives: Children with bronchiolitis are often considered a homogenous group, a view reinforced by the 2014 American Academy of Pediatrics bronchiolitis clinical practice guideline. Emerging evidence, however, suggests that bronchiolitis is actually a heterogeneous condition with different short-term and long-term outcomes. Our objective was to test the hypothesis that children hospitalized with rhinovirus (RV) bronchiolitis would be more likely than children with respiratory syncytial virus (RSV) bronchiolitis to have asthma-like characteristics (ie, prior wheezing, atopic characteristics, and more frequent treatment with corticosteroids).

Methods: We performed a 16-center, prospective cohort study of hospitalized children age <2 years with an attending diagnosis of bronchiolitis. For 3 consecutive winters (November-March) from 2007-2010, researchers collected clinical data and nasopharyngeal aspirates, which were tested for 16 viruses by PCR. We focused this secondary analysis on RSV and RV, the two most common viruses causing severe bronchiolitis. We compared RSV (RSV alone or coinfection with any virus, including RV) to RV (RV alone or coinfection with any other non-RSV virus). Analysis used Chi Square and multivariable logistic regression.

Results: Among the 2,207 enrolled children, there were 1,589 (72%) infected with RSV, including 287 children with RSV + RV coinfection. There were 277 (13%) children infected with RV, including 110 children coinfected with other viruses besides RSV. Compared to children with RSV, children with RV were more likely to be age >6 months (30% vs 58%, P < .001), to be male (58% vs 66%, P = .02), to have a history of wheezing (19% vs 30%, P < .001), to have a history of eczema (14% vs 23%, P < .001), and to receive corticosteroids in both the emergency department and the hospital (7% vs 23%, P < .001). In a multivariable model controlling for age, sex, race, history of wheeze, and history of eczema, children hospitalized with RV were more likely to receive corticosteroids in both the ED and in the hospital (adjusted odds ratio 2.1; 95% CI 1.4-3.2). Results did not materially change in sensitivity analyses comparing different combinations of viruses, including RSV-only, RV-only, and RSV without RV coinfection or when restricting to children age <1 year.

Conclusions: In a multicenter, multiyear, prospective cohort of US children hospitalized with bronchiolitis we found that children with RV bronchiolitis have similar characteristics to older children with asthma (eg, history of wheezing and history of eczema) including more frequent treatment with corticosteroids. We suggest that future research focus on identifying children age <2 years with bronchiolitis who may have short-term and/or long-term benefits from medications currently used to treat older children with asthma.

20 A Description of Pediatric Frequent Users of Emergency Department Resources

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Study Objectives: Health care reform efforts have focused on improving resource utilization among patients who are disproportionate utilizers of health care services, specifically frequent users of emergency department (EDs). Most studies have focused on adult frequent users, but little is known about pediatric frequent users. The purpose of this study is to evaluate patient characteristics and patterns of use of pediatric frequent users of ED resources to better target interventions to provide appropriate resources to these patients.

Methods: We performed a multi-center retrospective longitudinal cohort study of all hospital ED visits to California in 2011 using non-public data from 324 licensed non-military acute care hospitals. Visits without a valid patient identifier and patients who expired were excluded. Pediatric patients were defined as 1-17 years of age and age was categorized as 1-5, 6-12 and 13-17 years of age. Frequent users were defined as having 6 or more ED visits during the 12-month study period. We identified demographics and patterns of use, and used logistic regression to assess independent associations between demographic characteristics, payer, and diagnoses between occasional users and frequent users.

Results: During the study period there were 5,332,046 individual patients seen in area EDs resulting in a total of 9,436,955 visits. Of these, 704,585 (13.2% of all patients) were pediatric patients with 1,039,557 visits (11.0% of all visits). A total of 7,147 (1.0%) of the pediatric patients were identified as frequent users and were responsible for 54,038 (2.5%) visits. The percent of frequent users within the pediatric age groups were relatively consistent (1.0, 1.2, and 0.7% of patients and 5.2, 5.6, 3.6% of visits, respectively from ages 1-5, 6-12 and 13-17 years of age). Nearly half of frequent users were seen in more than one ED (45.8%) while the majority of non-frequent users were seen in only one hospital (94.6%). “Acute upper respiratory infection multiple sites” (ICD-9-CM = 465.x) was the most common primary diagnosis at visits for both groups (5.5% of occasional users and 6.2% of frequent users). In the regression model comparing frequent users to occasional users, leaving against medical advice (OR = 6.7, 95% CI = 6.1, 7.3), chronic pulmonary disease diagnosis (OR = 6.1, 95% CI = 5.8, 6.4), and psychiatric diagnosis (OR = 5.8, 95% CI = 5.3, 6.4) had the highest associations with being a frequent user.

Conclusion: In this study of all 324 non-military licensed EDs in California, there was a high number of pediatric frequent user visits with a disproportionate number of ED visits. This initial study of pediatric frequent ED users highlights an important ED user cohort.

21 Streamlined Admission of Critically Ill Trauma Patients Reduced Emergency Department Length of Stay

Fuentes E, Ramly E, Kaafarani H, Fillibin M, King D, DeMoya M, Brown D, Yeh DD, Velmahos G, Lee J/Massachusetts General Hospital, Boston, MA

Study Objectives: Boarding of patients in the emergency department (ED) leads to increased ED congestion, length of stay (LOS), increased use of limited resources, worse patient and family satisfaction and possibly worse patient outcomes. Starting April 2013, our Level 1 Trauma institution began a quality improvement project to decrease ED LOS among critically ill trauma patients requiring intensive care unit (ICU) admission. A multi-disciplinary team developed and approved a new process allowing critically ill trauma patients leaving the ED resuscitation for the CT scanner to then go directly to the ICU. Previous to this new process, patients would return to the ED resuscitation area for further workup and stabilization before ICU admission.

Methods: Starting April 1, 2013, all adult trauma activations were consecutively screened for the study. Pre-determined data elements were collected by trained research fellows from admission until discharge. These patients were then matched 1:1 to patients in our trauma database based on mechanism of injury, age, and Injury Severity Score. Proportions were analyzed with Pearson’s Chi-square test for significance. Results: Sixty-eight adult trauma patients were included in the study, 39 undergoing the new process and 39 matched controls. Patients admitted to the ICU with the new process had a dramatic decrease in the median ED LOS by 62%, from 4.56 hours to 1.28 hours (P < .001). There were no identifiable changes in hospital LOS, ICU LOS, mortality, 28-day ventilator-free days, deep venous thrombosis, urinary tract infections, pulmonary embolisms, and wound infections.

Conclusions: A new process to streamline admission for critically-ill trauma patients at our Level 1 Trauma center significantly decreased ED LOS without adverse outcomes.
A two-sample Wilcoxon rank-sum test was conducted on the data using SAS software (version 9.3) for Windows and R version 2.15.3 for Windows.

Results: Two hundred eight patients were recruited. One hundred twenty-one patients were randomized into the control arm and 87 patients into the experimental arm. Thirty-eight patients were excluded from our experimental group because they could not give a urine sample at the time of recruitment. It was determined that there was no statistically significant difference in time to disposition between subjects in the experimental group (mean of 5.25 hours) and subjects in the control group (mean of 5.51 hours), P = .5257. This prospective blinded randomized control study demonstrates that providing urine specimen cups to patients with certain chief complaints does not significantly shorten patients’ time to disposition in the ED.

**23 Turn That Frown Upside Down: Implementation of a Visual Cue Improves Communication During Emergency Department Inpatient Handoffs**

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Background: When a patient is admitted to a hospital from the emergency department (ED), their care is transitioned from the emergency physician (EP) to the inpatient physician. This care transition is called a “handoff” and signals the responsibility for the patient has shifted to the admitting team. “Calling report,” or communication between care teams, ensures that patient information, results of diagnostic studies, and patient status are seamlessly communicated with the admitting team. It alerts the team of the patient’s condition and need for ongoing treatment or workup. Failure to consistently perform patient handoffs from the ED to the inpatient unit creates a lapse in patient care and could have a negative impact on patient safety. In the pre-intervention state at our institution, our electronic health record (EHR) was designed with a “report called” button for the EP to click after calling report to the inpatient team. This button was located inside the patient chart, and the chart had to be opened before the physician could click. Additionally, once clicked, users had to change screen views in order to see the "Y" for yes or the "N" for no. This mechanism did not fit well into either physician or nursing workflows and was often overlooked. Patients might be transported to the floor without physician report being called, leading to poor communication and the potential for patient safety errors.

Study Objectives: Our primary outcome was to enhance visibility of a new communication signal to improve compliance with doc-to-doc communication prior to transporting the patient to the floor. Our secondary outcome was to evaluate the report called button’s impact on patient safety in ED to inpatient admissions.

Methods: We developed a visual cue on the track board to alert nursing staff that doc-to-doc report had been called. When an inpatient bed is requested, the EMR automatically produces a red icon on the trackboard (Figure). This icon alerts the EP and RN that a bed has been requested, but that report is not yet called. When doc-to-doc report is called, the EP clicks on the icon and changes the icon to green, signaling that report has been done and the patient is ready for transport.

Results: The baseline compliance for the “report called” button being appropriately clicked before implementation of our intervention was 20%. In the three months prior to the intervention, there were three “near misses” where patients were transported to the floor before report had been called, resulting in poor communication and the potential for patient safety issues. In the three months after our intervention, report called compliance was 98.9% and there were zero patients transported to the floor before report was called.

Conclusion: Our study demonstrates that visual cues and enhanced incorporation of a user friendly process in the workflow can improve compliance with ensuring that report is called prior to patient transfer from the ED. This may have a positive impact on physician communication and patient safety during the admission process.

**24 Patterns and Characteristics of Frequent Visitors to the Emergency Department**

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Study Objectives: Frequent visiting to the emergency department (ED) has been recognized as a pattern of ED use that is linked with inefficiency. As frequent ED visitors are a heterogeneous group, further exploration is needed to determine their demographics and visiting characteristics. The purpose of this study is to examine the patterns and characteristics of frequent visitors to the ED.

Methods: We conducted a retrospective observational study from January 1, 2013, to December 31, 2013, at the ED of a tertiary care academic medical center with > 150,000 annual patient visits. All adult patients who visited the ED 4 or more times per year were included. We divided these patients into 3 groups: occasional visitors (4-9 visits per year); moderately frequent visitors (10-19 visits per year); and highly frequent visitors (more than 20 visits per year).

Results: There were 150,727 visits to the ED, of which 47,399 were made by patients who visited 4 or more times per year (31.4% of total visits). Their mean age was 59 years (SD = 18.2) and most were female (54%). Those assessed at level 4 and 5 of the Canadian Triage and Acuity Scale included 62% of occasional visitors, 59% of moderately frequent visitors, and 58% of highly frequent visitors. Gastrointestinal and orthopaedic complaints comprised 20% and 15% of presentations, respectively. A positive history of cardiac disease increased with the frequency of visits: 9.6% of occasional visitors, 14% of moderately frequent visitors, and 22% of highly frequent visitors. The presence of cardiac disease accompanied by hypertension and a diabetic history also increased with frequency of visits: 23% of occasional visitors and 35% of moderately frequent visitors. Patients with an ED length of stay of more than 4 hours included 36% of occasional visitors, 43% of moderately frequent visitors, and 43% of highly frequent visitors. Patients with an admission rate of more than twice per year comprised 20% of occasional visitors, 58% of moderately frequent visitors, and 51% of highly frequent visitors.

Conclusion: Patients who visited the ED 4 or more times per year represent a significant proportion of patients. Their visits constituted almost one third of total ED visits in this study. Interventions need to be designed to address this issue, and further research is warranted to study this phenomenon.

**25 The Effect of a Nurse-Initiated Chest Pain Protocol on Disposition Time: A Retrospective Review**

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Study Objectives: Changes in emergency department (ED) front-end operations have been proposed to decrease patient length of stay (LOS), thereby improving throughput and reducing crowding. Chest pain is one of the most frequent and potentially serious
complaints seen in the ED. We initiated a triage nurse-driven chest pain protocol for patients over 29 years old with chest pain without obvious non-cardiac cause. The purpose of the study was to evaluate the effect of the protocol on patient disposition time.

Methods: Retrospective review of electronic medical records from May 2013 through October 2014. Inclusion criteria were chest pain patients over 29 years old with a troponin ordered. The setting is an urban safety net hospital with an emergency medicine residency program and about 65,000 adult visits per year. Chi square, student’s t-test, ANOVA and logistic regression analyses were used as appropriate. The study was exempted from review by the institutional review board.

Results: A total of 5,205 patients were included in the study; 2,295 (44%) had the protocol initiated by the triage nurse and 2,910 (56%) did not. Demographics included: 2,844 (54.6%) male, 2,967 (57%) black, 1,749 (33.6%) white, 4,950 (95.1%) English speaking, 2,052 (39.4%) discount or self-pay, 1,650 (31.7%) Medicaid, and 210 (4%) private insurance. For patients discharged from the ED, the time from arrival to discharge was 342 ± 144 minutes (min) for those with the protocol and 352 ± 145 min for those without the protocol (P = .131). For patients admitted to the hospital, the time from arrival to the decision to admit was 230 ± 130 min with protocol and 253 ± 141 min without protocol (P = .002) and from arrival until placed in an inpatient bed was 560 ± 328 min with protocol and 593 ± 363 min without protocol (P = .02). Regression analysis demonstrated that neither race (OR 1.026, CI 0.930-1.132) nor language (OR 0.801, CI 0.686-1.059) were associated with the protocol being utilized. However, more patients in the ED (OR 1.018, CI 1.014-1.022) and a payer category with some reimbursement (OR 1.166, CI 1.041-1.306) were associated with the protocol being used. Female sex (OR 0.813, CI 0.727-0.909) was associated with the protocol being less likely to be used.

Conclusion: Use of the chest pain protocol decreased LOS by 23 min from arrival to decision to admit and by 53 min from arrival to being placed in an inpatient bed. It had no effect on LOS for patients discharged from the ED. Use of the protocol was equitably distributed by race and language. It may make sense that the protocol was used more often when the ED was busy, but the decreased use in women warrants further investigation; the increased use with patients with some form of insurance is less clear. The average age of the patients and their sexes showed no statistically significant difference between the two groups. The most common diseases that placed the triage nurse in our setting does not routinely have ready access to payor information.

26 Protocol-Driven Model Shortened the Length of Stay of Patients Placed in Observation Unit
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Study Objectives: The use of observation unit can extend evaluation and treatment to a certain amount of hours for patients whose clinical needs exceed the achievement from regular emergency department (ED) visit, thus avoid the inappropriate hospital admission. Observation units can be managed by different health care providers (hospitalists/internal medicine or emergency physicians) in different models (protocol versus non-protocol driven). However, it is still uncertain which observation unit management models are superior to others in terms of shortening the hospitalization stay, reducing the misdiagnosis of high risk patients, and health care cost. The aim of this study is to determine whether a protocol-driven model significantly shortens the LOS in patients placed in observation unit while the patient population and disease patterns were not changed between different management models.

27 Incentives Toward Health Care Provider Motivation: Emergency Department to Inpatient Continuity
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Study Objectives: To explore emergency physician motivation for improving continuity of care from the emergency department to inpatient status.

Methods: Quantitative data was collected and analyzed from an initiative implemented in one suburban emergency department that asked all emergency physicians, emergency medicine advanced practice providers (APP), and emergency medicine residents to follow up on patients who they admitted to the hospital for a time period of 4 months. Various incentives were offered during each month, each one symbolic for a unique motivating factor: compliance, voracity, team affiliation, and altruism. Four incentives for physicians to visit patients that they admit to the hospital were identified: (1) A request from emergency medicine administrators (compliance); (2) A $100 monetary reward (voracity); (3) A donation to a charity of choice (altruism); (4) To be part of the winning team (team affiliation).

Results: The rate of overall ED rounding was greatest during the voracity group month (1.7%). This group had significantly higher rates of rounding than the control (P = .001) as well as the groups for altruism and compliance (P = .04 and .05, respectively). Rounding rates differed by physician group. Among attending physicians, the highest rate of rounding was in the altruistic group (1.4%, P = .26). Among resident physicians, the highest rate of rounding was observed in the voracity group (1.6%, P < .0001). Only one APP participated, revisiting one patient during the compliance period and one patient during the altruism month.

Conclusions: In this group of emergency providers, the incentive of voracity significantly increased patient follow-up from baseline. Although not statistically significant, there was a trend toward significance with the incentive of altruism. This study has addressed a topic where research-based knowledge is limited about what motivates physicians, specifically emergency medicine providers, to improve the quality of physician-patient relationship and continuity of care. We feel that this study demonstrates the importance of understanding what motivates physicians in order for medical leadership to better motivate physicians and may act as a tool to encourage the physician-patient relationship.

28 Analysis of Emergency Department Consultation Times
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Study Objectives: The emergency department (ED) team’s evaluation is often supplemented by specialist consultation. Consultant evaluation of the patient and their communication regarding plan of care to the ED team can increase throughput time. Reduction in this time may improve ED patient flow metrics as well as reduce cost. The goal of this project was to measure consultant times in a busy, urban, academic ED.

Methods: Using an innovative time-stamp tool on RedCap, a secure HIPAA-compliant online survey system, emergency physicians logged the times of specialist consultation request, response, evaluation of the patient, and communication of final plan to the emergency medicine team. A total of 56 consults were logged over a six-week period in a convenience sample. Primary outcomes were response time (time from initial page to first response), total consultation time (time from initial page to final plan) and decision-making interval (time from first response to final plan).

Results: Mean response time was 15 minutes (95% CI 11 to 19). Mean total consultation time was 134 minutes (95% CI 111 to 156). Mean decisionmaking interval was 119 minutes (95% CI 96 to 141). We also compared surgical consultants (general surgery, neurosurgery, obstetrics and gynecology, ophthalmology, orthopedics, transplant surgery, trauma surgery, urology and vascular surgery) versus non-surgical consultants (cardiac intensive Care, Gastroenterology, Medical Intensive Care and Neurology). No statistically significant difference was observed between surgical and nonsurgical consults in response time (P = .98), total consultation time (P = .11), or decision making interval (P = .10). However, the data showed trend toward a difference in total consultation time (mean 147 minutes vs 109 minutes) and decision making interval (mean 132 minutes vs 94 minutes).

Conclusion: Mean total consultation time for all specialists was greater than 2 hours. Surgical consults showed a trend toward longer total consultation time and decision-making interval. Specialist consultation adds a significant amount of time to ED evaluation, and further research is needed to develop ways to help mitigate its effect on throughput.
Study Objectives: The objective of this study was to compare the performance of emergency medicine residents when using a video-enabled Macintosh direct laryngoscope blade (Mac VL) compared to a conventional Macintosh direct laryngoscope blade (Mac DL).

Methods: This was a retrospective analysis of prospectively collected continuous quality improvement (CQI) data over the 7-year, 9-month period from July 1, 2007 to March 31, 2015. All intubations performed in this academic emergency department (ED) were recorded into a CQI database, which captures information regarding patient, operator, and intubation characteristics. Specifically, data collected included method of intubation, device(s) used, difficult airway characteristics, operator level of training, number of intubation attempts and outcome of each attempt. First pass success (FPS) was defined as success with a single laryngoscope insertion. Ultimate success was defined as successful intubation with the initial device used, by the same operator, regardless of the number of attempts. Adult patients were included in the analysis that underwent rapid sequence intubation (RSI) by an emergency medicine resident in the ED with a Mac VL (C-MAC Mac blade or GlideScope Mac blade) or a Mac DL. The primary outcome measure was the first pass success. The secondary outcome was ultimate success. A multivariate logistic regression analysis for FPS was performed to adjust for potential confounders such as difficult airway characteristics, reason for intubation, and operator level of training.

Results: A total of 1873 adult patients underwent RSI by an emergency medicine resident during the study period, 921 with a Mac VL and 952 with a conventional Mac DL. The FPS in the Mac VL group was 87.7% (95% CI: 85.4%-89.8%) and in the Mac DL group was 74.0% (95% CI: 71.0%-76.7%). Emergency medicine residents were ultimately successful with the Mac VL in 96.2% (95% CI: 94.8%-97.5%) of patients and with the Mac DL in 78.9% (95% CI: 77.1%-82.5%) of patients. In the multivariate regression analysis, the Mac VL was associated with increased odds of FPS (adjusted odds ratio 2.9; 95% CI: 2.3-3.8).

Conclusion: Emergency medicine residents had a higher FPS and were ultimately more successful when using a Mac VL compared to a Mac DL for emergency intubation. Emergency medicine training programs should consider using Mac VLs to maximize resident performance when intubating in the ED.

Succinylcholine Is Associated With Increased Mortality When Used for Rapid Sequence Intubation of Severely Head Injured Patients in the Emergency Department

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Study Objectives: The objective was to evaluate the effect of paralytic type used for rapid sequence intubation in the emergency department (ED) on mortality in patients with traumatic brain injury (TBI).

Methods: This was a retrospective cohort study conducted in an academic emergency department in the US. Adult patients with TBI who underwent rapid sequence intubation in the ED with rocuronium or succinylcholine between October 2010 and October 2014 were included. Billing and clinical databases were complemented with manual data acquisition. Data obtained were patient demographics, head abbreviated injury score (AIS), Glasgow Coma Scale, early occurrence of hypotension or hypoxia, comorbidities, and other medications used during intubation. The main outcome of interest was in-hospital mortality. The primary predictor of interest was paralytic type (rocuronium or succinylcholine). A logistic regression analysis was conducted to determine the association between paralytic type and mortality. A significant interaction was identified between head AIS and paralytic. Thus subjects were stratified based on severity of injury using head AIS scores. High-severity (HS) group had a severe or critical head AIS (score ≥4) and the low-severity (LS) had a less than severe head AIS (score <4).

Results: The final study cohort included 233 adult TBI patients who were underwent rapid sequence intubation using succinylcholine (n=149) or rocuronium (n=84). The median age was 42 years (IQR 29 to 56), the majority male (n=188, 81%), and 33% (n=76) had a HS head injury. In patients who were given succinylcholine, mortality was 22% (12/54) and 23% (7/30) in the LS and HS categories, respectively (P = 1.000). In patients who were given succinylcholine, mortality was 14% (14/103) and 44% (20/46) in LS and HS categories, respectively (P < .001). In the multivariate analysis after adjusting for important confounders, paralytic type was not significantly associated with mortality in the LS category, (OR 0.75, 95% CI 0.29 to 1.92, P = .548). However, in patients in the HS category, succinylcholine was associated with increased mortality (OR 4.10, 95% CI 1.18 to 14.12, P = .026).

Conclusion: In patients with severe TBI undergoing rapid sequence intubation in the ED, succinylcholine was associated with increased mortality compared to rocuronium.

Direct Versus Video Laryngoscopy in Patients With Gastrointestinal Bleeds

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Study Objectives: Video laryngoscopy (VL) has been shown superiority over direct laryngoscopy in many aspects of emergency airway management; however, they have not been assessed in patients with large volume hematemesis secondary to gastrointestinal (GI) bleeds in whom the screen may become soiled by blood in the hypopharynx. We sought to compare intubation outcomes between VL and traditional direct laryngoscopy (DL) using the National Emergency Airway Registry (NEAR III).

Methods: We performed a retrospective analysis of a prospectively collected national database (NEAR III) of intubations performed in 13 North American emergency departments. All cases where the indication for intubation was GI bleed were analyzed. We included patient, provider and intubation characteristics. Data were
compared between DL and VL using parametric and non-parametric tests when appropriate.

Results: Of the 17,583 cases in the registry, we identified 325 intubations for GI bleed (1.8%) using either DL (n=295) or VL (n=30). DL and VL cases were similar in terms of age, sex, weight, difficult airway predictors (limited neck mobility, mallampati>1, etc), operator specialty (emergency medicine, anesthesia or other) and level of operator training (post-graduate year 1, 2, etc). Proportion of successful first attempts (DL 261/295 (88.5%) vs VL 28/30 (93.3%) P = .58) and Cormack-Lehane views (P = .89) were similar between devices. The need for device change was similar between DL (2295 (0.7%)) and VL (1/30 (3.3%) (P = .15).

Conclusions: DL and VL had similar rates of success, glottic views and need to change devices in patients intubated for GI bleeding.

44 Just-in-Time Video Laryngoscopy versus Direct Laryngoscopy for Neonatal Intubation

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Study Objectives: In select emergency departments, neonatal nurses are called to perform endotracheal intubation (ETI) on neonatal patients. As neonatal ETI is a low-frequency, high-consequence event, it is essential that providers have access to resources to aid in ETI in this population. While video laryngoscopy (VL) has been shown to improve intubation outcomes in a variety of settings, its impact with neonatal nurses is unknown. We sought to determine if the impact of video laryngoscopy on intubation outcomes compared to direct laryngoscopy (DL) when performed by neonatal nurses.

Methods: We performed a prospective, randomized, cross-over study with neonatal nurses employed at a level-2 neonatal intensive care unit (NICU). Nurses performed both DL and VL on a neonatal mannequin using a CMAC (Karl Storz Corp, Tuttlingen, Germany) laryngoscope with a 90 Miller blade either with the assistance of the screen (defined as VL) or without the use of the screen (defined as DL). Prior to performing the intubation, providers were given a just-in-time, brief education presentation and allowed to practice with the device. Each ETI attempt was recorded and the videos were reviewed to obtain the percentage of glottic opening (POGO) score, time to intubation (TTI-time from insertion of the blade into mouth until the first breath was delivered) and time from blade insertion until the best POGO score. Data were analyzed using parametric and non-parametric tests when appropriate.

Results: We enrolled 19 participants, with a median (IQR) of 20 (9-26) year of experience and having a median of 2 (1-3) intubations within the past year. None had used video laryngoscopy in the NICU previously. Median TTI did not differ between DL and VL (19.9 (15.3-41.5) vs 20.3 (17.9-24.4), p=1). Other intubation outcomes including POGO scores and number of attempts also did not differ between DL and VL.

Conclusion: In our simulated setting, just-in-time VL training provided similar intubation outcomes compared to DL in ETI performed by neonatal nurses. For EDs where neonatal nurses perform ETI, just-in-time VL education may be an alternative.

34 Human Factors in the Emergency Department: Is Physician Perception During RSI Accurate?

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Study Objectives: Human factors are the relationships between humans, the tools we use and the environment in which we live and work. For the last several decades the study of human factors, which aims to determine how the cognitive and physical abilities of people as they interact with technology affects their ability to perform a task, has grown in fields such as aviation in response to avoidable errors that have resulted in the loss of life. It is estimated that medical errors in the United States account for anywhere from 44,000 to 98,000 deaths annually in hospitalized patients. Fixation errors are considered to be the persistent failure to revise a diagnosis or plan, in the face of evidence that suggests revision is necessary. The emergency department is a uniquely error-prone environment. In crisis situations, such as the need to establish an emergent airway, it may be easy to slip (eg. give medication prior to adequately preparing the patient) or suffer a lapse (eg. forget to set up suction). In order to prevent such errors, many departments have instituted checklists and closed loop communication. However, the problem of fixation is not addressed by these mechanisms, and has not been studied in the emergency department (ED). The purpose of this study was to determine emergency physician’s perception of how long it takes them to intubate a patient in the ED, how many times the patient desaturated and compare those perceptions to actual time.

Methods: A pre-intubation survey was conducted of the intubator in which they were asked if they thought the procedure would be a difficult intubation. The process was then audited by a research assistant for timing of several variables (duration of pre-oxygenation, NMB administration, and intubation-from the moment the intubator placed the laryngoscope in the patients mouth to confirmation of placement by waveform capnography). A post-intubation survey was then asked of the intubator consisting of 2 questions: 1) how long did it take them to intubate 2) How many desaturation events (O2<90%) occurred during the procedure.

Results: Over the course of a six-month period there were 248 intubations that took place in the ED. Of these 100 were captured in the study. Table 1 demonstrates the characteristics of the intubations and the difference between the intubator’s perception of what occurred versus the actual timing and occurrence of the events.

Conclusion: We found that provider perception of the time it takes them to intubate is significantly underestimated. We also found that the same providers were not able to recall the number of desaturation events that occurred during the procedure. Both findings raise concern over the potential for error during these procedures. The next step is to design a checklist based on these findings to determine if the implementation of such leads to better adherence to RSI technique and better physician perception of the process.

36 Comparison of the Videoendoscopy With the Videolaryngoscopy and Direct Laryngoscopy in Simulated Difficult Airway Scenario: A Manikin Study

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Study Objectives: Flexible intubation video endoscope (FIVE) has recently been introduced for video scope-guided intubation. Although it has guaranteed the intubation, difficulty of using is in question especially in inexperienced hands. The aim of our study was to compare and evaluate the efficacy of the FIVE with CMAC video laryngoscope and direct laryngoscope in simulated difficult airway scenario on the manikin.

Methods: Following power analysis, 34 medical students were enrolled to perform endotracheal intubation randomly using 3 different laryngoscopes including FIVE, CMAC, and direct laryngoscopes (DL) in simulated difficult airway scenario with cervical immobilization and tongue edema. After 60 minutes lecture, all students had chance to practice with each equipment until they performed a successful intubation. The outcomes measured included time taken to intubate and number of attempts for successful intubation. Participants were asked to sign up the degree of difficulty on a 100 mm visual analogue scale (VAS). A failed intubation attempt was defined as one in which the trachea was not intubated within 120 s or if the participant was unsuccessful at three attempts.

Results: The mean duration of the successful tracheal intubation attempt was 54 s [95% CI 42-67] for DL, 33 s [95% CI 27-39] for C-MAC and 36 s [95% CI 30-41] for FIVE. First intubation success rate was 83% in DL, 97% in CMAC and FIVE. Difficulty rate was 59 mm [95% CI 51-66] for DL, 17 mm [95% CI 13-22] for C-MAC and 12 mm [95% CI 8-16] for FIVE. 73% of participants preferred the FIVE and the 27% preferred C-MAC as their first choice for intubation.

Conclusion: Our study showed that video endoscopy is as effective as video laryngoscopy and superior to DL in difficult airway scenario. The concern about their difficult use is unwarranted even in inexperienced hands.
Study Objective: Pneumonia accounts for over 1.2 million US hospitalizations annually resulting in $10.2 billion in health care costs. Unnecessary hospitalizations put patients at risk and strain the limited resources of an already taxed medical system. Currently, tools to assess pneumonia severity have limited applicability to emergency department (ED) disposition decisions because they were developed using only data from patients admitted to the hospital. This study describes current ED admission practices for patients with community-acquired pneumonia (CAP) based on the CURB-65 severity index, and reports on CURB-65’s ability to predict 30-day mortality for a cohort of patients discharged and hospitalized from the ED.

Methods: A retrospective, observational study of all adult CAP encounters in 17 community EDs from July 2009 to June 2012. We calculated CURB-65 scores based on the established severity scoring system (0-5) to describe all encounters, as well as stratified by those hospitalized and discharged. Each score was used as a cut-off to calculate sensitivity, specificity, positive predictive value, and negative predictive value for predicting 30-day mortality. We described the use of hospitalization for ED CAP encounters and identified discharged patients returning for admission within 7 days.

Results: The sample included 21,183 ED encounters for CAP (7,952 discharged and 13,231 admitted). The C-statistic describing the accuracy of CURB-65 at predicting 30-day mortality in the full sample was 0.761 (95% CI, 0.747-0.774). Among patients discharged from the ED it performed better (0.864, 95% CI, 0.821-0.906) than for those admitted from the ED (0.689, 95% CI, 0.672-0.705). Among all encounters a CURB-65 threshold ≥1 was 92.8% sensitive and 38.0% specific with a 99.0% NPV. Among all encounters, 62.5% were admitted, 36.2% of those at lowest risk (CURB-65=0). Overall, discharged CAP patients had a 5.7% chance of returning for hospital admission within 7 days of the encounter. When stratified by CURB-65 score, 4.2%, 7.7%, 7.5%, and 12.8% were hospitalized within 7 days for scores 0-2 and >3 respectively. If a low-risk threshold of CURB-65 ≤ 1 had been the only factor used to determine ED discharge vs. admission, then only 34.3% of patients (versus 62.5%) would have been hospitalized. This would have avoided 6,956 (52.4%) of our observed low-risk admissions, and conversely increased admissions for high-risk (CURB-65 ≥ 2) by 970 admissions (7.3%), resulting in a net decrease of 5,966 (45.1%) hospitalizations.

Conclusion: CURB-65 has very good accuracy for predicting 30-day mortality for patients with CAP discharged from the ED, even better than previous reports of hospitalized cohorts (C-statistic 0.87 vs 0.80). This severity tool may be used when assessing ED patients with CAP to assist providers and patients with disposition decisions. Discharging the lowest risk patients could provide substantial savings to the US health system while maintaining acceptable patient safety.

Study Objective: The expansion of health care coverage has increased discussions about inappropriate emergency department (ED) utilization. Little is known about the ED referral patterns of patients by health care professionals (HCP) [physician office clinic, on-call hotline, or nurse on-call] and the appropriateness of the referral by the HCP or the appropriateness of patient self-referral among those with and without a primary care provider (PCP). We sought to determine whether ED patients contacted a HCP prior to ED presentation or if they self-referred as well as ascertain whether there were any differences in admission rates (hospital or ED observation unit) between HCP referred and self-referred patients.

Methods: This was a convenience sample of patients who presented to an urban, academic, tertiary care ED of a large integrated health system. Patients were enrolled in June 2014 by trained research assistants present in the ED during the business hours of local clinics/offices (Monday through Friday, 8a-5p). Inclusion criteria were English speaking, non-psychiatric patients >18 years of age, willing to consent, and not pregnant or critically ill. A standard survey form was used to record whether patients had a PCP and were referred by a HCP for their presenting problem. Information about acuity, demographics, and disposition were obtained from the electronic medical record (EMR). All analysis was descriptive.

Results: There were 672 patients who met inclusion criteria, and 511 (76%) consented. Mean age was 53 (SD 19), 57% were female and 50% were black. Overall, 242/511 (47%) reported contacting a HCP prior to their ED visit and 202/242 (83%) were referred by the HCP to the ED. Of these, 106/202 (53%) were admitted, compared to 90/309 (29%) of self-referred patients. The majority (95%) of HCP referred patients had an emergency severity index (ESI) of 2 or 3, compared to 74% in self-referred patients. There were 40/242 (17%) patients who contacted an HCP and were not referred to the ED, yet who subsequently self-referred. Of these, 12/40 (30%) were admitted. Most patients, 414/511 (81%) reported having a PCP. Of these, 215 (51%) contacted a HCP prior to the ED visit and 183/414 (44%) were referred by the HCP to the ED. Of those without a PCP, 27/97 (28%) contacted a HCP prior to the ED visit, 19/27 (70%) were referred to the ED, and 8/27 (30%) were not referred, and subsequently self-referred. Patients with a PCP had an admission rate of 43% compared to 19% in those without. Of those with a PCP, 73% of HCP-referred patients and 68% of self-referred patients saw a HCP within the past 3 months.

Conclusion: In this study conducted when outpatient clinics were open, nearly one-half of all patients contacted a HCP prior to their ED visit. Importantly, almost one-third of patients without a PCP also contacted a HCP prior to their ED visit. ED admission rates and it appears that HCPs appropriately refer to the ED; however, some patients should have been referred and were not. It is unlikely that these patients could have been treated in an alternate venue such as a walk-in clinic or PCP office. Despite popular sentiment to the contrary, many ED patients (with and without a PCP) attempt to use available resources prior to ED presentation. In addition, when indicated, patients appropriately seek timely emergent care unavailable in other settings. ED patients belong in the ED.

Study Objectives: Care coordination and community health worker interventions for frequent emergency department (ED) users are well studied in primary care settings, but less prevalent in EDs. We evaluated a quality improvement intervention to improve care coordination and reduce ED visits and hospitalizations among frequent ED users.

Methods: We developed an ED-based care coordination program for frequent ED users. We identified 72 patients with the most frequent ED use over the preceding year and preceding 3 months. We randomly assigned 36 patients to intervention and 36 to usual care. The intervention included (1) developing acute care plans that were easily identified on the electronic health record, and (2) hiring a community health worker to assist with social services and navigating care. Outcomes were: (1) ED visits, (2) hospitalizations (inpatient or observation), (3) expenditures (direct cost), (4) hospital revenue (payments), and (5) net margin. We calculated hospital revenue and expenditures related to ED visits, observation and inpatient hospitalizations, using hospital financial data and report proportional changes. We subtracted expenditures from revenue to calculate net margin. We analyzed the program effect for the 4 months post-intervention compared to the 9 months prior to intervention and standardized all numbers to represent visits and cost per patient per month (PPPM). We used an intention-to-treat analysis, including patients assigned to intervention regardless of whether they received services (some were difficult to contact or declined), but excluded 15 patients who had zero costs in the follow-up period (2 moved, 4 died, others transferred care, 9 intervention and 6 control). We calculated program effect using a difference-in-differences approach.

Results: The average cost of care for all patients (control and intervention) in the pre-intervention period was $4,195 PPPM. Among the usual care group, ED visits decreased but hospitalizations increased. Both ED visits and hospitalizations decreased in the intervention group. The program effect (difference in differences) was 0.18 fewer ED visits and 0.44 fewer hospitalizations PPPM in the intervention group compared to the control group. Revenue and expenditures increased in the control group, while revenues and expenditures decreased among the intervention group. The program was associated with reductions in direct costs (-37%), hospital revenues (-59%), and with an increase in net margin (+99%) in the treatment group compared to the usual care group PPPM. Other results are in the Table. These correspond to a total annualized...
Conclusions: An ED-based program to create acute care plans and engage a community health worker with frequent ED users is promising to reduce ED visits and hospitalizations. Our pilot program produced savings to the health care system and to the hospital. Further investigation is needed to determine long-term effects and impact on quality.

Effect on ED Visits, Hospitalizations (Per Patient Per Month)

<table>
<thead>
<tr>
<th></th>
<th># ED visits (PPPM)</th>
<th># Hospitalizations (PPPM)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control (Pre)</td>
<td>0.91</td>
<td>0.59</td>
</tr>
<tr>
<td>Treatment (Pre)</td>
<td>0.93</td>
<td>0.68</td>
</tr>
<tr>
<td>Control (Post)</td>
<td>0.85</td>
<td>0.72</td>
</tr>
<tr>
<td>Treatment (Post)</td>
<td>0.68</td>
<td>0.37</td>
</tr>
<tr>
<td>Change in Control Group</td>
<td>(-0.06)</td>
<td>0.13</td>
</tr>
<tr>
<td>Change in Treatment Group</td>
<td>(-0.25)</td>
<td>(-0.31)</td>
</tr>
<tr>
<td>Program Effect (Difference in Differences)</td>
<td>(-0.19)</td>
<td>(-0.44)</td>
</tr>
</tbody>
</table>

Hospitalizations include inpatient and observation. Negative values are in parentheses.

Pilot Study of Telemedicine in a County Jail to Assess and Treat Acutely Ill Inmates

Vilke GM, Guss DA/University of California San Diego, San Diego, CA; UC San Diego, San Diego, CA

Background: Providing health care to inmates in county jails and state prisons is very challenging. Beyond the diverse medical issues encountered, there is often limited access to high-quality practitioners, serious security concerns and costs related both to provision of care onsite and transfer to community medical facilities.

Study Objective: To assess the feasibility of a remote physician and onsite nurse to provide acute assessment and care to inmates in a county jail via telemedicine.

Methods: This was a prospective convenience pilot study. It was conducted at a large county jail that operates an onsite medical unit with 24-hour nursing care, daytime medical clinics and a post hospitalization care unit. Physicians are onsite between 8 am and 5 pm and available for phone consultation after hours. After 5 pm inmates with acute medical problems can be sent to a local community emergency department (ED) for evaluation and treatment before or after physician phone consultation. During the period of the pilot study an on-call physician could be contacted at the discretion of the onsite nurse to conduct an evaluation of inmates via telemedicine in lieu of immediate transport to the ED. The telemedicine unit provided for real-time two-way high resolution audio and visual communication. The unit was equipped with peripherals that permitted otoscopy, auscultation and very high resolution imaging via a hand-held camera. All communication was over an encrypted network. Data collected included chief complaint, final diagnosis, telemedicine examination, action taken which included outpatient treatment and disposition either transport to the ED or kept onsite. All patients had follow-up the next day at the onsite jail medical clinic.

Results: During the study period 6 inmates were assessed via telemedicine. Two patients had closed head injury associated with scalp lacerations, 1 had acute left eye pain and redness, 1 had a self-inflicted slashing wound to the neck, and 1 had blunt facial trauma and laceration. Four inmates were treated onsite after telemedicine physician assessment and 2 were sent to the ED for evaluation and treatment. Physician determination was that all patients would have been emergently transported to the ED if telemedicine was not available. Both patients with head injury and scalp laceration and the patient with facial trauma and laceration were treated onsite with tissue adhesive for the laceration and nursing neurological checks until with follow-up in sick call clinic. The patient with eye pain and redness was managed onsite after evaluation identified a small occult foreign body and corneal abrasion. The patient with self-induced neck wound and the patient with right eye pain and redness were treated onsite after evaluation identi...
Results: A total of 668 Latino patients were surveyed in 2012 followed by 1476 in 2014. Respondents had an average age of 48, were 53% male, 76% prefer Spanish language, and 71% reported having a chronic disease. Between 2012 and 2014, the proportion of patients who owned a cell phone (72% vs 79%) and the percentage that sent/received text messages (60% vs 63%) remained relatively stable and in-line with Pew estimates. The biggest discrepancy between Pew findings and our own was the use of “apps.” Although app usage in our sample climbed from 13% in 2012 to 36% in 2014, this is still far below the 58% described in the Pew report. Additional findings are detailed in the Figure. Patients who reported having chronic disease had reduced access to mobile devices (75% vs 82%, \( P < .001 \)) and lower use of all mobile phone functionalities when compared to patients without chronic disease. Similarly, there was a significant difference in owning and using mobile devices when stratifying patients by age and education levels (\( P < .001 \)).

Conclusions: Published and widely cited national estimates do not accurately reflect the mobile technology use of Latino patients at a large county hospital. The difference is even greater for older, less educated patients with chronic disease. Over the past two years, Latino patients have increased use to reflect national estimates in all mobile phone functionalities except apps. mHealth interventions for Latinos should be wary of published estimates, and currently text messaging remains the modality of mobile phone functionalities except apps.

mHealth Capacity for Latino Patients

<table>
<thead>
<tr>
<th>mHealth Capabilities</th>
<th>Latino Patients 2012</th>
<th>Latino Patients 2014</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mobile phone ownership</td>
<td>73%</td>
<td>75%</td>
</tr>
<tr>
<td>Access any non-write app</td>
<td>40%</td>
<td>42%</td>
</tr>
<tr>
<td>Access the internet</td>
<td>72%</td>
<td>74%</td>
</tr>
<tr>
<td>Send/receive email</td>
<td>60%</td>
<td>63%</td>
</tr>
<tr>
<td>Send/receive instant messages</td>
<td>58%</td>
<td>60%</td>
</tr>
</tbody>
</table>

44 Identifying Best Practices and Barriers to Improving Emergency Department Admissions for Patients With Chest Pain

Lin MP, Sinnette C, Ball A, Schuur JD/Brigham and Women’s Hospital, Boston, MA; Harvard Medical School, Boston, MA

Study Objectives: The decision to admit a patient to the hospital after an emergency department (ED) visit is the most expensive decision emergency physicians make, and yet it is variable. We aim to identify facilitators and barriers to ED discharge for visits related to chest pain.

Methods: We identified Massachusetts hospitals with lower than average ED admission rates for chest pain using data on all adult ED visits statewide for 2010-2011. We examined 23 statewide EDs (n=70) with below-average chest pain admission rates and stratified hospitals by region, volume, teaching and trauma center status. We invited EDs with below-average ED chest pain admission rate, and average or below average rates for balancing quality measures (72-hour ED revisit rate, 7-day readmission rate and 30-day related-condition readmission rate) to participate in the qualitative study. At each ED, we interviewed the clinical director or chair, full-time board-certified attending emergency physicians (EPs), case managers, and cardiologists or primary care physicians (PCPs). All interviews were recorded and transcribed verbatim by a professional transcriptionist. Three coders independently coded each transcript, using content analysis to identify themes and subthemes in NVivo9. After independently reaching thematic saturation, all codes were shared. The primary coder subsequently reviewed all codes and transcripts to classify themes as barriers and facilitators of discharge, which were reviewed by all co-authors; the rare discrepancies were reconciled by discussion among co-authors.

Results: We conducted 21 in-depth semi-structured interviews yielding 632 minutes of transcript with providers across 3 sites (5-7 per site); (1) an academically affiliated urban community ED with >50,000 annual visits, (2) a suburban community ED with 30-50,000 annual visits, and (3) a non-urban community ED with >50,000 annual visits. Mean time in practice across sites was 11.8 years. EPs cited the availability of PCP follow-up, stress tests from the ED, cardiology consultation and ED case management as key facilitators of ED discharge, while present. However, when these services are unavailable, or inconsistently available, they present a barrier to ED discharge. Many EPs identified pressure to maintain throughput as a barrier to ED discharge, and identified observation units as a potential solution. No ED had a defined clinical pathway for chest pain, and nearly all EPs stated that they did not adhere to a particular clinical pathway to guide disposition of ED patients with chest pain.

Conclusions: EPs identified availability of stress tests, ED cardiology consults, and rapid PCP follow-up as tools to mitigate the perceived risk of discharging ED patients with chest pain. Pressure to maintain throughput is a barrier to use of outpatient strategies. These approaches may be promising to reduce ED chest pain admission rates.

Key Themes and Quotes

<table>
<thead>
<tr>
<th>Availability of Stress Tests</th>
<th>Barrier</th>
<th>Facilitator</th>
</tr>
</thead>
<tbody>
<tr>
<td>“It involves a lot of faxing paperwork and trying to get a hold of their PCP, and figuring out who’s going to follow up these stress test results after they get done, so I haven’t done one. I tried one the first time, and it was just so hard to do that I just have.” Site A</td>
<td></td>
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<tr>
<td>“Sometimes, if you’re working Monday through Friday and it’s early enough in the day, you have somebody come in with chest pain and you’re just maybe not real sure... sometimes we can get in touch with the cardiologist, and if it’s early enough in the day, they can get a stress test. That’s a beautiful thing when that happens.” Site C</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

| Availability of Case Management | “Unfortunately we’re not just a daytime facility, we’re after hours and those are usually only available during daytime hours.” Site B |
| “The care managers are particularly helpful when they’re there, but we have only essentially a 40 hour FTE position in the ED at this time, so it’s not every day of the week, and it’s not, it’s a very small number of hours, although when the individual or individuals are available, they’re very helpful.” Site B |

| Availability of Cardiology Consults | “I mean would it change if the cardiologist was always available or if we had some better protocol for either imaging or stress test? Yeah, I think that would be nice. Our institution doesn’t have any. There’s no sort of set guideline, it’s just catch as catch can. If you can get the cardiologist on the phone and get them to do a stress test usually you sort of count yourself somewhat lucky I think.” Site B |
| “Here it’s pretty. I mean, cardiology, whoever the cardiologist on call is, they will I haven’t had a case, I think, where they’ve said no or we’re completely full. They’ll always fit the patient in and be able to do it.” Site B |

| Availability of PCP Follow-up | “No, I think that would be the biggest barrier, A, if they don’t have a primary care doctor, and B, if they cannot be seen timely to get that test that we need.” Site A |
| “If you know that there’s a one in 20 chance of a patient having a fatal outcome, your likelihood of sending that patient home who doesn’t have a primary care doctor who can see them well before that time, is low. If you know that they have primary care physician follow-up, I think you’re more than comfortable assuming that risk and letting them go.” Site A
Continued.

<table>
<thead>
<tr>
<th>Barrier</th>
<th>Facilitator</th>
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<tbody>
<tr>
<td>Availability of Observation Services</td>
<td>&quot;The same patient in the evening, they’re gonna get admitted, essentially to a chest pain observation unit setting, but we don’t have one at this hospital, so they just get admitted to us.” Site B</td>
</tr>
<tr>
<td>Pressure to Maintain Throughput</td>
<td>&quot;I think if we were to have an obs unit, that would help, because when a patient has to wait for a second biomarker, that prolongs their ER visit.” Site C</td>
</tr>
<tr>
<td>Communication and Care Coordination</td>
<td>&quot;I trained in a place where there was an obs unit, which I think makes it so much easier to because you can just obs them.” Site A</td>
</tr>
<tr>
<td>Impact of Clinical Policies</td>
<td>&quot;Honestly, for me, some patients, it’s reasonable to talk to their doctor about getting provocative testing done, especially if they’ve had it done previously or their doctor knows them really well. I think being able to know that someone’s going to be involved beyond sending them out the door to the great abyss.” Site A</td>
</tr>
</tbody>
</table>

Remote Device Interrogation in the Emergency Department Study Shows Decreased Time to Interrogation and Disposition Decision

Neuenschwander JF II, Ginsky M, Peacock WF IV, Stirman T, Magly M, Daugherty JC, Jr., Mowry KA, Campbell TL, Hiestand BC/Genesis Healthcare Systems, Zanesville, OH; Los Angeles Biomedical Research Institute at Harbor UCLA, Torrance, CA; Baylor College of Medicine, Houston, TX; St. Jude Medical, Plano, TX; Miami University, Oxford, OH; Wake Forest School of Medicine, Winston Salem, NC.

Study Objectives: The strain of cardiac rhythm management (CRM) device patients on already crowded emergency departments (EDs) can be expected to increase in the future. Treatment is often delayed because of prolonged time to interrogation of a device by medical personnel or device-specific industry personnel. The use of a universal transmitter in the ED for device data collection can potentially lead to more rapid interrogation and ease the burden of device patients on the ED. The goal of the Remote Device Interrogation in the Emergency Department (REMEDY) study is to assess the benefit of the St. Jude Medical unpaired Merlin@home(M@home) transmitter in the ED in expediting device interrogation and the time to a treatment decision.

Methods: Consecutive CRM device patients presenting to the M@home transmitter-equipped Genesis Healthcare System ED were approached for enrollment. Patients were classified as M@home-compatible or not. Study participation was limited to patients presenting with device-related complaints. Patients were excluded from the study if their device interrogation occurred after their ED stay. Analyses of time-to-device interrogation and time-to-treatment decision were carried out by two sample t-tests.

Results: Sixty-four patients were included, 46 (72%) male. Nine of 64 were non white (14.1%). Overall the mean age was 64.2±18 years. Of all, 28 had a device that was M@home-compatible versus 36 with a non-compatible device. In the compatible group, 20 (71%) presented with a cardiac chief complaint versus 26 (72%) in the non-compatible group. Mean time to interrogation for the compatible group was 46 minutes versus 124 minutes in the non-compatible cohort (P = .0003). Mean time to treatment decision was 187 minutes versus 230 minutes in the compatible and non-compatible groups, respectively (P = .0470).

Conclusion: We found that, in an emergency department setting, the use of the unpaired Merlin@home transmitter was associated with significant reductions in the time to CRM device interrogation and time to treatment decision. These results should be corroborated with larger, multi-center investigations.

Mean Time to Interrogation (minutes)

<table>
<thead>
<tr>
<th>Merlin@home</th>
<th>Standard of Care</th>
</tr>
</thead>
<tbody>
<tr>
<td>46</td>
<td>124</td>
</tr>
<tr>
<td>P = .0003</td>
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</table>

Mean Time to Disposition Decision (minutes)

<table>
<thead>
<tr>
<th>Merlin@home</th>
<th>Standard of Care</th>
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</thead>
<tbody>
<tr>
<td>187</td>
<td>230</td>
</tr>
<tr>
<td>P = .0470</td>
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</tbody>
</table>

Characteristics of Patients With Hypotensive Acute Heart Failure Presenting to the Spanish Emergency Departments: An Analysis From the “Epidemiology of Acute Heart Failure in Emergency Department” Registry

Ferre C, Jacob J, Llopis F, Irene C, Perez JR, Bardes J/Bellvitge University Hospital, L’Hospitalet de Llobregat, Spain.

Study Objective: To describe the main characteristics of patients with hypotensive acute heart failure (AHF) treated in Spanish hospital emergency departments (ED).

Methods: Design: The "Epidemiology of Acute Heart Failure in Emergency" project (EAHFE) is a non-interventional, multicentric and prospective study. Setting: ED of 29 Spanish hospitals. Period: a total of four months: May 2007, June 2009, and November-December 2011. Patients: All consecutive patients with AHF according to Framingham diagnostic criteria treated in the ED. Data were collected for demographic variables, comorbidities, NYHA and Barthel functional classification, clinical signs and laboratory results, treatment in the ED and 30-day mortality. Hypotension on presentation (study group) was considered for patients with systolic blood pressure (SBP) < 90 mmHg. Patients with acute coronary syndrome were excluded from the analysis. Differences between variables were considered statistically significant for P < .05.

Results: From a total of 5700 patients with AHF treated in the different ED during the study period, 128 (2.2%) had a SBP < 90 mmHg and therefore were included for analysis. Age on average was 81 ± 9.9 SD with female predominance (62%). Patients with hypotensive AHF had a worse baseline functional status (Barthel index <60 in 35.3 vs 19.5%, P = .001), were more confused on presentation (20 vs 5%, P < .001), had more signs of poor perfusion or peripheral vasoconstriction (39.1 vs 7.3%, P < .001) and had less breathlessness among their chief complaints (75 vs 85%, P = .003). Glomerular filtration rate < 60 ml/min/1.73 m2 (76.6 vs 56.6%, P < .001), hypokalemia <1.35 mmol/L (54.4 vs 20%, P 5000 pg/mL (61.7 vs 40.2%, P = .005) and positive troponin (58.2 vs 37.5% 0.001) were significantly more frequent in the study group. Mechanical ventilation (either invasive or non-invasive) was needed more often (14.9 vs 7.1%, P = .015) and inotropic agents (23.2 vs 16.6%, P < .001) as well as morphine (13 vs 5.8%, P = .012) were more frequently administered. Among patients with hypotensive AHF, 87.4% were admitted to he hospital compared to 76.5% for non-hypotensive (P = .04) and 30-day mortality was higher: 29.1 vs 8.5% (P < .005).

Conclusions: According to the results of our study, hypotensive AHF is infrequent in the ED. Differences were found in clinical presentation, mainly shortness of breath and mental status, and proportion of known prognostic factors. Mortality was much higher among patients with hypotensive AHF.
Background: Rapid detection of acute myocardial infarction is essential for appropriate management of patients presenting with chest pain suggestive of an acute myocardial infarction (AMI). A novel cardiac electrical biomarker (CEB) for detection of acute myocardial injury has been developed, with reportedly high diagnostic accuracy, that quantifies dipolar vs. multipolar energy in the cardiac electrical field in real time at the point of care directly from the cardiac monitor. The physiologic mechanism of the CEB is postulated to be due to myocardial injury consistent with troponin I (cTnI) elevation. Study Objective: The goal was to study the association between the CEB and cTnI in patients presenting with chest pain suggestive of an AMI.

Methods: This is a cross-sectional paired analysis of 138 consecutive patients presenting with chest pain suggestive of an AMI, including 77 men and 61 women. There were 19 patients who had cTnI proven AMI including 8 ST segment elevation and 11 non-ST segment elevation AMI. Resting 12-lead ECG, CEB and cTnI were acquired at presentation for initial measurement. The CEB is a real-time voltage-time measurement constructed from the derived 12-lead ECG using just 5 basis measured ECG leads obtained by the Vectorplex ECG System (VectorCor, Totowa, NJ), a cardiac monitoring/ECG device, used to detect ECG changes consistent with AMI. The CEB is considered a negative test for AMI detection at an index value –66. The cTnI (ng/ml) was measured using a Siemens Dimension Vista Troponin I assay (Siemens Healthcare Diagnostics, Camberley, UK). The cTnI assay is negative for AMI at <0.045 ng/ml. Pearson correlation and Spearman rank average correlation were used to measure the association between the Log10 CEB and Log10 cTnI for all cases. These correlations were repeated after excluding false positive cases in order to compare non-AMI cases directly to proven AMI cases. Statistical significance was tested at P < .05 with 95% confidence interval analysis.

Results: The Pearson correlation coefficient showed a strong positive correlation with r = 0.49 for all data with high significance at P < .00001. When all 11 false positive cTnI outlier non-AMI cases were excluded, the correlation increased to r = 0.59 with high significance at P < .00001. Similarly, when all additional 5 false positive CEB cases were excluded, the correlation increased to r = 0.76 with high statistical significance at P < .00001. Spearman rank average correlation of cTnI and CEB means for non-AMI vs. AMI cases showed positive correlations of r = 0.60 and 0.65 respectively for all cases. These Spearman correlations increased to r = 0.69 and 0.74 respectively when all false positive cases were excluded. All Spearman correlations were highly significant at P < .00001.

Conclusion: In patients evaluated for potential AMI, increasing values of cTnI were strongly associated with increasing values of the CEB. When comparing non-AMI cases only to cases with proven AMI (excluding false positive cases), very strong correlation between cTnI and CEB was demonstrated. These findings suggest that acute myocardial injury is the mechanism that causes an increase in multipolar force contributions, thereby decreasing dipolar force contributions, to the cardiac electrical field resulting in acute changes in the CEB.

Validation of the Modified Sgarbossa Criteria for Acute Coronary Occlusion in the Setting of Left Bundle Branch Block: Retrospective Case-Control Study

Meyers HP III, Limkakeng AT, Jr., Jaffa EJ, Patel A, Theyling BJ, Rezaie SR, Steward T, Zhuang C, Pera VK, Smith SW/Duke University School of Medicine, Durham, NC; Duke University Medical Center, Durham, NC; The University of Texas Health Science Center at San Antonio, San Antonio, TX; University of Minnesota Medical Center, Minneapolis, MN; Hennepin County Medical Center, Minneapolis, MN

Study Objectives: The modified Sgarbossa criteria have been proposed in a derivation study to be superior to the original Sgarbossa criteria for diagnosing acute coronary occlusion (ACO) in the presence of left bundle branch block (LBBB). The new rule replaces the absolute (5mm) criterion for excessively discordant ST elevation (STE) with a proportion (STE/S-wave ratio < 0.25). We sought to validate the modified criteria externally.

Methods: Design and Setting: This is a multicenter retrospective case-control study performed by chart review in two tertiary care center emergency departments (EDs) and one regional referral center. Subjects: We used a billing database at the primary site to identify all ED patients with LBBB and ischemic symptoms between May 2009 and June 2012, contributing both cases and controls. Additionally, all three sites identified LBBB ACO patients who underwent emergent cardiac catheterization. Exclusion criteria were potassium >5.5mEq/L, diastolic blood pressure >120 mm Hg, heart rate >130, pulmonary edema with respiratory distress requiring intubation, and cardiac arrest with no pre-arrest ECG available. Observations: We measured QRS amplitude and J-point deviation in all leads of available baseline and initial ECGs blinded to outcomes. Measurements were made to the nearest 0.5mm relative to the PQ junction. Another abstractor measured 130 ECGs and reviewed 53 charts for interobserver agreement. Outcome data were collected by the primary abstractor, who was blinded to ECGs. ACO was defined as angiographic acute occlusion or (a) angiography showing an acute non-occlusive culprit lesion and very elevated troponin (>10x the assay’s upper normal limit), (b) if no angiogram was performed, then very elevated troponin and a new regional wall motion abnormality on echocardiography, or (c) an ECG positive for any criteria with death before attempted catheterization. Diagnostic statistics of each rule were calculated and compared using McNemar’s test. Interobserver agreement was calculated by simple agreement for continuous variables (within 1mm for QRS amplitude, 0.5mm for ST deviation) and kappa for categorical variables.

Results: We identified 312 patients; 54 were excluded, 9 had ACO, and 249 were controls. Among the three sites an additional 36 cases of ACO were identified, for a total of 45 ACO cases and 249 controls. Interobserver agreement for ECG measurements was 92%. Simple agreement and kappa for ACO adjudication were 92% and 0.82. Sensitivity and specificity of each rule are presented in Table 1. The modified criteria (≤0.25) were significantly more sensitive than the original weighted (P < .001) and unweighted (P < .001) criteria. Specificity of the modified criteria was not statistically different from the original weighted criteria (P = .5), but significantly greater than the original unweighted criteria (P = .004).

Conclusions: The modified Sgarbossa criteria were superior to the original criteria for identifying ACO in LBBB.
Early Discharge With Next Day Stress Testing in Low Risk Chest Pain Patients Presenting to the Emergency Department is Feasible

Zwank MD, House CM, Isenberger KM, Quaday KA, Ziegenfuss JY, Moriarty KA, Nelson WE/Regions Hospital, Saint Paul, MN; Healthpartners Institute for Education & Research, Bloomington, MN

Study Objectives: Chest pain (CP) is a common presenting complaint in the emergency department (ED). Several clinical decision rules have been developed to help risk stratify a group of patients at very low risk for acute coronary syndrome and bad outcomes. Central to the care of most ED patients with CP is close clinical follow-up and appropriate risk stratification testing. We sought to determine if a protocol could be effectively implemented to help assure timely stress testing (stress echocardiogram or stress nuclear) of patients with undifferentiated CP.

Methods: We instituted a low-risk CP protocol that provided reliable stress testing with 72 hours of ED presentation at an inner-city tertiary care hospital with annual census of 80,000. Patients were eligible if they had a thrombolyis in myocardial infarction (TIMI) score of 0 or 1, a normal or unchanged EKG and a negative troponin I biomarker at 6 hours after onset of CP. Alternatively, patients could be enrolled if the treating ED clinician deemed the patient to be otherwise low-risk. The study was approved by the IRB. Data was abstracted from patient electronic medical records. Patients who did not show up for their scheduled stress test were surveyed by phone.

Results: A total of 340 patients were initially enrolled. The average age was 50 and 51% were female (age range 22-82). Two hundred nine patients had a TIMI score of 0 while 29 patients had a TIMI score of 3 or 4. Common risk factors included smoking (30%), hypertension (39%), hyperlipidemia (30%) and diabetes (12%). Median ED length of stay was 223 minutes. 265 (78%) patients followed up as scheduled and had stress testing performed. Median time to follow-up was 2.4 days (range 0-48 days) with 187 (55%) of the cohort completing their stress test within 72 hours. 75 (22%) failed to have stress testing performed. Of the 75 who did not attend their stress test appointment, 32 provided clinical follow-up data through a phone survey, 32 had electronic medical record clinical follow-up data beyond their emergency department visit, and the remaining 11 (3%) had no follow-up. Of the 329 patients with some form of follow-up available including scheduled stress testing, there were 17 (5%) with equivocal or abnormal stress test, 12 (4%) patients who had a subsequent coronary angiogram, 4 (1%) patients that underwent percutaneous revascularization, and 2 patients who suffered a myocardial infarction (0.05%). There were no deaths.

Conclusion: A majority of ED patients presenting with CP identified to be at low risk for ACS followed up for scheduled stress testing utilizing an ED low-risk CP protocol. However, a substantial minority did not show up for stress testing. The reasons for this are unknown. Observed rates of angiography, coronary intervention, and myocardial infarction were very low: 4%, 1%, and 0.05%, respectively. Reasons for this are unknown. Observed rates of angiography, coronary intervention, and myocardial infarction were very low: 4%, 1%, and 0.05%. The Ho and Morise scores are additional risk stratification scores that have been developed in patients undergoing stress testing.

Study Objectives: To assess and categorize the comprehensible components of patient-audible information (eg, provider conversations) in emergency department (ED) care areas. To initiate a baseline ED soundscape assessment.

Methods: Investigators at an academic referral hospital accessed 21 de-identified transcripts of recordings made with binaural in-ear microphones in patient rooms (n=10) and spaces adjacent to nurses’ stations (n=11) during ED staff sign-outs as part of an approved quality management process. Transcribed materials were first classified by speaker category (health care provider, patient/family/friend or unknown). Using qualitative analysis software and pre-defined thematic nodes, two investigators independently coded each transcript by phrase, clause and/or sentence for general content, patient information and HIPAA-defined patient identifiers. Scheduled reviews were used to resolve any data coding discrepancies.

Results: Patient room recordings featured a median of 1 (inter-quartile range 2-3) understandable words per minute (wpm) over 16.2 (15.1-18.4) minutes; nurses’ station recordings featured 74 (47-109) understandable wpm over 17.0 (15.4-20.3) minutes. Transcript content from patient room recordings was categorized as follows: clinical, 44.8% (17.7-62.2%); non-clinical: 0.0% (0.0-0.0%); inappropriate (provider): 0.0% (0.0-0.0%); unknown 6.0% (1.7-58.2%). Transcript content from nurses’ stations was categorized as follows: clinical: 86.0% (68.7-94.7%); non-clinical: 1.2% (0.0-19.5%); inappropriate (provider): 0.1% (0.0- 2.3%); unknown 1.3% (0.0-7.1%). Limited patient information was audible on

Comparison of Clinical Scoring Systems in Low to Intermediate Risk Chest Pain Patients in the Emergency Department

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Background: The Erlanger Stress Score (ESS) is a previously published scoring system for predicting risk of acute coronary syndrome (ACS) in patients undergoing nuclear stress testing. The retrospective study in which this scoring system was developed found that chest pain patients could be reliably risk stratified for 30-day adverse cardiac events utilizing age, sex, history of preexisting coronary artery disease, diabetes, and/or hyperlipidemia. The Ho and Morise scores are additional risk stratification scores that have been developed in patients undergoing stress testing.

Study Objectives: This prospective study compared the accuracy of the Ho, Morise, and Erlanger Stress Score clinical scoring systems in chest pain patients evaluated during 2012 at Erlanger Medical Centers.

Methods: Eight hundred forty-three consecutive patients who presented to a large, urban/suburban trauma center (80,000 annual visits) with a chief complaint of chest pain were prospectively enrolled. Demographic, medical, history, and EKG findings were utilized to risk stratify patients into low, medium, or high risk for acute coronary syndrome using three previously published clinical scoring systems. The utility of each scoring system was measured by calculating the positive predictive value (PPV), negative predictive value (NPV), and likelihood ratios for each scoring system using the outcome of diagnosis of acute coronary syndrome (acute MI or unstable angina) or an adverse cardiac event during that hospital presentation.
The Impact of a Follow-Up Clinic on Unscheduled Return Visits to an Emergency Department
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Study Objectives: The objective of this study was to examine the effect of the availability of a follow-up clinic on the rate of unscheduled return visits (URVs) to an emergency department (ED). URVs are an important indicator of ED quality. A high rate of patient returns could suggest problems with patient safety and shortcomings in care. At any level, they increase medical care costs. We hypothesized that access to a follow-up clinic would lower the number of URVs, including those leading to hospital admission (URVAs).

Methods: The study was performed at an urban, academic site that serves as a training site for an emergency medicine residency and has an annual census of about 40,000. We performed a retrospective before-and-after study over a 2-year period beginning November 1, 2012. The cohort included all patients who presented for emergency medical care during this period. We excluded diagnoses associated with scheduled return visits, such as wound checks for abscesses and lacerations. The pre-intervention group covered the first year, before the follow-up clinic was established. The post-intervention group covered the second year, during which emergency physicians had the option of scheduling follow-up appointments in a general medicine clinic. We looked at the number of return ED visits within 7 and 30 days for the same medical issue, and return visits with hospital admission for any issue. This work was supported by resources from the Baltimore VA Medical Center and the Veterans Health Administration. Regulatory approval for this work was obtained from the University of Maryland School of Medicine.

Results: During the 2-year period, the number of ED visits totaled 79,761, with the top three chief complaints being musculoskeletal pain (20%), respiratory issues (13%), and chest pain (5%). The demographics between the 2 years were similar with respect to age, race, comorbidities, and chief complaint (\(P = .001\)). During the second year, 1,009 post-ED care follow-up clinic appointments were made, 771 of which were kept (70%); roughly half of these appointments were for hypertension (21%), diabetes (12%), musculoskeletal pain (11%), and respiratory issues (6%). The number of URVs at 7 days totaled 1,280 (3.19%) in the pre-intervention period and 1,071 (2.70%) in the post-intervention period (odds ratio [OR], 0.84; 95% CI, 0.78–0.92). At 30 days, URVs totaled 2,957 (7.37%) pre-intervention and 2,606 (6.58%) post-intervention (OR, 0.89; 95% CI, 0.84–0.94). URVAs at 7 days totaled 41 (0.10%) pre-intervention and 42 (0.11%) post-intervention (OR, 1.04; 95% CI, 0.68–1.60). At 30 days, URVAs totaled 92 (0.23%) pre-intervention and 89 (0.22%) post-intervention (OR, 0.98; 95% CI, 0.73–1.31). In addition, patients who missed their post-ED follow-up appointment had a higher risk of returning to the ED at 7 days (OR, 3.92; 95% CI, 2.07–7.45) and at 30 days (OR, 1.96; 95% CI, 1.41–2.72).

Conclusion: The availability of a follow-up clinic had a positive and statistically significant impact on URVs to the ED but not on admissions. This is likely due to the focus of the follow-up clinic on less acute medical conditions. In the future, we plan to study how a more specialized ED follow-up clinic can affect the rate of hospital admissions.

Should We Regularly Collect Sexual Orientation and Gender Identity Data in the Emergency Department? The Divide Between Patient and Provider Perspectives
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Study Objectives: The purpose of this study is to assess patient and provider perspectives related to collection, documentation, and use of patient sexual orientation (SO) and gender identity (GI) data in the emergency department (ED).

Methods: A purposive sample of participants was recruited for semi-structured in-depth interviews. Patient participants were recruited through community outreach, fliers, and social media. ED provider participants including physicians, nurses, and advanced practice providers were recruited from three community and two academic centers. All interviews were conducted by one of two researchers. Audio data were de-identified, transcribed, and coded using the constant comparative method common to grounded theory.

Results: Fifty-three patient participants were interviewed, including 14 heterosexual, 12 gay, 12 bisexual, 9 lesbian, 2 queer, and 4 participants identifying as pansexual, asexual or unsure; 16 of whom identified as trans gender or gender nonconforming. Patient participants ranged in age from 22 to 67 (mean 42). Twenty-six provider participants were interviewed, including 12 nurses, 9 physicians and 5 APNs. Provider participants all identified as cisgender and heterosexual and ranged in age from 27 to 63 (mean 39). Patients and providers agreed that these data should be collected when reproductive health was the primary reason for seeking ED care. However, for all other medical concerns, providers felt this information was irrelevant because they indicated that similar care is provided to all patients regardless of SO and gender.
In contrast, patients often perceived collection of SO and GI to be important regardless of their medical concern, with some patients admitting to delaying treatment until illness worsened secondary to the inability to choose an emergency provider sensitive to and knowledgeable of SO and GI health issues. While many patients felt these data should be routinely collected to improve patient-centered care, they often described the need for additional training to ensure ED providers are comfortable addressing SO and GI minority health issues, including proper recognition of a patient’s name, title, pronouns, and family/relationship context.

Conclusion: Despite endorsement by the IOM and the Joint Commission for collection of SO and GI data, provider-perceived lack of medical relevance is a major barrier to routine collection of these data in the ED. Additionally, this provider perspective may be hindering the delivery of patient-centered care, with some patients noting that they may delay seeking emergent care because of concerns about provider sensitivity. Many patients feel this information is relevant to their health care, but note that additional training of ED providers regarding SO and GI minority health may be necessary. This discordance needs to be addressed with recognition that routine collection of SO and GI data ultimately serves to provide patient-centered care and provides data to better understand the health and possible health care disparities of SO and GI minorities.

Study Objectives: Musculoskeletal trauma is a common cause of emergency department (ED) visits. Timely response to pain is an important part of high quality emergency care and often impacts parental satisfaction. Many challenges lead to delays in treatment. We conducted a quality improvement intervention to increase appropriate and timely analgesic administration for children presenting to the ED with suspected extremity fractures.

Methods: A multi-disciplinary team met biweekly. Data from July 2013 to July 2014 established baseline practices. A prospective quality improvement initiative was conducted with a focus on appropriateness and timeliness of analgesia administration. The study population included patients presenting to the ED with long-bone fractures (exclusions: patients with digital fractures and those transferred from other facilities). Educational and practice support changes were introduced iteratively beginning in August 2014 including presentation of baseline data and information promoting ibuprofen and intranasal (IN) fentanyl use to all ED clinicians, placing a prescribing clinician in Triage, and modification of an ED fractures order set. Reminders were provided at shift change and screen savers for families and clinicians were placed in clinical areas. Progress reports were routinely provided to clinicians. Charts were reviewed when delays to order placement were noted and feedback provided to individual clinicians. Outcomes were proportion of patients receiving ibuprofen versus acetaminophen and, in those receiving opioids, proportion receiving IN fentanyl and time interval from clinician evaluation to order placement. At baseline, this time interval accounted for the greatest proportion of time from patient arrival to medication delivery. A median evaluation to order entry goal of ≤ 20 minutes was set. Outcomes were assessed weekly.

Results: From August to March, ibuprofen administration increased from 59% of patients to 79%. For patients receiving opioids, IN fentanyl use increased from 23% to 60%. Median time from evaluation to opioid order decreased from 41 to 23 and median arrival to administration decreased from 103 to 95 minutes. Since August, 46% of patients met the goal of evaluation to order of 20 minutes (Figure 1). Use of IN fentanyl was associated with decreased evaluation to order time (Figure 2).

Conclusion: Introduction of a bundle of educational and practice support initiatives by a multi-disciplinary team was associated with increased utilization of ibuprofen and IN fentanyl and decreased time from clinician assessment to opioid ordering. There was a strong association between IN fentanyl use and decreased order time. Future work will include ongoing monitoring of these gains as well as investigation of the effect racial and ethnic background and insurance status have on these metrics.
58 Does a Visual Cue Checklist Improve Communication and Adherence to Best Practices in the Emergency Critical Care Setting?
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Study Objective: Unwarranted variation in health care is common. Emergency care is a significant contributor to the cost of health care and, due to its intense and episodic nature, includes substantial variability. Checklists have been utilized as a simple, inexpensive method of decreasing unwarranted variation and improving physician adherence to best clinical and communication practices in other settings; however, little is known about the utility of checklists in the emergency critical care setting.

Methods: A prospective, observational study was conducted to assess the effect of a visually oriented checklist on best practices for the care of critical care patients in an academic tertiary care emergency department (ED). A visual checklist was developed using best practice guidelines and included key activities that ideally occur during each care team huddle. Care delivery observations were made before and after implementation of the checklist intervention. For each observation, registered nursing (RN) staff were surveyed regarding their understanding of the care plan and their comfort with emergency physician (EP) communication.

Results: Following implementation, the proportion of EPs observing a summary team discussion increased by 31% (P = .002). Significant improvements in the proportion of EPs discussing current knowledge of the patient (59%, P < .001), the working diagnosis (33.2%, P = .002), the care plan (9%, P = .002), and the disposition plan (24%, P = .006) were all noted. A non-significant increase (62% vs 67%) in EP discussions of stabilization interventions was observed. Significant changes in the proportion of EPs observed asking RNs to call with changes in patient status (P = .562) or questions regarding patient care (P = .420) were not noted. RN ratings of their understanding of care goals (P = .002), comfort with communication amongst providers (P = .025) and feelings of being a valued team-member (P = .018) all improved significantly. RNs' perceptions of the degree to which their EP colleagues shared valuable clinical information did not change (P = .228).

Conclusions: Implementation of a visually oriented checklist in the form of visual cues led to an increased level of provider communication as demonstrated by improved EP adherence to best communication practices and improved emergency RN satisfaction with communication between members of the care team.

59 Are There Gaps Between Patients’ Perceptions and Standard of Care in the Emergency Department?
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Background: Health care regulators are increasingly focused on customer service performance with a portion of reimbursement under the Affordable Care act tied to patient satisfaction scores. Federal agencies have imposed such measures despite the fact that researchers have not provided evidence that such scores improve medical outcomes. In addition, there is a paucity of research examining patients’ perception of proper treatment/quality care relative to the opinions of physicians. Discrepant opinions regarding appropriate treatment may result in lower satisfaction scores and, therefore, alter hospital reimbursement, whether or not the patient actually received high quality care.

Study Objectives: We hypothesized that there would be significant disagreement between patient and physician viewpoints regarding proper care when presented with two common clinical scenarios.

Methods: Prospective, cross-sectional study design. We enrolled a convenience sample of stable patients at an inner-city hospital. Patients completed a survey providing demographic/historical information, and were asked two closed-answer questions regarding proper clinical decision making. Question #1 considered treatment of viral URI with antibiotics vs proper reassurance, while question #2 addressed whether to provide a narcotics prescription for uncomplicated chronic back pain. Study authors had a consensus opinion that the latter option reflected best practice. Bivariate analyses were first conducted (chi-square). Multivariate logistic regressions performed to analyze the association between patient characteristics and their perceptions controlling for confounding factors; ORs provided. Primary outcome parameter was the percentage of patients who agreed with physician consensus.

Results: A total of 406 patients participated: mean age 41.2 +/- 14.8, 53% female, 63% hispanic, 86% income less < $40,000, and 38% less than high school graduate. 63% patients preferred no antibiotics and 71% preferred no narcotics. In bivariate analyses, females (versus males) were more likely to choose no antibiotics and other races (versus non-hispanic whites) were more likely to choose no antibiotics. These two variables were also statistically significant in the multivariate logistic regression (OR = 1.77 and 0.46, respectively). For the use of narcotics, the only significant variable in the bivariate analyses was age. Age 65+ (versus <65) was associated with lower likelihood of choosing no narcotics. However, it was not significant in the multivariate analysis.

Conclusion: The majority of our patients chose the best practice answer in both cases. However, the > 25% of patients who chose the non-best practice answer may represent a key point of focus for patient education and ultimately improvement in satisfaction ratings.

60 Intravenous Ondansetron and the QT Interval in Adult Emergency Department Patients: An Observational Study
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Study Objective: Ondansetron is known to cause QT interval prolongation, but this effect and clinical significance has not been prospectively studied in adult emergency department patients. Our primary objective is to determine the mean maximal corrected QT (QTC) prolongation after intravenous administration of 4mg of ondansetron. Our secondary objective is to report any serious adverse cardiac electrical events.

Methods: This was a prospective, observational, single center cohort study conducted between 2012 and 2013 in an academic, military hospital emergency department. Adult patients ordered to receive 4mg of intravenous ondansetron were eligible for the study. A 6-lead EKG was recorded at baseline and every 2 minutes after ondansetron administration for 20 minutes. The QTC was calculated using the Bazett formula. Serious adverse cardiac electrical events (non-sinus rhythm, severe bradycardia, and sudden cardiac death) were also recorded.

Results: Twenty-two adult emergency department patients were enrolled. Ondansetron caused a mean prolongation of the QTC by 19.7 ms (95%CI 14.0-25.5) with a mean proportion change from baseline of 5.2% (95%CI 3.8-6.6%). There were zero (95% CI 0-13%) reported serious adverse cardiac electrical events. Conclusion: While QTC prolongation does occur in adult emergency department patients receiving intravenous ondansetron, the clinical impact is questionable.

61 Can an “Ultrasound First” Policy Reduce Incidence of Computed Tomography Scan Use and Radiation Exposure in Pediatric Patients Presenting to the Emergency Department for Evaluation of Abdominal Pain?
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Background: Abdominal pain is a common complaint in presentation to the emergency department and acute appendicitis is the most common condition requiring emergent abdominal surgery. Early diagnosis to minimize the incidence of perforation is important to a successful outcome; however, diagnosis can be challenging in the pediatric population who frequently do not have a classic presentation and to whom radiation exposure is a concern. The American Academy of Radiology recommends ultrasonography as the initial imaging modality of choice for children in whom appendicitis is suspected. The principles of as-low-as-reasonably-possible (ALARA), an approach to minimizing radiation exposure, suggest ultrasonography be used in suspected cases of appendicitis, followed by computed tomography (CT) only if the ultrasound results are equivocal. In January 2013, New York Methodist Hospital instituted an "ultrasound first" policy for the evaluation of abdominal pain in patients presenting to the emergency department ages 18 years and younger. All patients presenting with abdominal pain underwent an ultrasound examination performed by an ultrasound-trained emergency medicine attending physician or an ultrasound performed by the radiology department prior to obtaining a CT scan.
Study Objectives: To demonstrate that a formal policy recommending ultrasound prior to CT scan in the diagnostic algorithm for acute appendicitis is effective at reducing CT usage and radiation exposure in the pediatric population.

Methods: A retrospective chart review was done of all pediatric patients who presented to the emergency department between January 1, 2013 and January 1, 2015 for abdominal pain and underwent an appendectomy. The rate of ultrasound use and CT use was compared to prior ultrasound and CT rates at our institution.

Results: In 2009, prior to the availability of POCUS at our institution, 116 cases of acute appendicitis were analyzed. Four patients went to the OR solely based on clinical exam findings (3.4%). Ten of 112 (8.9%) cases of acute appendicitis underwent an ultrasound examination prior to CT and 3 of these went to the OR based on ultrasound alone (2.7%). In 2011, after the introduction of POCUS, 140 cases of acute appendicitis were analyzed. Six went to the OR based on clinical findings (4.2%). 36 of 134 (26.8%) underwent ultrasound prior to CT and 15 of these went to the OR based on ultrasound alone (11%). From January 1, 2013 to January 1, 2015, there were 104 cases of acute appendicitis. None went to the OR based on clinical findings. 97 of 104 (93.2%) underwent ultrasound prior to CT and 38 of these went to the OR based on ultrasound alone (39.2%). Introduction of bedside ultrasound followed by implementation of an “ultrasound before CT” policy in our ED has raised the rate of risk avoidance from 2.7% to 38.9%.

Conclusion: Implementation of an “ultrasound first” policy for the evaluation of acute appendicitis for pediatric patients presenting to the ED is associated with a significant reduction in CT utilization. By decreasing CT use in the ED in the workup of acute appendicitis, it is reasonable to conclude that medical radiation exposure has decreased.

A Retrospective Chart Review of the Management of 370 Patients Who were Admitted to the Hospital With a Diagnosis of Small Bowel Obstruction

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Study Objectives: Nearly 300,000 patients are hospitalized annually in the United States with acute small bowel obstruction (SBO). The majority of patients are admitted to the hospital from the emergency department (ED) after imaging studies. While some patients with intestinal obstruction require exploratory laparotomy, others are managed with nasogastric tube placement and supportive care. We aimed to determine demographic and clinical features that predict the need for urgent operative management in ED patients. We theorized that patients with active malignancy and prior history of SBO would more likely undergo conservative treatment, whereas patients with prior abdominal surgeries but no history of acute malignancy were more likely to undergo operative management. We also examined whether markers of inflammation were higher in patients who underwent operative management. Finally, we examined whether additional abdominal CT findings (ascites, hernia) were associated with the need for operative management.

Methods: We performed a retrospective chart review of 370 consecutive patients admitted to a large urban academic teaching hospital with a diagnosis of SBO over a two-year period. We evaluated demographic features (prior SBO, prior abdominal surgery, active malignancy) and clinical features (vital signs, leukocytosis, lactic acid) to determine features associated with the need for urgent operative intervention.

Results: Overall, 27% (99/370) of patients required an operation. Patients with a prior SBO were less likely to undergo operative intervention [20.3% (42/207)] compared to those without a prior SBO [35.2% (57/162)], a risk difference of 14.9% (95% CI, 5.8% - 24.1%). Although patients with active malignancy [25.4% (44/173)] were just as likely as those without malignancy [27.9% (55/197)] to undergo operative intervention, a risk difference of 2.4% (95% CI, -6.5% - 11.5%), their surgery occurred an average of 1.6 days (95% CI 0.2 days - 3.1 days) later than patients without active malignancy. Leukocytosis and elevated lactic acid levels were not associated with increased likelihood of operative intervention. Patients whose CT scans demonstrated a hernia [68.0% (34/50)] were 47.7% (95% CI, 34.0% - 61.3%) more likely to undergo operative intervention compared to those without a hernia [20.3% (65/320)].

Conclusion: Although we hypothesized that patients with active malignancy would be more likely conservatively managed, they were just as likely as those without malignancy to undergo surgery, but did so almost 2 days later than patients without active malignancy. Patients with a history of SBO were less likely to require operative intervention at any point during their hospitalization. Neither elevated lactate levels nor leukocytosis were associated with an increased likelihood of operative intervention. An oral temperature > 100.4°F was not associated with an increased likelihood of operative intervention. The CT finding of a hernia predicted the need for operative intervention, while other findings (ascites, duodenal thickening) did not. Further research would be helpful to construct a prediction rule, which could help community EDs determine which patients may benefit from expedited transfer for operative management, and which patients could be managed conservatively as an initial treatment strategy.

Quantitative Radiographic Correlates of Acute Failure

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Study Objectives: False negative qualitative interpretation of chest x-rays (CXRs) in patients with confirmed acute heart failure (AHF) is a relatively frequent occurrence. We sought to evaluate test characteristics of quantitative CXR parameters in emergency department (ED) patients with AHF, to see if they may improve upon the more typical qualitative, “gestalt” approach.

Methods: Retrospective cohort study of ED patients with initial diagnosis of AHF. Chest radiographs obtained during the index visit in the ED were blindly reevaluated by two radiologists for cardiothoracic ratio (CTR), vascular pedicle (VPW), azygos vein width (AVW) and pulmonary artery:bronchus ratio (ABR). Using standard cut-points for these parameters, dichotomized measures were developed and test characteristics (sensitivity, specificity, negative and positive predictive values) were derived, using discharge diagnosis and n-terminal pro-brain natriuretic peptide (NT pro BNP) > 2000 pg/ml as separate “gold standards.”

Results: One hundred fifty patients (mean age 60.3 years; 50.7% male) were included. 107 (71%) of CXRs were initially read as positive for AHF during the index visit. By discharge diagnosis and NT pro BNP cut-point, 113 (75%) and 111 (74%) of patients had a true diagnosis of AHF, respectively. Diagnostic test characteristics for the clinical interpretation, and each of the 4 quantitative parameters individually and in combination are shown in the accompanying Table.

Conclusion: Sensitivity is improved when using quantitative parameters for CXR interpretation in patients with AHF. Combining these parameters into a composite also enhances specificity but prospective evaluation to fully define the diagnostic test characteristics of this approach is warranted.
Comparison of Total Turnaround Times for Urine versus Whole Blood Point-of-Care Pregnancy Testing Using a Nursing Protocol

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Study Objectives: There has been increasing pressure to improve emergency department efficiency and throughput. Laboratory result turnaround times have been shown to significantly influence throughput, with urine pregnancy testing often delaying advanced imaging, medication delivery, and disposition decisions. Previously, urine and whole blood point-of-care (POC) pregnancy tests have been shown to have similar accuracy. Our small pilot study demonstrated a mean time savings of 52 minutes. The purpose of this study was to determine if there is a true reduction in result time between urine and whole blood POC pregnancy testing in a much larger sample with nursing protocols.

Methods: We conducted a prospective, observational study at an urban, academic secondary care hospital comparing the result times for urine and whole blood pregnancy tests collected in standard fashion. We included female patients between 18 and 55 years of age who presented when one of the study nurses was present and who had both a urine pregnancy test and any blood obtained for laboratory testing as a routine part of their care. The blood and urine were collected by nursing or ancillary staff according to their standard protocol without intervention from the investigators. After the blood was collected, the study nurse would place 3 drops onto a Beckman Coulter ICON 25 Rapid HCG bedside pregnancy test and set a timer for 10 minutes in accordance with previous studies. At the end of the 10 minutes, the result and time were recorded on an encoded data sheet and not used clinically. The whole blood turnaround time was calculated as the time difference between the first blood order placed and the result time. The urine turnaround time was calculated as the difference between the urine pregnancy test order and the time that the result was entered into the computer. A paired sample t test was utilized to determine a significant difference in urine and blood result times, and a sample size of 225 patients was selected using a pre-determined, clinically significant time difference of 15 minutes for a two-tailed procedure with 90% Power and alpha < .05. Concordance between samples was assessed as a secondary outcome.

Results: Sixty-four patients were included in the study at the time of submission. The net turnaround time for the whole blood POC pregnancy test was 37 minutes (95% CI 32-42), while the net turnaround time for the urine POC pregnancy test was 59 minutes (95% CI 48-70). Paired sample test results determined there was a significant difference between whole blood and urine result times, with a net time savings of 22 minutes (95% CI 11-33); t(63) = 4.1, P > .001. There were 22 positive and 42 negative pregnancy test results, and there were 97% (95% CI 90-100%) concordance between the samples, with one false negative urine specimen with a quantitative HCG level of 81 mIU/L.

Conclusion: Our results suggest that the use of whole blood may reduce the total result turnaround time without significant changes in accuracy. Once FDA approved, this novel use of whole blood for POC pregnancy testing may significantly improve ED throughput.

Use of Plasma Collection Tubes With Smaller Volumes and Decreased Vacuum Significantly Reduces Hemolysis in Emergency Department Blood Samples

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Study Objectives: Hemolysed blood samples are a serious problem in emergency departments (ED). The cause is likely multifactorial, though one possible etiology is the high vacuum pressure of large collection tubes. The purpose of this study is to determine if smaller volume collection tubes, with lower vacuum pressures, reduce the hemolysis rates of ED blood samples.

Methods: This study was part of a larger performance improvement program aimed at reducing rates of hemolysis in blood specimens obtained in an urban, tertiary referral ED with annual census of 64,000. Usual ED practice was to obtain all blood specimens for electrolyte analysis using standard-sized tubes (15x100mm, collection volume, Lithium Heparin tube without gel separator). On February 22, 2015, these tubes were replaced with small volume/vacuum tubes (13x75mm, 2 mL collection volume, Lithium Heparin tube without gel separator) in an attempt to reduce hemolysis rates. The hospital laboratory database system (Sunquest) was queried for potassium (K+) results for all specimens obtained during the study period (February 2015). Baseline hemolysis rates were determined for specimens with a potassium (K+) order obtained prior to February 22, and compared with rates in small volume tubes from February 22 through the 28. Rates were measured by hemolysis index and reported out as either a hemolyzed specimen with comment (HK) or grossly hemolyzed (GHED). Chi Square analysis was performed on categorical variables and P values are reported.

Results: A total of 2475 blood samples were collected during the study period (1843 standard tubes, 632 small tubes). Baseline overall rate of hemolysis was 12.05% (222/1843) of which 9.5% (175/1843) hemolyzed with comment (HK) and 2.55% (47/1843) were grossly hemolyzed and rejected (GHED) specimens. After implementation of the small volume tubes the overall rate of hemolysis (HK + GHED) was significantly lower in the small volume tube group (12.05% vs 4.59% (209/632); P < .001), with significant reduction found in both the rate of moderate hemolysis with comment (HK) (9.50% vs 3.64% (253/632); P < .001) and gross hemolysis (GHED) (2.55% vs 0.95% (6/632); P = .02).

Conclusion: Small volume collection tubes significantly reduced hemolysis rates of ED blood samples as compared to standard tubes. We hypothesize that because the reduced vacuum in the smaller tubes creates a reduced pressure gradient as the blood moves through the collection setup, there is less turbulent flow resulting in less cellular damage and hemolysis. We are currently examining the effect of this reduced hemolysis rate on laboratory costs, laboratory turnaround time and ED throughput. CDC grant U47OE000053 Hemolysis in the ED: Evidence Based Lab Medicine: Lab Medicine Best Practices Systematic Review.
Study Objectives: Delayed transfer to the intensive care unit (ICU) from the general medical or surgical floor is associated with increased morbidity, mortality, and financial burden. The signs of vitality (SOV) is a novel scoring system comprised of eight weighted and three non-weighted criteria designed to identify patients at risk of clinical deterioration (Figure). We sought to evaluate the sensitivity and specificity of the SOV. We hypothesized that two or more abnormal weighted SOV is predictive of ICU transfer within 24 hours of emergency department (ED) admission.

Methods: We conducted a nine-month (January 1, 2014 to September 30, 2014) retrospective chart review of adults admitted to a non-ICU setting in a community teaching hospital who had an rapid response team (RRT) activation within 24 hours of admission. Appropriate RRT activations were defined as those having two or more abnormal weighted SOV. Patients were dichotomized into those who did, and did not, meet RRT activation criteria and their disposition was tracked. The primary outcome was transfer to ICU. The sensitivity, specificity, positive predictive value and negative predictive value of abnormal SOV was calculated and expressed with 95% confidence intervals (CI).

Results: There were 273 RRT activations within 24 hours of admission in the study period. 231 (84.6%) met RRT activation criteria and 63 patients were subsequently transferred to ICU. Four patients transferred to ICU did not meet RRT activation criteria. The presence of two or more abnormal weighted SOV had a 94% sensitivity (95% CI 84-98%), 18% specificity (95% CI 15-22%), 26% positive predictive value (95% CI 21-33%), and 90% negative predictive value (95% CI 76-97%) of predicting transfer to ICU within 24 hours of admission. Tachypnea was the most common abnormal SOV, present in 53 (84.1%) transferred patients.

Conclusion: The SOV are a sensitive but not specific indicator of need for ICU care within 24 hours of hospital admission. The sensitivity and the simplicity of the scoring system make it a useful screening tool for clinical deterioration.

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69 Quality of Research and Level of Evidence in Point-of-Care Ultrasonography Literature: Where Are We Now?
Adhikari S, Kartchner J, Amini R, Farrell I, Keim S/Banner University Medical Center, Tucson, AZ

Background: The methodological quality and level of evidence of journal articles can significantly impact clinical decisionmaking and patient care. To our knowledge, no published data are currently available focusing on quality of research related to point-of-care (POC) ultrasonography (US).

Study Objective: The objective of this study was to evaluate the methodological quality and level of evidence of POC US publications over the past twenty years.

Methods: Cross-sectional study. Six journals in which a majority of POC US articles were published were selected. All articles published in the each journal in the past 20 years (1994-2013) were manually reviewed and articles related to POC US were identified. POC US articles were categorized based on type of article and study design. The methodological rigor and the level of evidence in the POC US articles were rated according to the Oxford Center for Evidence-Based Medicine levels of evidence. The number of articles for each level of evidence rating was then expressed as a percentage of the total number of articles meeting the inclusion criteria.

Results: A total of 1781 POC US manuscripts were published in the six selected journals over 20-year period. Of these, 82% (1475) belonged to the “Diagnostic,” 5.2% (93) “Therapeutic,” and 0.7% (12) “Prognostic” type. Four percent of manuscripts are current research related to ultrasound education. Two hundred seventy five studies enrolled >100 subjects and 82 studies enrolled subjects at multiple centers. The distribution and relative frequency of each type of article published in the six journals are summarized in Table (attached). A majority (68%) were not original research articles, comprising of descriptive studies or surveys, case reports/series, editorials, expert opinions, review articles and letters to the editors. Among original POC US research articles, only 11% had a high level of evidence (level 1 and 2) while a majority (80%) had level 3 evidence. Nine percent had level 4 and 5 evidence. There was a significant trend toward higher levels of evidence, with the
combined percentage of Level I, II, and III studies increasing from 1994 to 2013 ($p < .05$).

Conclusions: A minority of POC US journal articles had a high level of evidence. However, the level of evidence of POC US publications has improved over the past twenty years. Future methodological improvements are crucial for POC US to progress within academic medicine.

Distribution and relative frequency of each type of article.

<table>
<thead>
<tr>
<th>Type of article</th>
<th>Frequency</th>
</tr>
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<tbody>
<tr>
<td>Systematic Review</td>
<td>20</td>
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<tr>
<td>Randomized Controlled Trial</td>
<td>12</td>
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<tr>
<td>Prospective observational/cohort</td>
<td>357</td>
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<tr>
<td>Retrospective cohort</td>
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<tr>
<td>Cross-sectional</td>
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</tr>
<tr>
<td>Case Series</td>
<td>56</td>
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<tr>
<td>Expert Opinion</td>
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<tr>
<td>Case Reports</td>
<td>773</td>
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<tr>
<td>Review/Editorial/Survey/Phantom/Media review/Policy/Other</td>
<td>262</td>
</tr>
</tbody>
</table>

A Cost Analysis of a County Hospital Emergency Department’s Ebola Virus Disease Preparedness

Abraham N, Jain A, Harrison D, Elting E, Malton W, Kim H, Patel A, Wei E/LAC-USC, Los Angeles, CA; Los Angeles County Department of Health Services, Los Angeles, CA

Background: The Ebola virus disease (EVD) outbreak in West Africa has led to more than 17,500 cases and 6,200 deaths worldwide since March 2014. The first confirmed US EVD case in Dallas, Texas and subsequent infection of two health care workers in September 2014 led to high anxiety amongst health care workers and the general public. Hospital and emergency department (ED) administrators scrambled to update their EVD protocols and to provide adequate training for their staff in compliance with evolving recommendations from the Centers for Disease Control and Prevention (CDC).

Study Objectives: To determine the overall cost of EVD preparedness in one county hospital ED. We hypothesize that there were high expenditures for EVD preparedness that placed a strain on a resource-limited county facility.

Methods: A retrospective review of all ED expenditures associated with complying with the CDC recommendations for EVD preparedness for a large, urban, academic, county ED with annual census of greater than 170,000 patients. The costs consisted of management time, planning meetings, personal protective equipment (PPE) training for staff, PPE supplies, and isolation tent installation.

Results: The total ED expenditures was $44,026. RN management and RN PPE training time accounted for $1,626 and $3,740, respectively. MD management and MD PPE training time accounted for $4,716 and $5,005, respectively. Total PPE costs were $28,098 while containment equipment totaled $840.

Conclusion: Although ED EVD preparedness protocols were developed prior to the first confirmed US case, widespread anxiety and fear of infection amongst health care workers led to frantic nationwide efforts to bolster hospital defenses against disease outbreak. In a resource-limited county hospital ED, efforts to comply with evolving CDC and County Department of Health Services recommendations for EVD preparedness led to steep expenditures that placed a significant economic burden on the ED. Similar scenarios likely occurred at every hospital across the country. Knowing EVD will not be the last epidemic to threaten public health in the US, there needs to be a more proactive, centralized, and standardized disaster response model for disease outbreak.

Emergency Department EVD preparedness costs by category

<table>
<thead>
<tr>
<th>Category of Expenditure</th>
<th>Cost (Dollars)</th>
</tr>
</thead>
<tbody>
<tr>
<td>MD Management Time</td>
<td>$4,716</td>
</tr>
<tr>
<td>MD Training Time</td>
<td>$5,005</td>
</tr>
<tr>
<td>RN Management Time</td>
<td>$1,626</td>
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<tr>
<td>RN Training Time</td>
<td>$3,740</td>
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<tr>
<td>Personal Protective Equipment</td>
<td>$28,098</td>
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<tr>
<td>Containment Equipment</td>
<td>$840</td>
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<tr>
<td>Total</td>
<td>$44,026</td>
</tr>
</tbody>
</table>

71 Had the Time Square Bomb Exploded: What Would Your Emergency Department Have Done?

Flaimm A, Fottin G, Frogel M/New York Institute of Technology College of Osteopathic Medicine, Brooklyn, NY; Maimonides Medical Center, Brooklyn, NY

Study objectives: On May 1, 2010, at 6 PM, there was an attempt to detonate a car bomb in Time Square, New York City (NYC). Had the bomb exploded, given the location and time of day, it is possible that many critically injured victims would have been children. The purpose of this paper is to raise awareness among emergency physicians to the possibility of a mass casualty event (MCE) requiring emergency department (ED) response to a large number of injured children in coordination with the pediatric critical care (PCC) units, offer a replicable model for disaster planning and drills, and provide insight from full scale exercises conducted at 7 hospitals in NYC. A MCE may result in an overwhelming number of critically injured children that exceeds available capacity of PCC units. The NYC Department of Health and Mental Hygiene (DOHMH) created a Pediatric Disaster Coalition (PDC), comprised of experts in emergency preparedness, emergency medicine, PCC, surgery, and city agencies. Currently, 21 NYC hospitals participate in the coalition. A survey conducted by NYC PDC in 2011 determined that on average, only 22% of PCC beds in NYC are available at any given time. EDs act as a gateway to the hospital and are charged with triage, stabilization and disposition. A disaster involving a large number of children may require activation of PCC surge plans to allow for disposition from the ED to the PCC unit. During a pediatric MCE emergency physicians may need to provide care for acute patients unrelated to event, triage and stabilize a large number of acutely injured children from the MCE pending disposition to surgery and PCC unit.

Methods: Seven hospitals completed PCC surge plans and tested them via a full scale exercise (FSE). A PDC representative participated in meetings at each hospital. Some of the hospitals used the Time Square event as the drill model. All hospitals used actors to simulate the victims. Three of the hospitals enlisted children from nearby schools as actors. They were given a card describing their injuries, moulaged, and briefed on how they should present at triage. The exercises included ED triage, patient evaluation, radiology, consultations and eventual admission to surgery, hospital wards and PCC unit.

Results: After-action conferences were completed at each site to determine lessons learned. The outcomes of the exercises were utilized to revise and operationalize the PCC surge plans. The process of planning for pediatric-specific disasters and conducting FSE helped participating hospitals identify their needs and improve in the areas such as ED activation and notification, local incident command, patient tracking, identification of additional ED surge capacity space, clearing ED upon notification, staffing and staffing notification, supervised overflow areas from ED for non-admitted children, family mental health center, one-way patient flow, ED incident command, supplies, pharmacy, employee needs and one-page protocols for unusual events.

Conclusions: Hospital plans for MCE should address unique pediatric needs. In order to provide PCC to a large number of victims, it is crucial that hospitals prepare PCC surge plans. It is important for emergency physicians to recognize their role in responding for MCE involving children in conjunction with PCC unit and other hospital areas. ED involvement in the creation of pediatric specific surge plans, and testing plans together with the PCC unit via FSE, may help improve hospital disaster plans.

72 Impact of Hurricane Sandy on the Staten Island University Hospital Emergency Department

Greenstein J, Berwald N, Chacko J, Ardolic B/Staten Island University Hospital, Staten Island, NY

Study Objectives: To describe and identify trends in patient volume and demographics, types of conditions treated, and admission rates as a result of Hurricane Sandy at Staten Island University Hospital North Site emergency department (SIUH-N).

Methods: Retrospective chart review of patients presenting to SIUH-N in the days surrounding the storm. Data was obtained from our emergency department information systems for October 26, 2012 through November 2, 2012 and compared to the same week of the year prior: October 28, 2011 through November 4, 2011. This control period was selected to account for seasonal variation in our geographic area. We looked at daily census, patient age, sex, admission rates, mode of arrival, and diagnoses in the days immediately prior to, during and after the storm.
Results: We saw a significant decline in patient volume for all ages on the day of landfill (day 0) with a census of 114; 55% compared to 2011 (Table 1). As seen in the Figure, the daily volume exhibited a precipitous drop on the days preceding the storm followed by a return to usual volumes after. We compared patient diagnoses for day 0 and the following day (day +1) to the same days of the week in October 2011. Chest pain and abdominal pain were common in both years. However, a notably larger percentage of patients were seen for medication refills in 2012; 5.8% versus 0.4% (P < .05). Lacerations and cold exposure were also substantially increased in 2012 at 7.6% versus 2.8% (P < .05) and 3.8% versus 0% (P < .05) of patient visits, respectively. This was likely related to destruction of homes and flooding, and to the limited availability of local clinics and pharmacies. Conversely, atraumatic back pain and motor vehicle accidents, common diagnoses in 2011 were nearly absent for the days reviewed in 2012. We experienced a large decline in admissions in the days prior to the storm, with a nadir on day +1 at 5% (-22%). Review of admitted patients revealed atypical admissions for home care service, such as need for supplemental oxygen or ventilator, as equipment and supplies to meet chronic needs were unavailable in the post storm period. In addition, we saw a drop in EMS utilization on days 0 and +1. SIUH-N typically sees 18% of patients arriving via EMS. On day +1, only 2% of patients arrived by ambulance. We presume this was due to limited access from flooding, roadway destruction and loss of electricity and telephone lines.

Conclusion: Our daily ED census saw a significant decline in the days preceding the storm, most notably on the day of landfill. In addition the types of conditions treated varied from our baseline, resulting in a drop in hospital admissions. Predicting clinical resource needs in the face of a natural disaster is difficult. Data such as that presented here can help make predictions for future scenarios.

73 Effect of Mass Casualty Incident on 72-Hour and 30-Day Return Rates to Carilion Roanoke Memorial Hospital Emergency Department

Liu M, Glick R, Burton J, Lee A, Kuehl D/Virginia Tech School of Medicine, Roanoke, VA; Carilion Clinic, Roanoke, VA

Study objectives: It is unclear how emergency department (ED) quality of care indicators are affected by mass casualty incidents (MCI). Policies instituted by Medicare that affect reimbursement penalties for 30-day return admission rates are a notable area of interest for such events. In this study, we sought to evaluate the effect a MCI has on a common quality of care indicator, 30-day ED return visit rates, for a tertiary-care institution.

Methods: This study was a retrospective cohort study of all ED patient encounters over the age of 18 from an electronic health record presenting to a large tertiary-care institution. Seasonal and annual variation in ED encounters was controlled in the data analysis with the primary outcome of interest studied as 30-day patient ED returns for medical care. Differences in patient ED return rates were subjected to ANOVA analysis.

Results: The total number of visit to the ED obtained during this time period was 471,459 visits, corresponding to a mean number of monthly patient visits during the study period was 6504 visits to the ED. The number of patient visits to the ED in the one month following the MCI was 7185 visits. Relative rates of return within 30-days for ED patients during the one-month interval following the MCI increased by 20.17% (P < .01, absolute increase of 2.61%).

Conclusion: An MCI at a single tertiary-care institution ED had a large detrimental impact on rates of return to the ED within 30 days. Policy and payment considerations dependent upon ED and hospital-quality indicators should factor adjustments for MCI events or similar factors that affect ED volumes and hospital resource utilization.

74 Tourniquet Use in a Civilian Out-of-Hospital Setting: The Los Angeles Experience

Sanko S, Mindlin D, Eckstein M/Keck School of Medicine of the University of Southern California; and Los Angeles Fire Department, Los Angeles, CA; Keck School of Medicine of the University of Southern California, Los Angeles, CA

Study Objective: Tourniquet application is a time-critical skill in the management of life-threatening exsanguination. Despite extensive use of tourniquets among military personnel, their use among civilian EMS providers is not well described. In January 2014, Los Angeles Fire Department (LAFD) began carrying combat application tourniquets. The objective of this study was to describe the experience of out-of-hospital tourniquet use in a large, urban, civilian EMS setting.

Methods: A retrospective review of electronic patient records from January 1, 2014 to March 31, 2015 (18 months) from LAFD, the EMS provider for a city of 4.1 million, identified 93 cases of reported tourniquet use. Patient demographics, causes and location of bleeding, time to tourniquet placement, success in achieving hemostasis and level of provider placing the tourniquet were all recorded.

Results: Tourniquets were applied in 81 incidents. Mean age of the patients was 44 years (IQR 30, 56); 73% were male (n=59). 17% reported a history of diabetes, 16% established HTN, and 21% chronic renal insufficiency. 41% were dispatched as BLS level of service and 59% as ALS; whereas in the field, based on local policy, 19% met criteria for BLS transport and 81% required ALS transport. Median time from patient contact to tourniquet placement was 5:00 minutes (IQR 2:00, 11:00), and median time from patient contact to leaving scene was 10:01 minutes (IQR 6:47, 14:58). 63% of incidents were due to penetrating trauma, 11% blunt trauma, 25% were due to bleeding dialysis access sites, and 1% were due to other sources of bleeding (eg, bleeding abscess). 79% of tourniquets were placed on an upper extremity, 20% on a lower extremity, and 1% on both an upper and a lower extremity. 11% of tourniquets were initially placed by bystanders, whereas 88% were placed by EMS personnel (of which 7% were placed by EMTs and 93% by paramedics). Hemostasis was achieved with the tourniquet in 77 (95%) of cases. Two patients (2.5%) suffered an out-of-hospital cardiopulmonary arrest: one due to exsanguination from a bleeding dialysis shunt who successfully achieved hemostasis with a tourniquet and subsequently regained pulses, and another who suffered a traumatic arrest due to gunshot wound to an extremity, had no out-of-hospital ROSC and subsequently died in the ED. Sixty-two (77%) were transported to a trauma center.

Conclusions: Out-of-hospital tourniquets were applied most often for penetrating trauma patients and bleeding dialysis shunts in this urban civilian EMS system with rapid achievement of hemostasis in almost all cases. Tourniquets should be widely available to all EMS providers.

75 Perception of Community Risk of Ebola and Its Effects on Volume in a Pediatric Emergency Department

Jones PW, Lucia DJ, Juergens AL/Scott and White, Temple, TX

Study Objectives: In the fall of 2014, a patient was diagnosed with Ebola in Dallas, TX. Many health care workers were exposed and some became infected. During this time, a Central Texas family was exposed to a nurse who was later diagnosed with Ebola. After the news broke, local officials closed several schools for cleaning. Our objective was to determine if this news caused any increased patient visits.
flow or influenced people to visit the emergency department (ED) at our free-standing pediatric hospital.

Methods: A phone survey was conducted following the announcement of school closures. The following eight days of the pediatric emergency department census data were used to select our survey population. Those with chief complaints that were consistent with media reports of Ebola symptoms (fever, headache, abdominal pain, etc) were selected as possible contacts. The potential subjects were then randomly selected to receive a phone call within seven days of their visit. Each participant was asked to answer five questions regarding the recent Ebola news and if that news influenced their decision to visit the emergency department.

Results: A total of 730 patients visited the emergency department over the eight-day period. Of those visits, 228 (31.2%) met our inclusion criteria and 140 of those were randomly selected to receive phone calls. Overall, 81 surveys were completed. Of those contacted 77 (95.1%) had heard about the Ebola case in Texas prior to their visit. Only 64 (79.0%) had heard of the local exposure and 73 (90.1%) had heard about the school closures. Ultimately, 10 (12.3%) of those surveyed stated that the recent news influenced their decision to come to the emergency department. The most common sources of Ebola information were TV or internet news agency 43 (53.1%), school newsletter 19 (23.5%), social media 15 (18.5%), radio, and word of mouth 1 patient each (1.2%). Two subjects (2.5%) had no source of information.

Conclusions: Emergency medicine lore states that during times of perceived public health crises, visits to the ED greatly increase. We found this not to be the case in this instance. Although the majority of those surveyed were aware of the concern for Ebola exposure in the community, only a few people stated that it affected their decision to visit the ED. Institutionalized sources (news agencies, school bulletins) provided the majority of the information to our patients. Our study only highlights one high-profile event, and further study is needed to better describe this phenomenon.

Patterns of Pediatric Injury in the Setting of Armed Conflict: Results of a Randomized Cluster Survey in Baghdad, Iraq

Carlson LC, Laflra R, Esac Al Shathari SA, Stewart BT, Burnham G, Kusheer AL/Brigham and Women’s Hospital and Massachusetts General Hospital, Boston, MA; Al Mustansiriya University, Baghdad, Iraq; Human Resources Development and Training Center, Iraq Ministry of Health, Baghdad, Iraq; University of Washington, Seattle, WA; Johns Hopkins Bloomberg School of Public Health, Baltimore, MD; Surgeons Overseas, New York, NY

Study Objectives: Injury accounts for over 11% of the total global burden of disease. This burden is greatest in low- and middle-income countries, where over 90% of deaths due to injury occur. In Iraq, this risk has been further compounded by ongoing conflict and violence since 2003. Children in such settings are particularly vulnerable, yet the epidemiology of pediatric injury during conflict has not been adequately assessed. This study aimed to characterize the pattern and outcomes of pediatric injury in Baghdad, Iraq from 2003 to 2014.

Methods: Between March and June 2014, we conducted a cluster randomized, cross-sectional, community-based survey in Baghdad to determine the epidemiology and impact of injuries occurring among children (i.e., under 18 years of age) between 2003 and 2014. Incidence, prevalence, hospitalization, procedures required and mortality were described. This study was approved by the University of Baghdad and the Iraqi Ministry of Health.

Results: A total of 900 households representing 5,148 persons were surveyed. There were 152 reported pediatric injuries. Within this group, the mean age at the time of injury was 8.48 years (SD: 5.07) and 114 were male (75%). The most common cause of injury was falls (34%), and the majority of injuries occurred at home (45%). Road traffic injuries (RTIs) accounted for 22% of injuries; 65% (22 of 34 RTIs) were pedestrian injuries. Fifteen percent of injuries were conflict related, primarily due to gunfire (7; 52% of conflict-related injuries), shells fragments (52%) and explosives (18%). Conflict-related injuries most often occurred amongst individuals 13 to 18 years of age (15 of 22 conflict-related injuries). There were 11 reported deaths out of the 152 pediatric injuries (7%). Additionally, 59% of reported injuries required surgical care and 24% were hospitalized. Mean length of stay was 2.4 weeks (SD: 6.34).

Conclusion: While traditional injury surveillance systems breakdown during times of armed conflict, this descriptive analysis provides novel insight into the patterns of pediatric injury amid insecurity. Conflict was responsible for one in six pediatric injuries during this time; however, falls and RTIs remained the most common causes of childhood injury. The need for surgical and hospital-based care was substantial, highlighting the need for strengthened surgical and acute care services in low- and middle-income countries, particularly those affected by conflict. Furthermore, the proportion of pediatric injuries resulting in death detected here was far higher than those reported in previous studies in low- and middle-income countries unaffected by conflict, typically less than 1-2%. This finding warrants further empirical investigation and reflects the need for bolstered efforts to prevent and intervene upon pediatric injury in times of conflict.

Pattern of pediatric injury by mechanism and age

<table>
<thead>
<tr>
<th>Age 0 - 3</th>
<th>Age 4 - 8</th>
<th>Age 9 - 12</th>
<th>Age 13 - 18</th>
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</thead>
<tbody>
<tr>
<td>(n = 34)</td>
<td>(n = 43)</td>
<td>(n = 29)</td>
<td>(n = 46)</td>
</tr>
<tr>
<td>Fall</td>
<td>15 (44.1%)</td>
<td>16 (37.2%)</td>
<td>11 (37.9%)</td>
</tr>
<tr>
<td>Road traffic injury</td>
<td>4 (11.8%)</td>
<td>12 (27.9%)</td>
<td>5 (17.2%)</td>
</tr>
<tr>
<td>Mechanical</td>
<td>4 (11.8%)</td>
<td>4 (9.30%)</td>
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<td>Poisoning</td>
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<tr>
<td>Electrical injury</td>
<td>0 (0%)</td>
<td>0 (0%)</td>
<td>1 (3.45%)</td>
</tr>
<tr>
<td>Conflict-related</td>
<td>3 (8.82%)</td>
<td>2 (4.65%)</td>
<td>2 (6.90%)</td>
</tr>
<tr>
<td>Others</td>
<td>6 (17.6%)</td>
<td>8 (18.6%)</td>
<td>8 (27.6%)</td>
</tr>
</tbody>
</table>

Perceived Retaliatory Evaluations of Faculty by Learners and Their Effect on the Culture of Feedback

Vora S, Williams S, De Boer K, Monrad S, Kamin C, Harris J (University of Illinois at Chicago, Chicago, IL; Stanford School of Medicine, Stanford, CA; University of California, San Francisco, San Francisco, CA; University of Michigan, Ann Arbor, MI)

Study Objectives: Faculty feedback plays a critical role in the education of medical learners. The reverse, evaluation of faculty by learners, has become an important consideration for academic promotion, with the potentially significant repercussions. There is scant literature on perceived retaliatory evaluations of faculty by medical learners. Our study explores this issue and its impact on the bi-directional culture of feedback.

Methods: A mixed-methods survey study was conducted with a purposive sample of faculty and learners from a wide range of institutions, specialties, and career stages. Open-ended question responses were analyzed to identify themes, using an inductive approach of constant comparative analysis associated with grounded theory.

Trustworthiness was achieved by involving multiple coders and by including data from diverse specialties, career stages, and geographical regions. Structured question data were analyzed with descriptive statistics.

Results: Twenty-three respondents represented 10 specialties from institutions across the US. Seventy-six percent were faculty, holding a range of leadership positions. Forty-seven percent reported they or a colleague had received an evaluation perceived to be in retaliation for “negative feedback.” Fifty percent indicated this perception made them or their colleagues less likely to give constructive feedback to learners. Three major themes focused on perceptions of retaliatory feedback were identified (with multiple sub-themes): attributes of the learner, (eg, perceived motivations), teacher, (eg, emotional reaction), and the evaluation itself (eg, tone).

Conclusion: Our study suggests the specter of perceived retaliatory evaluations has a major impact on faculty’s willingness to give constructive feedback. This threatens to undermine the culture of feedback necessary for effective medical education.

A Novel Teaching Model: Intubation in a Simulated Angioedema Airway Using a Fresh Frozen Cadaver

Walsh RM, Bothwell JD/Madigan Army Medical Center, Tacoma, WA

Background: The difficult airway is a common and challenging scenario in emergency medicine (EM). As educators, we are charged with preparing EM residents for successfully intubating patients with even the most troublesome anatomy. This situation is frequently encountered during the intubation of patients with severe angioedema. Fortunately, these patients are uncommon in the emergency department (ED). As a result, however, it is difficult to ensure each EM
residents are well trained in this intubation scenario prior to graduation. There are many maneuvers that allow for tongue swelling; however, it has been shown that cadaver training is more realistic.

Study Objective: Our primary objective was to develop an angioedema teaching model to increase resident knowledge, confidence, and proficiency at intubating in this clinical setting.

Methods: The angioedema model was implemented at our annual fresh frozen cadaver course. We found that angioedema can be easily simulated by injecting the lips, tongue, and larynx. Through trial and error and a multitude of different attempts including different needle sizes and injection materials, our most practical model came from the insufflation of air bilaterally near the sublingual glands. Using a 22 gauge spinal needle and a 60 cc syringe, we were able to easily cause realistic distention of the lips, tongue, and pharynx when we injected approximately 300 ml of air. Leaking still occurred, but re-insufflation was rapidly performed anytime deflation was detected, and the leaking did not fill the airways with liquid unlike our saline and agave models. Participants performed both direct and video laryngoscopy on the simulated angioedema cadaver. At the conclusion of the participants' intubation experience, participants completed a survey describing their impression of the angioedema model.

Conclusion: Participants included 5 board-certified EM faculty and 29 EM residents, with participants from all year groups. In response to the statement, “The angioedema model was high fidelity.” 12 residents strongly agreed, while the remaining 17 respondents agreed. In response to the statement, “The angioedema model was a good training model for angioedema,” 13 residents strongly agreed, while the remaining 16 respondents agreed. None of the participants answered strongly disagree, disagree, or neutral to either question. When solicited for comments on the model one participant wrote, “Awesome opportunity, I will be able to use this in the future.” As educators, we are always looking for more realistic training models for our residents. Because angioedema requiring intubation is an uncommon phenomenon, many residents will never encounter this scenario during their training. We have developed a simple angioedema training model using air insufflation in a fresh frozen cadaver. Our participants uniformly expressed positive impressions of both the fidelity and training quality of this model. Other EM residencies are encouraged to use this model in their own programs to facilitate training of the difficult airway in the angioedema patient.

Computer-Based Format Facilitates the Provision of Feedback During Mini-CEX Assessments in the Emergency Department

Chao C-H, Chang Y-C, Chen C-H, Chen C-H, Lee C-H, Ng C-J, Chen J-C/Chang-Gung Memorial Hospital and Chang-Gung University, Taoyuan, Taiwan

Background: Mini-CEX is widely used in the clinical education system. Receiving appropriate feedback during mini-CEX assessments promotes the identification of strengths and weaknesses within trainees’ clinical competencies, which is crucial for effective learning. Our objective is to analyse the effect of digitalization on feedback provisions during mini-CEX assessments.

Study Objective: This is a retrospective analysis of the documented feedback provided by assessors using mini-CEX in an emergency department (ED). The participants were post-graduate year-one (PGY1) doctors who were scheduled to undergo four mini-CEX assessments during their ED rotations. During the study period, the format was shifted from paper-based to computer-based according to the policy of the hospital management level. The contents were exactly the same between these two formats. The frequency of use and the word count for each feedback component (anything especially good, suggestions for development, and an agreed plan of action) were analysed.

Results: A total of 899 mini-CEX assessments were collected and analyzed. The completion rate of all three feedback components (strengths, suggestions for development, and an agreed action plan) were 19.9 percent and 28.3 percent when using a paper-based format and a computer-based format, respectively (Table 1). The feedback-facilitating effect of the computer-based format was uneven among junior and senior emergency physicians (Table 2). In addition, the feedback completion showed a primacy effect that the assessors tended to provide the first one or two feedback components in a busy ED setting (Figure).

Conclusion: A computer-based format facilitates the completion of the feedback, especially on the part of junior assessors.

Table 1. Demographics and comparison of mini-CEX components by different formats.

<table>
<thead>
<tr>
<th></th>
<th>Paper format (n = 295)</th>
<th>Computer format (n = 604)</th>
<th>P-value</th>
<th>Total (n = 899)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean age of patients (%)</td>
<td>55.1 ± 20.3</td>
<td>54.3 ± 19.3</td>
<td>0.583</td>
<td>54.5 ± 19.5</td>
</tr>
<tr>
<td>Senior doctor (&gt;10 years)</td>
<td>9.46 ± 4.9</td>
<td>7.80 ± 4.6</td>
<td>&lt;.001*</td>
<td>8.34 ± 4.7</td>
</tr>
<tr>
<td>Observation time (min)</td>
<td>14.0 ± 6.4</td>
<td>14.8 ± 8.6</td>
<td>0.140</td>
<td>14.5 ± 8.0</td>
</tr>
<tr>
<td>Feedback time (min)</td>
<td>10.5 ± 6.7</td>
<td>11.1 ± 5.0</td>
<td>0.169</td>
<td>10.9 ± 5.6</td>
</tr>
<tr>
<td>Clinical Domains measured</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Medical interview</td>
<td>294 (99.7)</td>
<td>603 (99.8)</td>
<td>0.549</td>
<td>897 (99.8)</td>
</tr>
<tr>
<td>Physical examination</td>
<td>291 (98.6)</td>
<td>600 (99.4)</td>
<td>0.450</td>
<td>891 (99.1)</td>
</tr>
<tr>
<td>Technical skills</td>
<td>144 (48.8)</td>
<td>72 (11.9)</td>
<td>&lt;.001*</td>
<td>216 (24.0)</td>
</tr>
<tr>
<td>Counselling skills</td>
<td>265 (89.8)</td>
<td>533 (88.3)</td>
<td>0.480</td>
<td>798 (88.8)</td>
</tr>
<tr>
<td>Clinical judgment</td>
<td>600 (99.3)</td>
<td>5.80</td>
<td>0.403</td>
<td></td>
</tr>
<tr>
<td>Efficiency / Organized</td>
<td>279 (94.6)</td>
<td>599 (99.2)</td>
<td>&lt;.001*</td>
<td></td>
</tr>
<tr>
<td>Professionalism</td>
<td>277 (93.9)</td>
<td>600 (99.3)</td>
<td>&lt;.001*</td>
<td></td>
</tr>
<tr>
<td>Word counts for each component</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Anything especially good</td>
<td>11.4 ± 7.3</td>
<td>9.0 ± 6.6</td>
<td>&lt;.001*</td>
<td></td>
</tr>
<tr>
<td>Suggestions for development</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Agreed action plan</td>
<td>11.0 ± 6.2</td>
<td>10.6 ± 7.6</td>
<td>0.504</td>
<td></td>
</tr>
<tr>
<td>Feedback components used</td>
<td>9.2 ± 5.1</td>
<td>12.8 ± 8.9</td>
<td>&lt;.001*</td>
<td></td>
</tr>
<tr>
<td>Anything especially good</td>
<td>263 (89.2)</td>
<td>540 (89.4)</td>
<td>0.910</td>
<td></td>
</tr>
<tr>
<td>Suggestions for development</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Agreed action plan</td>
<td>168 (57.0)</td>
<td>368 (60.9)</td>
<td>0.254</td>
<td></td>
</tr>
<tr>
<td>All three aspects of feedback provided</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>299 (33.3)</td>
<td>227 (25.3)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

§ Data presented as number (%).
\% Data presented as mean ± SD.
* Statistically significant.

Table 2. The subgroup analysis of feedback using computer-based format mini-CEX, stratified by seniority of 10 years.

<table>
<thead>
<tr>
<th></th>
<th>Junior EPs N=418</th>
<th>Senior EPs N=186</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mini-CEX time (in minutes)*</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Observation time</td>
<td>14.9 ± 9.6</td>
<td>14.4 ± 5.7</td>
<td>0.347</td>
</tr>
<tr>
<td>Feedback time</td>
<td>11.6 ± 5.2</td>
<td>9.93 ± 4.4</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>The frequency of each component utilized for feedback*</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Anything especially good</td>
<td>375 (89.7)</td>
<td>165 (88.7)</td>
<td>0.712</td>
</tr>
<tr>
<td>Suggestions for development</td>
<td>289 (69.1)</td>
<td>79 (42.5)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Agreed action plan</td>
<td>170 (40.7)</td>
<td>46 (24.7)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>All three aspects of feedback provided*</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>155 (37.1)</td>
<td>16 (8.60)</td>
<td></td>
<td>&lt;0.001</td>
</tr>
</tbody>
</table>

* Data presented as mean ± SD.
\% Data presented as number (%).
Background: Working in an urban, large volume, Level 1 trauma center residents are exposed to a plethora of patients who do not have English as their primary language but still require emergent evaluation. Residents are sometimes unaware of the resources available within the hospital for Language Services and interpretation of the patient history and therefore utilize non-certified individuals to obtain this information. The goal of our research was to improve awareness of Language Services to improve the care for patients who do not use English as their primary language.

Study Objectives: The objective of the study was to quantify provider comfort and type of interpreting services used. Providers were residents and physician assistants (PA), both of an emergency medicine (EM) residency and PA residency.

Methods: At the beginning of the academic year, a survey was given to 44 EM residents and 4 PA residents at a large, inner city, trauma center. Questions on the survey were designed in cooperation with Language Services. Surveys were administered to residents prior to a lecture given by Language Services on all resources available at our institution. Some of the topics in our survey included knowledge of a foreign language by provider, used language services in the past, and previous issues encountered with translation services.

Results: A total of 48 residents completed the survey. Sex distribution was 64.6% male and 35.4% female. Almost 1/3 of residents (27.1%) spoke a foreign language. 93.8% of histories were taken with telephonic interpreters. Additionally, 91.7% of respondents reported previously using family or friend of the patient to obtain the history and 81.3% used a colleague in the emergency department to obtain history. At the time of patient discharge only 30.4% explained discharge instructions with the use of an interpreter but 83.3% had used the option of printing the discharge instructions. The language barrier was discussed with 43.7% of patients and 83.8% of those who discussed the barrier mentioned that they used an interpreter.

Conclusion: This study demonstrates that EM residents working in a busy, urban level 1 trauma center with patients who do not speak English as their primary language often utilize family, friends and colleagues to obtain histories from the patients. This study also demonstrates that a high percentage of residents feel patient care is incomplete, even when an interpreter is used. This information might be valuable in designing resident education on the proper use of interpreters in the emergency department while working with Language Services to improve these interactions as well.

Figure 1. The completion rate of feedback components in mini-CEX assessments. These components were arranged in the order that appeared in the mini-CEX evaluation forms.

80 Utilization of Interpreter Services in the Emergency Department by Emergency Medicine Residents
O’Shea S, Carter M, Dominici P/Einstein Medical Center, Philadelphia, PA

81 What the Residents Don’t Know Will Hurt Them: The 2015 Patient Satisfaction Educational Needs Assessment
London KS, Druck J, Silver MA, Finetwood DC/University of Michigan Hospital System, Ann Arbor, MI; University of Colorado - Denver, Denver, CO; Kaiser Permanente, San Diego, CA; Hackensack University Medical Center, Hackensack, NJ

Study Objectives: Since the adoption of the Affordable Care Act in 2010 and arguably earlier, patient satisfaction (PS) has become a metric that can profoundly affect the careers of individual physicians, the functioning of entire departments and the fiscal balance of most hospitals. While government and hospital mandates demonstrate the prominence of PS as a quality measure, no such mandate exists for its education. The objective of this study was to determine the education and evaluation landscape for PS in categorical emergency medicine (EM) residencies.

Methods: This was a prospective survey analysis of the Council of Residency Directors (CORD) membership. Program directors (PDs), assistant PDs and core faculty who are part of the CORD listserve were sent an email link to a brief, anonymous electronic survey. Respondents were asked their position in the residency, the name of their institution and questions regarding the presence and types of PS evaluative data and education they provide.

Results: One hundred forty-nine responses were obtained from 126 individual residencies, representing 59% of all categorical EM residencies. 28% of responding residencies provide PS data to their residents. Of that 28%, 37% provide third party acquired data specifically about residents, 35% provide third party attending data on cases with resident participation, 32% provide internally acquired quantitative data with others providing simulation scores, anecdotes and other modalities. 38% of residencies have organized PS curricula. 95% of those utilize formal didactics, but others also use small group sessions (47%), simulation (46%), asynchronous materials (28%) and standardized patient encounters (24%). Most residencies with curricula explain techniques that can improve PS scores (95%) but only 49% explain the differences between surveys residents may be evaluated with upon graduation.

Conclusion: The majority of categorical EM residencies do not provide either PS data or any organized PS curriculum. Those that do utilize a heterogeneous set of data collection modalities and educational techniques. Further work is needed to improve education given the high stakes of PS in EM careers.

82 Experiential Value of Emergency Medicine Resident Membership on Hospital Rapid Response Team

Background: Rapid response teams (RRTs) have been instituted in hospitals across the country to manage deteriorating patients and are generally staffed by some combination of respiratory therapists, critical care nurses, and internal medicine/critical care resident or attending physicians. Emergency medicine (EM) residents are extensively trained to evaluate and stabilize life-threatening conditions on undifferentiated patients and have additional training in establishing vascular access and airway interventions. As such, they have been an integral part of the RRT at our institution since 2008.

Study Objectives: We investigated the resuscitative and procedural experience gained by EM residents as a result of being part of the RRT. We analyzed the type and frequency of interventions made by our residents during rapid response calls.

Methods: To be part of the RRT, EM residents must be post-graduate year 2 or greater in good standing, have 35 operating room and emergency department intubations, and have passed a simulated rapid response run with the Director of Emergency Simulation. We reviewed RRT logs from 2008 to 2013, analyzing interventions performed by the EM resident during the call. We a priori identified “interventions” as endotracheal intubation, ordering of non-invasive positive pressure ventilation, placement of central vascular access, placement of intraosseous access, and/or ordering of resuscitative medications.

Results: Seven hundred fifty-nine activations of the RRT were analyzed. EM residents intubated rapid response patients in 31.1% of calls and NIPPV was ordered in 13%. Vascular access was established by the EM resident by central venous catheterization in 2.5% of patients and intraosseous placement in 0.4%. Resuscitative medications were ordered by the EM resident in 14% of rapid responses.
Conclusion: By functioning as part of a RRT, EM residents have increased exposure to resuscitation and critical care procedures.

83 Using Standardized Patients to Evaluate Medical Students’ Evidence-Based Medicine Skills
Amini R, Hernandez NC, Keim SM, Gordon PR/University of Arizona, Tucson, AZ

Study Objectives: To determine the effectiveness of an Evidence-Based Medicine Objective Structured Clinical Examination (EBM OSCE) with standardized patients for end of third year medical students at our institution.

Methods: This was a single-center prospective cross-sectional study. As part of the eight-station OSCE exam, the investigators developed and implemented a new 25-minute EBM OSCE station with the goal of evaluating students’ ability to search for a relevant article, appraise the article, define and discuss the concept of relative risk and number needed to treat with regards to the administration of dexamethasone for rebound migraines. The OSCE case involved a highly educated patient with a history of recurrent debilitatating migraines who has brought eight specific questions regarding the use of steroids for migraine headaches. Students were provided computer stations equipped to record a log of the searches performed.

Results: One hundred four third-year medical students participated in this study. The average number of search tools used by the students was 4 (SD=2). A total of 896 searches were performed by 104 students. The two most commonly used Web sites were upToDate.com and google.com. Sixty-nine percent (95% CI, 60% to 78%) of students were able to find a meta-analysis regarding the use of dexamethasone for the prevention of rebound migraines. Fifty-two percent of students were able to explain that patients who took dexamethasone had a moderate RR (0.68 – 0.78) of having a recurrent migraine, and 71% of students were able to explain to the standardized patient that the NNT for dexamethasone was nine.

Conclusion: Standardized patients were successfully used to evaluate medical student EBM skills during an OSCE.

84 Do Reflective Students Learn More in the Emergency Department?
Hu K, Leuthauser A, Chary M, Hixson B/ICAhn School of Medicine at Mount Sinai, New York, NY

Study Objectives: Medical schools have begun to incorporate self-reflection exercises into their curricula. It is thought that these exercises help students master the material more deeply and perform better on exams. There are few data supporting this hypothesis. We evaluated the relationship between the degree of reflection after a student’s shift in an emergency department and that student’s final grade.

Methods: We conducted a retrospective case series by analyzing the performance and reflective statements of 116 students who participated in an emergency medicine clerkship at two clinical sites from 2013-2014. After each shift, an attending emergency physician evaluated the student and the student could complete an optional reflection free text section. We extracted the text from those comments, removed stopwords, and lemmatized the remaining words. Stopwords are words that occur frequently and serve only a grammatical functions, such as "a", "the", "of." We analyzed the correlation between a comprehensive exam grade and the fraction of reflections with at least one content word. We determined the most common words and pairs of adjacent words that students used to describe their reflections. We computed the median scores of those who wrote reflections more than half of the time with those who wrote reflections less than half of the time.

Results: Of the 145 possible records, 116 were included for analysis. The other 29 were excluded as they were visiting students. The correlation between exam grade and the number of completed self-reflections was 0.32. The correlation between exam grade and the average number of words in each self-reflection was 0.21. The first correlation is significantly greater than 0 (P = .05, t-test), but the second correlation is not (P = .16, t-test). The median score of those who wrote reflections on more than half of their shifts was significantly greater than those who wrote reflections half of the time, 83.675 versus 79.23 (P = .05, 2-sample Kolmogorov-Smirnov test).

Conclusion: Students who reflected more frequently scored more highly on a final written exam in an emergency medicine clerkship designed for fourth year medical students. The number of words in each reflection was not significantly correlated with exam performance. A more formal reflection program, perhaps including data from the clinical notes students write during their rotation, could help identify students struggling to master the content before they take the final exam.

85 Prevalence and Survival Impact of Bystander Cardiopulmonary Resuscitation in Sudden Cardiac Arrest Victims Treated by a Large, Urban Emergency Medical Services System in North America
Goodloe JM, Braithwaite SA, Arthur AO, Arthur E, Reed H/University of Oklahoma School of Community Medicine, Tulsa, OK; Office of the Medical Director, EMS System for Metropolitan Oklahoma City and Tulsa, Tulsa, OK

Study Objectives: Bystander cardiopulmonary resuscitation (CPR) is often cited as a contributor to neurologically intact survival from out of hospital sudden cardiac arrest (OOH SCA). Ardent efforts continue in hopes of training more laypersons in CPR, producing higher prevalence of bystander CPR in OOH SCA events, and realizing greater success in neurologically intact survival from cardiac arrest. This study’s purpose is to analyze demographics, prevalence and survival impact of bystander CPR in two large, urban metropolitan areas of North America.

Methods: Database query and descriptive analysis utilizing a multiple-variable database designed for use by medical oversight in a large, urban emergency medical services (EMS) system in North America. The database contains demographic, clinical resuscitation, and outcomes variables on all OOH SCA victims with resuscitation initiated by the study EMS system from January 1, 1993 onward. This study’s cohort included all such OOH SCA victims from January 1, 1993 through December 31, 2013.

Results: In the 21-year period, 20,567 resuscitations occurred. A bystander witnessed the arrest in 8,334 (40.5%) instances. Whether witnessed or not, bystander CPR was started in 7,028 (34.2%) of arrests. There was a downward trend of resuscitations being witnessed by bystanders from a high of 444/827 (53.7%) in 1995 to a low of 394/1232 (32.0%) in 2012. Despite this lower witnessing trend, there was an upward trend of bystander CPR being provided, from a low of 198/788 (25.1%) in 1994 to 472/1187 (39.8%) in 2012, with a high of 455/1028 (44.3%) in 2005. For 12,409 victims in which final outcomes were captured (mid-2000 and forward), bystander CPR was associated with an overall discharge from hospital rate of 694/4475 (15.5%). When compared to those surviving to hospital discharge without bystander CPR of 983/7934 (12.4%), P = .008. Using logistic regression, OR = 1.30 with 95% CI 1.17 - 1.44. Survival with a cerebral performance category score of 1 or 2 was enhanced by bystander CPR as well, bivariate logistic regression yielding OR = 1.65 with 95% CI 1.40 - 1.94.

Conclusion: In a particularly large cohort of OOH SCA victims, treated by the study EMS system in the over twenty years included, bystander CPR promotes neurologically intact survival with statistically significant results.

86 Recredentialing in Out-of-Hospital Care: Are We as Good as We Once Were?
Escott MEA, Case CM, Gilesgaard GR, Anderson JL, Gillum LS, Kennedy KM/Baylor College of Medicine/EMS Collaborative Research Group, Houston, TX; Montgomery County Hospital District, Conroe, TX; Montgomery County Hospital District, Conroe, TX

Background: Credentialing of medical staff within the hospital environment is a required discipline. The National EMS Scope of Practice Model is based on the framework of education, certification, licensure and credentialing, which varies within each system in sophistication and formalism. Recredentialing (RC) is the monitoring and periodic process that ensures professionals are re-evaluated to assure continued safe and effective patient care. Presently, a paucity of literature exists regarding RC within emergency medical services (EMS). The objective of this study was to determine if paramedics continued to meet the minimum requirements that were originally authorized under the license of the EMS medical director.

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Methods: A retrospective quality data review was conducted on all In-Charge (P3) and Supervisor (P4) paramedics in the suburban/rural EMS system of Montgomery County Hospital District (MCHD), Texas between August 14, 2014 and December 31, 2015. MCHD implemented a novel EMS RC process required at all levels of authorization. The algorithm includes two phases and requires participants to complete: Phase I—written exam (clinical guidelines, clinical knowledge and critical decisionmaking), Phase II—skill testing (demonstrate proficance use of all MCHD equipment and procedures within clinical guidelines). Candidates must have a minimum score of 80% to continue to Phase II. If a candidate does not meet the minimum grade a retest is offered, followed by an action plan for improvement. The goal of the action plan is to provide the candidate with the resources to be successful in the recredentilating process. Phase I pass scores were recorded for analysis and descriptive statistics were utilized to describe the standard study data characteristics.

Results: Phase I testing included a total of 37 (24.7%) of MCHD paramedics, with 29 (78.4%) (95% CI: 0.651-0.917, \( P < .001 \)) significant RC passing. Of those 24 (64.9%) were P3 with no difference in calculated pass rates P3 18 (75.0%) and P4 11 (84.6%) (95% CI: -0.1819-0.3739, \( \Delta P = .498 \)). The mean EMS years of experience were P4 14.6 and P3 12.2, (95% CI: -2.219-7.14, \( P = .293 \)).

Conclusions: The creation of a RC requirement policy resulted in a significant number of senior paramedics continuing with their authorization level, as well it also led to 8 or 22% of this group being demoted and/or put on performance plans. Further research is required to determine the effect of RC within EMS for continued safe, high quality health care.

87 Comparing Pressures for Improvised Wound Irrigation Devices
Spano SJ, Campagne D, Falcón-Banchs R, Montoya J, Luck JB/University of California, San Francisco, Fresno, CA; University of California, Berkeley and University of California, San Francisco Bioengineering Program, Berkeley, CA; Yosemite National Park, Yosemite Village, CA

Background: In the wilderness, many techniques are suggested to improvise wound irrigation. These improvised wound irrigation strategies have not been studied in a systematic way.

Study Objectives: Compare the pressures measured by improvised irrigation techniques to a commercial irrigation device used at a Regional Level 1 Trauma Center, and to pressures previously reported in the literature.

Methods: Devices tested include a commercial 500ml compressible plastic bottle with splash guard, a 10ml syringe found commonly in backpacking and to pressures previously reported in the literature.

Devices tested include a commercial 500ml compressible plastic bottle with splash guard, a 10ml syringe found commonly in backpacking and to pressures previously reported in the literature. A high speed pre-needle, and a backpack bladder-style hydration system (Osprey 3L). Each device was punctured by a 14-inch needle, a Ziploc plastic bag with puncture from a 14-inch needle, and a backpack bladder-style hydration system (Osprey 3L). Each device was pre-filled with water to its maximum capacity, leveled on a support and aimed towards a piece of glass. Maximum pressure was exerted on the device. A high speed camera (Panasonic Lumix DMC-FZ28) was placed behind the glass, recording the height of the stream upon impact at its highest and lowest point. Measurements (Figure) of Y0, Y1, and X were measured five times for each device. Y0 is the height of the support, X is the distance between the support and the glass, and Y1 is the height of the irrigant stream striking the glass. \( \Delta Y \) is the calculated difference between Y0 and Y1. Pressures in pounds per square inch (PSI) were calculated using these measurements.

Results: The syringe and needle pressures reached similarly high ranges seen in irrigation systems measured with human volunteers (35psi) rather than low prediction (8psi) from a landmark benchtop model. The 10ml syringe measured the highest pressures (23-49psi), followed by the 10ml syringe with 14-inch needle (15.7-24psi), the 14” punctured water bottle (7-25psi), the 50ml Syringe (7-11psi), water bottle with sports top (3-7psi), and commercial device with splash guard (4-5psi). Only the bladder-style hydration system (1-2psi) and plastic bag with 14-inch needle puncture (2-3psi) did not reach pressures generated by the commercial irrigation system with splash guard cap.

Conclusions: Pressures measured are consistent with those reported in a human subject model. Both the water bottle improvised systems and all syringe-based systems provided pressures at or exceeding those measured with a commercial wound irrigation device. A 14” punctured plastic bag and bladder-style hydration pack failed to generate similar irrigation pressures.

88 Comparison of Emergency Medical Services and Emergency Department Providers’ Clinical Impressions and Time to Disposition
Siegler JE, Wojcik S, Landsberg D/Upstate Medical University, Syracuse, NY

Study Objectives: It is expected of emergency medical services (EMS) providers to correctly interpret available clinical data and formulate a clinical impression that coincides with a standing order treatment guideline/protocol or to contact medical control for orders. It is expected that if the EMS providers’ impression is accurate necessary treatments will be provided in the out-of-hospital setting. The purpose of this study was to determine if agreement between EMS and emergency department (ED) providers impression impacts the patients’ ED time to disposition.

Methods: A convenience-based survey was conducted between March and August 2014 during the hours of 8am to 12am when research associates were available at an academic level 1 trauma center emergency department. A chart review was performed to determine the ED provider’s final impression and time to disposition. Surveys were reviewed by a senior emergency medicine resident physician to determine if the EMS and ED provider impressions agreed.

Results: Two hundred forty-eight patient encounters representing patients transported by 40 EMS agencies in the central New York region were collected. The mean age of patients was 43.6 (±26) years and 50% were males. The EMS and ED providers’ impression agreement was 85.9%. There was no statistical difference in the time to disposition with respect to impression agreement. Among the 5 EMS services that were surveyed the most, agreement ranged from 76.5-93.3% and were not statistically different. EMS providers surveyed were 78 EMT-Basic/Level 1 (31.5%), 1 EMT-Intermediate-Level 2 (0.4%), 16 EMT-Critical Care/Level 3 (6.5%), 153 EMT-Paramedic/Level 4 (61.7%). There was no statistical difference in the distribution of levels of providers by whether or not EMS and ED provider impressions were in agreement. The EMS providers averaged 12 (±10) years in EMS and it was not a predictor of EMS and ED provider impression agreement. There was no statistical difference in the agreement of EMS and ED provider impression between pediatric (0-19 years, 89.8%) and adult (≥19 years, 84.6%).

Finally, amongst the group of patients where there was disagreement in impression, there was a greater percent of women in the group. 71.4% (\( P = .006 \)).

Conclusion: From our available data, we were not able to show a statistical difference in time to disposition with regards to impression agreement. The findings suggest that the accuracy of diagnostic impression by EMS providers in this cohort is affected by patient sex. This may reflect an area for further research and/or education.
Study Objectives: Ketamine is a potent dissociative agent with analgesic properties. We implemented emergency medical services (EMS) out-of-hospital protocols for the administration of ketamine for pain, sedation, excited delirium/behavioral control, and medically assisted airway management. We implemented prospective reporting tools directed at safety and efficacy.

Methods: Utilizing standardized chart review, we analyzed 1240 separate patient encounters.

Results: The average patient age was 47.8 years (range 6 months to 109 years). Sixty percent of the patients were male. Pain was the commonest indication for administration (44.2%) followed by sedation (29.8%), excited delirium (17.6%) and MAAM (6.3%). 38.4% of cases were trauma, 46.7% were medical, and 14.1% were psychiatric. Ketamine was the only medication administered for analgesia or sedation in 71% of cases. Route of administration was IV in 79.8% of cases, IM in 19.4%, and IO in 1.2%. Adverse reactions were rare, occurring in 3.5% of cases, and serious adverse reactions (death or unplanned airway intervention) did not differ significantly from our baseline rate.

Conclusions: This large case series demonstrates the safety and efficacy of ketamine in the out-of-hospital setting.

Characterization of Pediatric Out-of-Hospital Cardiac Arrests After Implementation of a Pit Crew Approach to Resuscitation

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Study Objectives: To evaluate characteristics of pediatric out-of-hospital cardiac arrests following implementation of a “pit crew” approach to resuscitation.

Methods: Retrospective case review of pediatric cardiac arrests occurring in an urban/suburban emergency medical services (EMS) system before and after implementation of a pit crew approach to resuscitation. For the purposes of this study, pediatric was defined as less than 18 years of age. All pediatric patients who received cardiopulmonary resuscitation (CPR) by EMS personnel were included. Data were collected from electronic patient care reports, manual review of electronic records, and follow-up with receiving hospitals. Patient characteristics included age, presumed etiology of arrest, witnessed arrest, bystander CPR, and initial cardiac rhythm. Primary outcomes were termination of resuscitation on scene; sustained return of spontaneous circulation (ROSC) at any time; and survival to hospital discharge. Characteristics of subpopulations were compared using the Wilcoxon Rank Sum and Fisher’s Exact Test.

Results: There were 73 total pediatric cardiac arrest events from January 2010 through March 2013 during the study period; 54 (74%) of those occurred after implementation of the pit crew approach to resuscitation. More than half (54.8%, n=40) of all cases occurred within the first two years of life, with the remaining distributed across the pediatric age range. A total of 48 cases (55%) were dispatched as “cardiac arrest.” Presumed etiologies for cardiac arrest were as follows: respiratory 31%; cardiac 23%; trauma 11%; drowning 6%; other 29%. Twenty-six percent of cases were witnessed, and 44% received bystander CPR. Six (8%) cases were found to have an initial shockable rhythm. Resuscitation was terminated on scene in 56% (n=41) of cases. Overall survival prior to implementation of the pit crew approach was 0%; after pit crew implementation it was 17% (p=0.052). In the sub-population of patients transported to the hospital following pit crew implementation, 14 (46.7%) achieved sustained ROSC, and 9 (30%) survived to hospital discharge. Survivors were more likely to be older than non-survivors (median [IQR] age 7 years [3.12] versus 1yr [0.4], p=0.02), less likely to present in asystole (0% versus 45%, p<0.001), and more likely to be witnessed arrests (67% versus 21%, p=0.008). There was no significant difference in etiology or rate of bystander CPR.

Conclusion: These data suggest that adoption of a pit crew approach to resuscitation might improve outcomes following pediatric cardiac arrest. Survival may also be associated with the age of the child, presenting rhythm, and bystander CPR.

Unscheduled Return Visits to the Emergency Department: 9 Years On

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Study Objectives: Unscheduled return visits (URVs) to the emergency department (ED) reflect shortcomings in care and may result in increased morbidity and cost. We aim to investigate the incidence and factors associated with URVs, especially those requiring eventual admission and those with incorrect diagnoses on initial visit, and compare with similar data obtained in 2005.

Methods: This retrospective chart review of patients >16 years from the ED of National University Hospital, Singapore who had URVs within 72 hours from January 1, 2014 to June 30, 2014 excluded those with alcohol intoxication, returns for unrelated complaints and scheduled returns. Data was extracted from electronic medical records. Univariate and multivariate analyses were performed.

Results: There were 66 775 ED attendances during the study period, a 74% increase from 9 years before. Proportion of URVs was smaller compared to 2005 (1.94% vs 2.19%, p = .006), involving 1 207 patients with a median age of 34 years. The majority of patients with URVs were below 60 years (83.9%), community ambulant (98.6%), independent (99.2%) and seen at the ambulatory area of the ED (64.8%). On initial visit, 6.6% of patients were admitted. This proportion increased to 37.4% on URVs, with a median length of stay of 5 days. Patient outcomes following URVs include 5 deaths, 15 requiring critical care and 52 undergoing surgery. A multivariate stepwise logistic regression analysis identified the following factors associated with URVs requiring admission (odds ratio; 95% confidence interval): age ≥60 years (2.26; 1.60-3.21), female (2.15; 1.60-2.75), diabetes mellitus (1.99; 1.29-3.07), diabetes mellitus with end-organ damage (2.47; 1.01-6.03), previous myocardial infarction (2.86; 1.39-5.89) and chronic renal disease (5.25; 2.07-13.31). The most common presenting complaints were abdominal pain (22.2%), fever (21.0%) and nausea/vomiting (14.3%). Through another logistic regression model, URVs requiring eventual admission more likely presented with abdominal pain (1.91; 1.42-2.58), fever (1.67; 1.26-2.21), nausea/vomiting (1.51; 1.07-2.14), giddiness (2.54; 1.56-4.14), cellulitis/abscess (3.34; 1.71-6.52), asthma (3.08; 1.38-6.05) or dyspnea (3.33; 1.90-5.84). Incorrect diagnoses contributed 15.6% of URVs and were more likely to be admitted (2.40; 1.75-3.30). A quarter of patients had pain scores ≥5 upon their initial visit discharge. Patients with persistent pain made up 47.8% of URVs. Those with pain scores ≥5 (1.87; 1.22-2.84) and URVs for persistent pain (2.14; 1.41-3.26) were associated with incorrect diagnoses.

Conclusion: Despite a drastic increase in ED attendances since 9 years ago, the proportion of URVs has improved. Efforts must be directed to address pain with good documentation of relief before discharge. Physicians should be vigilant in the assessment of patients with higher risk of URVs to reduce its occurrences.

Multicenter, Prospective Study of Out-of-Hospital Administration of Analgesia in the Combat Theater in Afghanistan

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Study Objective: Early administration of analgesia has been reported to decrease morbidity after combat injuries. Currently limited data exists on analgesia administration practices in the out-of-hospital combat setting. In a previous study we reported the rate and type of analgesia in a out-of-hospital combat setting. However, that study was small, not stratified based on Injury Severity Score (ISS), injury pattern, or Glasgow Coma Scale (GCS), or report 30-day outcomes. In this study our goal was to determine whether these factors influence analgesia administration and 30-day outcomes in a large cohort.

Methods: In this IRB-approved study, we collected life-saving interventions (LSIs) performed on patients who arrived to 6 combat hospitals from the area of the ED re, treated by any provider type, and of any nationality. Military special interest patients were excluded. Trained site investigators evaluated patients on arrival and recorded demographics, vital signs, LSIs performed out-of-hospital, and analgesia administration. The agent, route and dose were documented. ISS of < =15 was mild and greater than 15 severe. For statistical analysis we compared the incidence with chi-square or Fisher’s exact tests.
Barriers to Safety in the Emergency Department: The Resident Experience
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Study Objectives: The practice of emergency medicine requires clinicians to care for patients with a broad range of both medical and psychiatric disease. Residents in training, who often have the most direct exposure to patients, are regularly faced with violent patients. However, these events often go unreported or unacknowledged. It is critical to address the factors that contribute to patient-initiated violence in the workplace, and what clinicians perceive as the barriers to maintaining their own safety. This study was conducted with the purpose of elucidating emergency medicine residents' experiences with violence in their emergency departments, as well as residents' perceptions of security in their work environment.

Methods: A paper survey was distributed on the same day to 143 emergency medicine residents from 3 ACGME-accredited residencies within the Mount Sinai Health System, two of which are PGY 1-3 and one is a PGY 1-4 program. All residents (PGY 1-4) were eligible. These residents work at a total of 7 hospitals within a large metropolitan area. Survey questions were derived from a previously published peer-reviewed study on violence in the emergency department, and included questions on types and frequency of violent acts, prior training received, contributing factors and job satisfaction. The three types of contributing factors addressed were patient, environmental and staffing. Descriptive statistics were calculated where appropriate.

Results: One hundred nineteen residents (89%) participated in the study, 74 (62.2%) were male, 36 (30.8%), 35 (29.4%), 36 (30.3%) and 12 (10.1%) of the respondents were PGY-1 through PGY-4, respectively. 118 (92.9%) of the respondents reported that specific patient factors contribute to physical abuse. Among these, the most frequent were alcohol (113; 95.0%) and drug use (112; 94.1%). One hundred ninety residents (91.6%) reported psychiatric disease. Seventy (58.8%) reported organic causes such as dementia leading to physical abuse, while 76 (63.9%) cited a patient's inability to deal with a crisis situation. One hundred eighteen (99.2%) reported environmental factors, with a lack of security or police (82.4%; 95% CI =75.5-89.2%) and security or police not responding in a timely manner (68.1%; 95% CI =59.7-76.4%) as the most common contributors to physical abuse. Patient areas open to the public, and ease of bringing weapons into the ED were both cited by 59 (58.0%) as leading to increased risk of violence. 115 (96.6%) reported staffing factors as a cause of physical abuse, with a lack of adequate staff (79.8%; 95% CI =72.6-87.0) being the most common. 59 (49.6%; 95% CI =40.6-58.6%) of respondents felt that working evening and nights made them more likely to encounter violence. Seventy-nine (66.4%) of respondents reported "Often" feeling safe at work and 92 (77.3%) felt "Somewhat" or "Very" satisfied with their current position. However, 58 (48.7%) felt "Somewhat" or "Very" dissatisfied with the security in their emergency department.

Conclusions: Patient, environmental, and staffing factors were all reported as significant barriers to safety in the workplace by the surveyed residents. The majority of residents are not satisfied with security presence, and there is opportunity for system-wide improvement in policies and procedures to promote a culture of safety. These findings support the need for a multifaceted approach towards reducing violence in the emergency department.

Rotational Patient Assignment versus Physician in Triage: A Comparison of Two Emergency Department Front-End Process Redesigns
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Study Objectives: Rotational patient assignment (RPA) is an emergency department (ED) front-end process in which patients are automatically and algorithmically assigned to physicians. Physician in triage (FIT) is a front-end process in which a physician (often with a nurse) evaluates and treats patients before they are placed into a room in the main ED. Both have been associated with improvements in ED throughput, but their comparative efficacy is unknown. We sought to compare ED operational metrics using RPA versus those using FIT at a single facility in consecutive years. ED operational metrics were length of stay (LOS), arrival to provider time (APT), left without being seen (LWBS), left before treatment complete (LBTC), early (within 72 hours) return to the ED (72R), early returns to the ED who were admitted (72RA), and complaint ratio (CR).

Methods: Design: Retrospective cohort review. Setting: Single site facility with 27,000 visits per year. Type of participants: Patients seen on 25 days during which PIT
was used in 2011 to 2012 and a matched cohort of 23 days during which RPA was used in 2012 to 2013. All days in both groups were the busiest days of the week (Monday and Friday) during the busiest season of the year (winter). In the primary analysis, we performed an unadjusted comparison of the two groups. In the secondary analysis, we performed an adjusted comparison of time outcomes (LOS and APT) utilizing multivariate regression to account for identified potential confounders. Identified potential confounders were patient characteristics (age, sex, and severity index [ESI] score), ED daily volume, ED physician staffing, ED nurse staffing, ED holding, and effective hospital occupancy.

Results: There were 1,906 visits during RPA and 1,869 visits during PIT. Primary Analysis: In a simple comparison, RPA was associated with a lower median LOS (219 minutes versus 233 minutes; difference of 14 minutes; 95% confidence interval [CI] 5.27 minutes to 21 minutes) and lower median APT (25 minutes vs. 44 minutes; difference of 19 minutes; 95% CI, 15.22 minutes) than PIT. There were no significant changes in LWBS, LBTC, 72R, 72R, 72R/A, or CR. Secondary Analysis: Multivariate linear regression incorporating identified potential confounders found no statistically significant difference in the geometric mean of LOS for RPA versus PIT (204 vs 217 minutes; reduction of 6.3%; 95% CI, 3.6% to 15.2%). Secondary analysis did confirm an improvement in geometric mean of APT for RPA versus PIT (14.6 vs 27.4 minutes; reduction of 46.8%; 95% CI, 33.6% to 57.4%).

Overall, about 8-30% of physician laboratory orders may not be indicated. The lack of indication can compromise ED reimbursement, as well as increase cost to the patient. Our administration determined that three lab tests were overutilized: prothrombin time and INR (PTT), partial thromboplastin time (PTT) and urine culture (Urine). The decision was made to remove these tests from the “most commonly used” list in the EMR. If the provider deemed that these tests were still indicated, it was possible to order from a more extensive drop down menu. In this study, we investigated the change in the monthly average number of PT/PTT/Urine lab tests before and after their removal from a commonly used list. We presumed that this additional step would decrease the overall amount of PT/PTT/Urine tests ordered. This decrease in average tests ordered would have potential financial benefits.

Methods: This was a retrospective study of physician ordering habits in two urban, academic emergency departments. In April 2014, the ED’s administration removed PT/PTT/Urine from the easily accessible drop down menu. The tests were still available if necessary. Physicians and staff were made aware of the change through multiple emails and reminders. We hypothesized that this implementation would result in an overall decrease in the number of tests ordered. The reduction of PT/PTT ordered was statistically significant and resulted in substantial cost savings. Through this study, we believe that the electronic medical record is an important tool in combating over-testing and reducing health care spending.

Study Objectives: Timely documentation improves communication between providers, increases patient safety and reduces harm events. Both academic and community emergency departments (ED) often struggle to improve this compliance metric. It is particularly challenging within a salaried model where incentives are not allowed. We sought to measure whether two, simple interventions—data transparency and disincentives—would improve 48-hour chart closure in a variety of ED settings.

Methods: We conducted a multicenter, interventional study comparing physician rates of 48-hour chart closure before and after the implementation of two interventions: (1) data transparency and (2) financial disincentives. Data transparency included an email to all physicians with a list of un-blinded names and the numbers of charts that remained open for each physician past 48 hours; any physician who still had open charts after 30 days had 10% of his pay withheld. This study was conducted across five EDs—one large, academic medical center and four community practice settings. It included 65 emergency physicians who cared for 171,988 patients over a 16-month period. Withheld charts were compared before and after the intervention. We performed a Chi-square test to compare proportions pre and post intervention.

Results: Pre-intervention data showed that 521 of 8765 charts (5.9%) remained open after 48 hours. Post-intervention data showed that 2635 of 163,233 charts (1.6%) remained open after 48 hours, a relative reduction of 73% (5.9% versus 1.6%) or an absolute reduction of 4.3%, chi-square test, P < .05. See attached graph, as the rate of open charts has lowered to <1% averaged over the past quarter.

Conclusion: Our two-pronged intervention was highly effective in improving 48-hour chart closure. These simple interventions have the potential to quickly change physician behavior, increase patient safety, and improve timely charge capture.
treatment area allows the patient a more comfortable and private environment during screening and initial care with proper isolation precautions. Additionally, it protects other patients and staff in the EDs by not exposing them to a potentially serious infectious disease. To date, there are no articles on the costs of implementation, maintenance, and patient care of such treatment areas. We examine the costs of implementation, maintenance and patient care of an extended Ebola treatment area at University Hospital (UH) in Newark, New Jersey were calculated.

Study Objectives: (1) To describe the necessary components for building and maintaining an Ebola extended treatment area; (2) To present the predictable costs of implementation, maintenance and care of UH’s Ebola extended treatment area.

Methods: Data points measured were: (1) Costs of implementation of UH Ebola extended treatment area including structure, physical plant personal, environmental service, personal protection equipment, medical supply, telecommunication and entertainment; (2) Costs of maintenance of UH Ebola extended treatment area including stand-by crew and continued staff training, and food service; (3) Costs of care of a patient in the UH Ebola extended treatment area including personnel (physicians, nurses, environmental services, etc), medical and pharmaceutical supplies, food service, and indirect costs (linens, non-PPE disposables, etc).

Results: (1) Costs of implementation of the UH Ebola extended treatment area was $688,000; (2) Costs of maintenance of the UH Ebola extended treatment area was $15,875 per month; (3) Costs of care for a patient in the UH Ebola extended treatment area was $87,500 per 100 patient care hours. The total cost of implementation and maintenance of Ebola extended treatment areas with 100 patient care hours was $767,000.

Conclusion: The total cost of establishing and maintaining an extended Ebola treatment area for 100 patient care hours was $767,000. If the Ebola outbreak continues or a new infectious disease outbreak were to occur, this data may help other EDs create similar models to care for these specific patients while maintaining the Centers for Disease Control and Prevention Ebola compliance regulations.
101 Comparison of the FlexView Video Laryngoscope, Macintosh Blade Direct Laryngoscope, and the GlideScope Video Laryngoscope

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Study Objectives: Video laryngoscopy was developed with the hope of increasing the success rate of endotracheal intubation over that of direct laryngoscopy. Previous study results evaluating this have been mixed. The aim of this study was to evaluate direct laryngoscopy (DL), the GlideScope video laryngoscope (GVL) and a new articulating video laryngoscope, the FlexView (FV), on a routine and a difficult airway simulator. Outcome variables included: failure rate, time (in seconds) to intubation (TF), glottic view (as reflected by a modified Cormack-Lehane score), and perceived difficulty (using a 5-point Likert scale).

Methods: Thirty-seven emergency medicine residents at differing levels of training participated in this study. Participants were provided demonstration of equipment use and up to three practice attempts with each device on a standard airway simulator. Participants were then observed intubating with each device, in a randomized order, on routine and difficult airway simulators. A Tru Corp Airmist Standard was utilized to simulate the routine airway. A Tru Corp Airmist Advance was utilized to simulate the difficult airway by use of a cervical collar with occiput elevation and neck flexion along with a swollen tongue. After using the devices on the routine airway simulator, participants used each device on the difficult airway simulator. Intubation times surpassing 120 seconds were considered “failures” but capped as such for the time variable. After using each device, participants rated the glottic view and level of difficulty. Glottic view was scored using the Modified Cormack-Lehane Score. Level of difficulty was based on a 5-point Likert scale item, ranging from 1 (very easy) to 5 (very hard).

Results: All routine airway intubations were successful, but there was one (2.7%) failure using the DL and four (10.8%) failures using the GVL on the difficult airway. Friedman’s test was used for the following analyses; all post-hoc analyses used a Bonferroni correction. For the routine airway, the DL (Mdn =11.55, P < .001) and FV (Mdn =12.50; P = .044) were significantly faster than the GVL (Mdn =15.06). The GVL (Mdn =1; P = .001) and FV (Mdn =1; P = .002) had better self-reported glottic views than the DL (Mdn =2). There were no statistical differences among devices for ease of use. For the difficult airway, the FV (Mdn =27.76) was significantly faster than the GVL (Mdn =42.28; P = .032) while the DL (Mdn =35.43) was not significantly different from either. The GVL (Mdn =2; P = .004) and FV (Mdn =1; P < .001) had better self-reported glottic views than the DL (Mdn =2). Lastly, the FV (Mdn =2) was rated significantly easier than the DL (Mdn =4; P < .001) and GVL (Mdn =4; P = .001).

Conclusion: With a routine airway, the DL, and FV yielded quicker intubation times while video laryngoscopy (GVL and FV) yielded better views. Devices did not differ significantly with regards to perceived ease of use. With a difficult airway, the FV was superior in terms of successful intubation, time to intubation, glottic view, and ease of use. These results suggest that the new articulating video laryngoscope, FlexView, is superior to DL and FV when performing intubation of restricted airways.

102 STABCric 2: Surgical Technique Against Bougie Cricothyrotomy

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Study Objective: Performing a surgical airway is a last resort heroic measure when a physician cannot ventilate nor intubate a patient. The traditionally taught open surgical technique is prone to error by using multiple tools in multiple steps. By adapting other novel bougie assisted methods we have developed a video instrument demonstrating a simplified 3-step method using only a scalpel and bougie. This observational study examines if the bougie-assisted cricothyrotomy is more rapidly performed than the classically taught open surgical method.

Methods: This was a prospective observational study using pig tracheas oversewn and up to three practice attempts with each device on a standard airway simulator. Outcome variables included: failure rate, time (in seconds) to intubation (TF), glottic view (as reflected by a modified Cormack-Lehane score), and perceived difficulty (using a 5-point Likert scale). An 18-month period was divided into groups based on whether VAL or direct laryngoscopy was used as the method for intubation. ALS providers are encouraged to use VAL as the primary method of intubation, but can use DL at their discretion. We reviewed patient records to determine the intubation method used, whether the intubation was successful on the first attempt, and whether the patient survived to hospital admission. We compared the differences between the rates of survival to admission between the two groups and calculated 95% confidence intervals (CI).

Results: Out of 480 total intubations, there were 354 in the VAL group and 126 in the DL group. 64% of the VAL group and 73% of the DL group were in cardiac arrest. There were no differences in age or sex between the two groups. First attempt success rate was 76% (72, 80) in the VAL group and 84% (76, 91) in the DL group (difference 8%; CI: 1, 16). Survival to hospital admission was 33% (CI: 27, 39) in the VAL group and 15% (CI: 8, 23) in the DL group. The difference in survival to hospital admission was 17% (CI: 7, 26; P < .05).

Conclusion: Compared to DL, VAL appears to improve survival to hospital admission in cardiac arrest patients who are intubated out-of-hospital.

104 Complications Related to Multiple Endotracheal Intubation Attempts in the Emergency Department

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Study Objectives: The objective of this study was to determine the association between one endotracheal intubation (ETI) attempt versus greater than one ETI attempt with complication rates in the emergency department (ED).

Methods: This is a prospective observational study involving consecutive adult ETI procedures performed in the ED over a 28-month period. The study took place at Royal Columbian Hospital, a 402-bed, tertiary care teaching hospital in Canada between July 2012 and November 2014. Respiratory therapists (RTs) attend every out of operating room ETI procedure. As part of an ongoing quality improvement initiative, RTs prospectively collect data regarding indication, number of attempts, urgency, primary operator level of experience, technique and complications. The primary outcome measure was the complication rate associated with one versus greater than one ETI attempt. An attempt was defined as the placement and removal of an intubation device into the oral cavity. Severe complications were defined as

A Systematic Review and Meta-analysis of First Pass Success Rates in Emergency Department Intubations: Creating a Benchmark for Quality Emergency Airway Care
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Study Objective: Many emergency departments (EDs) have begun to evaluate the quality of their airway care by measuring their airway performance. The proportion of endotracheal tubes placed on the first pass (the first pass success rate) is a commonly agreed upon marker of airway proficiency, and has been associated with the rates of adverse events. The aim of this systematic review and meta-analysis is to quantify the available data on ED first pass success rates in order to provide an evidence-based benchmark for EDs to gauge their performance against the published literature.

Methods: A structured literature search was performed with MEDLINE, PubMed, Clinical Key, and Embase. The electronic database search was supplemented by searching Emergency Medical Abstracts, Google Scholar, and the references of the full-text papers yielded from our literature search. Research published since 2000 was included if it contained prospectively collected data on patients intubated in adult and mixed EDs and reported the first pass success rates. Studies that reported paediatric and trauma only intubations, or intubations on select clinical provider, or equipment subgroups were excluded. Data was evaluated and extracted by two independent reviewers on the qualitative and quantitative variables of interest. These variables included basic demographics, main indication for intubation, quality of their airway care by measuring their airway performance. The proportion of endotracheal tubes placed on the first pass (the first pass success rate) is a commonly agreed upon marker of airway proficiency, and has been associated with the rates of adverse events. The analysis adjusted for age, sex, body mass index, the modified LEMON criteria, the primary cause of cardiac arrest and intubator characteristics (emergency physicians, emergency residents, transitional-year residents or others), the first pass success rate did not differ between the VL and DL groups (OR, 0.88; 95% CI, 0.57-1.38). By contrast, VL was associated with an improved glottic visualization defended by Cormack grade 1-2 (OR, 2.56; 95% CI, 1.28-5.90). The incidence of esophageal intubation did not differ between the two groups (OR, 0.51; 95% CI, 0.12-1.44).

In the sensitivity analysis excluding attempts made by transitional-year residents who are likely novice intubators, the results did not change materially—e.g., there was no significant difference in the first pass success rate (OR, 1.09; 95% CI, 0.62-2.00).

Conclusion: In this large multicenter prospective study of ED patients with cardiac arrest, we found that the first-pass success rate did not differ between the VL and DL groups despite improved Cormack grade with the use of VL.

Video Laryngoscopy Does Not Improve the First Pass Success Rate During Cardiopulmonary Resuscitation in the Emergency Department: An Analysis of Multicenter Observational Study
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Study Objectives: The use of video laryngoscopy (VL) improves the first-pass success rate of endotracheal intubation (ETI). However, its advantage over direct laryngoscopy (DL) during cardiopulmonary resuscitation has not been fully established. The increased amount of oropharyngeal secretion during resuscitation can unfavorably compromise video-laryngoscopic visualization. Previous single center studies report variable rates of successful ETI with VL. In this context, we sought to compare the first-pass success rate during resuscitation between VL and DL by using large multi-center data.

Methods: Secondary analysis of the data from a prospective, multicenter study of 13 emergency departments (EDs) in Japan (the Japanese Emergency Airway Network [JEAN] study). From February 2012 to September 2014, all patients with cardiac arrest who underwent ETI in the EDs were included for the analysis. Patients aged <18 years and those who underwent surgical airway management were excluded. The primary exposure was VL with C-Mac, GlideScope or MacGrath Mac or DL. The primary outcome was first-pass success. The secondary outcomes were glottic visualization assessed with Cormack grade and the incidence of esophageal intubation.

Results: Of 1581 patients, the mean age was 71 years, and 39% were female. The primary cause of cardiac arrest was medical in 1451 patients (92%) and trauma in 130 patients (8%). The first TI attempt was performed with VL in 130 patients (8%) and with DL in 1451 patients (92%). The first pass success rate was 70.0% in the VL group and 69.5% in the DL group. In the multivariable analysis adjusting for age, sex, body mass index, the modified LEMON criteria, the primary cause of cardiac arrest and intubator characteristics (emergency physicians, emergency residents, transitional-year residents or others), the first-pass success rate did not differ between the VL and DL groups (OR, 0.88; 95% CI, 0.57-1.38). By contrast, VL was associated with an improved glottic visualization defended by Cormack grade 1-2 (OR, 2.56; 95% CI, 1.28-5.90). The incidence of esophageal intubation did not differ between the two groups (OR, 0.51; 95% CI, 0.12-1.44). In the sensitivity analysis excluding attempts made by transitional-year residents who are likely novice intubators, the results did not change materially—e.g., there was no significant difference in the first pass success rate (OR, 1.09; 95% CI, 0.62-2.00).

Conclusion: In this large multicenter prospective study of ED patients with cardiac arrest, we found that the first-pass success rate did not differ between the VL and DL groups despite improved Cormack grade with the use of VL.

Research Forum Abstracts

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20% higher in patients with combined inhalation injury and cutaneous burns than in those with cutaneous burns alone. Although these statistics are alarming, they may not be applicable to all patients presenting to the emergency department (ED) with inhalational injuries. Numerous indications for invasive airway management have been documented in the literature ranging from cyanosis and stridor to full thickness burns of the face. The indications for invasive airway management and the definition of inhalation injury share distinct similarities. This coincides with the common teaching that all patients with inhalation injuries require invasive airway management; however, there is little data supporting this invasive strategy. No study has included nasopharyngeal irritation, singed eyebrows, singed nasal hairs, or soot in the proximal airway as an indication for intubation. There is no data on patients presenting to the ED or trauma bay with these findings regarding the necessity of invasive airway management.

Study Objectives: To date there are no retrospective studies identifying the presence or absence of the study indications for intubation in patients presenting to the emergency department or trauma bay with suspected inhalational injuries. We believe that this data will help in risk stratifying this patient population and avoid unnecessary invasive airway management and intensive care unit (ICU) admission. Invasive airway management has known complications in burn patients, including increasing the incidence of nosocomial pneumonia, damage to the airway resulting in tracheal stenosis, and secondary complications related to sedation. This data may allow us to develop a clinical prediction score for invasive airway management and test this score prospectively in the ED.

Methods: This is a retrospective chart review evaluation of a cohort of patients presenting to the UCSD emergency department or trauma bay with inhalational injury and facial burns. These patients will be identified via ICD-9 codes. Exclusion criteria include any patient that did not present to the ED or trauma bay, and any patient without the potential ICD-9 diagnosis. The presence of study indications for intubation will be evaluated.

Results: Thus far 45 patients who presented to the UCSD emergency department or trauma bay with inhalation injury and/or facial burn were analyzed. Preliminary data is showing only three of the patients from this cohort required endotracheal intubation while 12 presented with clear indication for intubation, and 12 presented with the aforementioned study indications for intubation.

Conclusion: Over 70% of patients with clearly established indications for intubation, as well as over 70% of patients the study indications for intubation avoided an expected airway intervention. This discrepancy challenges the current dogma of invasive airway management in the face of inhalation injury and facial burn, and suggests that clinic gestalt trumps the studied indications for intubation.

Ketamine as an Induction Agent in Emergency Department Intubation: Prospective Observational Multi-Center Study in Japan

Okubo M, Gibo K, Hagiwara Y, Watake H, Nakajima Y, Hasegawa K, on behalf of the Japanese Emergency Medicine Network Investigators/ Mayo Clinic, Rochester, MN; Kurume University, Kurume, Japan; Tokyo Metropolitan Children’s Medical Center, Fuchu, Japan; Japanese Emergency Medicine Network, Kamakura, Japan; Okayama Prefectural Hospital, Uruma, Japan; Massachusetts General Hospital, Boston, MA

Study Objectives: Ketamine is considered as the induction agent of choice in emergent airway management in hemodynamically compromised patients. However, clinical data of the use of ketamine in emergency department (ED) intubation are sparse. We compared the success rate of ED intubation and hemodynamic parameters among patients who underwent ED intubation with ketamine, benzodiazepine, and propofol.

Methods: A secondary analysis of the data from the Japanese Emergency Airway Network (JEAN) study two, a prospective observational multicenter study of 13 academic and community EDs that was designed to characterize the current ED airway management across Japan during between April 2012 and June 2014. Data fields included patient demographics, primary indication for intubation, difficult airways, and alternative methods of intubation, device, all medications used to facilitate intubation, number of attempts, adverse events, intubator characteristics, and pre- and post-intubation vital signs. All adult patients (>15-year-old) who underwent oral intubation with ketamine, benzodiazepine, and propofol were eligible for the analyses. The primary outcome was success rate on the first attempt. The secondary outcome was the difference between pre- and post-intubation systolic blood pressure (post-intubation systolic blood pressure minus pre-intubation systolic blood pressure).

Results: The registry recorded 3,693 intubations (capture rate 96%) and 1,192 were eligible for the analysis. 172 patients (14%) underwent intubation with ketamine, 748 (63%) with benzodiazepine, and 272 (23%) with propofol. The success rates on first attempt of intubation with ketamine, with benzodiazepine, and with propofol were respectively 68% (95% confidence interval (CI), 60%-75%), 70% (95% CI, 66%-73%), and 69% (95% CI, 63%-74%). In the multivariable analysis adjusting for age, sex, body mass index, primary indication for intubation, difficult airway score, method of intubation, device, and specialties and training level of intubator, the success rate of intubation with ketamine did not show significant difference when compared to intubation with benzodiazepine (odds ratio (OR), 0.79; 95% CI, 0.54-1.16; P = 0.23) and propofol (OR, 0.71; 95% CI, 0.46-1.10; P = 0.12). The differences between pre- and post-intubation systolic blood pressure was 9.3 mmHg (standard deviation [SD], 34.2) with ketamine, −5.1 mmHg (SD, 38.9) with benzodiazepine, and −10.4 mmHg (SD, 39.5) with propofol. After adjusting for potential confounders, the differences between pre- and post-intubation systolic blood pressure was 11.5 mmHg (95% CI, 7.1 mmHg-16.0 mmHg) with ketamine, −3.9 mmHg (95% CI, −7.1 mmHg -0.7 mmHg) with benzodiazepine, and −7.7 mmHg (95% CI, −11.6 mmHg -3.8 mmHg) with propofol (P < 0.01).

Conclusion: In this multicenter observational study, we found no significant differences in the success rate on first attempt among intubations with ketamine, benzodiazepine, and propofol but did the higher difference between pre- and post-intubation systolic blood pressure in intubation with ketamine than those with benzodiazepine and propofol.

Delayed Stress Delta N-Terminal Pro-B Type Natriuretic Peptide Is Significantly Higher With Myocardial Ischemia

Limkakeng AT, Jr., Lokhnygina Y, Sandesara H, Drake W, Christenson R, Newby LK, Duke University Medical Center, Duke University, Durham, NC; University of Maryland, Baltimore, MD

Study Objectives: Currently many patients undergo emergency department (ED)-based stress testing to rule out acute coronary syndrome. These tests are dependent on imaging modalities that have limited availability. Our previous work demonstrated that myocardial ischemia does not significantly change N-terminal pro-B Type natriuretic peptide (proBNP) levels at 2 hours following stress tests. We hypothesized that delayed stress-delta ProBNP levels (difference between levels 4 hours after stress testing and baseline) would be higher in patients with myocardial ischemia on stress testing.

Methods: Design: Prospective case-control study. Study setting: ED-based observation unit in an urban academic medical center. Participants: Adult patients who were scheduled for exercise stress echocardiography as part of usual care were eligible and approached by trained research staff. Patients with acute myocardial infarction or heart failure were excluded. Clinical data was collected after informed consent. Plasma samples were obtained at baseline (pre-stress test) and 4 hours post-test and frozen for batch processing. All stress tests were interpreted as part of usual care by board-certified cardiologist blinded to stress-delta proBNP values. Stress test outcome data were compared to the clinical record for quality assurance by the principal investigator. Indeterminate studies were reviewed in conjunction with the clinical data from the medical record and adjudicated by one investigator who is a board-certified cardiologist. ProBNP concentrations (Roche Diagnostics) were measured by an investigator blinded to stress test outcomes. Cases were defined as those with stress-induced worsening of regional wall motion activity versus controls with normal stress test results. Nonparametric statistics (Wilcoxon test) were used due to skew. Absolute and relative stress-delta proBNP values are shown in the Table. Patients with myocardial ischemia had significantly higher 4-hour, absolute and relative stress post-delta proBNP levels. After adjusting for log-transformed baseline levels, there was a statistically significant difference in log-transformed 4-hour proBNP between patients with positive and negative stress test (P = 0.0084).

Conclusion: Delayed stress-delta proBNP values are significantly higher among patients with myocardial ischemia on stress testing even after accounting for baseline values. Further study on the clinical value of such a testing paradigm appears warranted.
Initial Urine Output and Pro-BNP Independently Predict Hospital Length of Stay in Acute Heart Failure

Lardo ON, Saheed MO, Harmade B, Russell SD, Sharma K, Korley FK/Johns Hopkins University School of Medicine, Baltimore, MD

Study Objectives: Early identification of acutely decompensated heart failure (ADHF) patients who may be discharged home after observation and treatment in the emergency department (ED) remains challenging. Although most are admitted as inpatients, a significant fraction has a short hospital stay. Policymakers increasingly discourage short-stay inpatient admissions in order to reduce costs and improve quality. Currently, there are no tools to aid emergency physicians in early identification of short-stay ADHF patients. We investigated whether initial urine output (iUOP) after furosemide administration and presenting pro-BNP levels are both independently associated with hospital length-of-stay for ADHF.

Methods: A prospective cohort study was performed with convenience sampling of ED patients presenting between February 2013 and March 2015 who were diagnosed with ADHF. Subjects were included if they received IV furosemide and had at least one subjective (dyspnea/orthopnea, edema) and one objective finding (chest x-ray suggesting pulmonary vascular congestion, pro-BNP > 1,800 pg/mL). Subjects with no urine output recorded, on BiPAP in the ED, with a history of end-stage renal disease or hemodialysis, and those without pro-BNP measurements were excluded. Informed consent was obtained and a trained research assistant interviewed these subjects. iUOP was determined by measuring the total volume of urine voided within 2 hours of furosemide administration. Pro-BNP was measured using the visual analogue scale (VAS). Pro-BNP was measured using a Roche ELISA. Length-of-stay (LOS) was defined as the time from ED presentation to ED/hospital discharge. Our primary outcome was short hospital stay (LOS < 48 hours). Follow-up assessments to ascertain all-cause mortality and hospital readmission at 30 days were performed via telephone interview and medical chart-reviews for subjects who could not be reached via telephone. The association between our predictor variables (iUOP and pro-BNP) and the primary outcome was modeled using a multivariable logistic regression model. We adjusted for age, sex, race, and severity of dyspnea (as measured by the VAS). A P-value of < .05 was deemed statistically significant.

Results: Of the 230 subjects enrolled, a total of 173 with complete iUOP and pro-BNP data were analyzed. 149 subjects were admitted to the hospital as inpatients (86.13%), and 54 subjects were categorized as short-stay (31.2%); of those categorized as short-stay, 30 were inpatient admissions (55.6%). Median iUOP in cubic centimeters were higher among short-stay subjects than those with longer stays (770 [IQR: 500 - 1,200] versus 550 [IQR: 325 - 800], P = .0006). Pro-BNP levels in pg/mL were lower in short-stay subjects than in those with longer stays (1941 [IQR: 667 - 3876] versus 4392 [IQR: 2188 - 8544], P = .0001). After adjusting for age, sex, race, and severity of dyspnea, iUOP (odds ratio: 2.4 [95% CI: 1.2 - 4.8]) and pro-BNP (odds ratio 0.7 [95% CI: 0.5 - 0.9]) remained independent predictors of short-stay.

Conclusion: Initial urine output and presenting pro-BNP values both provide prognostic information regarding hospital length of stay for ADHF patients. Further studies are needed to determine the optimal iUOP and pro-BNP cut-offs that might be utilized for identifying ADHF patients at risk for short stays for whom inpatient admission may be avoided.

Delayed Stress-Delta High Sensitivity Troponin Does Not Elevate With Myocardial Ischemia

Linkkangat AT, Jr., Lokhyngiya Y, Sandesara H, Drake W, Christenson R, Newby LK/Duke University Medical Center, Duke University, Durham, NC; University of Maryland, Baltimore, MD

Study Objectives: Acute coronary blood flow insufficiency causes a spectrum of myocardial dysfunction that includes myocardial ischemia and myocardial necrosis. Currently, myocardial ischemia is distinguished by the lack of measurable cardiac troponin release. We hypothesized that a newer generation troponin assay with a lower detection level limit might be able to detect myocardial ischemia-induced troponin level changes (stress-delta levels) 4 hours after stress testing.

Methods: We prospectively enrolled adult patients who were scheduled for exercise stress echocardiography as part of usual care in an emergency department (ED)-based observation unit at an urban academic hospital into a case-control study. Patients with acute myocardial infarction or heart failure were excluded by usual care protocols. After informed consent, trained research staff collected clinical data and plasma samples at baseline (pre-stress test) and 4 hours post-test. High sensitivity troponin T concentrations (Roche Diagnostics) were measured on these samples by an investigator blinded to clinical data and stress test results. Stress tests were interpreted as per usual care by board-certified cardiologists blinded to stress-delta troponin values. The principal investigator audited stress test outcome data for quality assurance. A board-certified cardiologist investigator adjudicated indeterminate stress test results after reviewing the clinical record. Cases were defined as those with stress-induced worsening of regional wall motion activity whereas controls were patients with normal stress test imaging results. Absolute (4-hour levels minus baseline levels) and relative (%) stress-delta troponin T levels were calculated

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Positive for Ischemia (N = 15)</th>
<th>Negative for Ischemia (N = 154)</th>
<th>All patients (N = 169)</th>
<th>P-value from Wilcoxon test</th>
</tr>
</thead>
<tbody>
<tr>
<td>Baseline hs-Troponin T Median (25th, 75th)</td>
<td>8.9 (0.0, 13.3)</td>
<td>4.2 (0.0, 7.2)</td>
<td>4.5 (0.0, 7.5)</td>
<td>0.051</td>
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<tr>
<td>Baseline hs-Troponin T Min, Max</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0.0, 21.6</td>
<td>0.0, 65.3</td>
<td>0.0, 65.3</td>
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<td></td>
</tr>
<tr>
<td>4-hour Post-Stress hs-Troponin Median (25th, 75th)</td>
<td>12.7 (5.0, 16.3)</td>
<td>5.6 (0.0, 9.9)</td>
<td>5.8 (0.0, 10.3)</td>
<td>0.013</td>
</tr>
<tr>
<td>4-hour Post-Stress hs-Troponin Min, Max</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>0.0, 23.2</td>
<td>0.0, 74.2</td>
<td>0.0, 74.2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Absolute 4-hour Stress Delta hs-TroponinMedian (25th, 75th)</td>
<td>1.4 (0.0, 5.7)</td>
<td>0.5 (0.0, 4.5)</td>
<td>0.7 (0.0, 4.8)</td>
<td>0.53</td>
</tr>
<tr>
<td>Absolute 4-hour Stress Delta hs-TroponinMin, Max</td>
<td>-3.9, 16.1</td>
<td>-5.6, 36.4</td>
<td>-5.6, 36.4</td>
<td></td>
</tr>
<tr>
<td>Percentage 4-hour Stress Delta hs-Troponin*</td>
<td>11</td>
<td>92</td>
<td>103</td>
<td></td>
</tr>
<tr>
<td>Percentage 4-hour Stress Delta hs-TroponinMedian (25th, 75th)</td>
<td>3.4 (8.3, 32.3)</td>
<td>11.7 (8.4, 47.3)</td>
<td>10.7 (8.3, 46.4)</td>
<td>0.86</td>
</tr>
<tr>
<td>Percentage 4-hour Stress Delta hs-TroponinMin, Max</td>
<td>-100, 118.4</td>
<td>-100, 478.9</td>
<td>-100, 478.9</td>
<td></td>
</tr>
</tbody>
</table>

*Percentage stress-delta calculated only for those with detectable baseline levels.
and compared between groups using nonparametric Wilcoxon test. Additionally, log-transformed 4-hour troponin T levels were compared using linear regression while controlling for log-transformed baseline levels. 

Results: A total of 169 patients were enrolled with 15 patients (8.8%) having myocardial ischemia on stress testing. The median age was 52 (IQR 44, 59) years, 45.6% were men and 40.2% were African American. The median baseline, 4-hour, and absolute and relative stress delta troponin T values are shown in the Table. There were no significant differences in absolute or relative 4-hour stress delta troponin T levels or in log-transformed 4-hour levels after adjusting for log-transformed baseline levels (p=0.25). 

Conclusion: Myocardial ischemia is a distinct entity from myocardial infarction, distinguished by the lack of detectable troponin T release. Future studies should focus on developing better methods for identifying myocardial ischemia.

A Descriptive Analysis of Right Ventricular Echocardiogram Parameters in Patients Successfully Resuscitated from Cardiac Arrest

Darocki M, Sell R, Blanchard D, Kaushal K, Dittrich T, Wardi G/UCSD, San Diego, CA

Background: It is well known that there is significant left ventricular dysfunction after resuscitation from cardiac arrest. However, there is almost no investigation into the post-cardiac arrest echocardiographic profile of the right ventricle (RV). Although normal echocardiographic parameters of the right heart have been defined, to our knowledge, there are no human studies that have quantified these parameters in the post-arrest right heart. This is relevant to emergency providers as an abnormal right ventricle post-arrest may suggest pulmonary embolism (PE) while in fact there may be a significant degree of RV dysfunction regardless of the cause of arrest.

Methods: This study is a retrospective case series performed in two urban, academic inpatient facilities between 2010 and 2013. A comprehensive database of all resuscitative efforts is maintained at these institutions, and this includes demographic, clinical, and outcomes data. All patients identified as having successful resuscitation following inpatient cardiac arrest with a technically adequate echocardiogram performed within 24 hours of resuscitation were included. Parameters evaluated included RV end-systolic area, RV end-diastolic area, RV fractional area change (RVFAC); RV base, mid-level, and longitudinal measures; longitudinal strain, and tricuspid annular plane systolic excursion (TAPSE). Comparison normal parameters were obtained from the most recent guidelines published by the American Society of Echocardiography.

Results: Between 2010 and 2013, 60 patients were identified. Average RV end-systolic area was 14.4 mm, RV end-diastolic area was 20.6 mm, RVFAC was 32.0 (< 35 abnormal), TAPSE was 1.23 cm (< 1.6 cm abnormal), RV diameter at the base was 35 (>42 mm indicates RV dilation), 33.5 mm at the mid-level (> 35 indicates RV dilation), and 71.1 mm (>80 mm indicates RV enlargement). Only two echocardiograms were performed on patients with PE as the cause of arrest; their echocardiographic parameters showed slightly more dysfunction than the average values of the remainder of the dataset.

Conclusion: It is common to see echocardiographic evidence of right ventricular dysfunction in the first 24 hours following cardiac arrest. All echocardiograms revealed at least one parameter that was abnormal following resuscitation. Further studies may link echocardiographic abnormalities of the right heart with both etiology and outcome after cardiac arrest.

Comparison of Three Objective Methods of Classifying the History Component of the HEART Score


Study Objectives: The HEART score enables risk stratification of ED patients with chest pain, with the potential to identify patients who do not require inpatient evaluation or observation in a chest pain evaluation center (CPEC). Components of the 10-point score include history, electrocardiogram findings, age, number of cardiac risk factors and initial troponin. Unfortunately, the history component of the score introduces potential subjectivity in scoring. The authors evaluated three objective methods of stratifying patient history into slightly, moderately, and highly suspicious groups (0, 1, or 2 points respectively) and explored the association of each scoring method with results of subsequent computed tomographic coronary angiography (CTCA) or stress testing.

Methods: Retrospective chart review of consecutive patients evaluated in the CPEC of an academic tertiary care center between January 1, 2012 and December 31, 2012. Data were abstracted from the electronic medical record by trained study personnel. The history component of the score was calculated for each patient using three different methods developed by the authors (including a board certified cardiologist and emergency physicians) as described in the Table. Differences in the distribution of HEART scores for each group were compared by analysis of variance. Receiver-operating characteristic (ROC) curves were subsequently constructed using each model for the composite endpoint of an abnormal cardiac CTCA or nuclear, exercise or stress echo study.

Results: A total of 1,200 patients were evaluated in the CPEC during the study period, of which 1,016 had complete data and were analyzed further. Of these, 78 had an abnormal stress test or CTCA. The prevalence of specific symptoms among the cohort was as follows: substernal pain: 29%, exertional pain: 17%, dyspnea 48%, diaphoresis 21%, jaw pain 3%, pain in the left arm: 24%. The mean HEART scores for models 1, 2, and 3 were 2.63 (standard deviation (SD) 1.11), 2.50 (SD 1.22), and 2.94 (SD 1.27) respectively. The distribution of HEART scores generated by each model was statistically different from each other model ($P < .001$). The number of patients with a HEART score $\geq 3$ generated by each model was as follows: model 1: 779 (78%), model 2: 803 (79%), model 3: 868 (68%). C-statistics for the ROC curves of each model for the endpoint of an abnormal advanced study were similar (0.562, 0.567, and 0.547, respectively).

Conclusions: Comparing three models for classifying symptoms we found statistical, but not dramatic differences in the distribution of HEART scores. Our data supports the concept that the symptom component of the HEART score may not need any further refinement than the original classification scheme. Further study with more robust outcomes, as well as prospective studies, may be warranted.
114 T-Wave Changes Aid in the Electrocardiographic Diagnosis of Acute Coronary Occlusion in Left Bundle Branch Block
Elnum KD, Dodd KW, Smith SW/University of Minnesota Medical School, Minneapolis, MN; Hennepin County Medical Center, Minneapolis, MN; Hennepin County Medical Center and University of Minnesota Medical School, Minneapolis, MN

Study Objectives: In patients with acute myocardial infarction (MI) and normal cardiac conduction, T-wave changes such as hyperacute T-waves and T-wave inversion are known to occur. Here we investigate T-wave changes in patients with left bundle branch block (LBBB) and acute coronary occlusion (ACO), including absolute T-wave amplitude (TWA), discordant TWA-to-QRS amplitude ratio (TWA/QRS), and concordant ST-segment deviation-to-TWA ratio (ST/TWA). We hypothesize that these parameters will be greater in LBBB patients with ACO than in those without ACO.

Methods: Retrospectively, ECGs of ED patients with LBBB and ischemic symptoms were obtained. The ACO (STEMI)-equivalent group patients had 1) angiographically proven ACO or 2) culprit lesion and troponin I ≥ 10 ng/ml. The non-ACO control group consisted of patients with either 1) serial troponin-I below the 99th upper reference limit of the assay (no-MI) subgroup or 2) elevated troponin-I but negative emergent coronary angiography or echocardiography (non-STEMI) subgroup. ECG measurements included S- or R-wave amplitude, ST deviation at the J point, and TWA to the nearest 0.5 mm relative to the PQ junction. Concordance and discordance were incorporated due to the importance of this principle in LBBB; they were defined in relation to the ST segment for the ST/TWA ratio and QRS complex for the TWA/QRS ratio. The maximum ratio of all 12 leads in a given ECG was used in calculations. Statistics were by Kruskal-Wallis test or McNemar’s test and are reported with interquartile range [IQR] or 95% confidence interval (95% CI) as appropriate.

Results: There were 33 patients in the ACO group and 129 patients in the non-ACO group. Of the 129 non-ACO patients, 105 had no-MI and 24 met criteria for non-STEMI. The median TWA was 9 mm [IQR 6.5-11.5] for ACO and 8.5 mm [IQR 6.5-11.5] for no-ACO patients (p = N.S.). The TWA/QRS ratio was significantly larger for ACO versus no-ACO patients (p < 0.05; see Table). For ACO, the specificity of any TWA/QRS > 1.25 was 95% (95% CI 87-97) and the sensitivity was 45% (95% CI 29-63). Subgroup analysis of TWA and TWA/QRS ratio in non-STEMI versus no-MI patients was not significant. Similarly, the ST/TWA ratio was significantly increased for ACO versus no-ACO patients but not for non-STEMI patients compared to no-MI patients (Table). For ACO, any ST/TWA > 0.80 had a sensitivity and specificity of 76% (95% CI 57-88) and 59% (95% CI 50-67), respectively.

Conclusion: We found that patients with LBBB and ACO have proportionally larger T-waves (ie, higher TWA/QRS ratios) compared to no-ACO patients with LBBB. A cutoff of TWA/QRS > 1.25 has high specificity for ACO in LBBB. This may be analogous to hyperacute T-waves in STEMI in normal conduction. Additionally, the concordant ST/TWA ratio is significantly increased in ACO in LBBB. Further studies to define T-wave changes in patients with LBBB and ACO are needed and the diagnostic potential of these findings should be assessed.

Table. T-Wave Ratios in LBBB

<table>
<thead>
<tr>
<th>Category</th>
<th>Median TWA/QRS [IQR]</th>
<th>Median ST/TWA/QRS [IQR]</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACO (STEMI)</td>
<td>0.70* [0.43-0.75]</td>
<td>0.55* [0.44-0.71]</td>
</tr>
<tr>
<td>no-ACO (n = 129)</td>
<td>1.08 [0.85-1.5]</td>
<td>1.00 [0.8-1]</td>
</tr>
<tr>
<td>Non-STEMI (n = 24)</td>
<td>0.67* [0.50-0.75]</td>
<td>0.50* [0.50-0.75]</td>
</tr>
<tr>
<td>no-MI (n = 105)</td>
<td>0.50* [0.44-0.71]</td>
<td>0.50* [0.50-0.75]</td>
</tr>
</tbody>
</table>

*P < .05 compared to ACO, p = NS for non-STEMI vs no-MI.

115 The Prognostic Value of ST-Depression in Lead aVL in Patients With Inferior ST-Segment Elevation Myocardial Infarction
Fu J, Sills J, Rodriguez R, Tabias J/UCSF, San Francisco, CA

Study Objective: Inferior ST-segment elevation myocardial infarctions (STEMIs) with right ventricular (RV) infarct have been shown to have an estimated 2.6-fold increased risk of death. RV involvement is also associated with increased risk of cardiogenic shock, ventricular arrhythmias, and mechanical complications. Some literature suggests that the identification of RV infarct may be done in the conventional 12-lead by specifically looking for ST-segment depression in aVL. The objective of this study is to compare rates of cardiogenic shock in patients with inferior STEMI with and without ST-segment depression >1mm in aVL.

Methods: A retrospective secondary analysis was performed on the ACTIVATE-SF registry. Consecutive cases of inferior STEMI presenting to two hospitals in San Francisco, CA from 2008-2010 were analyzed. Rates of hypothermia defined as an SBP<90, emergency department (ED) use of vasopressors, and mortality were compared in patients with and without ST-depressions in aVL. Lead aVL was read by two independent emergency physicians who were blinded to the outcomes. Disconcordant reads were adjudicated by an attending emergency physician.

Results: One hundred twenty-five patients with mean age of 60.7 years, were included in the study. Rates of hypothermia were 12.7% [95% CI 2.9-22.7%] in those without aVL depressions versus 21.1% (11.7%-30.4%) in patients with aVL depressions, P < .05. The use of vasopressors was 6.4% (0.0%-13.6%) in those without aVL depressions versus 19.2% (10.3%-28.2%) in those with aVL depressions, P < .05. Lastly, mortality rates differed between those without and with depressions in aVL: 2.1% (0.0%-6.4%) vs 12.8% (5.2%-20.4%), P < .05. In patients with inferior STEMI, there was a trend towards higher rates of hypothermia and statistically significant increased prevalence of ED pressor use and mortality. There is evidence that RV infarct is clinically significant and aVL may predict RV infarct.

Conclusion: This study suggests that aVL may have clinically relevant prognostic value. Recognition of hemodynamically significant STEMIs may be aided by evaluating lead aVL.

116 Acute Care Diagnostic Collaboration: Assessment of Diagnostic Quality of TIMI versus HEART Risk Score Integrating Coronary Computed Tomography Angiography in a Bayesian Statistical Model
Cochon L, Supino M, Caputo M, Baize AA/Universidad de Barcelona, Barcelona, Spain; Jackson Memorial Hospital, Miami, FL; Holy Cross Hospital, Fort Lauderdale, FL

Study Objectives: Cardiac events are one of the leading causes of emergency department visits. Both thrombolysis in myocardial infarction (TIMI) risk score and HEART score are used as integrated clinical assessment tools. The objective of this study was to assess the diagnostic accuracy of TIMI and HEART risk scores with the integration of coronary computed tomography angiography (CTA) using Bayesian statistical modeling.

Methods: TIMI and HEART score were used as tools for risk stratification of the patient population in low and moderate risk. TIMI risk score of 0-3 points was considered low, with a 13.3% risk of complications and 4-5 points was moderate with a 23.2% risk. HEART score of 0-3 points was considered low with a 1.7% risk and moderate 4-6 points with 16.6% risk. CTA was used as a validation tool. Sensitivity and specificity for CTA was obtained from pooled meta analysis data and likelihood ratios (LR) were calculated. Percent risk from scoring system was used as pre test probability in Bayesian nomogram and LR were inserted to calculate post test probability. Absolute (ADG) and relative diagnostic gains (RDG) were then calculated.

Results: Low TIMI risk score and LRs yielded a post test probability of 5.9%, ADG 39.8% and RDG 39.5%. Moderate TIMI score resulted in 69% post test probability, ADG 45.8% and RDG 197.4%. Using LR. for TIMI low risk test probability of 1% and RDG 92.4%. Moderate risk had a post test probability of 2% and RDG 91.4%. Low HEART risk score and LRs yielded a post test probability 11%, ADG 9.3% and RDG 547.1%. Moderate risk resulted in 59% post test probability, ADG 42.4%, RDG 255.4%. Using LR. low risk had no yield, while moderate risk had a RDG of 93.9%.

Conclusion: HEART risk score demonstrated superior diagnostic gain in both patient populations, low and moderate risk. Limitations include the retrospective nature of the study and the limited universe of subjects in the meta-analysis pool.

117 Scholarship and the Emergency Medicine Educator: A Workforce Study
Jordan J, Yarris L, Runde D, Clarke S, Fowkes E, Coates W/Harbor-UCLA Medical Center, Torrance, CA; Oregon Health and Sciences University Medical Center, Portland, OR; University of Iowa Hospitals and Clinics, Iowa City, IA; University of California Davis Medical Center, Sacramento, CA

Study Objectives: Education research is an emerging field. Recent literature calls for initiatives to improve the quality of education studies and support faculty in approaching educational problems, questions, and theory in a scholarly manner.

Medical educators have reported being limited by: (1) Time; (2) Funding; (3) Access to...
expertise for study design and statistical analyses; (4) Access to mentors; and (5) A sense that education research does not result in extrinsic or intrinsic reward in our current academic paradigm. This study aims to illuminate the current workforce model for the academic emergency medicine (EM) educator. Understanding educators’ job descriptions, available resources and staffing for conducting their educational missions is a crucial precursor to developing programs and policies to support educators and promote education scholarship in EM.

Methods: Study participants included program leadership at ACGME accredited EM training programs who completed an online survey consisting of multiple choice and completion items. Descriptive statistics were calculated and reported.

Results: Fifty-three programs from all regions of the United States participated (39.62% 4-year programs: 60.38% ≥ 5 year). Mean number of residents/program: 40.40 ± 16.08, 95% CI [36.07-44.73], Mean number of core faculty/program: 16.29 ± 8.21, 95% CI [14.04-18.55]. Mean number of faculty full time equivalents (FTEs)/program dedicated primarily to the education mission is 5.86 ± 3.89, 95% CI [4.67-7.06], including (mean): Vice Chair for education (0.19); Director of Medical Education (0.09); Education Fellowship Director (0.29); Residency Program Director (0.77); Associate Residency Director (0.91); Assistant Residency Director (0.97); Medical Student Clerkship Director (0.70); Associate/Assistant Clerkship Director (0.25); Simulation Fellowship Director (0.08); Simulation Director (0.37); Director of Faculty Development (0.15). Mean number of FTEs/program for administrative support of the educational mission is 2.52 ± 1.07, 95% CI [2.19-2.85] including the following roles (mean): Education Manager (0.16), Residency Coordinator (1.28), Medical Student Coordinator (0.64), Education Research Administrative Assistant (0.19), Direct Administrative Assistant for education faculty (0.22). Sixty-five percent of respondents stated that there was an established standard for the number of clinical hours required of core faculty; the mean hours/week in these programs was 26.90 ± 3.03, 95% CI [25.74-28.07]. Determination of clinical hours for education faculty varied amongst respondents but many cited individual negotiations with the chair and residency review committee requirements. Only 42.5% of respondents stated they had a person with education research expertise in their department. Of those, less than half had an education research director.

Conclusion: Education faculty represent about 1/3 of the core faculty workforce. Many programs do not have the full spectrum of education leadership roles and educational faculty divide their time between multiple important academic roles. Clinical requirements vary. Many departments lack personnel with expertise in education research. This information may inform policies and interventions to promote education scholarship and support educators in their academic careers.

118 High Efficiency Linguistics Program for Spanish: A Cyclic Curriculum for Improving Spanish Language Capacity Among Resident Physicians

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Study Objectives: The United States Latino population is increasing rapidly, and lack of Spanish-speaking providers often impedes medical care in emergency situations. Emergency medicine (EM) residents and their training programs lack access to flexible language programs that fit resident schedules. In response, the High Efficiency Linguistics Program for Spanish (HELPs) curriculum was developed. The study objective was to design a flexible Spanish language curriculum (based on second-language acquisition principles) that is adaptable to each user, flexible in timing, and economical. It also needed to accommodate resident work schedules (and variability) and include measurement of language progress.

Methods: A flexible curriculum involving: (1) individualized language lessons online, (2) weekly assigned homework, and (3) technology-based learning resources (ear/voice time) was developed based on literature review of previous studies and proposed best practices. Participants were asked to commit three hours each week to these activities. Individualized language lessons were conducted through video conferencing with experienced teachers at the Celas Maya Spanish School in Quetzaltenango, Guatemala. A cohort of 20 participants was recruited, including (7) EM residents, (5) 1st year medical students, (7) 2nd year medical students, and (1) clinical nurse leader. Participants self-reported hours spent on each of the three curriculum activities. Lessons and homework completion was verified by their teachers. Pre- and post-HELPs interviews for assessment of language progression and oral proficiency were completed by independent evaluators at Celas Maya.

Results: Participants were assessed over a 10-week period for both completion of program requirements and language progression. 80% of the participants were able to complete all 10 of their online lessons, with 95% of participants completing at least 9 of 10 lessons. One-way analysis of variance (ANOVA) statistical testing revealed no significant difference between EM resident, medical student, and nursing student completion rates of lessons, homework, and ear/voice time. Qualitative data regarding progress in specific areas of language acquisition were collected for each participant and provided to them as feedback. Exit interviews revealed that 44.4% of participants advanced to the next highest level of Spanish language training, and 11.1% advanced by two levels.

Conclusion: EM residents, despite their demanding and variable work schedules, were successful in completing the 10-week HELPs program. There was no significant difference in the ability of residents to complete weekly online language lessons, homework, and technology-based learning compared to other participants. Entry and exit interviews conducted by independent evaluators allowed us to assess language skills, track progress, and provide meaningful feedback to residents. In an effort to improve Spanish language capacity among health care providers, we plan to expand HELPs into a robust 3-year curriculum available to resident physicians in all fields of medicine.
Methods: We conducted a cross-sectional survey in the pediatric emergency department. Participation was voluntary and anonymous. Separate surveys linked by encounter number were completed by both a parent and a student before and after a medical evaluation (4 surveys per encounter). Included were 3rd and 4th year medical students and parents of patients under age 21 who were evaluated by a student. Parents over age 14 were also offered surveys. Non-English speaking parents and patients under age 18 without a parent or guardian present were excluded. In addition to demographic and background information, survey questions asked participants to rate level of agreement on a 5-point bipolar Likert scale. Questions were piloted on sample groups, modeled after those used in previous studies, and used positively phrased statements to minimize risk of overestimation of satisfaction.

Results: A total of 100 encounters (98 surveys) were enrolled via convenience sampling during medical student shifts from October 2014 to March 2015. Parents reported that they were satisfied or very satisfied with the medical student encounter 94% of the time, while medical students perceived parents were satisfied only 74% of the time. Students agreed that they are comfortable performing a physical exam on a younger child (under age 3) only 29% of the time and reported comfort with the exam 71% of the time. Logistic regression analyses were performed to evaluate potential factors for predictors of comfort levels. For each increase in shift number that the student had previously completed the odds of the student being comfortable increased by 2.26 (OR = 2.29; 95% CI [1.35, 4.15]). For each increase in the child’s age in years by 1, the odds of a parent being comfortable with students increased by 1.1% (OR = 1.09, 95% CI [1.01, 1.17]). Seventy-five percent of parents agreed that they understand the role of the medical student in the pediatric ED.

Conclusions: Medical student rotations remain a crucial component of medical education. To optimize success, measures should be taken to ensure that students are comfortable and families are appropriately educated prior to encounters. There is opportunity for improvement in both parent and student education. For medical students, a simulation or module focused on exam skills of younger children prior to the rotation may help improve student satisfaction and comfort levels. An educational tool may be useful to ensure that parents understand the role of the medical student in the ED.

121 Good to Great: Strategies That Result in Successful Scholarly Publications in Emergency Medicine Programs
Keyes D, Moore JA, Nguyen P, Haigave T, Boch J, Kondrat K/St Mary Mercy Hospital, Livonia, MI; Michigan State University, East Lansing, Michigan, MI

Study Objectives: Organizations that accredited US residency programs increasingly require that core faculty publish peer-reviewed articles. The objective of this study was to identify key resources that are used by successful emergency medicine residency programs to achieve this goal.

Methods: Using Graduate Medical Education (GME) emergency medicine (EM) programs in the Great Lakes region as a representative sample, this project involved two steps: (1) quantifying the number of publications identified with specific EM departments using the NLM Pubmed database in discrete intervals of time, including 1990-1994, 1995-1999, 2000-2004, and 2005-2014, and (2) correlating these results with a cross-sectional survey of all 48 EM residency programs in the 5-state region. The region included Michigan, Ohio, Illinois, Indiana and Wisconsin. Programs were divided into two groups based on whether they had a consistent ≥50% increase in publications at any point in time across the intervals. Groups were compared using descriptive statistics. For dichotomous variables with small expected cell sizes, we used Fisher’s exact test between the highly improved group (HIG), and the control group (CG) that did not improve over the study period.

Results: The online survey was conducted from August 2014 through March 2015 and 57/48 programs responded to the survey (77%). Eight of the departments identified has having made ≥50% “leaps” in publication productivity (HIG) during the study period, 7 of which responded to the survey. The only question that showed statistical significance was the presence of a research methods training program (86% HIG vs 35% CG). Several individual responses showed positive trends, but were not found to be statistically significant, including the presence of a research coordinator (86% HIG vs 70% CG), subsidized, paid “protected” time (71% HIG vs 60% CG), or recruiting a successful researcher (57% HIG vs 37% CG). Three criteria appeared necessary but not sufficient, including statistical support (100% HIG vs 70% CG), having a source of funding (100% HIG vs 70%), and presence of a physician research director (100% HIG vs 80%).

Conclusion: Several factors appear to be important for creating an environment that cultivates scholarly publications. The presence of statistical support, some source of funding (intramural or extramural), and research leadership were present at all sites that experienced transformation to a successful research program. Trends were also present for having a research coordinator, paid “protected” time, and recruiting an actively publishing researcher, but these did not reach statistical significance in our study. The only factor that was clearly statistically significant in accelerating a program was the presence of a training program in research methodology. This study describes a novel methodology for future comparison of scholarly support in the GME setting.

122 Emergency Medicine Ultrasound Milestones: Resident Opinion and Perceptions of the Guidelines
Emergency Medicine Ultrasound Milestones Survey Study Group, Stolz L, Fiorello AB, Adhikari S/University of Arizona, Tucson, AZ

Study Objectives: Emergency ultrasound (US) has become an integral element of the practice of emergency medicine (EM). The Accredited Council for Graduate Medical Education (ACGME) has adopted the EM Milestones for assessment of residents’ progress during their residency training which includes demonstration of procedural competency in bedside US. Council of Emergency Medicine Residency-Academy of Emergency Ultrasound (CORD-AEUS) consensus document provides guidelines for resident assessment and progression. The objective of this study was to assess EM resident perceptions of the proposed US milestones and guidelines for assessment.

Methods: This study is a prospective stratified cluster sample survey of all United States EM residency programs. Programs were stratified into strata based on their combination of geographic location (Northeast, South, Midwest, West), presence/absence of US fellowship program, and size of residency with programs sampled randomly from each stratum and all residents within a program were surveyed. The survey was first pilot tested on a small sample of EM residents. Summary statistics and 95% confidence intervals (CI) account for the survey design, with sampling weights equal to the inverse of the probability of selection, and represent national estimates of all EM residents.

Results: A total of 490 residents from 15 EM residency programs completed the survey for a response rate of 84%. A total of 9.6% (95% CI: 3.1, 16.0) self-reported their US skill level as novice, 72.6% (61.5, 83.7) as intermediate, and 17.7% (8.5, 26.8) as advanced. On a scale of 1-5 (1 = strongly disagree, 2 = disagree, 3 = neither agree nor disagree, 4 = agree, 5 = strongly agree), residents agreed that US is an essential skill for the practice of EM (mean = 4.3 [4.1, 4.5]). Residents disagreed that certification by an external organization is necessary to validate competency in the use of emergency US (2.7 [2.4, 3.1]). Residents felt as though an average of 325 (286, 364) US examinations should be required during residency training, but also agreed that number of US examinations alone does not ensure a resident’s US competency (4.0 [3.8, 4.14]). The US applications that residents felt they would be likely or very likely to use in clinical practice after residency were for the diagnosis of cardiac standstill, evaluation of trauma (FAST), vascular access, diagnosis of pericardial effusion, procedural guidance, diagnosis of intrauterine pregnancy, skin and soft tissue abscess, abdominal aortic aneurysm, pneumothorax and hydrocephrosis.

Conclusion: EM residents agree that US is essential for the practice of EM and disagreed that certification should be managed by an external organization. Residents identified a higher number of US examinations that should be required during residency training, but felt that the number of examinations alone does not ensure competency.

123 Video-Assisted Endotracheal Intubation via Direct Laryngoscopy Using Google Glass: A Pilot Study
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Study Objective: The objective of this study was to demonstrate that Google Glass (GG) offered an effective video-assisted teaching method for endotracheal intubations by direct laryngoscopy compared to traditional methods.

Methods: One hundred two medical students at the University of Toledo College of Medicine were divided into two groups: a GG group and a control group. Each group was given an instruction tutorial: one via the traditional method and one using the GG, video-assisted method. Each student was given 3 attempts to successfully intubate a mannequin and their times were recorded and graded based on success. Failed intubations, indicated by entry into the esophagus, were also recorded. MANOVA and Chi Square tests were performed to assess the statistical significance of the findings.
Results: The mean performance time means for the GG serial attempts were 20.95 ± 13.36 seconds, 15.48 ± 10.48 seconds, and 13.66 ± 7.74 seconds, respectively. For the traditional method serial attempts, the mean performance times were 29.15 ± 19.65 seconds, 20.54 ± 14.28 seconds, and 17.05 ± 11.01 seconds, respectively. Although the GG group intubated faster than the control group, a MANOVA analysis showed a difference between both groups that did not reach significance ($P = .077$). In addition, a Chi-Square test did not show a significant difference between groups ($P = .08$) when assessing successful esophageal intubations between the two methods.

Conclusions: GG provided equivalent results compared to the traditional teaching method for endotracheal intubation by direct laryngoscopy. Therefore this technique should be strongly considered in educational forums since it would serve as a more efficient teaching method allowing larger audiences to view the procedure from a first-hand perspective, while maintaining an adequate proficiency in demonstrating the procedure.

124 Lessons Learned: Developing an Education Format for Disseminating Clinical Pearls Gleaned from Adverse Event Review

Thomas JF, Martin D, Scanlan-Hanson L, Snow K, Nestler D/Mayo Clinic, Rochester, MN

Study Objectives: Staff that participates in adverse event review feel valuable clinical pearls can be gained from the process. We sought to create a Web-based intervention, called “Lessons Learned,” to share these pearls with all providers and nurses in our ED. Our monthly module would test clinical knowledge, teach through de-identified but actual adverse event case events, test short- and long-term retention of these clinical pearls, and measure whether or not participants are using this information in their clinical care.

Methods: All nurses (163), emergency medicine residents (25), advanced practice providers (8), and board-certified physicians (45) in a tertiary care academic emergency department (ED) with 73,000 annual visits were invited to participate in our Lessons Learned. Our pre-existing adverse event review process utilizes provider peer review and/or multidisciplinary review of cases with unexpected outcomes. Leaders of our adverse event review process identified cases that were suitable for sharing with the entire department. Monthly, the Lessons Learned team emailed staff a link to a Web-based module that included: two pre-test medical knowledge questions, two case vignettes with education, and two post-test questions, designed to test short-term acquisition of the clinical knowledge. Starting on month three, we included a retention and utilization section where we asked the two questions initially posed eight weeks earlier (testing longer-term acquisition) and whether the clinical pearls have been considered in bedside care. Education literature describes a progression through levels of learning. This process allows us to assess these levels of learning from knowledge acquisition to retention to analysis with incorporation into clinical practice.

Results: Our voluntary modules averaged a response rate of 46% (n = 112) of the 242 eligible staff receiving the email invitation to participate. In this pilot phase, four modules have been disseminated, and the first two have been tested for remote recall eight weeks after initial dissemination. These two modules demonstrated short- and long-term learning ("knowledge" and "retention"), and demonstrate application of the clinical pearls in bedside care ("application" and "synthesis") (Figure).

Conclusion: A Web-based format with short, concise case-based modules provides a platform for a large, diverse group of providers to glean clinical pearls from adverse event review. Analysis of provider groups can identify learning gaps related to these lessons learned to inform future quality and education initiatives related to patient care.

125 Optimizing a Rational Departmental Protocol for Diagnosing Pulmonary Embolism: Adjusting d-Dimer Cutoff for Age Can Further Reduce Computed Tomography Use With An Acceptable Miss Rate

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Study Objective: The pursuit of the diagnosis of pulmonary embolism (PE) has been the focus of much discussion in the medical literature, and ever testing in the pursuit of the diagnosis of PE has long been an area of concern. Pulmonary artery computerized tomography (PACT) has potential complications, including an increase of neoplastic disease, potential nephrotoxicity, and severe reactions, such as anaphylaxis. There are also implications for cost, throughput, patient satisfaction, and resource allocation. Additionally, there are risks of long-term anticoagulation in patients with false positive or clinically insignificant positive findings. Recently, the implementation of an evidence-based imaging algorithm in our emergency department was associated with a 10% reduction in PACTs performed. Other studies using a different d-dimer assay than the one at our institution have demonstrated that a higher, age-adjusted, cutoff value in patients older than 50 is appropriate and safe. The objective of our study was to determine the false negative rate for age-adjusted D-dimer when added to our clinical algorithm, and how many unnecessary PACTs might be avoided by doing so.

Methods: This was a retrospective chart review from October 2013 to October 2014 using data collected prospectively at an urban tertiary care teaching hospital emergency department during the implementation of departmental protocol to rationalize the diagnostic approach to PE. All patients 50 years or older who had both a D-dimer assay performed and a PACT for PE were included. The Hemolos D-Dimer HS assay (Instrumentation Laboratory, Bedford, MA) was used with a manufacturer recommended cutoff of 230 ng/mL. The appropriate age-adjusted cutoff was determined to be age x 5 for patients over 50, based on a previous study which examined the cutoff for deep venous thrombosis exclusion.

Results: During the study period, 400 patients met inclusion criteria. Of these, 63 (15.8%; 95% CI - 12.4% to 19.8%) had a PACT positive for PE. If an age-adjusted d-dimer had been used, 90 CTPA studies would have been avoided, a 22.5% (95% CI - 18.6% to 27%) reduction in imaging. Four patients (1%) with a negative PACT result (95% CI - 0.32% to 2.72%) had a negative age adjusted-d-dimer. Three of these four false negative age adjusted-d-dimers were for PE of subsegmental pulmonary arteries.

Conclusions: Our study found that the use of an age adjusted Hemolos D-Dimer HS assay resulted in a 1% false negative rate, which is within the established testing threshold of 2%. Implementation of an age adjusted strategy would potentially result in a significant reduction in PACTs for diagnosing PE.

126 Does Educational Intervention Improve Physician Adherence to Wells’ Score for Diagnosis of Deep Venous Thrombosis?


Study Objective: The Wells’ criteria has been validated to show d-dimer (DD) to be an appropriate test to rule out deep vein thrombosis (DVT) in low to moderate risk patients in the emergency department (ED). The primary objective of this study is to determine the effects of an educational intervention of emergency physicians on adherence to the Wells’ criteria for patients being evaluated for DVT.

Methods: A retrospective cohort study was conducted of patients who had been evaluated for DVT at a Level II Trauma Center with over 85,000 annual visits. Emergency physicians underwent an educational intervention regarding the use of Wells’ Score to risk stratify patients with suspected DVT and a new guideline was
suggested to help decrease unnecessary lower extremity ultrasound (DVU) utilization. The results of DD levels and DVU were recorded over a 3-month period prior to the intervention to establish a baseline. During the following 3 months after the intervention intervention, the number of positive and negative DD and need for subsequent DVU were recorded for comparison to the baseline. Chart reviews were conducted to calculate patients Wells' Scores.

Results: During the baseline period, 256 adult patients were evaluated for DVT, with 16.4% (42/256) diagnosed with DVT. Twenty-four patients had initial DD screening with a positive rate of 70.8% (17 out of 24) necessitating further evaluation with DVU. During the period after the educational intervention, 313 adult patients were evaluated for DVT, with 7.9% (25 out of 313) diagnosed with acute DVT. Forty-seven had initial DD screening with a positive rate of 40.4% (19 out of 47) necessitating further evaluation with DVU. During the intervention period, there was a statistically significant increase in the percentage of patients who underwent DD screening, increasing from 9.4% (24 out of 256) in the baseline group to 15.0% (47 out of 313) in the intervention group (P < .042). However, there remains significant room for improvement in adherence to the Wells' criteria because 90.0% of patients in the baseline group and 85.0% of the patients in the intervention group underwent DVU only screening even though they met Wells’ criteria to be evaluated with DD. Appropriate application of the Wells' criteria has the potential of significant cost savings as at this site a charge for DDVU is more than 17 times the charge for DD.

Conclusion: An educational intervention was successful in producing a small but statistically significant improvement of physician adherence to the Wells' criteria for the evaluation of DVT. Based on this retrospective chart review, there are a large number of patients who could undergo DD screening for workup of DVT with potential for decreased ultrasound utilization and substantial cost savings.

127 Determining the Usage of Imaging Modality in Management of Adult Patients Presenting to Emergency Department With Foreign Body Sensation in Throat/Neck

Background: Many patients come to the emergency department (ED) for evaluation of foreign body (FB) sensation in their neck area after eating. There is limited data evaluating the best diagnostic and management strategies for this chief complaint.

Study Objectives: (1) We determine to study the usage of imaging in this patient for this chief complaint. (2) To determine the sensitivity of computed tomography (CT) and x-ray imaging in the evaluation of impacted fishbones. (3) To determine consult patterns in this patient population.

Methods: A descriptive retrospective chart review study was conducted at an urban teaching ED with annual consensus of 130,000. Inclusion criteria: Adults ≥ 18 yrs of age and who had ED diagnosis of following ICD-9 codes: code 993.0 for foreign body in the pharynx, 933.1 for foreign body in the larynx, and 935.1 for foreign body in the esophagus. The data collected included: demographics, vital signs, general appearance, imaging utilized, retrieval procedures, study and procedural outcomes, consults, and follow-up visits. We used median and percentages to describe the data and used chi-square and Mann Whitney U test for univariate analysis of categorical and continuous variables with alpha set at P < .05.

Results: Total 330 unique adult patients were identified with median age of 48.5 years (34.62±19), 55.5% females, 114 (35%) Asian, 36 (10.9%) black, 23 (6.7%) hispanic, 121 (36.7%) white, and 36 (10.9%) others. Most commonly expressed chief complaint was feeling of FB sensation in throat 213 (64.5%), choking sensation being next common 36 (10.9%). Majority patients were in no acute distress 322 (97.6%) with median spo2 of 96 (IQR 97-100%). There was no significant difference in spo2 in patients with acute distress vs no acute distress on univariate analysis. ENT consult was called for 49 (14.9%), GI consult for 20 (5.9%) and both ENT and GI consult was called for 12 (3.6%) patients. Direct laryngoscopy was performed in 34 (10.3%) cases and there were 129 (39%) cases where no imaging was utilized. CXR was performed in 68 (20.6%), Neck soft tissue x-ray in 96 (29.1%), CT neck in 76 (23.1%), chest CT in 5 (1.5%). Both neck x-ray and CT were performed in 21 (27.6%) cases. All the patients were discharged home and only 2 patients had recurrent visit. FB was located in 54 patients of those-35 above cricoid, 19 below cricoid. Soft tissue neck x-ray sensitivity 0.64 95% CI (0.42-0.81), specificity 0.62 (0.39-0.81) when compared to combined CT and endoscopy findings. CT neck sensitivity to esophagoscopy findings is 0.96 95% CI (0.77-1). In 92 patients who had soft tissue neck x-rays that were reported negative, confirmatory CT in 14 patients and 7 with positive FB. Twenty-five patients with positive FB on x-rays, 8 had CT neck with 7 positive FB. X-ray versus CT alone, sensitivity is 0.50, 95% CI (0.24-0.76) specificity 0.875 (0.47-0.99).

Conclusion: CT neck has a high sensitivity for picking up impacted bony FB. This test should be considered as the preferred imaging modality for diagnosing impacted boney oropharyngeal foreign body.

128 Utility of Hepatic Function Testing in Emergency Department Patients With Abdominal or Epigastric/ Right Upper Quadrant Pain
Driver B, Shaker S, Gadbois J, Garrison O, Prekker M, Moore J, Gray R/Hennepin County Medical Center, Minneapolis, MN; University of Minnesota School of Medicine, Minneapolis, MN

Background: Abdominal pain is a frequent emergency department (ED) complaint, and labs are commonly ordered. The rate of 30-day follow-up events, and the frequency of ordering and utility of hepatic function tests (LFT) in ED patients with abdominal pain is not known.

Study Objectives: To determine the rate of 30-day follow-up events that could ostensibly be diagnosed by abnormal LFT results in ED patients with abdominal pain, and correlate this with chief complaint and LFT order status and result.

Methods: Pilot study conducted via a retrospective database query at a high-volume urban ED of adult patients presenting with abdominal pain between 2009 and 2012. The chief complaint, laboratory values, and 30-day follow-up data were pulled from the electronic medical record directly. ED ultrasound data was abstracted by two trained reviewers. Abnormal AST, ALT, and lipase were defined as greater than 80, 112, and 120 IU/L, respectively (greater than twice the upper limit of normal). Abnormal total bilirubin and alkaline phosphatase (AlkPhos) were defined as more than 1.2 mg/dL and 126 IU/L, respectively. LFT was defined as abnormal if any of AST, ALT, total bilirubin, or AlkPhos were abnormal. Outcome events were defined as any of the following within 30 days of the index ED encounter: ERCP, cholecystectomy, liver biopsy, new diagnosis of ICD-9 code 155-157, 273.4, 275.01, 275.10, or 570-577, laboratory testing for cirrhosis or hepatitis, MRCP, or gastroenterology consultation without a diagnosis of gastrointestinal hemorrhage. Data were analyzed descriptively.

Results: A total of 17,277 ED patients with 26,281 encounters were identified. LFT was ordered in 8,090 encounters (30.8%), and abnormal in 1,986 (24.5% of ordered). When ordered, lipase, AST, ALT, total bilirubin, and AlkPhos were abnormal in 668 (8.6%), 844 (11.1%), 469 (6.2%), 732 (9.1%), and 1,122 (15.2%) patients, respectively. Eighty hundred thirty (3.2%) patients had either a procedure completed or new diagnosis made at 30 days; 2,498 (9.5%) patients had at least one follow-up event. Abnormal LFT was 54.9% (95 CI 50.8-58.9) sensitive and 77.9% (95 CI 76.9-78.8) specific for a procedure completed or new diagnosis at 30 days. In patients with epigastric/RUQ pain, who did not have an abnormal lipase value or abnormal RUQ ultrasound, 2.9% had a procedure or new diagnosis at 30 days; 60% of these patients had either normal LFT results or did not have LFT ordered. See the Figure and Table for detailed data by chief complaint and LFT order and result.

Conclusion: In this retrospective, single-center study, LFT was neither sensitive nor specific for 30-day events in ED patients presenting with abdominal or epigastric/ RUQ pain.

Table. 30-Day Outcome Data

<table>
<thead>
<tr>
<th>Procedure</th>
<th>Lab or Imaging</th>
<th>Consult</th>
<th>Event</th>
</tr>
</thead>
<tbody>
<tr>
<td>All patients</td>
<td>26,281</td>
<td>409</td>
<td>511</td>
</tr>
<tr>
<td>Abdominal Pain</td>
<td>20,682</td>
<td>120</td>
<td>243</td>
</tr>
<tr>
<td>Epigastric Pain</td>
<td>5,599</td>
<td>289</td>
<td>268</td>
</tr>
<tr>
<td>Epigastric pain &amp; abnormal lipase or U/S</td>
<td>1,722</td>
<td>256</td>
<td>189</td>
</tr>
<tr>
<td>Epigastric pain, excluding abnormal lipase or U/S</td>
<td>3,877</td>
<td>33</td>
<td>79</td>
</tr>
<tr>
<td>With normal LFT</td>
<td>1,802</td>
<td>11</td>
<td>30</td>
</tr>
<tr>
<td>With abnormal LFT</td>
<td>382</td>
<td>14</td>
<td>31</td>
</tr>
<tr>
<td>No LFT ordered</td>
<td>1,693</td>
<td>8</td>
<td>18</td>
</tr>
</tbody>
</table>

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intervention were similar: sepsis, pyelonephritis and acute kidney injury (OR 1.51, 1.78 and 1.55, \(P < .0001\)) or having private insurance (OR 1.55, reference group: Medicare) were associated with a statistically significant increased risk of urologic intervention, while black and Hispanic race were associated with lower risk (OR 0.73 and 0.92, \(P < .0001\), respectively, reference group: whites.). Regional variation was observed: patients seen at rural hospitals had lower admission and CT rates, and patients visiting hospitals in the northeast region had higher intervention rates, with admission rates double those of southern and western hospitals.

Conclusions: In this dataset, the majority of patients did not require admission or immediate intervention. Despite this, 250,000 CT scans were performed over 2 years, in a cohort representing nearly 20% of all US ED visits. The variation noted as well as the surgical intervention rate suggest that the CT rate of 72% could be improved upon, particularly in light of increasing concerns about radiation. Further research is needed to investigate the causes of variation and also to risk stratify patients, helping to identify those who could safely forgo immediate CT.

**130 The Sensitivity of Combined Revised Geneva Rule Risk Stratification and D-Dimer Testing in Excluding Acute Pulmonary Embolism**

Borough WJ, Dominici P, Castillo J, Cooney B, Damiron K, Guttentag A/Einstein Medical Center, Philadelphia, PA

Study Objectives: Risk stratification for acute pulmonary embolism using the Wells Rule (WR) and ELISA D-Dimer has been well studied. The Revised Gene Rule (RGR) for pulmonary embolism differs from the WR by removing the subjective component in scoring. The combined use of the RGR and ELISA D-dimer has received little study. We hypothesize that in patients classified as low or intermediate pre-test probability (L-PTP, I-PTP) through the RGR, a negative ELISA D-dimer is sufficient to rule-out acute pulmonary embolism (PE) and avoid diagnostic imaging.

Methods: This was a prospective, observational study of patients who presented to a Level I training emergency department with signs and symptoms that could be related to acute PE. Patients were enrolled if they failed the PE Rule-out Criteria (PERC) rule and received advanced imaging to diagnose PE. D-Dimer testing and scores for both WR and RGR were calculated prospectively at the time of enrollment. Reading radiologists were blinded to enrollment in the study. The results of the diagnostic imaging were then compared to the dichotomized WR and RGR pre-test probability classifications as well as D-Dimer result. McNemar’s test was performed to determine sensitivity, specificity, positive predictive value (PPV) and negative predictive value (NPV) of D-Dimer in both groups to rule out PE. Subjects with negative advanced imaging were followed for 90 days post-enrolment for subsequent PE diagnosis.

Results: Of 672 patients screened, 256 met inclusion criteria and were enrolled, receiving both D-dimer testing and advanced imaging via CT pulmonary angiography (CTPA) or ventilation/perfusion (V/Q) scans. In all, ELISA D-Dimer was positive in 208 (81%) of enrolled subjects. However, PE was diagnosed in only 26 (10%) subjects. There was remarkable disagreement between WR and RGR in CTPA (sensitivity 95%, false detection rate 2%) and V/Q scans (sensitivity 92%, false omission rate 2%).

No subjects discharged with negative imaging were diagnosed with PE within 90 days. Subjects with negative advanced imaging had a 100% sensitivity to rule out PE. In L-PTP groups (n = 208, NPV 95% and 97%) Only 1 of 256 subjects had advanced imaging that was positive for PE (V/Q scan) despite a negative D-dimer (overall sensitivity 99.7%, false omission rate 2%).

Conclusions: In this dataset, the majority of patients did not require admission or immediate intervention. Despite this, 250,000 CT scans were performed over 2 years, in a cohort representing nearly 20% of all US ED visits. The variation noted as well as the surgical intervention rate suggest that the CT rate of 72% could be improved upon, particularly in light of increasing concerns about radiation. Further research is needed to investigate the causes of variation and also to risk stratify patients, helping to identify those who could safely forgo immediate CT.

**131 Evaluating the Need for Computed Tomographic Pulmonary Angiography in Patients With Low Pre-Test Probability and Slightly Elevated Quantitative D-Dimer: A Retrospective Chart Review**

Burkett J, Maior R Jr., Felton B, Kenney R/Michigan State University, East Lansing, MI; Sparrow Health Systems, Lansing, MI

Study Objective: Increasing the lower threshold of a positive quantitative d-dimer could decrease unnecessary testing in patients with low pre-test probability for pulmonary embolism.
pulmonary embolism (PE) as defined as a Traditional Wells’s score of less than two, a modified Wells score of less than or equal to four, or a Revised Geneva Score (RGS) of three or less. The primary goal of this pilot study was to determine the incidence of missed PE diagnosed by computed tomography pulmonary angiography (CTPA) in patients undergoing evaluation for PE with a quantitative d-dimer assay of 0.5–1.0 mg/L and a low-risk pre-test probability. The secondary goal of the study was to determine whether adjusted pre-test probabilities and reduced CT scans would result in missed diagnoses of pneumonia in this patient population.

Methods: Participants: All patients older than 18 years of age being evaluated for pulmonary embolism with a d-dimer result between 0.5 and 1.0 mg/L during emergency department evaluation between the dates of January 1, 13 and June 14, 14 at a tertiary academic hospital. Design: A retrospective chart review was completed on all patients meeting primary inclusion criteria. The patients were retrospectively stratified based on traditional Wells’s scoring system, Modified Wells’s, and RGS. Patients in which pre-test probability was determined to be low (<2 by traditional Wells’s, ≤ 4 by modified Wells, or <4 by RGS), a d-dimer result of 0.5–1.0 mg/L, and who underwent definitive imaging for pulmonary embolism in the emergency department were selected for inclusion in the study analysis. Analysis: The incidence of missed PE in patients with low pretest probability as well the incidence of pneumonia in each scoring system was determined.

Results: After reviewing 2231 eligible patient records for inclusion criteria, 46 patients were included for final analysis. For patients evaluated for PE with diagnostic imaging who had an intermediate d-dimer (0.5–1.0 mg/L) and a non-elevated bi-level modified Wells’s score (<4), 2 patients (4.34%) were ultimately diagnosed with PE by CTPA. When using either traditional low-risk Wells’s or RGS scores in patients with an intermediate d-dimer, no patients were found to have PE (0/42 and 0/21, respectively). Pneumonia was found by CTPA in 4/46 patients in the non-high modified Wells’s score range (8.7%), and in 4/42 (8.34%) of patients in the low risk Wells range. Pneumonia was found by standard chest x-ray in each of these patients.

Conclusions: This pilot study suggests that increasing the threshold for a positive d-dimer to 1.0 mg/L in conjunction with a low pre-test probability as defined by traditional Wells’s score of less than two could be used to exclude PE with 100% negative predictive value while simultaneously reducing the use of CTPA and exposure to ionizing radiation in the emergency department. Further study with an increased number of patients meeting inclusion criteria needs to be performed before widespread adoption of this diagnostic algorithm can be considered as the sole exclusion in patients being evaluated for PE in the emergency department.

Performance of the Four-Range Motion Test for Radiographic Injuries After Blunt Elbow Trauma
Panacek EA, Goona S, Kann G, Vinson D/University of South Alabama Medical Center, Mobile, AL; UC Davis, Sacramento, CA; Kaiser Permanente, Sacramento, CA

Study Objectives: A previous study observed that limited active range of motion (ROM) of the elbow appeared highly sensitive for positive radiographs after blunt trauma. Our aim was to validate those findings in patients five years or older with acute (<24 hours) non-penetrating elbow injuries by determining the performance characteristics of a four-range ROM test.

Methods: We undertook a prospective study of a convenience sample of emergency department (ED) patients who underwent radiographs of an injured elbow between August 2012 and January 2015 at 5 different EDs. Patients were excluded with pre-injury limb mobility deficits, altered mental status, a distracting injury, elbow deformity, or neovascular abnormality. Prior to imaging the treating clinician completed a standardized data collection sheet that included the patient’s age, sex, and mechanism of injury. They also documented four-range ROM (full extension, flexion to 90°, full pronation and supination) in the affected elbow and, if abnormal, in comparison with the contralateral elbow. A staff radiologist, blinded to the exam findings, determined the presence of fracture or joint effusion.

Results: A total of 251 subjects were enrolled; the median age was 24 years (range 5 to 89), and 124 (49.4%) were female. 92 patients (36.7%) had active four-range ROM, and 159 patients (63.3%) showed limitation in one or more directions. Negative radiographs were present in 152 patients (60.6%). Of the 99 patients (39.4%) who had abnormal radiographs, 75 had explicit fractures and 24 had joint effusions. The four-range ROM test had a sensitivity of 0.99 (95% confidence intervals [CI], 0.94–1.00, specificity of 0.60 (95% CI, 0.52–0.68), positive predictive value of 0.62 (95% CI, 0.54–0.69), and negative predictive value of 0.99 (95% CI, 0.94–1.00). One seven-year-old boy had a false negative test: his non-displaced supracondylar fracture was treated with immobilization without operative intervention and recovered to pre-injury function.

Conclusions: The active four-range ROM test is 99% sensitive for all radiographic injuries following blunt elbow trauma, and 100% sensitive for injuries requiring active intervention. The test may perform better in adults than in children. A moderate specificity of 60% would allow avoidance of radiographs in many patients.

Intraosseous Infusions from the Proximal Humerus Reach the Heart in Less Than 3 Seconds in Human Volunteers
Montrez DF, Pugh T, Miller L, Saussey J, Davlantes C, Kim S, Philbeck T/Teleflex Incorporated, Shavano Park, TX

Study Objectives: The proximal humerus intraosseous (PHIO) access site has advantages over lower extremity intraosseous (IO) access sites including less pain with IO infusion and higher infusion rates. Another advantage of PHIO access is the rapid delivery of drugs and fluids into the central circulation. However, the speed of delivery has not been quantified. Two volunteer studies comprised of healthy human subjects were performed to evaluate the PHIO vascular access insertion site. One objective was to evaluate the infusion pathway and collect pilot data to determine the time required for drugs and fluids injected through the PHIO site to reach the heart via the superior vena cava. To our knowledge, this is the first study evaluating the IO infusion pathway from the proximal humerus to the heart in humans.

Methods: Both studies received approval from IntegReview IRB, and all subjects provided informed consent for participation. Ten (10) subjects were recruited for inclusion in the study; subjects with prior adverse reaction or a known sensitivity to contrast media or iodine were excluded from the contrast injection portion, resulting in 7 subjects eligible to receive bolus contrast injection. IO vascular access was established using the Arrow EZ-IO 45 mm x 15 gauge Needle Set. All insertions were made in the right PHIO site for allow for visualization of the IO catheter tip and the superior vena cava in the field of view of the cinemascopes. With left PHIO access the needle tip and superior vena cava could not be viewed simultaneously. Each subject received a 10 mL (2,400 mg) bolus of Omnipaque Injection 240 contrast media (240mg/mL) through the EZ-Connect extension set attached to the IO catheter by manual injection given over 3-4 seconds, under fluoroscopic imaging. The lapsed time from first appearance of contrast media out of the IO catheter tip to entry into the superior vena cava was measured using the recorded video images by counting the number of frames (30 per second) for each injection and calculating the time lapsed.

Results: Seven subjects were injected with contrast through the right PHIO catheter. Video images for 6 of the 7 were adequate to determine the time interval between contrast injection and arrival at the superior vena cava. For one injection, the image was too vague to discern contrast reaching the superior vena cava. The mean time elapsed from appearance of contrast out of the needle tip to appearance at the superior vena cava was 2.42 (±0.39) seconds.

Conclusion: The mean elapsed time from appearance of contrast from the tip of the IO catheter to appearance at the superior vena cava was less than 3 seconds, suggesting that use of PHIO vascular access as the first line of access should be considered when urgent access is needed and rapid administration of drugs or fluids is required.

Causes of False Positive and False Negative Software Interpretation of ST-Elevation Myocardial Infarction in Out-of-Hospital Electrocardiograms
Bosson N, Eckstein M, Sankio S, Stickney R, French WJ, Jollis J, Kontos MC, Taylor T, Lank P, Koenig W/Los Angeles County EMS Agency, Los Angeles, CA; Keck School of Medicine of the University of Southern California, Los Angeles, CA; Physio Control, Redmond, WA; Harbor-UCLA Medical Center, Torrance, CA; University of North Carolina, Cary, NC; Virginia Commonwealth University, Richmond, VA

Study Objectives: Many emergency medical services (EMS) systems rely on software interpretation of the out-of-hospital electrocardiogram (ECG) to determine routing protocols and cash lab activation in patients with ST-segment elevation myocardial infarction (STEMI). The purpose of this study was to determine the causes of software misinterpretation of STEMI, false positives (FP) and false negatives (FN), in order to identify opportunities to improve out-of-hospital identification of STEMI.

Methods: This was a retrospective study of EC gs acquired on consecutive adult patients transported in a large urban EMS system from July 2011 through December 2012. Cases were included if the patient was 18 years or older and received an ECG stored in the electronic medical record. Patients transferred from another hospital or clinic with a prior diagnosis of STEMI were excluded. A single EMS provider agency operates within the study area using the LIFEPAK 15 monitor. The regional system maintains a registry of EMS and hospital data on all patients transported by EMS with a out-of-hospital ECG interpretation of STEMI and/or a hospital diagnosis of STEMI. For patients with multiple EC gs, a systematic approach to ECG selection was
established a priori. The software interpretation of the ECG (STEMI or not) was compared with the chest lab data in the registry to classify the interpretation as true positive (TP), true negative (TN), FP, or FN. For cases where classification was not possible with the registry data, 3 cardiologists, blinded to the software interpretation and patient outcome, interpreted the ECG as STEMI or no STEMI. Once classification was complete, a single expert in electrocardiography, with detailed knowledge of the software algorithm diagnostic criteria, using all available registry data for the patient, reviewed each ECG with FP or FN software interpretation to determine the likely class of misclassification. The reasons for FP or FN were then independently reviewed by the 3 cardiologists for a random sample of 100 ECGs and the causes of misclassification were updated in an iterative fashion.

Results: There were 44,611 cases eligible for inclusion. Patients were 50% male and median age was 65 (IQR 52-80). The cases were classified as 482 TP, 711 FP, 4371 TN, and 47 FN. Of the 711 classified FP, 117 (16%) could be considered appropriate interpretations, because the ECG showed definite ST elevation (52 cases) or borderline ST elevation (65 cases) in an occlusive coronary pattern. The leading causes of FP were ECG artifact (16%), early repolarization (13%), probable pericarditis/myocarditis (11%), indeterminate (10%), left ventricular hypertrophy (6%), and right bundle branch block (4%). There were 18 additional distinct reasons for FN interpretation (< 4% each). The leading causes of FN were borderline ST-segment elevations smaller than the algorithm thresholds (67 cases) and misclassifying the ST/T ratio below threshold (15%). There were 11 additional distinct reasons for FN interpretation occurring 3 or fewer times each.

Conclusion: The leading causes of FP software interpretation for STEMI were ECG artifact and non-ischemic causes of ST-segment elevation. FN were rare and were related to ST-segment elevation or ST/T ratio that did not meet the software algorithm threshold for the STEMI statement.

135 Sternal Flow Rates and Insertion Success Using a Multisite Intraosseous Device
Phibbeck TE, Puga T, Montez DF, Miller LJ, Saussey J, Davlantes C/Teleflex Inc, Shavano Park, TX

Study Objectives: The intraosseous (IO) vascular access route is an effective option for vascular delivery of critically needed drugs and fluids. Flow rates are site and device size dependent with a wide range of reported infusion flow rates through the proximal humerus and tibia using a 15 g needle set. First described by Tocantins in 1940, the sternum was among the first bones used for IO access. This site option is important when other sites are contraindicated, as with injuries sustained due to explosives when the manubrium may be the most accessible uninjured site; yet there is a paucity of published data describing infusion flow rates and other performance characteristics through this bone. In 2012, an FDA-cleared manually inserted multi-site (sternum, humerus and tibia) IO device was introduced (Arrow EZ-IQ T T.A.L.O.N., Teleflex Inc., Reading, PA) primarily for military and tactical medicine use. A prospective, single site study of the T.A.L.O.N. device was conducted to examine performance characteristics, including flow rates; using healthy volunteers as study subjects.

Methods: IRB approval was obtained and subjects were recruited. Prior to insertion into subjects, device training was conducted with mannequins and cadavers. The device consists of a 38.5 mm, 15 g needle set used with a sternal locator to establish IO access in the sternum, and without locator for extremity access. Twenty four sternal IO insertions were performed by 8 certified military trained medical officers. To simulate a field scenario and assess needle retention during movement, insertions were made on a litter positioned on the floor. Subjects were then lifted and transferred to an examination table. For infusion pain 2% preservative and epinephrine-free lidocaine was given; then contrast was injected for visualization by fluoroscopy to verify placement and rule out extravasation. Normal saline (NS) was infused using a pressure bag with flow rates calculated after 3 minutes of infusion with gravity and infusion pressures of 100 mm Hg, 200 mm Hg, and 300 mm Hg. The NS bag was weighed before and after each infusion to determine volume infused. Subjects were monitored for signs of extravasation during infusion. A second contrast bolus was given after the last infusion pressure tested to determine if extravasation occurred during the pressure infusion.

Results: Subject mean age was 33.4 ± 8.8 years; 79% were male. Subject mean body mass index (BMI) was 26.3 (range: 17.1-31.7). Four subjects (17%) had a BMI greater than 30, but had palpable landmarks and did not have excessive tissue overlying the insertion site. Successful needle placement was initially confirmed by aspiration in 100% of cases. After the subjects were moved, one case of minor extravasation (noted after the 100 mm Hg infusion) and one case of needle dislodgment were observed under fluoroscopy, yielding a first attempt placement success rate with functionality of 92%. In no cases was there penetration of the posterior cortex of the manubrium. The mean infusion rates were: 1130 ± 692 mL/hr (n=23), 100 mm Hg: 5374 ± 1370 mL/hr (n=23), 200 mm Hg: 6419 ± 1785 mL/hr (n=23) and 300 mm Hg: 5327 ± 1724 mL/hr (n=22). There were no serious complications.

Conclusion: Results suggest that the T.A.L.O.N. may be used by military and tactical medicine personnel to safely and successfully establish IO vascular access in the sternum with excellent infusion flow rates.

136 Retrospective Application of a Low Acuity Emergency Medical Services Triage Protocol to Identify Patients Appropriate for Urgent Care

Study Objectives: Currently, the standard of care for emergency medical services (EMS) is to transport all patients to the emergency department (ED) regardless of the patient condition or level of acuity. This is in part due to the fact that eligibility for reimbursement is contingent upon transportation to an emergency department. Yet studies estimate that 7-61% of transported patients could be safely treated in an alternative environment such as a primary care office or urgent care center, and that doing so would yield improved patient and system-centered outcomes. However, an effective and efficient EMS algorithm for identifying these patients has not been established. Recently, a low acuity triage protocol was implemented in the region to improve EMS turnaround times at the ED. This study explores whether the protocol could potentially be used to identify patients appropriate for treatment at an urgent care center as an alternative to transport to the ED.

Hypothesis: The Fast Track Triage (FTT) protocol identifies low acuity EMS patients that may be appropriate for evaluation at an urgent care center.

Methods: This is a retrospective cohort study of low acuity ED patients who arrived by 911 EMS and were triaged with an Emergency Severity Index (ESI) level of 4 (less urgent) or 5 (non-urgent) during a 2-month period (November-December 2014). Patients’ charts were reviewed to determine if they met the FTT selection criteria, consisting of 24 inclusion and 8 exclusion criteria, and if so were abstracted in a structured fashion for clinical presentation, disposition, utilization of diagnostic testing modalities and performance of clinical interventions. Cases were then independently analyzed by two urgent care physicians to determine which patients were appropriate for evaluation and treatment at an urgent care center. Disagreement between these two physicians was settled by independent review by the principal investigator (PI).

Results: A total of 2,355 patients were identified from the hospital EHR who had arrived by EMS and were triaged with a level 4 or 5 ESI score during the two-month period. Of these, 96 patients (41%) met selection criteria for the FTT protocol. Two urgent care physicians reviewed abstracted data and determined 70% and 83% of cases, respectively, to be appropriate for treatment at an urgent care center. The study PI provided a final determination for the 19% of cases for which there was a disagreement, yielding an final result of 79% of FTT protocol patients being deemed appropriate to receive care at an urgent care center.

Conclusion: This study retrospectively evaluated if low acuity ED patients arriving via 911 EMS, who also met the criteria of a novel out-of-hospital triage protocol, were appropriate for evaluation and treatment at an urgent care center. This study explores whether the protocol could potentially be used to identify patients appropriate for treatment at an urgent care center as an alternative to transport to the ED.

137 Frequent Emergency Department Users: Describing Care Coordination Services
Zhan J, Wiler J, Jones C, Schroeder A, Favaro C, McLean R, Harpin S, Capp R/Denver Health Medical Center, Denver, CO; University of Colorado School of Medicine, Aurora, CO

Background: Many nationwide interventions have developed over the past few decades to help reduce health care use. However, little is known about which social determinants are associated with frequent emergency department (ED) use and what types of services patients are interested in receiving from care coordination programs.

Study Objective: To evaluate which care coordination services patients would like to receive during ED visits.

Methods: A cross-sectional study, developed through a community-academic partnership. Patients with public or no insurance, aged 18-80 years presenting to a large, urban, academic ED were eligible to participate in the survey study. We excluded
patients who were: pregnant, incarcerated, unable to consent, or required a 1:1 sitter. Thirteen trained student patient navigators (SPNs) screened the ED electronic health records for eligible patients between the hours of 11 AM-3 PM, 7 days a week, from June to August of 2014. SPNs administered surveys in person in the ED to consenting patients. Patients who completed the survey were eligible to enter a gift card drawing and received patient navigation at no cost. Participants were asked about social determinants, chronic diseases, and barriers to accessing primary care services. The survey data was merged with each participant’s hospital electronic health record in order to calculate the total number of ED visits that occurred within the previous 12 months. We defined frequent ED use as ≥ 4 ED visits in the previous year. We used chi-square analysis and t-tests to assess significance of findings.

Results: A total of 454 of 646 patients agreed to complete the survey (70% response rate). Frequent ED users comprised 26% of all surveyed patients. The population socio-demographics are described in Table 1. When compared with non-frequent ED users, frequent ED users had higher rates of unemployment (37%; P < .01), disability (19%; P < .01), and receiving government assistance (67%; P = .01). More than half of the interviewed patients identified a PCP, but 38% of frequent ED users and 52% of non-frequent users reported not seeing their PCP in the previous 6 months. We defined frequent ED use as ≥ 4 ED visits in the previous year. We used chi-square analysis and t-tests to assess significance of findings.

Conclusion: Frequent ED use is associated with multiple socioeconomic determinants and chronic medical conditions. Frequent users were more likely than non-frequent users to want help with PCP appointments and transportation. Care coordination programs in the ED tailored to help these frequent ED users should provide PCP appointments and transportation solutions.

138 Out-of-Hospital Pediatric Cardiac Arrest
Laskowski-Kos U, Slivitz A/Newark Beth Israel Medical Center, Newark, NJ

Study Objectives: (1) To assess differences in post-arrest mortality versus survivors. (2) To evaluate whether the overall morbidity and mortality was affected by directly taking the patient to a pediatric center/teaching hospital. (3) To evaluate which out-of-hospital interventions were associated with improved survival.

Methods: Retrospective review of an observational cohort of children up to and including 18 years old who experienced an out-of-hospital cardiac arrest (OOHCA) and who were cared for by the emergency medical services (EMS) system in New Jersey from 2009 to 2014. For the purposes of this study, OOHCA was defined as a child who was apneic, pulseless, and unresponsive who had resuscitation initiated by emergency health care services including the Fire Department, 911 EMS responders (Fire First Responders, emergency medical technicians [EMTs], or paramedics). Pediatric OOHCA patients who were pronounced dead without initiation of resuscitative efforts on scene were not included in this study.

Results: A total of 66 charts were identified and reviewed from centralized MONOC EMS in the State of New Jersey from January 2009 to December 2014 which corresponded to a total of 66 patients up to and including 13 years of age who suffered an OOHCA. Patient demographics included: Age- ranged from 8 days to 13 years with a mean age of 3 years. There was equal distribution of boys to girls. Most children were of Caucasian ethnicity (n=42) but others included African American and Hispanic race. Geographically, the children’s residences spanned from the Jersey Shore up to North Jersey and 12 medical centers were the destination for EMS with only a few of these specializing in pediatric emergency medicine and having pediatric faculty coverage. Preliminary results show dismal survival with only 6 patients having return of spontaneous circulation, all of which were found to have asystole on initial cardiac rhythm. There was no association between survival and the patient being taken to a pediatric center or teaching hospital. Likewise, this was no association between initial heart rhythm on EKG/cardiac monitor and geographic location for cardiac arrest as well as sex. There was a trend toward survival in the younger age range, namely infancy. Likewise, the event having been witnessed, the child having received early chest compressions, quick EMS arrival time and chest compressions with ventilation showed a positive association with survival.

Conclusion: More data is necessary to help identify factors associated with improved survival in pediatric OOHCA patients. Our study was limited by a small number of charts given the rarity of pediatric cardiac arrest and range of study spanning six years. The strength of the study comes from review of charts made available following centralization of EMS in the State of New Jersey, where data was uniform and adhered to specific markers. Overall, several patient factors show promising trends for patient survival after suffering a cardiac arrest.

139 Differences in Out-of-Hospital Electrocardiogram Test Characteristics by Patient Sex and Ethnicity in a Large Urban Area
Sanko S, Eckstein M, Bosson N, Stickney RE, French WJ, Tadeo R, Jollis JG, Kontos MC, Lank P, Koenig WJ/Kecsk School of Medicine, University of Southern California, Los Angeles, CA; Los Angeles Fire Department, Los Angeles, CA; Los Angeles County Emergency Medical Services Agency and Harbor-UCLA Medical Center, Torrance, CA; Physio-Control, Inc., Redmond, WA; Harbor-UCLA Medical Center, Torrance, CA; Los Angeles County Emergency Medical Services Agency, Santa Fe Springs, CA; Duke University, Durham, NC; Medical College of Virginia at Virginia Commonwealth University, Richmond, VA; Los Angeles County Emergency Medical Services Agency and Harbor-UCLA Medical Center, Santa Fe Springs, CA

Study Objective: The object of this study was to provide an epidemiologic description of out-of-hospital electrocardiogram (ECG) test characteristics for patients based on sex and ethnicity.

Methods: This was a retrospective study of all initial out-of-hospital 12 lead ECGs performed by the Los Angeles Fire Department from July 2011 to December 2012 for patients younger than age 18 years using the Physio-Control LIFEPAK 15 monitor. The primary outcome was device test characteristics by sex and ethnicity.

Conclusions: More data is necessary to help identify factors associated with improved survival in pediatric OOHCA patients. Our study was limited by a small number of charts given the rarity of pediatric cardiac arrest and range of study spanning six years. The strength of the study comes from review of charts made available following centralization of EMS in the State of New Jersey, where data was uniform and adhered to specific markers. Overall, several patient factors show promising trends for patient survival after suffering a cardiac arrest.

Table 1: Patient Socio-Demographics

<table>
<thead>
<tr>
<th>Socio-Demographic</th>
<th>Percent of Non-frequent ED Users</th>
<th>Percent of Frequent ED Users</th>
<th>P Value</th>
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<tr>
<td>Age</td>
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<td>39.7% (SD 13.72)</td>
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<tr>
<td>Sex</td>
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<tr>
<td>Female</td>
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<tr>
<td>Marital Status</td>
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<tr>
<td>Race</td>
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<tr>
<td>Other</td>
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<td>38%</td>
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</tr>
</tbody>
</table>

Figure 1. Services Patients Would Like Receive During their Emergency Department Visit

Annals of Emergency Medicine
Impact of a New Dispatch System on 911 Call Processing Time for Confirmed Time-Critical Emergencies

Eckstein M, Sanko S/Keck School of Medicine of the University of Southern California; and Los Angeles Fire Department, Los Angeles, CA

Study Objective: In December 2014, the Los Angeles Fire Department (LAFD) implemented a new dispatch system that emphasizes early recognition and rapid dispatch for select time-critical emergencies. The objective of this study was to determine the impact of the new dispatch system on these high priority calls.

Methods: This was a retrospective study evaluating the elapsed time from 911 call receipt to dispatch of resources before and after implementation of the new dispatch system. Comparator groups included a "before" arm (January 1 - September 30, 2014) and an "after" arm (January 1, 2015 to March 30, 2015). The study was conducted in the City of Los Angeles, which has a population of 4.1 million and whose 911 center is staffed by uniformed firefighters certified as emergency medical dispatchers. Dispatch and emergency medical service (EMS) are provided by LAFD, which is a fire-based EMS provider, with each patient encounter captured by an electronic patient care report (ePCR). All incidents with field confirmed provider impressions of eight time-critical emergencies were identified, and elapsed time from 911-call receipt to dispatch of resources was calculated. Mean and median times were collected for both groups. In the two study periods, there were no significant changes in dispatch personnel, population served, number of daily EMS incidents, or field care protocols for the emergencies under study.

Results: Following implementation of the new LAFD dispatch system, there was not a decrease in 911 call processing time for field confirmed cases of airway obstruction, auto versus pedestrian collisions, bystander-witnessed cardiac arrests, childbirth, drownings, gunshot wounds, long falls (fall from greater than 2 patient’s height), and seizure.

Conclusion: The new Los Angeles Tiered-Dispatch System improved 911-call processing times for all time-critical emergencies under study.
Vital Signs as Predictors of Rapid Response Team Activations Within Twelve Hours of Admission From the Emergency Department

Walston J, Bellew SD, Bellolio MF, Cabrera D, Lohse CM/Mayo Clinic, Rochester, MN

Study Objective: Rapid-response teams (RRTs) are interdisciplin ary groups created to rapidly assess and treat patients with unexpected clinical deterioration in non-intensive care unit (ICU) beds. It has been suggested that emergency department (ED) disposition should take into consideration vital signs (VS) at the time of hospital admission. We aimed to predict which patients will have RRT activation within 12 hours of admission based on their ED VS.

Methods: We conducted a case-control study of patients presenting from January 2009 to December 2013 to a tertiary ED who subsequently had RRT activation. Each of the 474 RRT activation cases was matched to a control by age, sex, and ED diagnosis. Controls presented to the ED during the same time period, January 2009 to December 31, 2013, to a tertiary ED who subsequently had RRT activation within 12 hours of admission based on their ED VS.

Results: Vital signs have a bimodal distribution, where the lowest and the highest extremes are concerning. Cutoff comparison between cases and controls is shown in Table 1. Patients with RRT activations were more likely to have a heart rate > 111 bpm (OR 2.76; CI 1.65-4.60), have a SBP 157 mmHg (OR 1.82; 1.19-2.80), have a respiratory rate > 24 (OR 4.15; CI 2.44-7.07) and have an oxygen saturation < 93% (OR 2.29; CI 1.43-3.67) at the time of ED departure.

Conclusion: After matching for age, sex, and ED diagnosis, abnormal VS at the time of ED departure are predictive of RRT activation within 12 hours of admission. However, an ideal set of VS cut points to trigger a change in ED disposition remain unclear.

Effect of Nursing Patient Flow Coordinators on Length of Stay of Boarded Patients in Emergency Department

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Study Objectives: Hospital crowding and the resultant long emergency department (ED) length of stay (LOS) for boarded patients has been associated with poor patient outcomes. An analysis of prolonged boarding times found that charge nurses who were responsible for managing ED operations and prioritizing patients awaiting admission were overwhelmed with duties. The complex communication tasks between the ED, admission officers, and various inpatient units needed improvement. We introduced a new nursing patient flow coordinator (NPFC) position. The NPFCs aimed to improve patient flow within the ED; their duties included prioritizing patients awaiting admission by coordinating with admission officers and inpatient units, responding to ED bed shortages, ensuring prompt patient transfers once a bed had been assigned, and coordinating the opening, closing, and staffing of overflow areas. The purpose of this study is to determine the impact of the NPFC position on ED crowding by measuring the LOS for boarded patients.

Methods: This retrospective, observational, pre–post study was conducted at an emergency medicine department with 115 beds, five distinct clinical areas, and more than 150,000 annual visits in a 1,000-bed academic tertiary care center. We compared the LOS of boarded patients before the introduction of the NPFC role (January 2011 through March 2011) with the LOS after the introduction of the NPFC role (January 2013 through March 2013).

Results: A total of 60,904 patients were enrolled; 29,129 patients in period before the intervention, 31,775 in patients period after the intervention. The median LOS of boarded patients was longer in the period after implementation (18.7h, Interquartile range 22.0) than before the implementation of the NPFC [(14.7h, Interquartile range 27.4); P < .0005]. However, the number of ED visits after implementation increased by 4%, and the rate of admissions from the ED increased from 10.1% to 11.4% as well. The hospital operation indicators were nonsignificant change in the two periods; inpatient bed turnover before and after the implementation were 3.9 and 3.6 patients/bed/month respectively while inpatient units bed occupancy rate was constant at 92%.

Conclusion: Despite subjective improvement in nurse’s satisfaction, the NPFC program did not achieve a positive effect on LOS for boarded patients. This may have been influenced by worsening hospital crowding indicators. This intervention should have been coupled with improvements in ED input and output processes in order to improve the impact on the LOS of boarded patients.
culture of safety in the workplace. The emergency department (ED) is inherently at risk for medical errors due to its fast pace, high acuity, and multiple handoffs. Currently, there is limited data on the culture of safety in the ED. While an exact roadmap to achieving such a culture is lacking, an understanding of the baseline culture can be useful in order to direct areas of improvement.

Study Objectives: To determine the baseline culture of safety in an academic ED in the areas of teamwork, communication, handoffs, and transitions.

Methods: An anonymous survey was distributed to 256 full-time ED staff in an 88-bed, academic, tertiary care ED with an annual census of 81,000 patients. Fifteen questions were taken from the Agency for Healthcare Research and Quality (AHRQ) Patient Safety Culture Survey, including the dimensions of Teamwork Within Units, Overall Perceptions of Safety, Communication Openness, Handoffs and Transitions, and Patient Safety Grade. The 256 ED staff members included 24 faculty, 48 residents, 14 physician assistants, 119 nurses, and 48 technicians. The primary outcome measured was the difference between percent agreement (agree and strongly agree) of ED staff compared to the 2012 AHRQ national hospital averages.

Results: One hundred eighty out of 256 (70%) ED staff members completed the survey, with proportional response rates in all groups. The ED response score lower than the 2012 AHRQ national hospital average in three of four dimensions: Teamwork Within Units (22% lower), Overall Perceptions of Safety (8% lower), and Communication Openness (8% lower). These were all statistically significant per AHRQ analysis instructions indicating statistical significance at 5% difference. The dimension of Handoffs and Transitions was similar to the national benchmark.

Conclusion: When applied in the ED, the AHRQ Patient Safety Culture Survey results demonstrated low scores in the dimensions of Teamwork Within Units, Overall Perceptions of Safety, and Communication Openness. Further investigation into the root causes of these areas will help us better understand the baseline culture in the ED and help to guide us towards the culture of safety that the IOM declares that we achieve.

<table>
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<tr>
<th>Table. Percentage agreement for AHRQ domains compared to 2012 AHRQ national averages</th>
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<td>Study &amp; Positive Response</td>
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<tr>
<td>Teamwork Within Hospital Units</td>
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If the positive response is more than 5% from national average, it is considered significant (AHRQ).

**146 Safety of Computer Interpretation of Normal Triage Electrocardiograms**

Hughes K, Lewis S, Katz L, Jones J/University of North Carolina, Chapel Hill, NC

Study Objectives: Frequent interruptions within the emergency department may lead to errors that negatively impact patient care. The immediate review of electrocardiograms (ECGs) obtained on triage patients is one source of interruption. Limiting triage ECGs requiring immediate attention to those interpreted by the computer as abnormal is one way to reduce interruption. We hypothesize that triage ECGs interpreted by the computer as “normal ECG” are unlikely to have clinical significance that would affect triage care.

Methods: All triage ECGs at the University of North Carolina were performed between November 14, 14 and February 1, 15 according to a standard nursing triage protocol using General Electric machines running Marquette 12SL software. Triage ECGs with a computer interpretation of “normal ECG” were compared to an attending cardiologist’s final interpretation. Triage ECGs for which the cardiologist’s interpretation differed from the computer interpretation of “normal ECG” were presented to two emergency physicians blinded to the goals of the study. The physicians were asked to evaluate the ECG for any clinical significance. Clinical significance was defined as any change from normal that would alter triage care. Triage ECGs were considered true negatives if either the cardiologist agreed with the normal computer interpretation or if both emergency physicians agreed that the ECG did not show clinical significance.

Results: A total of 646 triage ECGs were collected over the 10-week time period. One hundred eighty-three (28%) of those were interpreted by the computer as normal. Of the ECGs with a computer interpretation of “normal ECG,” 11 had an interpretation by an attending cardiologist other than “normal.” Two attending emergency physicians reviewed these triage ECGs. None of the 11 ECGs were found to have clinical significance. The negative predictive value for triage ECGs interpreted by the computer as “normal” was calculated to be 100% (95% CI 97.95 - 100%).

Conclusion: Our data suggests that triage ECGs identified by the computer as normal are unlikely to have clinical significance that would change triage care. We have demonstrated a large portion of triage ECGs are interpreted by the computer as normal. Eliminating physician review of triage ECGs with a computer interpretation of normal may be a safe way to improve patient care by decreasing physician interruptions.

**147 Collaborative, Multi-Disciplinary Design and Testing of a Portable Procedural Surface for Use in the Emergency Department**

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Study Objectives: Investigators sought to design, fabricate, test, revise and locally deploy a bedside procedural surface prototype based on clinical needs, emergency department (ED) environment parameters, simulation-based testing and end-user feedback.

Methods: A portable, stable and readily accessible work surface that is suitable for bedside medical procedures is an essential tool for providers working in acute care settings. Design and implementation issues limit the portability, adjustability and availability of existing systems such as Mayo stands, which can lead to suboptimal practice settings that jeopardize the safe and effective performance of medical procedures. Comprising emergency physicians, mechanical engineers, pre-clinical medical students and design students, the investigators constructed a novel and functional prototype device through an iterative research and development process. Clinician-driven concepts were initially incorporated into exploratory design prototypes that were constructed out of low-cost, off-the-shelf hardware parts. Early variants featured under-mattress stabilizing supports or ratcheting clamp mechanisms for attachment to patient stretchers (Figure, upper left series). Recursive and collaborative use-testing sessions by clinical providers and designers in an appropriately mocked-up simulation environment resulted in subsequent design revisions to improve device stability, usability and operating characteristics (Figure, right series). Based on...
in-simulation observations, a bedrail-hook-and-lock mechanism was tested with device modifications and basic machining then implemented in a final working prototype using additional off-the-shelf hardware (Figure, lower left series).

Results: Prototype devices were presented to a panel of clinical and industrial design faculty as part of a joint health care and design course’s critique process in an academic setting. The current prototype will be deployed shortly in the investigators’ primary clinical site for in situ use-testing and revision prior to final deployment. Future variants with adjustable attachment points and additional user-assistive features are under development.

Conclusion: A working bedside procedural surface device prototype was collaboratively developed and tested through an iterative process using design, human factors and simulation techniques.

148 Long-Term Evaluation of a Brief Educational Intervention for Use of Inferior Vena Cava Ultrasound to Determine Intravascular Status: Cause for Concern

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Study Objective: The use of ultrasound to determine fluid status by visualization of the inferior vena cava (IVC) has become routine in many emergency departments particularly as part of the sepsis pathway. Although there are some data indicating that the technique is not difficult to acquire there is virtually no information as to whether knowledge of this particular ultrasound application decays (or improves) over time. The purpose of this prospectively designed before- and after trial was to determine if knowledge learned in a brief (1-hour) educational intervention was retained after a follow-up period of 1 year. Our hypothesis was that emergency department (ED) attendings, who would be utilizing IVC evaluations in their clinical practice, would maintain or improve their knowledge.

Methods: We enrolled all attendings in an urban emergency medicine (EM) residency program in a 1-hour educational intervention consisting of a slide presentation, a video and a hands-on component devoted to teaching the technique of intravascular status evaluation using ultrasound of the IVC. Comparisons were by paired t test.

Results: As expected, the scores on the written immediate posttest were significantly higher than the pre-intervention scores (6.35 vs 4.00, P < .001). All 17 of the original participants still at the institution then took the identical posttest 12-14 months later. The mean scores demonstrated a dramatic decrease from the immediate posttest scores (4.71 vs 6.55, P < .01) and were now not significantly different from the pre-intervention scores (4.71 vs 4.00, P > .20). Only 3 of the 17 enrollees improved their score over the immediate posttest and all those improved by only 1 point. Attendees who were previously credentialed in emergency ultrasound scored significantly better on all tests than those who were not and those who reported performing more than 6 IVC ultrasounds during the year did better on the posttest than those reporting fewer than 6 exams (P < .01).

Conclusion: Knowledge in the use of IVC ultrasound for fluid status determination is acquired quite easily but this knowledge declines to near pre-intervention levels over the course of a year. The decline is particularly steep in those who rarely utilized the technique in clinical practice.

149 Impact of Frailty and Sociodemographic Factors on Hospital Admission From an Emergency Department Observation Unit

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Study Objectives: To prospectively evaluate risk for inpatient hospital admission among adult patients in an emergency department (ED) observation unit (OU). We hypothesized that frailty and sociodemographic factors may predict admission. Secondary objectives evaluated the contribution of medical history, comorbidities, social habits, and ED laboratory values to admission risk.

Methods: A prospective convenience sample of adult (age ≥ 18) OU patients was invited to participate in a survey assessing their sociodemographic status, social habits, and frailty as measured by the Katz Index of Independence in Activities of Daily Living. A positive response to any of the Katz Index questions indicated risk for frailty, and those with positive responses were further assessed by the Groningen Frailty Index to determine the specificity of the Katz Index for frailty. Laboratory values, comorbidities, and demographic information were abstracted from the record of their ED OU visit.

Comparisons were made between those patients admitted to the hospital from the OU versus those discharged from the OU.

Results: Of the 307 patients surveyed, 54 were admitted and 253 were discharged from the OU. The two groups were similar in age (53.7 ± 15.6 vs 52.6 ± 16.1 years, P = .645), sex (61% vs 64% female, P = .756) and body mass index (31.9 ± 11.7 vs 31.7 ± 10.5, P = .885). Racial distribution trended toward more black and fewer white patients in the admitted group (22% white, 76% black vs 39% white, 58% black, P = .067). The two groups had a similar distribution of medical vs. surgical chief complaints (93% vs 88% medical, P = .478). The admitted group had a higher rate of positive responses to the Katz Index (28% vs 13%, P = .007), with an unadjusted odds ratio of 2.73 (95% confidence interval 1.55-5.51) for admission. The Katz Index’s specificity for frailty was 89% when compared to the Groningen Index. College- educated patients were less likely to be admitted (8% vs 26%, P = .003), as were those who are currently employed (28% vs 43%, P = .047). Those on Social Security Disability Insurance were more likely to be admitted (37% vs 23%, P = .037). There were no differences in marital status, health insurance status, or median income by home zip code among the two groups. On secondary analysis, patients who reported using illicit drugs in the past month were more common in the admitted group (15% vs 5%, P = .018). Patients with hypercalcemia (6% vs 1%, P = .049) and elevated white blood cell count (32% vs 15%, P = .009) were more likely to be admitted. None of those with hypercalcemia had a diagnosis of cancer. Comorbidities, medications, number of ED or hospital visits in the past year, smoking status and alcohol use were similar in the two groups. On multivariate analysis, frailty by Katz Index, educational status and elevated white blood cell count remained significantly associated with admission.

Conclusions: Frailty, disability insurance collection and lower educational status are significant predictors of admission to the hospital from an OU, as are illicit drug use, hypercalcemia and elevated white blood cell count. These could serve as screening criteria when determining appropriate ED disposition. Future studies could apply these criteria to assess outcomes and cost-effectiveness.

150 High Utilization of Emergency Department Services

Heidt JW, Metcalf J, Schultz T/University of Missouri–Columbia, Columbia, MO

Study Objectives: Patients with high emergency department (ED) utilization are typically defined to have 4 or more visits in one calendar year. Nationally, this group comprises only 8% of all individuals who use the ED, yet are responsible for 20% of all visits. Frequently, these patients are believed to utilize the ED for non-urgent care, lack insurance, and do not have a primary care physician. However, recent data suggests such pre-conceived notions are incorrect. The goal of this study was to identify common characteristics of patients with high ED utilization at one tertiary academic center.

Methods: Patients with high ED utilization (≥3 in fiscal year (FY) 2014 (July 2013 to June 2014) were identified using existing billing data at one tertiary academic center (60,796 total visits with 37,762 unique patients). Data extracted included number of ED visits, insurance status, ED disposition and final diagnosis for the identified cohort of 4,666 patients. A more extensive review of the medical records of the 50 greatest utilizers was performed as a representative sample. During the secondary review, data collected included primary care physician (PCP) designation, number of chronic medical conditions, history of mental illness, and history of substance abuse.

Results: A total of 4,666 of 37,762 (12.4%) unique patients of the ED had high ED utilization rates. These high ED utilizers accounted for 21,579 of 60,796 total FY2014 visits, (35.5%). The high ED utilizers mean admission rate was 37.7% as compared to the overall admission rate of 35%. Sixty-six percent of identified patients had an assigned PCP. Forty-eight percent of patients were Medicaid participants (both fee for service and managed care), 30% Medicare, 16% self-pay, 6% commercial insurance. Seventy percent of identified patients lived within local zip codes. Documentation suggested a mean of 5.5 chronic medical conditions per patient, 80% with a diagnosis of mental illness, and 38% had a history of substance abuse.

Conclusion: Patients with frequent ED utilization contribute significantly to high ED volumes. The patients reviewed tended to have multiple chronic illnesses, an admission rate similar to the overall admission rate and to have either Medicaid or Medicare (total 78%) as their primary insurance. Interestingly, patients with high utilization also frequently had a PCP identified. This data suggests that despite insurance coverage and PCP assignment, a barrier to accessing care for these patients in conjunction with poor management of their chronic illnesses exist which results in high ED utilization and hospital admission rates.
151 The Effect of Helmet Use on Emergency Department Costs in Central Florida
Valzer J, Eskandari AM, Patel N, Avgenopoulos G, Ono SK, Cassidy DD/University of Central Florida College of Medicine, Orlando, FL; University of Central Florida, Orlando, FL; Orlando Regional Medical Center, Orlando, FL

Study Objectives: As of 2011, Florida’s 627,613 registered motorcycles accounted for 3.6% of motor vehicles in Florida and a disproportionate 18.8% of traffic fatalities. Motorcycle helmet use is estimated to reduce risk of death by 42% and reduce risk of head injury by 60%. It has been shown that helmet use is directly influenced by whether or not a state has a universal helmet law, with an average of 89% of motorcyclists using helmets in states with a universal helmet law vs 49% in states without one. Florida repealed its universal helmet law in 2000, resulting in an increase in unhelmeted riders from 0.5% in 1998 to 44.7% in 2010. This study evaluates the impact of helmet use on trauma resource utilization and the extent of injuries in victims of motorcycle accidents in Central Florida based on data collected from the Orlando Regional Medical Center (ORMC) Trauma Registry.

Methods: This was a retrospective cohort study of all motorcycle accidents recorded within the ORMC Trauma Database between January 1, 2012 and July 1, 2014. The analysis included all patients involved in two-wheeled motor vehicle crashes with a known helmet status, and did not discriminate based on age, race, or other demographic data. Patients were stratified into two groups based on their helmet status (ie, helmet used versus no helmet used). Odds ratios were calculated for skull fracture, intracranial bleeding, and death between the two groups. Independent two sample t-tests were used to elicict the mean emergency department (ED) cost and mean injury severity score (ISS) for each group.

Results: A total of 728 patients (n=728) were included in the study: 635 males and 95 females. There were 406 riders between the ages of 15 and 40, 290 riders between 41 and 65, and 32 riders over the age of 66. Incidentally, exactly half of the patients studied (n1=364) wore a helmet while the other half did not (n2=364). The patients were assigned to two groups based on their helmet status for the data analysis. The study yielded a statistically significant difference between the means of ED costs for helmeted and unhelmeted riders at $6790.00 and $5825.83 respectively (P < .01). Hence, the average ED visit cost for unhelmeted riders was 16.6% higher than the average for the helmeted group (average cost difference = $964.17; 95% confidence intervals [CI] 317.86 to 1610.46, P < .01). Additionally, when compared to riders who wore a helmet, an observed odds ratio of skull fracture was calculated to be 4.27 times higher in the unhelmeted group (95% CI 2.73–6.45, P < .01). Risk of death was 2.67 times higher in unhelmeted group (95% CI 1.31 to 5.46, P < .01). Risk of intracranial bleeding was 2.09 times higher in unhelmeted group (95% CI 1.41 to 3.08, P < .01). Lastly, the unhelmeted group had an ISS mean of 13.3 which is 1.5 higher (95% CI 0.10 to 2.91, P < .01) than the mean ISS of the helmeted group, 11.8.

Conclusion: This study supports the hypothesis that inconsistent use of helmets significantly impacts Central Florida ED costs and leads to increased risk of serious and fatal injuries in motorcycle riders. Hence, it is likely that the repeal of Florida’s universal helmet law in 2000 and subsequent increase in unhelmeted riders has led to increased ED costs among hospitals throughout Florida.

152 Applying Network Adequacy Standards to Emergency Medicine
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Study Objectives: The Affordable Care Act authorized the U.S. Department of Health and Human Services (HHS) to regulate qualified health plans’ (QHPs) network adequacy. QHPs must include a sufficient number and type of physicians within their provider network to deliver contracted benefits and services. HHS determines adequacy by applying a “reasonable access” standard using provider network data reported by QHPs. While the regulations apply to all specialties, emergency medicine (EM) is clinically and operationally unique due to emergency physicians’ distinct billing and employment practices. Although many emergency physicians employed by large urban hospitals are paid rates negotiated between the hospital and insurers, approximately 65% of hospitals staff their emergency departments with independently contracted emergency physicians, many of whom do not negotiate with insurers. We investigated whether applying the reasonable access standard to in-network emergency physicians provides sufficient information for determining network adequacy. We hypothesized that roughly 10% of plans would lack in-network emergency physicians.

Methods: We examined Silver QHPs offered in the 34 states in the Marketplace in 2015. An estimated 65% of participants select Silver Plans. In each state, we sampled four plans available in the insurance rating area containing the most populous county: the lowest, second-lowest, median, and highest premium plans. Premium pricing information was obtained using publicly available QHP Marketplace data from the Center for Medicare and Medicaid Services. Using each QHP’s publicly available provider directory, we identified the number of in-network emergency physicians within 100 miles of the primary ZIP code for the rating area’s most populous city. If a directory’s maximum search radius was less than 100 miles, we selected the broadest search radius available. We applied this same methodology to identify in-network hospitals within the same search radius. Data were summarized using descriptive statistics.

Results: Among the 136 QHPs analyzed, the total number of identifiable in-network emergency physicians ranged from 0 to 840 (median: 28). We identified 30 plans (22%) with networks completely lacking emergency physician coverage. The number of in-network hospitals ranged from 0 to 500 (median: 28). Five plans (3.7%) lacked hospital coverage. Three plans (2.2%) covered emergency physicians but did not cover a hospital. Two plans (1.5%) lacked both in-network emergency physician and hospital coverage. Information regarding whether emergency physicians were hospital employees or independent contractors was not available.

Conclusion: Our findings raise serious questions about the application of the network adequacy framework to EM. One-in-five plans lacked identifiable in-network emergency physicians, a situation that does not meet the reasonable access standard. The same is true of hospital coverage. There is a broad range of in-network coverage of both emergency physicians and hospitals. While some health plans cover a large number of in-network emergency physicians and hospitals, others lack coverage of both. The opaque nature of physician-hospital contracts and billing obscures the ability to identify whether an in-network hospital employs out-of-network emergency physicians, or vice-versa. In light of these obstacles, regulators seeking to determine emergency physician network adequacy will require additional information beyond that presently requested of QHPs.

153 Patient Length of Stay in the Context of the “2-Midnight Rule”: Assessing the Accuracy of Attending Providers’ Predictions
Lindor RA, Sadosty AT, Madsen BE, Goyal DG, Newman JS, Schatz AL, Bellolio MF/Mayo Clinic College of Medicine, Rochester, MN

Study Objectives: Since the enactment of the “2-midnight rule” in October 2013, CMS requires admitting providers to predict whether patients will require hospitalization less than 2 midnights, in which case they are designated an observation status (OS), or 2 midnights or longer, designated as inpatient (IP). Providers’ inaccurate designation of patients as OS or IP has financial consequences for hospitals and patients. For hospital stays originally designated as IP but lasting <2 midnights, hospitals may not be able to capture CMS payment and patients may be held financially responsible for more of the services provided during the stay. For hospital stays originally designated as OS but lasting >2 midnights, hospitals are more likely to have a negative margin for the stay and patients may not be eligible for insurance coverage of subsequent skilled nursing facility care. We sought to: a) determine providers’ accuracy in predicting which patients require hospitalization greater than two midnights and b) identify patient characteristics that providers may use to improve prediction accuracy.

Methods: We conducted an analysis of consecutive adult (18+ years) emergency department (ED) visits resulting in admission to the hospital within a 90-day period (May 2014 through August 2014) where an attending emergency physician prospectively designated the admission type (OS versus IP). Inaccurate predictions were defined as those involving patients who were designated as IP but stayed <2 midnights and patients designated as OS but stayed >2 midnights. Patient characteristics associated with inaccurate predictions were identified. Linear regression models were fit to explore associations and predictors of accurate versus inaccurate predictions. IRB approval was obtained.

Results: A total of 4760 adult patients were admitted to the hospital through the ED during our study period; 58% (n=2760) were IP and 42% (n=2000) OS. Overall 53.7% were males and median age was 63 years (IQR 46 to 78). The overall rate of error in predicted length of stay was 38.3%. Inpatient cohorts: Of 2760 patients admitted as IP, 27.6% (761) stayed for < 2 midnights. Patient...
characteristics associated with these shorter-than-predicted stays include immunosuppression, with 63% of immunosuppressed patients staying for <2 midnights \( (P < .001) \), and younger age (median 60 years [IQR 43-75] for those staying <2 midnights versus 67 [IQR 50-80] for 2+ midnights, \( p=0.001 \). 

**Observation cohort:** Of the 2000 patients admitted as OS, 53.2% (1063) stayed for 2+ midnights. Patient characteristics associated with longer-than-predicted stays included altered mental status, dialysis requirement, psychiatric issues, hospice care, or nursing home residency.

**Conclusion:** In this study, providers inaccurately predicted patients’ length of stay in almost 40% of cases, and sub-populations of patients were at higher risk for over- and under-estimated of length of stay. Under the “2 midnight rule,” this places hospitals at risk of underpayment and patients at risk of increased financial liability for their hospital stays and subsequent skilled nursing facility care. Future research is needed to identify interventions that can improve providers’ prediction accuracy.

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**154 Hospitalization Rates for Syncope Trend Higher in States With Higher Malpractice Rates**

Alegria JR, Eskin B/Morristown Medical Center, Morristown, NJ

**Study Objective:** Hospitalization of emergency department (ED) patients with syncope has low diagnostic and therapeutic yield. Hospitalization rates may vary from place to place and concern over litigation may be a major driving factor for hospitalization. Our goal was to determine if there was a correlation between hospitalization rates for syncope and malpractice rates by state.

**Methods:** Design: Using PubMed and the Boolean operators AND and OR, we searched for papers using the following terms: (hospitalization OR admit) AND (emergency service, hospital OR emergency medical services OR emergency medicine) AND (Syncope). We also searched the reference lists in the included papers for other studies not identified by the search. Papers included had data that allowed calculation of the hospitalization rate for adult patients > 21 years. We excluded papers for any of the following reasons: (1) studies done at sites with observation units (2) adults of all ages not included (eg, age > 65) (3) duplicate publications on the same population (4) data on syncope and near syncope could not be separated (5) study done over > 5 years (6) hospitalization rates not available. For states where more than one rate appeared we used the average. We used the National Data Bank for malpractice rates by state. We also calculated the hospitalization rates in patients > 21 years in a retrospective cohort of ED visits in 15 New Jersey (NJ) EDs with annual visits from 22,000 to 82,000 in 2008, the last year before observation units were introduced. We used linear regression to analyze the relationship between hospitalization and malpractice rates.

**Results:** We found seven papers meeting our inclusion criteria. The individual rates by state were: California 34%, 51%, 55%, 59%; Utah 47%; Massachusetts 69%; and New York 83%. The hospitalization rate in the NJ EDs was 58%. There was a trend to higher hospitalization rates for syncope in states with higher malpractice rates (R squared = 0.65, \( P = .1 \) ).

**Conclusion:** Hospitalization rates for syncope trended higher in states with higher malpractice rates. Attempts to avoid litigation may be driving up medical costs with marginal benefit.

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**155 EMF Moved to SEMF**

**156 Survey of Patient Knowledge and Expectations About Freestanding Emergency Departments**

Bucciarelli C, Payton T, Weeks E, Falgiani M/University of Florida, Gainesville, FL

**Study Objectives:** A freestanding emergency department (FSED) is defined as “a facility that is structurally separate and distinct from a hospital and provides emergency care.” FSEDs are relatively new in this country and are growing. The placement of FSEDs within communities may lead to patient confusion as to the level and cost of medical services when compared to urgent walk-in care centers or traditional hospital-based emergency departments (EDs). FSEDs are very different from urgent care centers in many ways. FSEDs are able to provide a higher level of care and are open 24 hours a day, every day of the year. The breadth of hospital services at a FSED is different from traditional EDs. Patients seen at FSEDs are typically billed at traditional ED rates. The purpose of our study was to survey patient knowledge about FSEDs, and to better understand patient expectations in terms of the level of medical care available, their perception of the cost of services at a FSED, and reasons why patients chose a FSED over urgent care center alternatives.

**Methods:** A convenience sample of patients who presented to a new FSED in Gainesville, Florida was offered a 14-question survey. The survey could be completed by the patient if over age 18, or by a parent or family member. The survey asked questions related to the patient’s perceptions of cost of service at the FSED, services available at the FSED, and reasons why the patient selected the FSED over other possible alternatives. Survey results were tabulated and analyzed by a biostatistician. Surveys were excluded from analysis if less than 90% was complete.

**Results:** A total of 127 surveys was collected and included for this study. The majority of patients were female (71%), and the average age was 39.5, with a range from 7 to 87. Over 40% of patients believed that a specialist could see them at the FSED, when in fact the patient would require transfer to the main ED, for specialist evaluation. Over 55% of patients did not know they would require transfer to the main hospital campus for admission if their condition required hospitalization. However, the majority of patients (70%) believed they could be completely treated for the condition they presented with at the FSED. 42% responded that another alternate location for emergency or urgent care was closer to them than this particular FSED. The top reasons patient chose care at this FSED were perceived shorter wait time and total visit time, as well as it being a convenient location. Regarding costs of service, the majority of patients (almost 74%) either did not know or believed their cost of service would be lower than a traditional ED visit.

**Conclusions:** This study shows that patients chose a new FSED in Gainesville, Florida, primarily for convenience and a perception that service will be faster. Hospitals and other organizations can emphasize these attributes when marketing a FSED to the public. In general, patients do not have a full understanding of the level of service and cost associated with this FSED in comparison to alternative urgent or emergency care options. It is important that any effort to open a FSED in a community be coupled with an appropriate marketing campaign designed to educate the public as to these important elements. Additional educational materials about the level of services available and process to be hospitalized or receive specialty consultation could be given to patients upon their arrival to a FSED.

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**157 You Googled What? Describing Online Health Information Search Patterns of Emergency Department Patients and Correlation With Final Diagnoses**

Scott G, McCarthy DM, Dresden SM, Aileen AZ, Graveron S, Czerniak A, Courtneyn DM/ Northwestern University, Chicago, IL, Presence St Joseph Medical Center, Joliet, IL

**Study Objectives:** The Internet search terms used by patients prior to visiting the emergency department (ED) have not been well characterized. The objective was to characterize the Internet search terms patients used prior to ED arrival and evaluate the relationship between the search terms and final diagnoses.

**Methods:** These data were obtained as part of a larger prospective survey study investigating age-related patterns of Internet use and trust of health information (HI) sources. Enrollment occurred Monday-Friday 9am-9pm and Saturday 9am-5pm. The subset of patients who reported using online HI prior to their ED visit were asked to...
list the search terms used. Chief complaint and ED diagnosis were obtained from the medical record. The Internet search terms were classified into the following categories using an a priori coding schema: ED process, symptoms (eg, chest pain), specific diagnosis (eg, heart attack or myocardial infarction), treatment options, anatomy question, or other. Many discharge diagnoses in the ED are, in fact, symptom-based (eg, chest pain) as opposed to a more “formal” diagnosis. Therefore, the relationship between the search term and final diagnosis was assigned to 1 of 7 categories representing search/diagnosis combinations (symptom search/symptom diagnosis, symptom search/formal diagnosis, diagnosis search/symptom diagnosis, diagnosis search/formal and same diagnosis from search, diagnosis search/formal and different diagnosis from search, other search/symptom diagnosis, other search/formal diagnosis). For example, a patient searched “ankle pain” and was diagnosed with “fibula fracture” was coded “symptom search/formal diagnosis,” but if the same patient received the symptom-based diagnosis of “ankle pain” the case was coded “symptom search/symptom diagnosis.” Two physicians coded each case and reconciled all codes.

Results: A total of 889 patients were approached; 723 (81.3%) participated. Of participants, 177 patients (24.5%) reported Internet use prior to ED presentation; however, five did not provide search terms and two were missing chart information, resulting in a final sample of 170 patients. Respondents had a mean age of 47 years (SD 15.7) years. 59% female, and 66% white. 80% reported owning at least 1 device capable of Internet access. 32% (N=55) reported using more than one search term. 61.7% searched symptoms; 40.6% searched a specific diagnosis by name. Looking specifically at the relationship between search terms and final diagnosis, 9.4% patients searched a diagnosis by name, but received a discharge diagnosis with less specificity because it was a “symptom-based” diagnosis. In contrast 20.6% of patients searched a symptom and received a detailed diagnosis. Most patients received discharge diagnoses of equal specificity as their search terms (31.2% symptom/symptom and 31.2% diagnosis/diagnosis). Among those who searched a diagnosis by name, 23% received a symptom-based final diagnosis, 48% received a different detailed final diagnosis and only 29% received the diagnosis that they had searched.

Conclusion: The majority of patients who used the internet for HI prior to visiting the ED used symptoms as the basis of their search, but a large subset searched for specific diagnoses. When patients did search for specific diagnoses, only a minority had searched for the diagnosis they eventually received.

158 Hypertensive Patient Characteristics, Knowledge, and Barriers and Facilitators to Improve Transitional Care for Hypertension in the Emergency Department
Heln e rt S, Del Rios M, Bhimani A, Puri n-Shem-Tov Y, Christian E/University of Illinois at Chicago, Chicago, IL; Rush University Medical Center, Chicago, IL; John H. Strieger, Jr. Hospital of Cook County, Chicago, IL.

Study Objectives: Hypertension (HTN) affects 76.4 million adults in the United States and accounts for up to 30% of emergency department (ED) visits annually. It significantly increases the risk for stroke, myocardial infarction, congestive heart failure, renal failure, and sudden cardiac death. The purpose of this study was to use a mixed methods approach to identify characteristics, HTN knowledge, and barriers and facilitators to follow-up in patients with elevated blood pressure (BP) who present to the ED.

Methods: In-depth interviews were completed with ED patients with elevated BP (>140/90) at an urban academic hospital. Interviews were conducted over two months, and participation was voluntary. Before the interview began, participants completed a short questionnaire to gather information on demographics, HTN knowledge, and medication adherence. Interviews addressed these topics more in-depth, as well as barriers and facilitators to improve transitional care for HTN in the ED. Interviews were transcribed, and then analyzed by four members of the study team who came to consensus on major themes.

Results: Of 13 interviewees, 62% were female and average age was 53.8 (SD=15.7) years. Participants were composed of 7/7 African American, 15% Hispanics (one Puerto Rican and one Mexican), and 8% Caucasian. A majority (77%) of participants had a primary care provider (PCP). Approximately half (49%) of participants exhibited low HTN knowledge, defined as getting 7 or less questions correct on a 10-item knowledge assessment. Despite the fact that all participants correctly knew that people with high BP should take their medicine every day in the knowledge assessment, 46% of participants reported low medication adherence when asked about their own practices. All participants also were aware that high BP can cause strokes. In-depth interviews with patients revealed a general awareness of important aspects of HTN. They cited high salt diet and stress as main causes, and were well aware of associated complications such as strokes, heart attacks, and kidney problems. Most participants had originally learned about HTN through family members with the disease. Family members were the participants’ main source of support to help them manage their HTN, so participants were less amenable to seeking out support from the community. They were overwhelmingly motivated to change their behaviors to control their HTN, but did not know how to do so. Participants reported that HTN education in the ED at discharge had been less than ideal and would prefer to receive education and instructions through both paper and verbal modes. Barriers to follow-up with a PCP included a lack of insurance, lack of transportation, and an overall lack of time. Those without insurance cited the related cost as the major factor for not following up with a PCP and being non-compliant with medications.

Conclusions: These findings suggest opportunities in the emergency setting to recognize education needs for hypertensive patients and provide assistance in overcoming barriers that stand in their way for primary care follow-up. Future interventions that address these barriers, as well as increase patient education and medication adherence, could help hypertensive patients better control their blood pressure.

159 Understanding What Patients Need to Stay Healthy: The Perspective of Community- and Hospital-Based Caregivers
Rising KJ, Hollander JE, Carr BG/National Academic Center for Telehealth, Thomas Jefferson University, Philadelphia, PA

Study Objectives: To elicit the perspectives of community- and hospital-based caregivers regarding the types of assistance patients need in their daily lives and how the health system might better serve patients.

Methods: This is a qualitative study engaging community- and hospital-based health workers (case managers and social workers) in Philadelphia. We conducted focus groups and one-on-one interviews with use of a discussion guide to elicit details of relationships with clients, perceptions regarding client needs, and experiences with the health system, and thoughts about how the health system may better meet clients’ needs. Participants were contacted through email and flyers and were scheduled for a focus group or interview depending on preference and scheduling constraints. All sessions were transcribed, and themes were identified using the grounded theory approach.

Results: We engaged 39 individuals (3 focus groups and 21 interviews), with 17 community health workers and 22 hospital-based workers. Participants described clients often not getting treatment for several reasons, including lack of initiative to proactively manage health issues, lack of information about the health care system, discomfort with or mistrust of the health care system, and personal economic challenges. They noted that many clients seek care primarily in the ED because they know they will not be turned away. Even clients with insurance often have difficulty affording copays, thus limiting utilization of outpatient services. Clients often delayed care, and preferred the convenience and speed of receiving testing in the ED. Primary factors limiting participants’ ability to thoroughly assist clients included problems building trust and understanding patient needs in the minimal time they had engagement, client financial concerns, and significant mental health and substance abuse issues of clients. Provision of services such as one-time copay waivers helped their clients in short-term, but they were rarely able to address root causes of client struggles. Fear was the primary pervasive theme throughout discussion—including fear of receiving a bad diagnosis, intimidation of the health system, and lack of trust of the health system (such as a fear of losing kids to DHS if the realities of home life are revealed to doctors). Thus, the primary suggestion of the participants for health system improvement was that there should be more visibility of health system within communities. They suggested that providers going into communities would help establish trust and let patients know that they are valued. They also suggested that providers should focus more on asking about the life issues that patients face, with a focus on understanding patients as people instead of ailments.

Conclusion: This work engaged a previously under-represented population, hospital- and community-based caregivers, to explore perceptions about how patients might be better served by the health system. Though specific roles varied, the participants were unified in describing lack of system engagement at the community level and under-use of patient-centered approaches to identifying patient needs and developing treatment plans.
160 “Sometimes You get to Feel Like the Freak Show”: Transgender and Gender-Non-Conforming Patient Experiences and Barriers to Emergency Care

Samuels EA, Choo E, Tape C, Garber N, Bowman S/Brown University, Providence, RI; Rhode Island Department of Health, Providence, RI

Background: Transgender, transsexual, gender variant, and intersex people (TGI) have decreased access to care and poorer health outcomes compared to their LGB counterparts. Little has been studied and documented about TGI patient emergency department (ED) care experiences and barriers to care.

Study Objectives: Identify major themes related to TGI patient access and utilization of emergency services and develop preliminary hypotheses about TGI patient emergency care experiences, systemic barriers to TGI access to emergency care, and potential provider-level knowledge deficits.

Methods: Four focus groups were conducted in 2014 with TGI Rhode Islanders (RI) over the age of 18 years of age who had been a patient in an ED in the last 5 years. Participants were recruited from the community by email listserve announcements, outreach to local TGI organizations, and periodical advertisements. The study team developed an interview guide to elicit ED experiences and barriers to care that was reviewed by a qualitative research advisory committee. Deidentified participant demographic information was collected using a standardized instrument. All discussions were captured on digital audio recorders and professionally transcribed. The study team developed a coding guide with codes grouped into major themes and subthemes, and a final thematic framework developed collaboratively. Focus group transcripts were reviewed and coded by two independent investigators; discrepancies were resolved through discussion.

Results: Among 32 participants, 43% were female-to-male or male-identified, 75% were white. Over 40% noted prior avoidance of the ED, with fear of discrimination noted as the most significant barrier. Major discussion themes on ED experiences included lack of privacy, poor provider competency and communication, and common experiences of grossly inappropriate, awkward and/or inconsiderate reactions of health care providers to revelations of gender identity. Overall, participants preferred direct communication from providers regarding their gender identity and specific health needs, but cautioned against reducing all health concerns to gender identity. Recommendations for improvement focused on provider deficits, need for provider training and education, and infrastructure changes to maintain privacy.

Conclusion: Efforts to improve TGI ED experiences should focus on provider competency, communication training, and ED infrastructure changes to address safety and privacy concerns. Further research with increased inclusion of transwomen and people of color is needed to identify themes that may not have been raised in this preliminary investigation.

161 Hospital Characteristic-Specific Cost-to-Charge Ratios Can Be Used to Estimate National Costs of Emergency Department Care and Determine the Most Expensive Diagnoses

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Study Objectives: As health care costs continue to rise, emergency departments (EDs) have been seen as one likely cost-reduction target. Our objective was to develop a method to estimate national costs of care by diagnosis using large administrative datasets.

Methods: This is an observational cohort study of ED visits by Medicare beneficiaries in the US in 2011. Data were extracted from the Outpatient and MedPar files to obtain a census all discharged and admitted patient visits in 2011, respectively. We included all visits to EDs in 2011, regardless of ultimate disposition, and we included all Medicare beneficiaries regardless of eligibility category (aged, disabled, ESRD). Using data AHA Annual Survey Database we characterized hospitals based on geographic region in the US (northeast, south, west, and midwest), trauma center designation (none, level I, level II, level III), locale (large metropolitan, small metropolitan, micropolitan, non-urban residual), and teaching status (metropolitan teaching, metropolitan non-teaching, and non metropolitan). Cost-to-charge indices (CCIs) for each of these categorical bins were calculated as weighted averages of ED-specific cost-to-charge ratios (CCRs) for each hospital, using hospital average daily census as the weighting factor. Actual and estimated facility costs for each ED visit were calculated by multiplying the ED charge by the actual hospital CCR as well as the applicable bin CCI, respectively. Principal diagnoses were categorized by Clinical Classification Software (CCS) codes and aggregate numbers of visits and total costs were calculated for each CCS diagnosis. Diagnoses were rank-ordered by total aggregate cost. Data for CCS diagnoses with fewer than 12 visits were suppressed.

Results: There were 25,056,876 Medicare claims for ED care in 2011. Of those, 18 were excluded due to too few visits in a single diagnosis. Actual cost data were missing for 11.6% of non-excluded visits due to missing hospital-specific CCRs while estimated cost data were missing for 5.7% of non-excluded visits due to missing category CCIs. The rank-ordered lists of diagnoses by total aggregate costs were nearly identical per the actual and estimated cost methods (Figure), with Spearmann’s rank-order correlation of 0.9998 (P < .00001). While individual diagnoses’ aggregate estimated costs varied from an 8% underestimate to a 12% overestimate (excluding one diagnosis with a 76% overestimated cost), total cumulative aggregate estimated costs remained consistently 22% above their actual counterparts.

Conclusion: Hospital characteristic-specific CCIs can be used to estimate rank-ordered lists of most expensive diagnoses and upper bounds of associated cumulative national aggregate costs of ED care from Medicare data. This method is likely valid for other similarly large administrative datasets that include ED charges and hospital characteristics.

162 EMF Characterizing Hospital-Level Variation in Emergency Department Visitation After Hospital Discharge for Medicare Beneficiaries

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Study Objectives: At the locus of acute, outpatient care and the primary portal of hospital admissions and readmissions, emergency department (ED) visits following hospital discharge may convey meaningful information about post-hospitalization care. The Centers for Medicare and Medicaid Services (CMS) has proposed to capture ED visits following hospital discharge as part of quality measures of care transitions. Recent studies conducted within single centers or in select states have shown post-discharge ED visits to be frequent; however, the magnitude and national variation by which Medicare beneficiaries re-visit the ED following hospital discharge is unknown. We sought to characterize the frequency, diagnoses and hospital-level variation in post-discharge ED visitation for three priority conditions of national quality measures: acute myocardial infarction (AMI), heart failure (HF) and pneumonia (PNA).

Methods: Cross-sectional analysis of Medicare Beneficiaries hospitalized and discharged alive for AMI, heart failure and pneumonia between July 2011 and June 2012. We used Medicare hospital inpatient, outpatient and physician Standard Analytic Files to identify admissions, readmissions, and ED visits. Each condition-specific cohort is consistent with CMS readmission measure definitions of AMI, HF and PNA based on ICD-9 discharge diagnosis. Post-discharge ED visits are defined as any hospital outpatient claim for ED services in the 30 days post-discharge from index
hospitalization without readmission. AHRQ Clinical Classification Software (CCS) was used to group post-discharge ED visits diagnoses. We excluded patients who left against medical advice, without continuous Medicare enrollment, and index hospitalizations via hospital transfer. Hospitals with fewer than 25 condition-specific index hospitalizations were excluded.

Results: During the study year, we included a total of 157,035 patients hospitalized at 1,656 hospitals for AMI, 391,209 at 3,047 hospitals for HF, and 342,376 at 3,484 hospitals for PNA included in our analyses After hospitalization for AMI, there were 14,714 ED visits (9.4%) and 27,241 readmissions (17.5%) within 30 days of discharge; 31,621 (8.1%) and 88,106 (22.5%) after hospitalization for HF and 26,681 (7.8%) and 59,352 (17.3%) after hospitalization for PNA. The most common post-discharge ED visit diagnosis following AMI hospitalization was non-specific chest pain (2217, 15.1%); following HF hospitalizations was congestive heart failure (3347, 10.6%); and following PNA hospitalizations was lower respiratory diseases (1678, 6.3%). Post-discharge ED visits were for the same diagnosis as the index hospitalization rarely for AMI (<1%) and pneumonia (5.3%). There was wide hospital level variation in post-discharge ED visit rates for each condition: AMI (median: 8.3%, 5th/95th percentile: 2.8%-14.3%), heart failure (7.3%, 3.0%-13.3%) and pneumonia (7.1%, 2.4%-13.2%).

Conclusions: For every two hospital readmissions, Medicare beneficiaries have one ED visit without readmission after hospital discharge. Post-discharge ED visits occur for a wide variety of reasons. An with substantial hospital level variation. Policymakers and researchers should further study post-discharge ED visits as measures of health care access and care transitions in the vulnerable Medicare population.

164 EMF Factors Influencing Emergency Department Service Times

Hoot NR, Banuelos RC/University of Texas Health Science Center, Houston, TX

Study Objectives: Prior work showed that emergency department (ED) service times, defined by time elapsed from bed placement to disposition decision, are affected by the chief complaint and acuity level. The goal of this work was to determine whether crowding independently affects service times. We hypothesize that local crowding will increase service times, after adjusting for other factors.

Methods: We conducted a retrospective analysis of visits to the 32-bed adult ED at an urban level 1 trauma center from January 1, 2014 to July 1, 2014. Data were obtained from an electronic health record. Patients who left without being seen, left against medical advice, or expired were excluded from analysis, since these patients may not finish the intended ED course. The independent variables were the chief complaint, acuity level, numbers of waiting/pending/boarding patients, and the National ED Overcrowding Study (NEDOCS) score. Patients were defined as “pending” while undergoing active evaluation and management. Coded chief complaints were grouped into 23 categories, modified from ones developed in prior work. Acuity levels were determined using the Emergency Severity Index (ESI). The four crowding measures were calculated at the time of bed placement for each individual patient. A linear regression was fit using service time as the dependent variable, which was log transformed due to an expected right skew. Significance was assessed at the 0.05 level with Bonferroni correction.

Results: The analysis included 22,736 visits (9.3% excluded). Service times had a median and interquartile range of 2.7 hours (1.5-4.3 hours). The most common chief complaints were minor trauma (16.8%) and abdominal pain (8.9%), and 8,276 patients were admitted (36.4%), typical for the site. A quantile-quantile plot showed that log transformation improved normality of service times. The acuity level (F = 760.3, P < .001), chief complaint (F = 40.4, P < .001), and number of pending patients (F = 72.0, P < .001) affected service times, while the NEDOCS score and numbers of waiting/pending/boarding patients did not. Psychiatric issues and abdominal pain had longer service times than other chief complaints; focal neurologic deficits and major trauma had the shortest. Patients with ESI level 2 had longer service times than patients with other ESI levels. The acuity level and chief complaint influenced service times to a greater degree than the number of pending patients. For example, adding 12 pending patients increases the expected service time by the same amount as changing the ESI from level 3 to level 2.

Conclusion: Service times are influenced by chief complaint, acuity level, and number of patients pending simultaneously. The other measures of crowding did not affect service times. The resulting model may be useful at this hospital to estimate service times as influenced by these factors, and further work will determine the generalizability of the method to pediatric and community sites.

165 Assessment of Emergency Medicine Resident Skill in Determining Diagnosis and Management for Emergent Electrocardiograms: A Multi-Center Study

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Study Objective: To assess emergency medicine (EM) resident competency at interpreting and responding to critical electrocardiograms (ECGs).

Methods: This is a multi-center, prospective study of post-grad year (PGY) 1-4 residents at 5 EM residency programs in the United States. The scope of “critical” ECG diagnoses was first agreed upon by study authors as well as two nationally recognized experts in emergency electrocardiography. Examples of these ECGs were identified from chart review and internet search, each of which was assessed for validity by a panel of 3 emergency physicians, and those not unanimously agreed upon were rejected. An assessment tool was then created which asks the physician to either identify the ECG diagnosis or identify the best immediate management of the condition reflected on the ECG. All major ECG diagnoses and most possible responses to important ECG findings were provided as possible answers to every question in a multiple choice format. The tool was first piloted at a single EM residency program among PGY 1-4 residents. After IRB approval or confirmation of exemption at each of the 5 sites, residents were given the assessment tool, consisting of 25 randomly selected ECG questions from a pool of 96 available. Testing was conducted on Qualitrax, an
Prompted Post-Resuscitation Formal Feedback Improves Clinician Satisfaction Without Distracting from Other Duties

Drake AB, Wassermann J, Quanu J/Mount Sinai St, Luke’s-Roosevelt Hospital Center, New York, NY

Study Objective: Trauma and medical resuscitations inherently involve the most acute patients, and therefore possess the greatest potential opportunity for education. Given the nature of emergency department operations, time constraints often prevent an educational “debriefing” or post-resuscitation feedback. We proposed that the introduction of a physical prompt would improve frequency of feedback, and thus improve educational opportunities.

Methods: Adult providers on a multidisciplinary resuscitation team in an urban, academic level 2 trauma center were voluntarily and anonymously enrolled by filling out a single page survey after medical and trauma resuscitations for 12 months. After a convenience sampling of resuscitations, all involved providers were approached by trained research associates and asked to evaluate confidence in their roles, team communication, satisfaction with the resuscitation, and the quality of its management on a scale from 1 to 10. After a control period of 6 months, resuscitation leaders were provided a laminated sheet containing potential feedback points to encourage debriefing. Pre- and post-intervention descriptive statistics were derived to determine the effect of this prompt on frequency and length of debriefing sessions, as well as to determine which factors were associated with improved perception of resuscitation management, communication, and satisfaction.

Results: A total of 1098 surveys were completed during the control period, while 867 surveys were completed after introduction of the prompt. Formal feedback frequency did not statistically increase due to the prompt (pre 27% [95% CI 24.0-30] vs post 29% [95% CI 26.32]). Average satisfaction scores among PGY-1, PGY-2, & PGY-3 residents and faculty were 8.2 (95% CI 7.9-9.5), 7.1 (95% CI 6.9-7.5), 6.1 (95% CI 5.8-6.4) and 6.6 (95% CI 6.3-6.9) prior to the intervention. Similar scores were seen post-intervention in PGY-1 and PGY-2 residents (7.9 [95% CI 7.5-8.3] and 7.2 [95% CI 6.9-7.5]), but PGY-3 and faculty responders rated post-intervention resuscitations as significantly more satisfying (7.1 [95% CI 7.0-7.2] and 7.7 [95% CI 7.4-8.0]). Also, independent of the prompt, any time formal feedback was given, residents across all training levels reported improved confidence in their role (8.9 [95% CI 8.8-9.0] vs 8.4 [95% CI 8.3-8.5]) communication (8.9 [95% CI 8.8-9.0] vs 8.6 [95% CI 8.5-8.7]) overall satisfaction (9.0 [95% CI 8.9-9.1] vs 8.6 [95% CI 8.5-8.7]), and resuscitation management (9.0 [95% CI 8.9-9.1] vs 8.5 [95% CI 8.4-8.6]). Very few respondents felt debriefing detracted from other clinical duties, even after the prompt was instituted (5.7% vs 6.0%). In most cases, both pre- and post-intervention debriefing sessions took less than 3 minutes (80% [95% CI 76-84] vs 84% [95% CI 80-88]).

Conclusions: A post-resuscitation physical prompt did not increase the frequency of debriefing. Junior residents were unaffected by the prompt, but senior residents and faculty derived significantly greater satisfaction from resuscitations after introduction of a prompt. Regardless of the prompt, post-resuscitation debriefing resulted in significant improvements in resident confidence in their roles, team communication, and resuscitation satisfaction. When it occurs, post-resuscitation debriefing is brief and does not distract from other clinical duties.

Factors Important to Underrepresented Minority Applicants When Selecting an Emergency Medicine Program

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Study Objectives: In 2008, the Council of Emergency Medicine Residency Directors (CORD) assembled a panel of program directors (PDs), associate PDs, and emergency medicine (EM) faculty members to discuss the state of diversity in EM and to recommend a set of “best practice” recruitment strategies designed to increase the number of under-represented minorities (URMs) in EM residency training programs. To date, no studies have evaluated the perceived importance of these recommended recruitment strategies by URM applicants. We sought to identify decision factors that were significant in influencing program selection by URM candidate program selection.

Methods: A 32-question survey which was vetrred by URM students and residents was sent to all self-identified URM applicants who applied to one or more of four convenience sample EM residency programs in 2015. The survey design focused on the recommended recruitment strategies and URM feelings of perceived importance in decisionmaking regarding applications and ranking. De-identified responses were collected via a Web-based survey tool, SurveyMonkey (Palo Alto, CA).

Results: The survey was distributed to 277 URM applicants and 100 completed the survey; the response rate was 36.1% (100/277). The median respondent age was 27 (range 24-40) and 46% of the applicants were female. Forty-nine percent (49%) of respondents reported being African-American, 47% were Hispanic, and seven (7%) were Native American or Alaskan Native. Seven percent (7%) of respondents identified as being LGBT. The average URM applicant applied to 42 programs (range 2-130) and received 15 interview offers (range 0-38). The average Step 1 score was 224 and Step 2 score was 238. In comparison with prior EM applicant metrics, URM applicants were at or above the mean level. The most significant factors that were considered when selecting a residency program were geographic location (82% either agree or strongly agree), the interview day (96%), interaction with EM residents (98%), and program reputation (84%). Criteria specific to the issue of diversity included: having

Table. Results

<table>
<thead>
<tr>
<th>Post Grad Year</th>
<th>n</th>
<th>Average Overall Scores</th>
<th>Percent passing*</th>
<th>Diagnosis - Correct Responses</th>
<th>Management - Correct Responses</th>
</tr>
</thead>
<tbody>
<tr>
<td>All</td>
<td>113</td>
<td>68.6% (95% CI 65.8-71.4)</td>
<td>40%</td>
<td>968/1395 = 69.4%</td>
<td>970/1412 = 68.7%</td>
</tr>
<tr>
<td>PGY-1</td>
<td>43</td>
<td>63.2% (95% CI 58.0-68.3)</td>
<td>28%</td>
<td>356/542 = 65.7%</td>
<td>323/521 = 62.0%</td>
</tr>
<tr>
<td>PGY-2</td>
<td>33</td>
<td>69.0% (95% CI 62.2-73.7)</td>
<td>39%</td>
<td>281/396 = 71.0%</td>
<td>288/426 = 67.6%</td>
</tr>
<tr>
<td>PGY-3 and 4</td>
<td>37</td>
<td>74.6% (95% CI 70.9-78.4)</td>
<td>54%</td>
<td>331/457 = 72.4%</td>
<td>359/465 = 77.2%</td>
</tr>
</tbody>
</table>

*Passing threshold estimated using Anghoff method, at 73% correct.
significant diversity in the patient population (93%), working with underserved populations (83%), resident and faculty diversity (82% and 78% respectively), and a commitment to diversity by the residency program (81%). Factors that were considered less significant included the presence of a diversity statement on the Web site (55%), the presence of pipeline programs (67%), global health opportunities (65%), and having an ethnic background similar to the patient population (56%).

Conclusion: The results of our survey highlight areas that may require additional emphasis in recruiting URM applicants, such as the overall diversity of the patient population regardless of whether it matches the racial or ethnic background of the applicant, and the overall level of faculty and resident diversity at the program. The results also suggest that some of the currently recommended “best practice” recruitment strategies may be less influential in URM program selection than previously thought. With limited resources, these findings may point towards certain interventions or emphases having a higher utility than others.

168 SNAPPY Teaching and Assessing Medical Students: Sonographic Assistance for Procedures in Preclinical Years
Amini R, Breshares E, Stolz L, Stea N, Hawbaker N, Thompson M, Sanders A, Adhikari S/Banner University Medical Center, Tucson, AZ

Study Objectives: Medical students typically have minimal to no formal education in the use of ultrasound (US) guidance for procedures such as central venous line placement, nerve blocks and abscess drainage. As the use of bedside US increases dramatically across specialties, curricula should be developed to teach medical students US-guided procedural skills. The objective of our study was to determine the impact of an US teaching session geared towards training medical students in needle guidance to perform three US-guided procedures.

Methods: Cross-sectional study at an urban academic medical center. The goal for the one day US education session (SNAPPY) session was to teach and assess third year medical students in three US-guided procedures: abscess drainage, nerve block, and central line placement. A one-hour didactic session was given to review basic US physics and commonly used knobs and controls. Following the didactic session, a sample of 11 students (10.5%) was asked to perform the three procedures to establish a baseline of student proficiency. A survey regarding student opinions, self-assessment of skills, and US procedure knowledge was administered before and after the educational intervention. During the educational intervention, medical students were divided into small groups of 5-6 students and rotated through 6 stations. The first three stations were focused on student education with a focus on hands-on practice with dedicated instructors. The next three stations were focused on student assessment where instructors administered a five-point validated technical skills rating scale tool. An online survey was administered before and after the session to assess procedural confidence and procedure knowledge base.

Results: One hundred five third-year medical students participated in this study. Prior to the hands-on session, 90% (95% CI, 84% to 96%) of students disagreed with the statement, “I can perform ultrasound-guided procedures by myself without any assistance with simultaneous probe manipulation and needle advancement.” After the hands-on session only 6% (95% CI, 1% to 11%) disagreed, 88% (92/105) of the medical students completed the pre-test and 78% (82/105) of the medical students completed the post-test. The average score for the knowledge-based test improved from 46% (SD 16%) to 74% (SD 14%). The technical skills rating scale scores are demonstrated in Table 1. On a Likert scale from 1 to 10 student overall confidence in needle guidance improved from 3.1 (SD 2.4) to 7.8 (SD 1.5) (abscess drainage: 2.8 (SD 2.1) to 7.8 (SD 1.3), vascular access: 3.0 (SD 2.4) to 7.8 (SD 1.3), nerve block: 2.1 (SD 1.8) to 7.5 (SD 1.4) (P < .001).

Conclusion: In academic institutions where an US curriculum is not established for medical students or where resources are limited, one-day training session focused on US-guided procedural skills is an effective educational tool.

Table 1: 5-Point Technical Skills Rating Scale

<table>
<thead>
<tr>
<th>Sonographic Skill</th>
<th>Before Training session</th>
<th>After Training session</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Abscess drainage</td>
<td>2.2 (SD 1.1)</td>
<td>3.7 (SD 0.7)</td>
<td>&lt; .001</td>
</tr>
<tr>
<td>Vascular access</td>
<td>1.8 (SD 1.0)</td>
<td>4.7 (SD 0.5)</td>
<td>&lt; .001</td>
</tr>
<tr>
<td>Nerve block</td>
<td>2.7 (SD 1.5)</td>
<td>4.1 (SD 0.7)</td>
<td>&lt; .001</td>
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169 Billing and Coding Shift for Emergency Medicine Residents: A Win-Win-Win Proposition
Takacs ME, Stilley JD/University of Iowa, Iowa City, IA

Study Objectives: Effective teaching of billing and coding has been well known to be deficient in emergency medicine (EM) residencies. Our primary objective was to create an effective teaching method for billing and coding education in an emergency medicine residency via an interprofessional shift in our billing and coding office.

Secondary objectives were to improve the efficiency and job satisfaction of our billers and coders and to increase revenue in the department.

Methods: We conducted a one-on-one interprofessional workshop with our lead coder. From September 2014 to March 2015 and during their EM 4-week rotation at the University of Iowa Hospital, one resident from each class was asked to sign up for a billing and coding shift between days 11 and 18 of their 28-day rotation. The lead coder worked individually with each resident providing a one hour interactive lecture, followed by a 1-2 hour exercise of residents coding a set of standardized charts followed by a feedback session of their performance on coding. We surveyed the residents within the week after their workshop as to the quality of this experience as a measure of our primary objective. We surveyed the coders in April 2015 as a measure of our secondary objectives.

Results: Seventeen of 26 emergency medicine residents (65%) completed the interprofessional workshop and 14 of 17 residents (82%) completed the post-workshop self-assessment survey. A paired t-test on a 5-point scale comparing knowledge gained before and after the workshop showed an improvement from 3.4 to 4.3, P < .001. On a 5-point Likert scale, EM residents favorably gained a significant amount of knowledge (mean 4.29 and SD 0.61), felt it was beneficial (mean 4.38, SD 0.51), and would change my clinical practice (mean 4.29, SD 0.83). Overall resident satisfaction of this interprofessional workshop on a 7-point Likert scale was favorable (mean 6.29, SD 0.61). All residents were able to identify mistakes they commonly made as a result of the billing and coding shift. On a 3-point Likert scale, residents favored the length of time was just right (mean 2.14, SD 0.36). Residents made additional comments of being thoroughly satisfied with this experience and requesting it to be required for next year. Secondary results were obtained from the 4 of 4 coders (100%) completing their survey. All coders in our department have been employed for at least 5 years. On a 5-point Likert scale, coders favorably see consistent documentation of required elements (mean 4.25, SD 0.50), identify that good documentation makes their job easier (mean 5.0, SD 0.0), have seen improvement in documentation from the prior year (mean 4.5, SD 0.58), note a decrease in job satisfaction with well-written notes (mean 5.0, SD 0.0), note good documentation allows them to process more charts (mean 5.0, SD 0.0), and estimate a 38% increase (SD 42%) in efficiency of charts able to process in one day. Coders were also able to identify common mistakes made by ED residents.

Conclusion: Billing and coding interprofessional shift is an effective teaching method for emergency medicine residents. Improvements in documentation also led to an increase in job satisfaction and efficiency of coders. Future work in this area may show an increase in department revenue creating a win for resident education, a win for coders, and a win for the department.

170 Risk-Management and Medical Malpractice Curriculum for Emergency Medicine Residency
Amin DP, Shoenberger J, Vasquez V, Malton W/University of Southern California, Los Angeles, CA

Study Objectives: Lawsuits frequently name resident physicians as co-defendants along with attending physicians and the hospital. Many residents are not aware of the full extent of their exposure to medical malpractice liability nor do they understand the medical liability coverage they are provided by their training programs. Our efforts as a medical profession to prepare resident physicians to navigate the current legal system are either lacking or deficient. According to one large Northeast malpractice insurer, from 1994 to 2003, in the graduate medical education setting, residents were named in 22% of medical malpractice lawsuits. Between 1990 and 2004, the National Practitioner Database reported 1530 claims awarded in suits involving residents, a number regarded as low due to underreporting. The purpose of this study is to review the current literature regarding emergency medicine (EM) resident physician medical malpractice education and to make recommendations based on this literature to develop a model medical malpractice program for EM residents.
Methods: A PubMed search was performed using the combined keywords "resident liability," "resident lawsuits," and "resident medical malpractice." The search yielded 24 citations. These were reviewed along with the bibliographies of relevant articles. A search was also performed of the Cochrane Database of Systemic Reviews using the same strategy, which yielded only 1 relevant review. Seven articles were selected for review that directly addressed medical malpractice education in residency programs. Two of the articles specifically described elements of an EM resident medical malpractice education program.

Results: All selected articles discussed how residency programs recognize the need for more in-depth medicolegal education but lack a curriculum for such. The article review revealed that some programs invite hospital attorneys to discuss such topics as pitfalls inherent to charting, and explain the format of a medical malpractice trial and the pre-trial litigation process. The timing of such training appears to be an obstacle. The most relevant article discussed how a mock trial involving emergency medicine residents improved their communication skills and expanded their knowledge of documentation pitfalls, problems with staff interaction, and consequences of medical errors. Medicolegal curriculum allowed residents to learn how the lay public and patients view the care that they deliver. It taught residents how they are perceived, both positively and negatively, while they are administering medical care.

Conclusion: Malpractice education is serious concern for residents and a financial liability for hospitals but there is a paucity of organized education programs during residency. Physician-defendants have been forced to become educated on the subject of medical malpractice first hand instead of having a dedicated education program in residency. Although there is consensus on the importance of medicolegal education during residency there is limited information in the literature on residency programs having a dedicated educational program for such.

171 At the Bedside: Developing a Resource for New Resident Teachers and Exploring its Impact
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Study Objective: While learning is a skill residents hone through a lifetime of experience, teaching presents a radical shift in the education paradigm which often finds new resident instructors unsure of how to deliver high quality concepts in a practical and effective manner. Though extensive resources exist for resident learning, few tools aim to assist the novice instructor. A new clinical education tool could bridge that gap, empower residents to teach more, and result in more effective translation of core concepts to junior residents. Our objective was to pilot a bedside teaching adjunct to assist these new instructors in delivering on-shift bedside education, and then to assess response and effectiveness from senior and junior residents in order to consider a future residency-wide teaching curriculum.

Methods: Fourteen 5-minute slideshow presentations were prepared by members of the PGY3 class covering relevant management of core ED topics such as sepsis, seizures, asthma, etc, and stored on multiple Internet locations available to senior residents. The lectures were designed to be concise, practical, accessible to all resident teacher abilities, and targeted at the intern level. A new clinical education tool could bridge that gap, empower residents to teach more, and result in more effective translation of core concepts to junior residents. Our objective was to pilot a bedside teaching adjunct to assist these new instructors in delivering on-shift bedside education, and then to assess response and effectiveness from senior and junior residents in order to consider a future residency-wide teaching curriculum.

Methods: A PubMed search was performed using the combined keywords 'scheduling,' 'teaching,' and 'interactive' to find new resources for bedside teaching. Of note, few tools aimed to help novice instructors. A bedside teaching tool could bridge that gap by empowering residents to teach more, and result in more effective translation of core concepts to junior residents. Our objective was to pilot a bedside teaching adjunct to assist these new instructors in delivering on-shift bedside education, and then to assess response and effectiveness from senior and junior residents in order to consider a future residency-wide teaching curriculum.

Results: Methods: Fourteen 5-minute slideshow presentations were prepared by members of the PGY3 class covering relevant management of core ED topics such as sepsis, seizures, asthma, etc, and stored on multiple Internet locations available to senior residents. The lectures were designed to be concise, practical, accessible to all resident teacher abilities, and targeted at the intern level. PGY3’s were surveyed to assess response and effectiveness from senior and junior residents in order to consider a future residency-wide teaching curriculum. Results: Response rate for all 3 PGY classes was 100% (51 of 51). Of interns who received bedside teaching with our initiative 100% found it effective at conveying relevant bedside concepts and 91% liked this teaching style. Other techniques commonly used were: discussion with (94%) and without (88%) sketches/writing, and “pimping”/Socratic method (65%). When asked, the majority of interns (59%) felt discussion with sketches/writing would help them learn best at the bedside. PGY3’s found the lectures improved their own knowledge (67%), encouraged teaching (67%) and made teaching more comfortable (83%). The most frequent concerns from the PGY2 class for delivering bedside education were time management (88%), fund of knowledge in material to be taught (76%), and confidence/comfort in teaching (59%). Pertinent suggestions by interns for improving our resource included more frequent use and better access for later review, while requests by PGY2’s included more instruction on education and how to balance clinical duties with junior teaching.

Conclusions: New teachers need better tools to make this education transition in their training. Our initiative was very well received by learners and felt to be effective in teaching core concepts, though many included limited exposure by interns (11 of 17) and poor use among PGY3s (6 of 17). The majority of interns in our study felt the most helpful teaching modality would combine discussion with sketching/writing as a visual aid, in contrast to the slideshow format used in our tool. The most cited PGY2 concerns for teaching (knowledge, confidence, and time management) are addressed by our bedside teaching resource. This suggests an effective role for our tool as a vehicle to aid beginner teaching as residents evolve into better instructors. Further bedside teaching curricula is needed and simple adjuncts such as ours can serve as a foundation for progress.

172 Bridging the Gap Between Milestones and the Emergency Medicine Model: Incorporation of Patient Encounter Types Into Residency Training
Manning JD, Kuehl DR/Virginia Tech Carilion Emergency Medicine Residency Program, Roanoke, VA; VTC School of Medicine Carilion Clinic, Roanoke, VA

Study Objective: Emergency medicine (EM) is the only specialty with a scientifically derived and widely model of its clinical practice (EM Model). This model is used to guide the American Board of Emergency Medicine’s written and oral certification exams for EM and was key to the development of EM Milestones, though milestones notably do not assess patient encounter types. Despite having ready access to electronic health record (EHR) data, residency programs may be unaware of how many patient encounters residents are seeing and how these experiences vary by time in training. We sought to examine what types of encounters residents experience and identify deficiencies in the EM Model that might be present in an EM training program. We determine what variation in patient encounter types exists in the first 6 months of residency training and at what point encounters become similar among EM residents.

Methods: This was a retrospective study of EM resident patient encounters at a tertiary 85,000 visits ED and Level 1 trauma center with a 3-year ACGME accredited EM residency program. Data was extracted from an EHR over a four-year period and all EM resident encounters were categorized into 6-month intervals and coded by encounter type. We created a novel software package that uses the Healthcare Cost and Utilization Project’s Clinical Classification Software (CCS), which is a categorization scheme of the diagnoses and procedure codes found in the International Classification of Diseases, 9th Revision, Clinical Modification’s (ICD-9-CM’s) uniform coding system. Over 15,000 diagnosis codes were condensed into clinically meaningful categories (296), which we then grouped into the five key patient types in EM: Medical, Trauma, Obstetrics/Gynecology, Psychiatric, and Pediatric. Medical patient types were further divided into 12 areas to better represent the EM Model.

Results: A total of 322,755 patient encounters occurred over a four-year period, of which 306,043 held at least one ICD-9-CM diagnosis and EM attending. EM residents were involved in 48,333 of these encounters. In the first six months of training, residents averaged 304 total encounters (n=30), which increased to a total of 228% after completion of two years. Of the key patient types and subcategories that reflect EM Model areas, 51 areas (10.6% of 16 possible categories/resident) had fewer than 5 encounters in the first six months, with the greatest deficiencies seen in hematoloy, toxicology, and genitourinary. After two years, only 1 area for one resident (0.4%, hematology) had fewer than 20 encounters.

Conclusion: We demonstrate significant variation in exposure to the breadth of the EM model by EM residents in the first 6 months of training. At the end of year two, all residents had more uniform exposure in all areas of the EM model. The addition of patient encounter types to an EM residency training program offers considerable benefit in assessing EM Model practice areas. Given the inconsistency of resident encounters early in training, it may be beneficial to establish personalized triggers for competency assessment (e.g. assess knowledge of chest pain after x encounters) rather than set times. This methodology can potentially identify deficiencies in exposure to the EM Model at the individual or program level and guide didactic and simulation experiences.

173 Prevalence of Out-of-Hospital Cardiac Arrest Presenting as a Seizure
Sanko S, Eckstein M/Keck School of Medicine of the University of Southern California; and Los Angeles Fire Department, Los Angeles, CA

Study Objective: Agonal breathing in early sudden cardiac arrest can be perceived by bystanders as seizure-like activity, and this can delay activation of 911 and the start
of chest compressions. The objective of this study was to measure the prevalence of out-of-hospital cardiac arrest calls that are dispatched as seizures.

Methods: This was a retrospective study of field-confirmed bystander-witnessed cardiac arrests responded to by the Los Angeles Fire Department, the EMS provider for a city of 4.1 million whose 911 center is staffed by uniformed firefighters certified as emergency medical dispatchers. Cases were identified by sorting electronic patient care reports from all cases meeting Utstein criteria for bystander-witnessed, non-traumatic cardiac arrests in patients > age 18 from January 2014 to March 2015. Dispatch descriptors were recorded for all incidents.

Results: There were 651 field-confirmed bystander-witnessed cardiac arrests during the study period, during which time there were 24 (3.7%) seizure dispatches to these incidents (range per quarter: 1.3-6.7%). Among the 207 bystander-witnessed cardiac arrests where the initial rhythm was shockable, 18 (8.7%) were dispatched as a seizure (range per quarter: 3.4-12.2%).

Conclusion: Although rare, some bystander-witnessed cardiac arrests are dispatched as a seizure, particularly shockable cardiac arrests. Emergency medical dispatchers should have a high degree of suspicion for cardiac arrest when callers report an active seizure, closely assess breathing once the seizure stops and have a low threshold to provide dispatcher-assisted chest compressions.

174 Comparing Emergency Physicians’ Emergency Anesthesia Performance In and Out of Hospital: Apples and Oranges?

Ross M, Cortfield A, Loughrey JP, McCormack J/Royal Infirmary of Edinburgh, Edinburgh, United Kingdom; Royal Alexandra Hospital, Paisley, United Kingdom; Emergency Medical Retrieval Service, Glasgow, United Kingdom; Royal Hospital for Sick Children, Edinburgh, United Kingdom

Study Objective: Tracheal intubation is a cornerstone of the management of undifferentiated critically ill patients. Tracheal intubation in the setting of an emergency department or out-of-hospital environment is associated with a higher complication rate than in elective anesthesia due to a variety of factors. We undertook a retrospective analysis of all intubations performed by a national aeromedical critical care service, Emergency Medical Retrieval Service (EMRS), in Scotland between June 2009 and June 2013. We compared this data with our previously reported national data on intubation in Scottish intensive care units (ICU).

Method: Data capture forms were completed at the time of each intubation, both within EMRS and ICU, including demographic data as well as information about drug choice and complications associated within tracheal intubation.

Results: A total of 289 patients underwent tracheal intubation by EMRS doctors; 106 intubations for primary retrieval and 184 for secondary retrieval. The first time success rate was 80% (n=74) and 82% (n=150) in primary and secondary retrievals respectively, compared with 91% in the contemporaneous ICU group (n=719 of 794). No patient required more than 4 attempts at intubation or a surgical airway. One attempt was abandoned and another required the insertion of a laryngeal mask airway. Ketamine and etomidate were the commonest induction agents in both primary (n=52 48%, n=24, 22% respectively) and secondary retrievals (n=46, 25%, n=78, 42% respectively). Etomidate was used in only 9% (n=73) and ketamine in just 3% (n=20) of the ICU cohort. Hypoxia occurred in 15% (n=16) and 17% (n=32) of primary and secondary retrievals compared with 41% (n=327) in the ICU group. There were only 2 episodes of hypotension in the primary retrieval group and in 5% (n=10) among secondary retrievals, compared to 33% (n=230) in the ICU cohort. Hypotension was more likely in those who received propofol or thiopental than those given etomidate or ketamine (30% vs 4%).

Conclusions: The EMRS provide a robust retrieval service with comparable intubation success rates to that found in concurrent ICUs. The incidence of hypoxia and hypotension were lower than the ICU group. The reduction in hypotension may be related to the choice of induction drug.

175 Does Knowing Hands-Only Cardiopulmonary Resuscitation Improve Willingness to Use It?

Bahhum N, DeBelly J, Kazan V, Kaikish E/The University of Toledo Medical Center, Toledo, OH

Study Objectives: To determine the effect of teaching proper hands only cardiopulmonary resuscitation (HOCPR) technique on a layperson’s willingness to use it.

Methods: Study participants were selected from the University of Toledo Medical Center Emergency Department in addition to the Toledo area community. All subjects 18 years of age and older willing to learn proper HOCPR technique and follow up with one- and six-month surveys were enrolled in the study. Participants were shown a teaching video from the American Heart Association (AHA), followed by a mannequin demonstration. Participants then filled out a survey immediately after practicing HOCPR on the mannequin and at one month.

Results: Seventy-five subjects received HOCPR training and completed an initial survey and 44 (59%) of the subjects completed a one-month follow-up survey. The results of the initial survey revealed that 100% (n=75) were able to correctly recall the HOCPR process and 79% (n=59) were very likely to provide HOCPR to a person suffering from a cardiac episode. 76% (n=57) were more willing to assist a person in need as a result of not having to provide breaths to the person in need. At the one-month follow-up, 100% (n=59) of the respondents remembered the order of steps and 73% (n=32) were willing to provide HOCPR since no rescue breathing was required. After learning the material, 15% (n=11) of the participants tried to teach their family and friends about HOCPR.

Conclusion: HOCPR is a simple method that the average person is able to recall after a brief training in proper technique. Subjects were more willing to provide HOCPR because providing breaths was not required. In addition, HOCPR was simple enough for participants to teach their family and friends.

176 Out-of-Hospital En Route Care and Life-Saving Interventions of Traumatically Injured Combat Patients Transported by MEDEVAC From Point of Injury

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Study Objective: Traumatically injured patients in combat require immediate care and evacuation to improve survival. Limited research exists on the en route care of patients transported by military health care providers (MEDEVAC) from the point of injury (POI). The objective of our study was to describe the care and response to care (life-saving interventions, complications, adverse events) of combat injured patients who were air evacuated via MEDEVAC from POI to military medical facilities of different levels in Afghanistan.

Methods: We conducted an IRB-approved, retrospective review of out-of-hospital and MEDEVAC care records of patients who were traumatically injured and air evacuated via MEDEVAC from the POI to the first military medical facility in Afghanistan between 2011 and 2014. Patients killed in action were excluded from this study. Data abstracted included demographics, injury description, provider type, procedures and complications, analgesics administered, and combat theater survival. Percentages and frequencies were reported along with mean±SD; median [interquartile range].

Results: A total of 1,022 patient records were reviewed: mean age 25 (SD±5), 98% male, 73% blast-related injury, 26% penetrating, 2% blunt, and 6% burn. Thirty-nine percent of patients (n=397) received IV fluids. Blood products were administered in 4% (n=39) of patients. Clinical events included pain 79% (n=807), hypoxia 7% (n=72), hypotension 7% (n=75), and tachycardia 11%
Three percent (n=29) of patients had bleeding that was not controlled by initial interventions. A failed procedure was reported in 7% (n=66) of patients and equipment failure was rare 1% (n=7). Eighty-seven percent (n=892) had at least one documented adverse event. Analgesia was administered to 45% (n=464) of patients: morphine 24% (n=241), fentanyl 20% (n=201), and ketamine 9% (n=92). In-theater survival was 93%.

Conclusion: In this study of 1,022 patients the most frequently performed procedures were IV access, oxygen support, pressure packing, analgesia and fluid administration by military health care providers in the out-of-hospital combat setting. Airway, chest procedures, and blood product administration were rare. The most frequently reported complication was pain; hemodynamic instability was rare. Almost half of the patients received an analgesic with morphine being the most common. Findings from the study may be applicable to civilian emergency out-of-hospital care of traumatically injured patients.

177 Analysis of MEDEVAC Providers and Procedures Performed En Route From Point of Injury to a Military Treatment Facility in Combat

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Study Objective: In combat zones, rotary platforms of out-of-hospital en route care (MEDEVAC) are comprised of military health care providers who perform life-saving interventions to improve survival. The association between provider skill level and in-flight procedures is not well understood. An evaluation of provider types and procedures performed during evacuation could benefit military training and improve efficiency of en route care. The objective of our study was to describe MEDEVAC provider types and identify associations between provider type and the procedures performed.

Methods: We conducted an IRB-approved, retrospective record review of patients traumatically injured in combat who were air evacuated via MEDEVAC from the point of injury between 2011 and 2014. Data abstracted included injury description, provider type, procedures performed, analgesics administered, and survival to the first military medical facility. Subjects were grouped according to provider type: EMT-B/EMT-I (Medic), EMT-P/Special Ops/PJ (Paramedics), RN/MD/PA (RN/MD). Groups were compared by injury and injury severity score (ISS), procedures, in-flight events, and analgesics administered. Data were collected by trained staff, with periodic quality assurance, and by standard research abstraction methods. Data were reported as percentages and frequencies. Analyses were performed using chi-square tests for categorical variables and Kruskal-Wallis tests for continuous variables. P < .05 was considered significant.

Results: One thousand MEDEVAC records were reviewed by trained abstractors. The providers were Medic 86% (n=855), Paramedic 11% (n=107), and RN/MD 4% (n=38). Seventy-two percent (n=687) had blast-related injuries with no difference in mean ISS. RN/MD were more likely to use pressure packing (22% Medic vs 18% Paramedic vs 63% RN/MD; P = <.02). RN/MD applied more hemostatic dressings (2% Medic vs 2% Paramedic vs 9% RN/MD; P = .04). Chest needle decompression was more likely to be performed by RN/MD (1.5% Medic vs 8% Paramedic vs 13% RN/MD; P = <.0001). Chest tube, chest seal, tourniquets, CPR, cricothyrotomies, intubations, IV fluids, blood product administration, oxygen support, spinal stabilization and hypothermia prevention were similarly performed among groups. Vascular access was similar for IV insertion; however, the RN/MD group was more likely to insert an IO catheter (5% Medic vs 11% Paramedic vs 13% RN/MD; P = .02). Provider type was not associated with complications such as reported pain, hypoxia, abnormal hemodynamics, or viral signs. Analgesics were similarly administered by each provider type. Survival to discharge from theater was highest in the Medic and RN/MD group (94% Medic vs 88% Paramedic vs 95% RN/MD; P = .04).

Conclusion: In our study of MEDEVAC flights, Medics were the most common provider type in the out-of-hospital combat setting. Survival to the initial medical facility was higher in the Medic and RN/MD group. RN/MD applied more pressure and hemostatic dressings and performed more chest needle decompressions and IO placement. Other procedures were similarly performed across groups. There was no difference in complications between provider types. Findings from this study may be applicable to civilian providers treating traumatically injured patients in the emergency out-of-hospital setting.

178 Increasing Prevalence of Senior Citizen Frequent Users of Emergency Medical Services in Large, Urban Area

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Study Objective: Geriatric patients (seniors) tend to arrive more frequently by ambulance, have higher acuity status, require more frequent hospital admissions with longer lengths of stay, and ultimately have higher health care costs when compared to other emergency department (ED) patients. The objective of this study was to describe trends in the prevalence of patients over age 65 among frequent users of the 911 EMS system.

Methods: A retrospective review of electronic medical records from the Los Angeles Fire Department, the EMS provider for a city of 4.1 million people, identified patients with 6 or more EMS transports during each 6 month period for fiscal years 2011-2013.

Results: In fiscal year (FY) 2011-2012, seniors represented 144 (25%) of LAFD’s 556 unique frequent users. In FY2012, seniors accounted for 249 (32%) of unique frequent users, accounting for 4,450 resource deployments. In FY2013, seniors accounted for 32% of frequent users, and 5,243 resource deployments (17.8% increase). There was a progressive increase in the total number of frequent users, and a disproportionate increase in senior frequent user resource utilization. From first half of FY2011 to second half of FY2013, number of frequent users increased from 556 to 961 (72% increase), and the number of resources utilized increased from 5225 to 9376 (79% increase). In the same period, senior frequent users have increased from 144 to 311 (116% increase), and responding resources utilized have increased from 1262 to 2672 (115% increase).

Conclusion: Geriatric patients constitute a steadily increasing proportion of EMS frequent users. Future efforts must focus on specific predictors for accelerated EMS use, as well as mechanisms through which EMS can partner with other governmental and non-governmental agencies to optimize care of elderly frequent users.
Study Objective: Approximately 360,000 Americans suffer out-of-hospital cardiac arrest (OHCA) each year. Attempts to identify predictors of survival have led to conflicting results. In this study, we describe characteristics of a multi-center cohort of survivors of OHCA who presented with electrocardiographic (ECG) findings of ST segment elevation myocardial infarction (STEMI).

Methods: From January 2009 through November 2012, 239 patients treated at 11 medical centers across the United States who survived to emergent coronary angiography after OHCA with STEMI on the out-of-hospital or post-resuscitation ECG were evaluated. Data collected included demographics, interventions, survival and neurologic outcome. Predictors of survival to hospital discharge were determined using multivariate logistic regression analysis.

Results: Average age of study patients was 60.48 ± 12.82 years, with 122 (77%) male patients and 86 (54%) Caucasians. One hundred seventy-six patients (74%) underwent percutaneous coronary intervention. Pre-admission characteristics exhibited by survivors included location of arrest in public place (n = 82, 95% CI 1.24-3.77), known preceding chest pain (n = 97, 95% CI 1.39-4.28), arrest witnessed by health care personnel (n = 62, 95% CI 1.08-3.58), GCS ≥ 6 on admission (n = 31, 95% CI 1.08-6.15), attempted defibrillation (n = 138, 95% CI 1.75-6.76), initial shockable rhythm (n = 138, 95% CI 2.02-7.31), and use of paralytics (n = 49, 95% CI 1.10-3.98). All were statistically significant (P < .05). Factors associated with mortality included cardiogenic shock at time of admission (n = 44, 95% CI 0.20-0.66), vasopressors on admission (n = 39, 95% CI 0.21-0.67), assisted ventilation (n = 115, 95% CI 0.01-0.58) and intubation (n = 106, 95% CI 0.08-0.53) and non shockable initial cardiac rhythm (n = 0.10, 95% CI 0.05-0.23).

Conclusions: In this multi-center, contemporary cohort of survivors of OHCA with presumed STEMI, factors associated with in-hospital survival included arrest location, preceding chest pain and initial shockable rhythm. In contrast to prior studies, bystander CPR and other resuscitative efforts aimed at maintaining circulation were not significantly associated with survival.

Background: Drug shortages may be especially harmful in the setting of unscheduled care for high acuity conditions, such as the emergency department (ED). Early evidence indicates that the Food and Drug Administration Safety and Innovation Act (FDASIA) of 2012 has decreased the number of new shortages overall. However, anecdotal evidence suggests that drugs that are often used in the ED may be under shortage with increasing frequency and duration.

Study Objectives: To describe trends in national drug shortages between 2002 and 2014 for drugs used in the ED in comparison to non-acute care drugs.

Methods: We analyzed all reported national drug shortages from January 2002 to October 2014 collected by the University of Utah Drug Information Service, University of Utah Hospital and Clinics, Salt Lake City, UT; Yale School of Medicine, New Haven, CT; Center for Outcomes Research and Evaluation, Yale-New Haven Hospital, Yale School of Medicine, New Haven, CT; Yale School of Medicine, Center, CT; for Outcomes Research and Evaluation, Yale-New Haven Hospital, New Haven, CT

Results: A total of 1,898 national drug shortages occurred from 2002 to 2014; 275 shortages occurred each year on average; and 52% of shortages (n = 987) affected acute care drugs. During the period studied, the shortage of acute care drugs is highest in 2014 (n = 449) with a trend over the past decade that is statistically different from non-acute care drugs, which peaked in 2012 (n = 242), P = .0064 (Figure). The median durations of shortage for acute and non-acute care drugs were lowest in 2007 at 82 and 93 days respectively, then increased significantly more for acute care drugs (365 vs 264 days in 2013) (P = .0001 for trend).

Conclusion: Half of all reported drug shortages during 2002-2014 involve acute care drugs used in the ED, and these shortages are increasingly frequent and prolonged. National drug shortages can hinder the delivery of care in EDs across the country, thus additional policy interventions beyond FDASIA are merited.
the number of investigations and violations were estimated. Per capita rates of violations were calculated using population estimates from the American Community Survey, and described by CMS region.

Results: During the study period (11 years), CMS conducted 5,475 EMTALA investigations of which 2,382 (43%) resulted in at least one substantiated EMTALA violation. Overall, there has been a linear downward trend in the number of investigations during the study period from 868 in 2006 to 370 in 2014 (46% decrease). Violations, on the other hand, remained stable in the early part of the study period (2004-2009) but declined steadily from 245 violations in 2009 to 180 in 2014 (27%). In terms of service deficiencies, 62% of investigations involved medical emergencies (40% substantiated), 15% psychiatric emergencies (48% substantiated), 11% surgical emergencies (40% substantiated), 10% trauma-related emergencies (47% substantiated) and 7% labor-related emergencies (63% substantiated). Finally, during the study period, there was substantial regional variation (>7 fold) in both investigations and substantiated violations. Nationally, there were 7.70 violations per 1 million residents but this ranged from 2.66 per 1 million in CMS region II (New York office) to 19.76 in CMS region VII (Midwest-Kansas City office).

Conclusion: We report the first national estimates of EMTALA enforcement activities in at least 15 years and generally note that despite large regional variation in investigations and violations, the general trend is toward fewer CMS investigations and fewer substantiated violations, particularly since 2009. Future research should focus on whether this downward trend reflects improvement in emergency care or diminishing enforcement efforts.

182 Assessing Economic and Health Care Access Social Determinants of Health in the Emergency Department
Park AM, Anderson AL, Nguyen JD, Saltzman DA, Kastetter BL, Winsauer LE, Philips CS, Capp R/University of Colorado, Denver, Aurora, CO

Study Objectives: No studies to date have examined the presence of social determinants of health (SDH) in vulnerable patients using the emergency department (ED). In this study, we evaluate the prevalence of health care access and economic SDH present in vulnerable populations using the ED.

Methods: This was a cross-sectional study, developed through a community-academic partnership. Patients with public (Medicaid/Medicare) or no insurance, aged 18-80 years presenting to a large, urban, academic ED were eligible to participate in the survey study. We excluded patients who were: pregnant, incarcerated, unable to consent, or required a 1:1 sitter. Thirteen trained student patient navigators (SPNs) screened the ED electronic health records for eligible patients between the hours of 11 AM-5 PM, 7 days a week, from June to August of 2014. SPNs administered surveys in person in the ED to consenting patients. Patients who completed the survey were eligible to enter a gift card drawing of $100 and received patient navigation at no cost. Participants were asked about social determinants, such as health care access (eg, lack of primary care, inability to get appointments) and economic determinants (eg, lack of housing, food), as defined by the Healthy People 2020. Our outcome of interest was having ≥1 SDH. We assessed the association between patient characteristics and presence of ≥1 SDH using a multivariate logistic regression analysis.

Results: Four hundred fifty-four of 664 patients agreed to complete the survey (70% response rate). Among respondents, the mean age was 42 years, 246 (54.2%) were females, and 279 (61.5%) of patients had one or more chronic diseases. Eight-nine percent of patients described having ≥1 SDH (Figure 1). Notably, when compared with those who have Medicaid insurance, those who are uninsured were less likely to suffer from ≥1 SDH (OR 0.23; 95% CI 0.09-0.60). Those with a mental health co-morbidity were more likely to suffer from ≥1 SDH (OR 3.60; 95% CI 1.24-10.40) when compared with those who don’t have a mental health co-morbidity. Finally, individuals who frequently use the ED (≥4 visits/year) were more likely to suffer from ≥1 SDH (OR 9.34; 95% CI 2.01-43.53) when compared with those who are non-frequent ED users.

Conclusion: A large proportion of under-insured and uninsured patients suffer from ≥1 SDH. These SDH appear to be linked to frequency of ED usage, insurance type, and mental health status. EDs should attempt to help these individuals in overcoming these social determinants, in order to improve their health outcomes, and thus decrease health inequities and avoidable ED utilization.

183 The Affordable Care Act: Disparities in Emergency Department Use for Mental Health Diagnoses in Young Adults
Yanuck J, Chakravarty B, Billimek J, Anderson CL, Hicks B/University of California, Irvine, Irvine, CA

Study Objectives: Young adults have high levels of mental health needs but often lack health insurance. Recent health reforms have increased coverage, but it is unclear how this has affected psychiatric emergency department (ED) visit rates for each sex and various racial subgroups. In 2010, the Affordable Care Act (ACA) required insurers to permit children to remain on parental policies until age 26 as dependents. This study estimated the association between the dependent coverage provision and changes in young adults’ usage of (ED) services for psychiatric diagnoses.

Methods: Quasi-Experimental analysis of emergency department use in California from 2009-2011 encompassing 280,798 visits with a behavioral health diagnosis for individuals aged 19 to 31 years old. Analyses used a difference-in-differences approach comparing those targeted by the ACA dependent provision (19- to 25-year-olds) and those who were not (27- to 31-year-olds), evaluating changes in ED visit rates per 1,000 in California. Primary outcome measures included the quarterly ED visit rates with any psychiatric diagnosis, with subgroup analysis looking at the effects of race (white, black, Hispanic, Native American, Asian/Pacific Islander, mixed/other) and sex on the primary outcome.

Results: The young adult dependent provision was associated with 0.05 per 1,000 people (P < .001) fewer psychiatric ED visits among 19 to 25-year-olds compared to 27 to 31-year-olds. However, this significant reduction in psychiatric ED visits was not seen in males, Hispanics, Asians or Pacific Islanders. Furthermore, Hispanics, Asians, and Pacific Islanders were the only racial subgroups that did not see significant gains in the proportion of psychiatric ED visits covered by private insurance.

Conclusion: The young adult dependent provision was associated with a modest reduction in ED use for psychiatric purposes; however, racial disparities in the effect of this provision appear to exist for Hispanics, Asians, and Pacific Islanders.

184 Racial Disparities in the Frequency of Workplace Injuries
Seabury S, Boden L, Terp S/USC Keck School of Medicine, Los Angeles, CA; Boston University, Boston, MA

Study Objectives: Workplace injuries are a significant public health concern, and are known to lead to significant health care costs and productivity losses for millions of people each year. While it has been well established that there are significant disparities in health and economic opportunities across racial and ethnic divides, it is unknown whether minorities are more or less subject to workplace injury risk.

Methods: This study used retrospective data on survey respondents age 18-64 from the 1996, 2001, 2004, and 2008 panels of the Survey of Income and Program Participation (SIPP) published by the US Census Bureau. The SIPP is a...
national survey including data on demographics, labor market outcomes, disability status and cause of disability. We recorded data on self-reported health conditions limiting the type or amount of work and whether those conditions were reportedly due to work-related injuries. Additionally, we recorded whether the individual reported any workers’ compensation income in the survey month. Because work-related injuries are dependent on employment, and there are known differences across racial groups in terms of employment outcomes, we estimated differences in injury frequency conditional on work exposure. Exposure was defined as years of potential work, based on the time from the survey year compared to the year in which respondents first worked six consecutive months or more. We used logistic regression to estimate the frequency of workplace injuries for whites, blacks, Hispanic and Latinos, and other racial groups conditional on age, sex, education and potential work exposure. We compared predicted injury risk for each racial group according to years of exposure holding other covariates at their mean values.

Results: There were 221,403 respondents in the study sample, of which 25,829 (11.7%) reported any disability, 3,635 (1.6%) reported a disability from a work-related injury and 1,029 (0.5%) reported receiving workers’ compensation benefits. Blacks were most likely to experience any disability (17.0%) and a disability due to a work-related injury (2.0%) (Figure 1). Hispanics were least likely to have a disability from work-related injury but most likely to receive workers’ compensation benefits. Adjusting for years of potential exposure, the injury risk was similar for all races at low level of exposure, but increased more for minorities as exposure increased (Figure 2).

Conclusions: There are significant differences in the frequency of disabling workplace injuries and workers’ compensation benefit receipt across racial and ethnic groups. More work is needed to understand the reasons why workplace injury risk differs across racial groups, and to understand how differences in workplace injury risk contribute to the observed economic and health disparities.
audiovisual communication was placed in the patient’s room, at which point the H&P performed by a surgical resident was observed remotely by a surgical attending. Virtual surgical consultants had access to electronic charts, laboratory data, and radiographic imaging. The patient was then seen by the same resident and a different physical-presence surgical attending. Both attendings were asked to complete a case report form detailing their plans. Attendings were blinded to each other’s plans. All participating surgical attendings were fellowship trained in trauma and surgical critical care and had >3 years of post-fellowship experience. Interrater reliability plans formulated by virtual and physical-presence attendings in perception of need for additional consultation, need for operation, plan for OR timing (if required), and admission disposition were assessed using the Kappa statistic.

Results: A total of 15 patients were enrolled in the pilot study. Patients had a mean age of 45±21 years, were 47% Caucasian, 64% male, and had abdominal pain as a chief complaint in 93% of cases. Interrater reliability of disposition plans between physical and virtual attendings was substantial in the domains perceived of need for additional consultation (0.66), need for operation (0.65), and admission disposition (0.68) but only fair (0.29) for the timing of operation.

Conclusions: We have demonstrated that telemedicine can be used to bring surgical specialty consultation into the ED. Disposition plans for ESS consults derived from virtual consultation showed substantial agreement with those derived from physical consultation but opinions on the timing of required operations showed less agreement. Larger sample sizes are needed to better understand the strengths and weakness of virtual consultation.

### Inter-Physician Variability in Emergency Department Length of Stay for Discharged Patients

**Traub SJ, Chang YH, Grierer R, Lokaveddy S, Patterson J, Tolson H, Judson K/Mayo Clinic-Arizona, Phoenix, AZ; Arizona State University, Tempe, AZ; Gonza University, Spokane, WA**

**Objective:** Emergency department (ED) length of stay (LOS) is a key metric in ED operations. Prior studies have looked at system factors as drivers of LOS; however, little work has been done to determine the role of the individual physician as a driver of LOS. We seek to determine the contribution of the individual physician to inter-physician variability in LOS.

**Methods:** Design: Retrospective review of operational data. Setting: Single-site ED with 27,000 visits per year at which physicians are assigned patients algorithmically (removing any provider-generated differences in productivity). Type of participants: All visits evaluated by 21 separate physicians. We developed a three-category framework to classify factors: completely independent of physician (age, sex, ESI, daily physician staffing, and hospital occupancy); partially dependent on physician (number of IV fluids/medications, laboratory tests, x-ray, and advanced imaging studies [computedized tomography, ultrasound, and magnetic resonance imaging] ordered), and completely dependent on physician (physician decisionmaking and mental processing). We used multilevel linear regression and the multilevel modeling methodology proposed by Snijders and Bosker to estimate the effects of the first two categories on inter-physician variability in LOS. We constructed three models by sequentially adding the partially physician dependent variables and physician independent variables to physician independent variables, and then estimated the the percentage of variability explained by the model.

**Results:** There were 26,811 visits evaluated by the core group of 21 physicians over 18 months. The range of mean LOS for individual physicians for discharged patients was 150 to 240 minutes. Data was log-transformed to correct for skew. The regression model estimated that variables completely independent of the physician had a negligible impact on inter-physician variability in LOS, and that factors partially dependent on the physician accounted for approximately 37% of the variability in LOS.

**Conclusion:** In a single site analysis, we found that factors that are partly or completely within the control of the physician accounted for essentially all of the inter-physician variability in physician-specific mean LOS for discharged patients. Within the limitations of our model, we also found that processes that were partially dependent on the physicians, such as differential utilization of ancillary services, accounted for less than 50% of the variation between physicians. This suggests that the variation in mean LOS between physicians for discharged patients may depend significantly on difficult-to-quantify factors such as physician decisionmaking, mental processing, and individual workflows.

### Costs Attributable to Emergency Department Care by Diagnosis

**Slutzman JE, Wilson M, Cutler D, Schuur JD/University of Massachusetts Medical School, Worcester, MA; Brigham and Women’s Hospital, Boston, MA; Harvard University, Cambridge, MA**

**Study Objectives:** Emergency departments (EDs) are the site of over 130 million annual visits and account for over 50% of hospitalizations. We estimate the total cost of ED care and identify and describe the most expensive visits to EDs in the US by diagnosis while describing a variety of accounting methods for ED cost.

**Methods:** This is an observational cohort study of ED visits in the US, using the 2011 Nationwide Emergency Department Sample (NEDS). The primary outcome measure is cost of care attributed to the ED visit, aggregated by diagnosis. We converted NEDS charges to costs using hospital characteristic-specific cost-to-charge ratios. This method was validated using 2011 Medicare data on ED visits in a separate study. The primary accounting method included all ED costs for all ED visits regardless of disposition. Sensitivity analyses included: (1) ED costs of discharged patients only, (2) all ED costs plus all inpatient costs for patients with length of stay less than 2 days, and (3) ED costs of all patients plus the first day of inpatient costs for admitted patients.

**Results:** A small number of diagnoses (19-25 depending on accounting method) represented over 50% of all costs. The most expensive diagnoses were generally conserved across accounting methods, with lists of the top 10 most expensive diagnoses only including a total of 15 distinct diagnoses. All methods have nonspecific chest pain and abdominal pain as the top 2 most expensive diagnoses, with 10% of all costs (Table). ED costs in total represent approximately 4-5% of total US health care costs.

**Conclusion:** Nationally representative aggregate costs can be estimated from NEDS. Few diagnoses represent the greatest expense, and which ones are not significantly affected by accounting methods. Consensus regarding what costs should be attributed to the ED should consider including all costs incurred in the ED for all patients as well as a component to capture the cost of the decision to admit.
End-Organ Damage Among ED Visits for Hypertensive Emergency

Nearly, is an uncommon occurrence in U.S. EDs. Among those with a hypertensive emergency was $1,668 (IQR: $1,076 to $2,445), which was similar to external causes

Headache; including migraine $650 ± $23 $1,972 ± $107
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Calculus of urinary tract $1,469 ± $51 $1,809 ± $107

Incidence and Cost of Hypertensive Emergencies in United States Emergency Departments

Janke AT, McNaughton CD, Levy PD/Wayne State University School of Medicine, Detroit, MI; Vanderbilt University, Nashville, TN

Study Objectives: To characterize the incidence and charges associated with hypertensive emergencies in United States emergency departments (EDs).

Methods: A retrospective cross-sectional study using the 2012 National Emergency Department Sample, a large nationwide database that includes information on ED utilization by international classification of disease-9 codes, along with ED charges, disposition, age, and sex, was performed. Hypertensive emergencies were defined as those visits carrying a code for malignant hypertension (primary or secondary) in combination with any diagnosis indicating end-organ damage where the patient was either admitted, died, or was transferred to another facility. All visits that culminated in discharge from the ED were excluded. End-organ damage was defined as any of the following: retinal hemorrhage, papilledema with increased intracranial pressure, acute heart failure, myocardial infarction, dissection of a major vessel, subarachnoid hemorrhage, intracerebral hemorrhage, non-traumatic extradural hemorrhage, cerebral thrombosis, transient cerebral ischemia, hypertensive encephalopathy, or ruptured aneurysm of a major vessel. Descriptive statistics were derived for number of visits, sex, age, type of end-organ damage, and total ED charges.

Results: Nationwide, there were an estimated 142,731 visits meeting our criteria for hypertensive emergency, amounting to 0.11% of all ED visits (95% CI 0.10% to 0.12%). The accompanying table depicts the associated diagnoses denoting end-organ damage.

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189 Incidence and Cost of Hypertensive Emergencies in United States Emergency Departments

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Table. Most expensive diagnoses treated in EDs, total ED costs regardless of disposition.

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191 Exploring Perspectives on Home-Based Health Care as an Alternative to Hospital Admission After Emergency Department Treatment

Stuck AR, Brennan J, Crowley C, Kilien J, Martinez T, Wittgrove A, Castillo E/West Health Institute, La Jolla, CA; University of California, San Diego, San Diego, CA

Study Objectives: Faced with emergency department (ED) crowding, patient boarding due to a lack of inpatient beds, an increasing awareness of the benefits of community-based care, and a growing awareness of in-hospital harms, there is an emerging need to provide emergency physicians with alternatives to hospital admission. Little is known regarding the extent to which emergency physicians might recommend home-based delivery of acute medical care to patients directly from the ED. The objective of this study was to explore awareness, willingness and experience for emergency physicians to transition patients directly to home-based health care and to explore what patient inclusion criteria, processes and services would facilitate the use of home-based alternatives to hospitalization following ED treatment.
Methods: This study used a survey and focus group methodology. A 5-question survey was sent electronically to all 52 attending emergency physicians from an academic health system with two hospitals; an urban academic teaching hospital with an annual census of 45,000 and a suburban community hospital with an annual census of 26,000. The survey assessed previous experience referring to home-based care, patient selection, and key perceived motivators and challenges for considering use of home-based care as an alternative to inpatient admission. Following the survey, three focus groups were convened to complement the survey using an interview and discussion format. The focus groups averaged five members, each representing a wider range of health care professionals comprising (1) emergency physicians identified in the survey with experience in ED to home health transitions, (2) ED administrators and (3) ED nurses and social workers. Interviews and discussions were recorded, transcribed and analyzed for thematic content.

Results: Overall, 92% (48) of attending emergency physicians completed the survey. Of these emergency physicians, 38% (18) reported ordering home-based care directly from the ED for a patient in the past year as an alternative to an admission or observation. Ninety percent (43) of emergency physicians ranked cellulitis among their top three medical conditions they would consider for home-based care followed by UTI 79% (38), diabetes 69% (33), and community-acquired pneumonia 48% (23). Ninety percent (43) of emergency physicians ranked “Reduce unnecessary hospitalizations and observation stays,” among their top three perceived motivators and 77% (37) of emergency physicians ranked “No existing process in place to refer to home-based care” among their top three perceived barriers to consider home-based care as an alternative to admission. Thematic content extracted from the focus groups included recognition of a need for alternatives to admission for patients who require some level of post-ED care; recognition of the longer term benefits of providing community-based care; the need for streamlined processes to transition patients to home-based health services; and the need for home-based care that is responsive with quality. Concerns were raised about clinical oversight of a home-based care episode and the need for home-based care that is responsive with quality. With further development, these novel geographic units could be used to incentivize regional coordination to improve the quality of acute care delivered to a geographic community.

192 Variability in Survival From Emergency Care Sensitive Conditions Across Emergency Care Service Regions in Pennsylvania
Karp DN, Baehr A, Delgado MK, Kilaru AS, Wiebe DJ, Carr BG/Perelman School of Medicine, University of Pennsylvania, Philadelphia, PA; Highland Hospital, Oakland, CA; Sidney Kimmel Medical College, Jefferson University, Philadelphia, PA

Study Objective: Despite a national emphasis on innovative solutions to improving population health and health care, no widely known unit for measuring health care outcomes at the population level exists. We demonstrate the use of empirically derived Emergency Care Service Regions (ECSRs) to benchmark regional variation in survival from emergency care sensitive conditions (ECSCs) in Pennsylvania.

Methods: This is a cross-sectional, population-level analysis of in-hospital survival variability across ECSRs for 5 ECSCs [trauma, ischemic stroke, severe sepsis, out-of-hospital cardiac arrest, and ST-elevation myocardial infarction (STEMI)]. We used 2010 all-payer statewide claims data from the Pennsylvania Health Care Cost Containment Council to identify patients with previously validated diagnosis codes consistent with the ECSCs of interest. Patients were assigned to 10 previously defined ECSRs (served by 4-39 hospitals each) based on their home residence. ECSC mortality rates and observed-to-expected mortality ratios were estimated for each ECSR using logistic regressions adjusted for age, sex, transfer status, and comorbid conditions.

Results: ECSR-level mortality varied significantly between ECSRs and by condition (Figure 1). Only one ECSR (#10) demonstrated adjusted mortality rates consistently lower than the median across all three conditions. Only 2/10 ECSRs on the other hand, demonstrated concordance for STEMI and cardiac arrest outcomes. Significant variability in mortality rates across ECSRs was observed for all ECSCs combined and for sepsis, stroke, and trauma. STEMI and cardiac arrest did not demonstrate statistically significant variability between ECSRs (Figure 1).

Conclusions: We have demonstrated that ECSRs reflecting population utilization patterns for emergency care can be used to assess regional variability in outcomes for these conditions, which require timely intervention and a system response. As opposed to a hospital-centric approach, ECSRs represent a geographically defined population, and accordingly can be used to better measure regional emergency care quality. With further development, these novel geographic units could be used to incentivize regional coordination to improve the quality of acute care delivered to a geographic community.

193 Mobile Health Capacity Amongst Emergency Department Inner-City Patients With Risky Alcohol Use and Satisfaction With a Text Message-Based Intervention

Zhang M, Torres J, Ford K, Terp S, Arora S, Menchine M, Burner E/USC Keck School of Medicine, Los Angeles, CA

Study Objectives: Inner-city emergency department (ED) patients have high rates of risky alcohol use, and an ED visit offers an opportunity to intervene when patients are in a critical teachable moment. Screening, brief intervention, and referral to treatment (SBIRT) have been successfully used to reduce alcohol use in ED patients. Most SBIRTs use face-to-face interventions by trained personnel, which limits generalizability given time constraints in the ED. Mobile health (mHealth) may allow SBIRTs to be more broadly implemented by removing the necessity for the SBIRT interaction to be completed in the ED and allowing it occur after discharge. However, we do not know if the target population (inner-city patients with risky alcohol use) has sufficient mobile capacity to receive an SBIRT through mobile phone, nor if they are willing to do so. In this study, we evaluate the feasibility of and patient satisfaction with a 7-day text-based mHealth intervention (Mobilizing to Reduce Overuse of Alcohol in Emergency Department Patients or mROAD) aimed at reducing risky alcohol use in low-income, urban ED patients.

Methods: We surveyed consecutive adult ED patients to determine their level of alcohol use and capability of receiving an mHealth intervention (owned a mobile phone and could receive text messages). Those with text messaging-capable phones who were also at risk for alcohol use disorders (Alcohol Use Disorders Identification Test (AUDIT) scores >8 but <20) were recruited. Trained research assistants informed patients they were at risk for hazardous alcohol use, and invited them to receive a text-message-based intervention (mROAD). Subjects were randomized to either the control group that received a sham text message greeting daily for 1 week ("Welcome to the study. Thank you for participating!") or the intervention group that received mROAD. mROAD is a one-week intervention of twice daily text messages based upon the NIH’s Rethinking Drinking, available in English or Spanish (example message “Up to 4 drinks per occasion & 14 per week is safe for men. For women, it’s 3 per occasion & 7 per week. 70% of adults don’t drink or do it in the safe range”). We contacted patients 30 days after the final text message to assess satisfaction and willingness to recommend the study to a family member or friend.

Results: Of the 1,028 patients screened, 95 (9.2%) exhibited risky alcohol use based on AUDIT and 24% (239/954) did not own a text messaging-capable phone, leaving 76% (711/954) of risky alcohol users eligible. 68% of eligible patients (487/711) agreed to enroll and were randomized to mROAD or control. One patient in the mROAD arm opted out prior to completion. 65% of enrolled patients (31/48) were reached by telephone during follow-up. Within the mROAD group of 18 patients who completed follow-up, 94% stated that text messages were a good way to teach, 89% were motivated by the messages, and 89% would recommend mROAD to friends and family.

Conclusions: Over three quarters of patients with risky behavior seen in the ED owned a text message-capable phone and two thirds of these were willing to participate. Participants had an overwhelmingly favorable impression of mROAD with globally high satisfaction scores. A text message-based SBIRT is a feasible and well-intervention in this pilot sample and if successful has potential to reduce rates of risky alcohol use in ED patients.

194 Cost-Effective Analysis of Emergency Department Utilization for Dental Pain

Brody A, Kumar V/Wayne State University-Detroit, MI, Detroit, MI

Study Objectives: The number of annual visits for dental emergencies to emergency departments (EDs) in this country has increased drastically from 1 million in 2000, to 2.1 million in 2010. Beyond an absolute increase in numbers, these visits have also increased as a proportion of all ED visits, from 1.06% to 1.65%. The total cost to the health care system was between $700 million and $2.1 billion in 2010. Beyond increased cost, ED visits are not effective in treating the problem, as patients are typically given short-term pain relief and antibiotics, but are not provided with definitive management. Outpatient dental practices often refuse to see patients with public insurance, as reimbursement rates are low. Our objective in this study is to explore the feasibility and cost effectiveness of a three-fold increase in dental reimbursement rates.

Methods: A cost-effective analysis, from a societal perspective, of a program which increased dental reimbursement rates to $200. The population are adult Medicaid recipients in the state of Michigan. A decision tree model was utilized, and outcome was reported as incremental cost effective ratio, with dollars as the numerator, and quality-adjusted life-years (QALYs) as the denominator. Data sources for proportions, costs, and outcome measures were taken from published studies, Michigan Medicaid data, and expert opinion. Sensitivity analysis was applied to all variables.

Results: The incremental cost effectiveness analysis of increasing dental reimbursement rates from $45 to $200 was $7,321/QALY. The estimated increase in cost per recipient was $32.86. The estimated total cost of the intervention is between $20,989,660 and $35,269,512. The variables that most impacted the sensitivity analysis were utility of dentist care, utility of no dental care, cost of dentist reimbursement, and ED utilization.

Conclusion: Increasing dental reimbursement rates for Medicaid patients is a cost-effective method to improve dental health. Despite this, it will actually increase costs drastically in the short run, as ED utilization will decrease, but not disappear. In order to actually reduce costs in the short term, policy changes that prohibit ED utilization for conditions amenable to primary dental care must be considered.

195 Increasing Non-Targeted HIV Testing in the Emergency Department: Which Method Is Most Effective?

Arora S, Jacobson K, Schulman I, Lam CN, Menchine M/USC Keck School of Medicine, Los Angeles, CA

Study Objectives: Due to safety net status and high prevalence of disease, the emergency department (ED) is a novel and necessary location to screen and diagnose new cases of HIV. In response to the CDC recommendation for non-targeted HIV testing of patients in all health care settings regardless of risk category the Los Angeles County + University of Southern California (LAC-USC) Department of Emergency Medicine has had non-targeted HIV screening program since 2011. This program has evolved from a point-of-care, parallel process, dedicated tester model to an integrated model using 4th generation laboratory assays with rapid turnaround. During this transition, several intermediate changes to the testing model were applied with the goal of increasing the number of individuals tested. The aim of this investigation is to
describe the effect of these protocol changes on non-targeted HIV tests performed in a large, safety net ED.

Methods: This is a retrospective review of testing counts in response to significant protocol changes in the LAC+USC ED HIV screening program. The first significant change occurred in September 2011 when a second tester was added to the initial parallel process, dedicated tester model. The second major change occurred in July of 2013 when laboratory-based testing began using the Abbott Architect in addition to two point-of-care testers. In November 2013, a second, faster point-of-care testing platform was deployed (Insti, Biologically Laboratories) to test patients who were not having blood sent to the laboratory. Finally, in April 2014 a "pop-up" reminder appeared on the EMR when physicians ordered initial laboratory tests reminding them of the CDC recommendations and to add on an HIV test as appropriate.

Results: There was very little change in total number of testing over the first several years of the program despite the addition of a second dedicated point-of-care tester, and a faster point-of-care testing platform. Interestingly, in isolation, implementing a laboratory-based testing platform that did not require a dedicated tester to also had little change on the amount of tests performed. By far the largest change was seen after the automated pop-up reminder. See the Table for details. Testing more than doubled in the 4 months after the pop-up when compared with the 4 months before the pop-up (n=5456 pre vs n=11310 post). The number of new diagnoses increased by 36% (from 33 in the 4-month pre pop-up period to 45 in the 4-month post pop-up period). When compared to the 4-month pre pop-up period, and the number of acute HIV infections (the highly infectious period of HIV infection that contributes disproportionately to HIV transmission lasting 3-4 weeks and is the time during which the concentration of HIV is highest in the blood and genital tract is highest) increased from 3 to 5.

Conclusion: The most impactful change to the number of individuals tested was the addition of a pop-up reminder in our EMR. Hospitals should be mindful of this when designing their HIV testing programs and invest the time up-front with IT to develop similar solutions.

determined the prevalence of S. aureus infection among adults hospitalized with CAP, and compared clinical features of S. aureus CAP to pneumococcal CAP and viral CAP.

Methods: This was a prospective cohort study nested within the CDC Etiology of Pneumonia in the Community (EPIC) Study. Adults hospitalized with clinical and radiographic evidence of CAP were enrolled at 5 hospitals in Nashville, TN and Chicago, IL from January 1, 2010 to June 30, 2012. Patients with severe immunosuppression or recent hospitalization were excluded. Diagnostic testing included: cultures of blood, high-quality (≥10 epi cells/lpf and ≥25 WBC/lpf) sputum and endotracheal aspirates, bronchoalveolar lavage, and pleural fluid; Binax pneumococcal and Legionella urinary antigen tests; PCR of naso-oropharyngeal (NP/OP) swabs for viruses and atypical bacteria; and acute/convalescent serology for respiratory viruses. S. aureus CAP was defined as any positive blood or respiratory culture for S. aureus, with or without concurrent detection of other pathogens. Pneumococcal CAP was defined by detection of Streptococcus pneumoniae by culture or urinary antigen test with or without other pathogens. Viral CAP was defined by detection of a respiratory virus by NP/OP PCR or ≥ 4-fold rise in antibody titer between acute and convalescent sera, with no concurrent detection of bacteria. Presenting clinical characteristics and outcomes were compared between the S. aureus CAP group and the other two groups using two-group hypothesis testing (Fisher’s exact test; Wilcoxon rank sum test).

Results: Among 3634 eligible patients, 2259 (62.2%) were enrolled and underwent bacterial and viral testing. Thirty-seven (1.6%) enrolled patients had S. aureus CAP, including 15 with methicillin-resistant S. aureus (MRSA), 21 with methicillin-susceptible S. aureus (MSSA), and 1 with S. aureus of undetermined susceptibility. Compared with 115 patients with pneumococcal CAP and 530 with viral CAP, S. aureus CAP patients were more likely to have received hemodialysis, but other presenting characteristics were similar (Table). Median age for the S. aureus, pneumococcal, and viral CAP patients was 60, 59, and 56 years, respectively. S. aureus CAP patients had more severe outcomes than the other groups (Table).

Conclusion: S. aureus CAP was uncommon but associated with worse outcomes compared to other types of CAP. Presenting clinical features of S. aureus CAP overlapped with those of other etiologies, making it difficult for clinicians to reliably identify S. aureus and to decide when to treat with anti-staphylococcal antibiotics. With a combination of low prevalence and severe outcomes for S. aureus CAP, development of rapid diagnostic tests to accurately identify S. aureus would be useful to guide optimal antibiotic selection.

196 Prevalence, Clinical Characteristics, and Outcomes of Adults Hospitalized With Staphylococcus Aureus Community-Acquired Pneumonia

Casimir G, Grijalva CG, Wunderink RG, Williams DJ, Anderson EJ, Cournty DM, Bramley A, Jain S, Edwards KM, Self WH, Etiology of Pneumonia in the Community (EPIC) Study Investigators/Vanderbilt University, Nashville, TN; Northwestern University Feinberg School of Medicine, Chicago, IL; Emory University, Atlanta, GA; Centers for Disease Control and Prevention, Atlanta, GA

Study Objectives: Many patients with community-acquired pneumonia (CAP) are empirically treated with vancomycin due to concerns about potential Staphylococcus aureus infection. Understanding the prevalence and clinical features of S. aureus CAP could help optimize the use of anti-staphylococcal antibiotics. We determined the prevalence of S. aureus infection among adults hospitalized with CAP, and compared clinical features of S. aureus CAP to pneumococcal CAP and viral CAP.

Methods: This was a prospective cohort study nested within the CDC Etiology of Pneumonia in the Community (EPIC) Study. Adults hospitalized with clinical and radiographic evidence of CAP were enrolled at 5 hospitals in Nashville, TN and Chicago, IL from January 1, 2010 to June 30, 2012. Patients with severe immunosuppression or recent hospitalization were excluded. Diagnostic testing included: cultures of blood, high-quality (≥10 epi cells/lpf and ≥25 WBC/lpf) sputum and endotracheal aspirates, bronchoalveolar lavage, and pleural fluid; Binax pneumococcal and Legionella urinary antigen tests; PCR of naso-oropharyngeal (NP/OP) swabs for viruses and atypical bacteria; and acute/convalescent serology for respiratory viruses. S. aureus CAP was defined as any positive blood or respiratory culture for S. aureus, with or without concurrent detection of other pathogens. Pneumococcal CAP was defined by detection of Streptococcus pneumoniae by culture or urinary antigen test with or without other pathogens. Viral CAP was defined by detection of a respiratory virus by NP/OP PCR or ≥ 4-fold rise in antibody titer between acute and convalescent sera, with no concurrent detection of bacteria. Presenting clinical characteristics and outcomes were compared between the S. aureus CAP group and the other two groups using two-group hypothesis testing (Fisher’s exact test; Wilcoxon rank sum test).

Results: Among 3634 eligible patients, 2259 (62.2%) were enrolled and underwent bacterial and viral testing. Thirty-seven (1.6%) enrolled patients had S. aureus CAP, including 15 with methicillin-resistant S. aureus (MRSA), 21 with methicillin-susceptible S. aureus (MSSA), and 1 with S. aureus of undetermined susceptibility. Compared with 115 patients with pneumococcal CAP and 530 with viral CAP, S. aureus CAP patients were more likely to have received hemodialysis, but other presenting characteristics were similar (Table). Median age for the S. aureus, pneumococcal, and viral CAP patients was 60, 59, and 56 years, respectively. S. aureus CAP patients had more severe outcomes than the other groups (Table).

Conclusion: S. aureus CAP was uncommon but associated with worse outcomes compared to other types of CAP. Presenting clinical features of S. aureus CAP overlapped with those of other etiologies, making it difficult for clinicians to reliably identify S. aureus and to decide when to treat with anti-staphylococcal antibiotics. With a combination of low prevalence and severe outcomes for S. aureus CAP, development of rapid diagnostic tests to accurately identify S. aureus would be useful to guide optimal antibiotic selection.

197 An Analysis of Factors Associated With Ciprofloxacin-Resistant Escherichia coli Caused Urinary Tract Infections in Patients Discharged From the Emergency Department

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Table. Clinical characteristics and outcomes of CAP by etiology

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>S. aureus CAP (n = 37)</th>
<th>Pneumococcal CAP (n = 115)</th>
<th>P value (S. aureus vs pneumococcal)</th>
<th>Viral CAP Without Bacteria (n = 530)</th>
<th>P value (S. aureus vs viral)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pneumonia Severity Index, median (IQR)</td>
<td>76 (118)</td>
<td>61 (110)</td>
<td>0.09</td>
<td>48 (96)</td>
<td>&lt; .01</td>
</tr>
<tr>
<td>End-stage renal disease with hemodialysis, n (%)</td>
<td>13 (5.5)</td>
<td>2.64</td>
<td>0.01</td>
<td>3 (6.1)</td>
<td>&lt; .01</td>
</tr>
<tr>
<td>Recurrent soft tissue infections (&gt; 1 infection in past 5 years)</td>
<td>13 (5.5)</td>
<td>11.32</td>
<td>0.72</td>
<td>6 (6.8)</td>
<td>.01</td>
</tr>
<tr>
<td>Hemoptysis, n (%)</td>
<td>13 (5.5)</td>
<td>39 (18.9)</td>
<td>0.87</td>
<td>19 (25)</td>
<td>.01</td>
</tr>
<tr>
<td>Multilobar infiltrates on chest x-ray, n (%)</td>
<td>23 (5.6)</td>
<td>40 (34.7)</td>
<td>&lt; .01</td>
<td>19 (25)</td>
<td>.01</td>
</tr>
<tr>
<td>Intensive care unit admission, n (%)</td>
<td>4 (1.1)</td>
<td>5 (4.4)</td>
<td>0.15</td>
<td>4 (8.0)</td>
<td>&lt; .01</td>
</tr>
<tr>
<td>Median hospital length of stay, days (IQR)</td>
<td>4 (1.1)</td>
<td>5 (4.4)</td>
<td>0.15</td>
<td>4 (8.0)</td>
<td>&lt; .01</td>
</tr>
</tbody>
</table>
Study Objectives: Urinary tract infections (UTIs) are one of the most common bacterial infections and account for approximately 2.3 million emergency department (ED) visits per year. *Escherichia coli* (*E. coli*) is the main causative pathogen for UTIs, accounting for 75% to 95% of all cases. Ciprofloxacin is a commonly prescribed antibiotic for this condition, and, as a result, resistance has risen to ciprofloxacin in *E. coli* isolates. Our objective was to identify factors associated with *E. coli* resistance to ciprofloxacin among discharged ED patient visits for a urinary tract infection with this antimicrobial agent. We hypothesized that specific historical factors readily available upon ED presentation would be associated with increased odds of ciprofloxacin resistance in the studied patient population.

Methods: We conducted a retrospective, observational cohort study of consecutive discharged adult ED patient visits with a primary diagnosis of urinary tract infection caused by *E. coli* to a single center (census: 50,000 visits/year) 2011-2014 (chronologically first 100 Ciprofloxacin-resistant and 100 Ciprofloxacin-susceptible UTI visits included). We identified visits through the use of a microbiology lab report of positive *E. coli* urine cultures and included if they had a final primary discharge diagnosis from the ED of UTI, cystitis, or pyelonephritis. Two investigators separately abstracted to a pre-constructed data collection form the following independent variables on each included visit: patient age dichotomized as at or above 65 or not, sex, residence in a nursing home or other institutionalized care setting, active immunosuppressive condition or medication at time of visit, chronic indwelling Foley catheter, hospitalization within 90 days prior to presentation, antibiotic use within 90 days prior to presentation and recurrent UTI/cystitis/pyelonephritis. A third investigator adjudicated conflict between the two investigators in abstracting these independent variables. We utilized multivariable logistic regression after taking into account co-linearity to identify those independent variables associated with increased odds of ciprofloxacin resistance in included study visits and report descriptive characteristics of the study cohort, odds ratios with 95% CI and model strength.

Results: The table shows the descriptive statistics of the cohort and the results of the multivariable logistic regression model after adjusting for co-linearity. Age ≥65, recurrent UTI and recent hospitalization were significantly associated with Ciprofloxacin-resistant *E. coli* in ED UTI visits.

Conclusion: In this single center study, age ≥65, recurrent urinary tract infection and recent hospitalization were most clearly associated with increased odds of ciprofloxacin-resistant urinary tract infections in discharged adult ED patient visits. If validated, these factors should suggest that alternative antimicrobial agents should be considered in the treatment of this condition among discharged adult ED patients.

### Urinalysis Findings Associated With a Low Risk of Urinary Tract Infection in Adult Emergency Department Patients: An External Validation Study

Hertz JT, Lescalette RD, Barrett TW, Ward MJ, Self WH/Vanderbilt University, Nashville, TN

Study Objectives: Excess urine culture testing in the emergency department (ED) results in unnecessary costs and consumes limited human and laboratory resources. To reduce the number of unnecessary urine cultures, Jones et al (2014) developed a protocol that reflexively cancelled urine cultures on samples with low-risk findings for infection on urinalysis. Our objective was to externally validate this protocol for identifying urine samples with a low risk of infection.

Methods: We conducted a cross sectional study of all adult (≥ 18 years old) ED patients at a single, academic medical center in the United States who had both a urinalysis and urine culture obtained within 4 hours of one another for clinical care between January 1, 2013 and December 31, 2013. Based on the Jones et al protocol, a urine sample was defined as low-risk for infection by urinalysis if it had all of the following features: negative for nitrites, leukocyte esterase, and bacteria, and ≤ 10 WBC/high powered field (hpf). The study outcome was a positive urine culture, defined as >10,000 colony-forming units (CFUs) of a typical urinary pathogen or >50,000 CFUs of an atypical pathogen. We evaluated the diagnostic test characteristics of this low-risk urinalysis definition compared to urine culture as a gold standard.

<table>
<thead>
<tr>
<th>Population</th>
<th>n</th>
<th>Positive urine cultures, n (%)</th>
<th>Low risk urinalysis, n (%)</th>
<th>Sensitivity, % (95% CI)</th>
<th>Specificity, % (95% CI)</th>
<th>Positive predictive value, % (95% CI)</th>
<th>Negative predictive value, % (95% CI)</th>
<th>False omission rate, % (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>All Adults ≥ 18</td>
<td>4859</td>
<td>1140 (23.5)</td>
<td>1677 (34.5)</td>
<td>93.2 (91.5, 94.6)</td>
<td>43.0 (41.4, 44.6)</td>
<td>33.4 (31.7, 35.0)</td>
<td>95.3 (94.2, 96.3)</td>
<td>4.7 (3.6, 5.7)</td>
</tr>
<tr>
<td>Female Adults</td>
<td>3115</td>
<td>813 (26.1)</td>
<td>853 (27.4)</td>
<td>92.7 (90.7, 94.4)</td>
<td>34.4 (32.5, 36.5)</td>
<td>33.3 (31.4, 35.3)</td>
<td>93.1 (91.2, 94.7)</td>
<td>6.9 (5.3, 8.8)</td>
</tr>
<tr>
<td>Male Adults</td>
<td>1744</td>
<td>327 (18.8)</td>
<td>824 (47.2)</td>
<td>94.2 (91.1, 96.5)</td>
<td>56.8 (54.2, 59.4)</td>
<td>33.5 (30.4, 36.6)</td>
<td>97.7 (96.4, 98.6)</td>
<td>2.3 (1.4, 3.6)</td>
</tr>
</tbody>
</table>
standard, both in the full population and after stratification by sex. Negative predictive value (NPV) was the proportion of patients with a low-risk urinalysis who had a negative culture. The false omission rate (FOR), calculated as 1-NPV, was the proportion of patients with a low-risk urinalysis who had a positive culture. Positive predictive value (PPV) was the proportion of patients with a high-risk urinalysis who had a positive culture.

Results: Among 4,859 patients included in the study, 1,140 (23.5%) had a positive urine culture. Among positive cultures, the most common pathogens were Escherichia coli (48.3%), Klebsiella pneumoniae (12.6%), and Enterococcus faecalis (9.0%). A total of 1,677 (34.5%) patients had a low-risk urinalysis. Diagnostic test characteristics of the low-risk urinalysis definition compared to culture results are summarized in the Table. If urine samples with a low risk urinalysis had not undergone culturing, there would have been a 34.5% absolute reduction in urine cultures performed with a FOR of 4.7% (95% CI 3.6%, 5.7%) in the full population. After stratification by sex, the FOR was significantly higher in women (6.9%, 95% CI: 5.3%, 8.8%) compared to men (2.3%, 95% CI: 1.4%, 3.6%) (P < .01).

Conclusion: A reflex cancellation protocol in which urine cultures are not performed on samples with low-risk urinalysis features (negative nitrites, negative leukocyte esterase, negative bacteria, and ≤ 10 urinary WBCs/hpf) would have led to a substantial reduction in urine cultures performed while maintaining a low rate of missed positive cultures, particularly in men. Given the higher FOR in women, more accurate tools to identify urine samples at low risk for infection in women are still needed.

199 Urinary Squamous Epithelial Cells Do Not Accurately Predict Urine Culture Contamination

Mohr NM, Harland KK, Crabb V, Baumgartner D, Mutnick R, Spinosi S, Haarstad M, Ahmed A, Schweizer M, Faine B/University of Iowa Carver College of Medicine, Iowa City, IA; University of Iowa College of Public Health, Iowa City, IA; University of Iowa Hospitals and Clinics, Iowa City, IA

Study Objectives: Urinary tract infection (UTI) is a common diagnosis in the emergency department (ED), accounting for 1 million ED visits and 7 million non-ED outpatient visits annually in the US. The diagnosis of UTI in most patients hinges on a combination of symptoms and urinalysis results, but up to 35% of urinalysis specimens are contaminated by external flora during specimen collection. Traditionally, the presence of squamous epithelial cells (SECs) has been used as a marker of urinary contamination, but this practice has not been supported by clinical evidence. The objective of this study was to determine the value of predicting urine contamination by using the quantitative measurement of SECs in a urine sample.

Methods: Retrospective cross-sectional analysis of all adults (age ≥ 18 years) presenting to a 711-bed academic medical center between January 1, 2009 and December 31, 2013 and having both urinalysis with microscopy and urine culture performed. The primary analysis was to determine a threshold count where SECs would best predict a result of contamination in the urine culture. Secondary analysis was defined a priori to identify clinical demographic predictors that would modify this relationship, and to assess whether SECs modify the relationship between traditional urinalysis indicators of infection (pyuria, nitrites) and bacteriuria. The data were divided randomly prior to analysis into a derivation and a validation set so that the threshold value selected could be validated in an independent data set.

Results: A total of 19,367 complete records were included in the analysis. Of those, 36% of cultures revealed culture contamination, and 24% indicated bacteriuria suggestive of infection by culture criteria. Receiver operating curve (ROC) analysis showed that squamous epithelial cell count was a poor predictor of urine culture contamination (AUC = 0.677, 95% CI 0.668-0.686). Neither age nor obesity modified this effect. SECs were more predictive of contamination in females than in males (AUC 0.609 vs 0.578, P = 0.0084). The utility of SECs in modifying the relationship between urinalysis results and bacteriuria was assessed among non-contaminated specimens. The positive likelihood ratio (LR+) of predicting bacteriuria by urinalysis results degraded significantly at higher levels of SECs. The LR+ in the absence of SECs was 6.08 (95% CI 5.48-6.74), and with more than 8 SECs/hpf, the LR+ fell to 2.35 (95% CI 2.17-2.54). This SEC count was selected as the threshold value where the LR+ for samples with few SECs exceeded the 95% CI of the sample with no SECs. In the independent validation data set, urinalysis among samples with fewer than 8 SECs predicted bacteriuria well (sensitivity 82%, specificity 85%), while samples with more SECs performed much more poorly (sensitivity 85%, specificity 65%) [diagnostic OR 26.0 (21.4-31.7) vs 10.4 (8.5-12.6)].

Conclusion: Squamous epithelial cells predict urine culture contamination very poorly, and demographic factors do not improve the prediction model. Among non-contaminated specimens, however, SECs are an effect modifier, such that urinalysis predicting urinary infection does not perform well in specimens with more than 8 SECs/hpf. Clinicians should consider repeating urinalysis in specimens suggestive of UTI with higher counts of SECs, if urinalysis is being used to guide antimicrobial treatment.

200 Is There an Association Between Trichomoniasis and Other Sexually Transmitted Infections in Adolescent versus Adult Emergency Department Patients?

Elschens K, Retterath L, Tavares E, Bush C, Zhan J, Jones JS/Michigan State University, Grand Rapids; Grand Rapids Medical Education Partners, Grand Rapids, MI

Study Objective: Trichomonas vaginalis (TV) is a common sexually transmitted infection (STI) causing vaginitis. Few published studies have assessed TV prevalence in the adolescent emergency department (ED) population or its association with an increased risk of coinfection with other STIs, like chlamydia, gonorrhea, herpes simplex virus, and syphilis. The goals of this study were: (1) to compare the prevalence of TV in the adolescent versus adult female population; (2) to determine if findings on wet mount microscopy were associated with four other sexually transmitted infections; and (3) validate national guidelines for the empiric treatment of cervicitis in the presence of Trichomonas infection.

Methods: This was a retrospective, cohort analysis of consecutive females seen at seven EDs in West Michigan from August 2010 to July 2013. Affiliated institutions included three rural medical centers, three university-affiliated hospitals and a children’s tertiary care facility. All patients underwent a pelvic exam with endocervical specimens submitted for wet mount microscopy for TV, and polymerase chain reaction (PCR) assays for chlamydia and gonorrhea. Enzyme immunoassays were used for the detection of syphilis and herpes simplex virus. Demographics, clinical findings, and laboratory test results were obtained from ED records using standardized abstraction forms. Inter-rater reliability was determined using kappa statistics. The primary outcome measure was a positive likelihood ratio of patients with positive TV that are co-infected with four other sexually transmitted infections. Adult and adolescent (ages 13-19) groups were compared using 2-tailed unpaired t-tests and Wilcoxon rank sum tests for continuous and ordinal data, while nominal data was analyzed by chi-square tests.

Results: During the 36-month study period, 8,413 consecutive females were evaluated for STIs; 1,432 were adolescents (17.0%). A total of 275 adolescents had at least one documented STI (19.2%; 95% CI = 17.1 to 21.2%); 101 patients tested positive for TV (7.1%, 95% CI = 5.8 to 8.4%). In the adult population, 1,537 had at least one documented STI (22.0%; 95% CI = 21.0 to 23.0%) and 569 patients tested positive for TV (8.1%, 95% CI = 7.5 to 8.7%). TV was the most common STI in adult women, while chlamydia was the most prevalent in the adolescent age group (8.7%). Coinfection rates were significantly lower in the adolescent age group (9.8% vs. 16.1%, P < .001). Statistical analysis revealed a weakly positive association with other STIs in adults with Trichomonas vaginalis (+ LR = 1.75, 95% CI = 1.4 to 2.1), but not in adolescent patients (+ LR = 0.79, 95% CI = 0.5 to 1.3). National guidelines for the empiric treatment of cervicitis in the presence of Trichomonas infection would result in the over-treatment of 6% of adolescents and adults with GU symptoms.

Conclusions: In our ED study population, TV was the most common STI in adult women and was associated with a slightly increased risk of coinfection with other STIs. In the adolescent age group, chlamydia was the most prevalent STI. There was no association between the presence of TV and coinfection with other STIs in young patients.
201 Community-Based Study of Untreated Cervical Infections in Adolescent and Adult Females Presenting to the Emergency Department
Reiterath L, Eschenh K, Bush C, Tavares E, Jones JS/Michigan State University, Grand Rapids; Spectrum Health Department of Emergency Medicine; Grand Rapids Medical Education Partners, Grand Rapids, MI

Study Objective: Untreated infection with Neisseria gonorrhoeae (GC) and Chlamydia trachomatis (CT) can result in chronic pelvic pain, infertility, and ectopic pregnancy. The prevalence and empiric treatment of these sexually transmitted infections (STI) within the population are poorly understood. The objectives of this study were to determine the frequency of under recognized GC and CT cervical infections in adolescent and adult women examined in the emergency department (ED); and to quantify the treatment interval until effective treatment was provided. We hypothesized that if ED clinicians strictly complied with Centers for Disease Control and Prevention (CDC) recommendations for empiric treatment of cervicitis there would be fewer women discharged with untreated infections, and fewer women lost to follow-up.

Methods: This was a retrospective, cohort analysis of consecutive females seen at three EDs from 2009-2014 (60 months). All patients presented to the ED with lower abdominal pain or genitourinary symptoms and underwent a pelvic exam with endocervical specimens submitted for wet mount microscopy for TV, and polymerase chain reaction (PCR) assays. Demographics, clinical findings, and laboratory test results were obtained from ED records using standardized abstraction form. A blinded critical review of a random sample of 10% of the charts was done to determine rater reliability. The primary outcome measure was the proportion of females with STI who were untreated in the ED.

Associations between variables and the presence or absence of GC/CT were assessed using chi-square test for categorical data and by t-test for continuous variables.

Results: A total of 14,294 consecutive females were evaluated for STIs during the 5-year study period. Overall, 2725 (19%) were adolescents, ages 13-19, and 11,569 (81%) were adults. Four hundred thirty-three adolescents (18%) had at least one documented STI; 283 patients (10%) had GC and/or CT cervicitis. In comparison, 1987 adults had at least one documented STI (21%); 1259 patients (11%) had GC and/or CT cervicitis. Among those patients with cervicitis, 56.8% of adults and 51.9% of adolescents were not treated in the ED (P = .14). Factors such as age, ethnic background, insurance status, ED provider status, previous STI, or known STI exposure were not associated with antibiotic treatment in the ED. However, untreated patients were significantly more likely to have a discharge diagnosis of urinary tract infection (31% vs 11%), new pregnancy (29% vs 9%), and vaginitis (33% vs 7%). Only 8% (68/862) of the untreated patients fit the CDC guidelines for empiric treatment of PID. On discharge from the ED, 36% of adolescents and 13% of adults with STIs were given STI discharge instructions. After phone follow-up, treatment could not be documented for 40% of the occurrences, in all cases due to an inability to locate the patient. An additional 19% of the women did not receive treatment for 14-60 days. The consistency of the data recording was excellent, with a median kappa statistic of 0.89.

Conclusions: Women with sexually transmitted infections are frequently untreated in the ED, despite physician compliance with CDC recommendations for liberal antibiotic treatment. Improved point of contact detection is needed in these patients, especially those presenting with urinary or pregnancy-related complaints.

202 The Utility of the Emergency Department Observation Unit for Community-Acquired Pneumonia
Lin Z, Soh C, Kuang WS/National University Health Systems, Singapore

Study Objectives: The emergency department observation unit (EDOU) is protocol-driven and a cost-effective alternative to inpatient management of patients with non-severe community-acquired pneumonia (CAP). Under-utilization of the EDOU for management of CAP may incur unnecessary admissions, increase cost for the patient and exacerbate access block. While there are established severity scoring systems such as CURB-65, data on admission criteria and factors; both clinical and social, affecting disposition to the EDOU, has not been studied extensively. We aim to determine factors associated with successful discharge of patients admitted to the EDOU for CAP.

Methods: This retrospective observational study included patients who presented to the National University Hospital emergency department (ED) with a diagnosis of CAP from August 1, 2013 to April 30, 2014. The primary outcome was length of stay ≤ 2 days, indicating admission to the EDOU may have been more appropriate. Patients with severe CAP, hospital-acquired pneumonia, terminal illness or who had other medical issues that necessitated admission were excluded. Univariate analyses were performed using Fisher’s exact, Mann-Whitney U and Student’s t-tests where appropriate. A stepwise logistic regression model was created for variables with P < .10 derived from the univariate analyses.

Results: A total of 275 patients with non-severe CAP were included of whom 122 (44%) were admitted for ≤2 days. Only 22 (8%) were admitted to the EDOU. The median age was 64 years (IQR 48 years to 78 years) and 57% were female. Univariate analyses found the following to be significantly associated with length of stay ≥ 2 days: age ≥ 65 years (OR 1.68; 95% CI 1.01-2.80), history of malignancy (OR 4.44; 95% CI 1.42-18.27), hemoptysis (OR 5.72; 95% CI 1.31-12.99), pleural effusion on chest X-ray (OR 2.64; 95% CI 1.31-5.55) and CURB-65 score ≥ 2 (OR 1.98; 95% CI 1.18-3.50). A multivariate stepwise logistic regression analysis included other predictor variables of chronic renal disease, alcohol use and presence of multilobe infiltrates on chest X-ray. It showed that history of malignancy (OR 4.2; 95% CI 1.37-13.11), hemoptysis (OR 3.80; 95% CI 1.55-10.72), pleural effusion on chest X-ray (OR 2.83; 95% CI 1.42-5.62) and age ≥ 65 years (1.72; 95% CI 1.04-2.84) remain significantly associated with higher likelihood of being admitted for more than 2 days. Based on these results, an additional 100 patients could have benefited from admission to the EDOU during the study period.

Conclusion: Through careful selection of patients, the EDOU can be an invaluable facility to the ED to maximize resources for managing CAP. History of malignancy, presence of hemoptysis and radiological features of pleural effusion should be considered exclusion criteria for admission due to lower rate of successful discharge from the EDOU.

203 Initiating Workups in the Waiting Room Decreases Emergency Department Bed Time and Left Before Completion of Service Rate
Beaga T, Salem R, Agarwal N, Duan L, Taira B/Olive View-UCLA, Sylmar, CA; UCL, Los Angeles, CA

Study Objectives: Emergency department (ED) crowding and long wait times are challenging issues. There is little evidence as to the impact of clinician rapid screening exams on ED throughput, and, in particular, the effect of ordering tests on patients still in the waiting room is unknown. This study aims to determine the effect of initiating laboratory and imaging studies from the waiting room on patient total time in the ED, time in an ED bed, and the likelihood of leaving before their evaluation is complete, i.e., before completion of service (LBCS).

Methods: Prospective, randomized controlled trial evaluating 700 non-pregnant adults with a chief complaint of abdominal pain conducted in a public hospital with an annual census of 55,000. This is a preliminary report on a larger ongoing study. After a standard brief screening exam by a physician or trained ED nurse practitioner, patients who were stable to remain in the waiting room were randomized to either “no testing” or “testing” groups. Patients in the “no testing” group returned to the waiting room to await definitive evaluation in the ED. Patients in the “testing” group had laboratory and imaging studies ordered if warranted. The primary outcome was time from arrival to disposition. Secondary outcomes were time in an ED bed and rate of LBCS. T tests and Chi Squares were used to compare outcomes where appropriate.

Results: Between August 2014 and November 2015, 700 patients were enrolled and 586 completed the study. There were 301 patients in the “no testing” and 285 in the “testing” group. There were no differences in baseline demographics. Mean time in the ED was 8.7 hours (SD: 3.5) for the “no testing” group and 8.4 hours (SD: 3.9) for the “testing” group (P = .149). Mean time spent in an ED bed was 4.7 hours (SD: 2.25) for the “no testing” group, compared to 4.4 hours (SD: 2.58) for the “testing” group (P = .011). Of the 700 patients enrolled, 82 patients LBCS. Among these patients, 52/560 or 14% of patients in the “no testing” group LBCS compared to 30/325 or 9% of those in the “testing” group (P = .047).

Conclusion: There was no statistically significant difference in total ED time between the groups. Waiting room order entry did reduce time spent in an ED bed and LBCS rates. Because ED bed real estate is a valuable commodity, initiating workups from the waiting room may increase efficiency and decrease the number of patients who leave before completion of their evaluation.
MedLibs: A Mobile Application for Facilitating Emergency Department Consultation Requests
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Study Objectives: Accurate and pertinent communication plays a critical role in improving provider efficiency and may ultimately affect the quality and safety of patient care. Up to half of all emergency department (ED) patients require direct consultation between the emergency medicine (EM) provider and a consultant. Despite this prevalence, medical students receive little instruction in consultation communication before transitioning to residents. Furthermore, less than one-fifth of emergency physicians utilize standardized tools while transitioning patient care. The objective of this study was to design and evaluate an electronic consultation application named MedLibs (Medical Library of basic consultation schemes) to improve physician-physician communication during the consultation process. The “app” provides an efficient framework of dynamic templates, which create a script for referring users.

Methods: Residents spending one month in the emergency department were randomized to a “cross-over” study. Participants are surveyed following enrollment in the study. The survey evaluates: conciseness, pertinence of information presented, flow, effectiveness of communication skills, and overall quality of physician-to-physician consultations. These parameters were graded utilizing a 5-point scale. Participants utilize the “app” via an iPad prior to contacting their consultants. Halfway through their one-month rotation, residents completed an identical follow-up survey and subsequently switched study arms for the final half of their rotation. At the end of their rotation, residents completed a final survey.

Results: Eight residents completed the study. Utilization of the “app” improved the quality of communication from an average of 2 to 2.75 (P = .02). Flow of communication improved from 1.63 to 2.75 (P = .005). Similar improvements were demonstrated in conciseness (2.5 to 2.88, P = .16), pertinent information (2.63 to 3, P = .08), and effective communication (2.5 to 2.75, P = .23). The study remains ongoing with further data collection anticipated.

Conclusions: The early results of this study demonstrated the ability of a mobile application to improve a resident’s interpretation of the quality and flow of their physician-to-physician communications.

Rapid Assessment and Treatment of Category 2 Patients in the Emergency Department
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Study Objectives: According to the National Health Services (NHS) in the United Kingdom (UK) Rapid Assessment and Treatment (RAT) is defined as the “early assessment of ‘majors’ patients in Emergency Department (ED), by a team led by a senior doctor, with the initiation of investigations and/or treatment.” Merely a handful of studies have been conducted on the implementation of RAT in the ED, in fact to our knowledge this is the first study to be conducted in the Middle East region. Our study aims to assess the effect of implementation of RAT in shortening the door to doctor time for triage category 2 (Canadian Triage Acuity Scale [CTAS]) patients (RAT-2) presenting to our tertiary care ED by improving communication between the triage nurse and emergency physician.

Methods: This is a retrospective, pre and post RAT-2 intervention study of periods in our ED. Data was collected using the Enterprise Reporting System and consisted of patient demographics, door-to-doctor time for CTAS category 1-5, length of stay for discharged patients, and sentinel events during the study period.

Results: Total number of patients were 28,933 from which 2034 were CTAS category 2 and 1031 were post-RAT intervention. Using the TTEST procedure our results showed pre-RAT mean door-to-doctor time of 78 minutes (median: 45) and post-RAT time of 53 minutes (median: 33). This was statistically significant (P < .001). There was no difference in patient demographics or the door-to-doctor time for other category patients. There were no sentinel events reported on patients with RAT-2 intervention. See table and figure.

Conclusion: Direct nurse-physician communication with early physician assessment and treatment of category 2 patients reduces patient door-to-doctor time without delaying care of other patients or causing any sentinel events.

Quarterly Reporting of Computed Tomography Ordering History Reduces the Use of Imaging in an Emergency Department
Ehrlichman RS, Dezman ZDW, Klein J, Jeudy J, Lemkin D/University of Maryland, Baltimore, MD

Study Objective: Computed tomography (CT) is a necessary part of the evaluation of many emergency department (ED) patients, and the number of CT scans performed annually in the United States has been increasing. The accompanying risks of radiation exposure and increasing cost have sparked national efforts to reduce CT ordering in the ED. The purpose of this study is to analyze CT ordering habits before and after implementation of a feedback tool at a high-volume community ED. We hypothesize that our feedback intervention will decrease CT use in ED patients.

Methods: Retrospective pre-/post-intervention study of ED visits between October 2013 and January 2015. The primary endpoint was the proportion of patients...
receiving CT scans. This study used only ED visits and CT orders that were linked in the electronic medical record to the patient who underwent imaging and the care provider responsible for that patient. Data regarding baseline CT ordering habits between October and December 2013 were collected. Starting on January 1, 2014, personalized feedback reports were generated using data pulled from our electronic medical record and distributed to care providers on a quarterly basis. Reports showed how many CT scans (overall and by anatomic region [head, chest, or abdomen/pelvis]) a care provider ordered as well as the number ordered by the entire practice over the same period. The proportion of ED patients undergoing CT imaging was compared before and after the intervention at an a priori alpha of 0.05. Subgroup analyses included breakdown by body region, the scan-ordering histories of midlevel personnel and physicians, years since graduation from residency, and years of board certification.

Results: Of the 26,386 patients seen in the baseline period, 21.0% underwent CT imaging. After the intervention, 18.9% of 78,068 ED patients underwent CT imaging (−10.0% relative change [P < .0001] [Figure]). The relative percentages of CTs avoided by anatomic region in 2014 were 11.3% head, 9.3% chest, and 9.5% abdomen/pelvis. Compared with the baseline period, projected reductions in the number of scans for 2014 were 780 head, 259 chest, and 644 abdomen/pelvis. The decrease in CT ordering habits between physicians (n = 29, median relative change =−9.2%) and midlevel care providers (n = 29, median relative change =−12.9%) did not reach statistical significance (P = .41). There was no correlation between years of board certification (mean = 11.7 ± 8.1 years, r = −0.17) and years in practice (mean = 8.5 ± 6.3 years, r = −0.12) with decrease in CT use.

Conclusions: Implementation of a feedback mechanism for care providers significantly reduced CT use in the ED. The intervention had equal effectiveness between groups of care providers with a wide range of experience. Future studies will examine implementation of the feedback process at multiple institutions in our hospital network.

Figure. Reduction in CT utilization by quarter and body region.

207 Emergency Department Revisit Rates for Patients With Abdominal Pain Decreased After the Introduction of Observation Units
Kekel, K; Allogra, J.R.; Eskin, B.; Richman, P.; Morristown Medical Center, Morristown, N.J.; Christus Spohn/Texas A&M School of Medicine, Corpus Christi, TX

Study Objective: Patients with abdominal pain often revisit the emergency department (ED) shortly after their initial visit. In 2009 and 2010 many hospitals in our area introduced observation units. We hypothesize that the introduction of these units decreased the revisit rate for a number of reasons such as providing more time to observe the course of the disease, making an accurate diagnosis and giving appropriate treatment.

Methods: Design: Retrospective cohort of consecutive ED visits. Setting: Seven New Jersey suburban and urban EDs with annual visits from 27,000 to 84,000. Population: Consecutive patients seen by emergency physicians between 1-1-1999 and 9-31-2014. Protocol: We identified abdominal pain patients who returned to the same ED within 72 hours using the ICD-9 codes. We then determined the annual number of revisits for abdominal pain for each year of the study and normalized these numbers by the total annual ED visits (we normalized because the total number of ED visits increased by 52% during this time period). We calculated and plotted the ratio of the normalized annual return visits to those in 1999 ("Revisit Ratio"). We calculated the change in the Revisit Ratios and the 95% confidence interval between the years 2010 and 2014.

Results: Of the 5,693,380 total ED visits in the database, 25,141 were for abdominal pain revisits. The average age of these patients was 39 ± 20 years and 63% were female, with little change in these numbers over the years of the study. The Revisit Ratios increased from 1999 to 2010 from 1.0 to 2.4 and then rapidly decreased to 1.0 from 2010 to 2014 (Figure). This represents a decrease in Revisit Ratios from 2010 to 2014 of 39% (95% CI: 35% to 43%, P < .001).

Conclusions: We found that the revisits for patients with abdominal pain decreased significantly from 2010 to 2014. We speculate that this decrease may be due to the introduction of observation units. Why revisits from 1999 to 2010 increased is unclear.

208 Electronic Health Record-Based Sepsis Protocol Effectively Lowers Time to Antibiotics and Time to Intravenous Fluids in Emergency Department Patients
Hayden, GE; Tuuri, RE; Scott, R.; Blackshaw, AM; Schoenling, AJ; Raidt, RA; Hall GA/ Medical University of South Carolina, Charleston, SC

Study Objectives: Evaluate the effectiveness of an emergency department (ED) triage sepsis alert and sepsis workup and treatment (SWAT) protocol in patients admitted from the ED with sepsis.

Methods: This was a retrospective, cross-sectional, descriptive study of patients ≥ 18 years admitted to the hospital with the diagnosis of sepsis. Setting was a single, urban, academic ED with an annual census of 48,000. Patients admitted through the ED with a diagnosis of sepsis before (pre-SWAT) and after (post-SWAT) implementation of the SWAT protocol were compared. The protocol involved an electronic medical record (EMR)-based triage sepsis alert incorporating systolic blood pressure (SBP), Systemic Inflammatory Response Syndrome (SIRS) criteria, and suspicion of an underlying infection (SWAT A = hypotensive; SWAT B = normotensive). A sepsis alert triggered direct triage nurse to physician communication, followed by activation of a SWAT bundle: standardized order sets, broad-spectrum antibiotics, immediate fluid bolus, and mobilization of ED personnel. Outcome variables included door-to-antibiotic times, door-to-fluid bolus times, and mortality rates. Proportions were compared for categorical data and t-tests were used to analyze continuous data. 95% confidence intervals were calculated for differences in proportions and means. P < .05 was considered statistically significant.

Results: There were 108 patients in the pre-SWAT and 130 patients in the post-SWAT group. The 2 groups had no significant difference in age, sex, or race. Patients in the post-SWAT group had a higher number of total SIRS criteria (P = .043) and shock index (P < .001). The post-SWAT group demonstrated marked improvements in both the door-to-bolus time and the door-to-antibiotics time. The door-to-bolus time improved by 50.5 minutes (P < .001) and the door-to-antibiotics time improved...
by 58.8 minutes ($P < .001$). There were 13 pre-SWAT A patients and 32 post-SWAT A patients. In the post-SWAT A patients, the mean door-to-antibiotics time was 67.8 minutes less ($P = .024$). There were 95 pre-SWAT B patients and 98 post-SWAT B patients. Post-SWAT B mean door-to-bolus time was 30.7 minutes less ($P = .001$) and the mean door-to-antibiotic time was 56.3 minutes less ($P = .001$). No mortality difference was observed between the pre-SWAT and post-SWAT groups (Table).

Conclusion: An EMR-based triage sepsis alert and SWAT protocol resulted in lower door-to-bolus time and door-to-antibiotics time in an adult ED population admitted with sepsis. As improved outcomes in septic patients are associated with adequate fluid resuscitation and rapid administration of appropriate antibiotics, these findings are significant. The improved door-to-antibiotics time was maintained in the SWAT A and SWAT B subsets. Overall, we observed a greater severity of illness for the post-SWAT patients based on SIRS criteria and shock index. The improved times to bolus and antibiotics could be attributed to the post-SWAT patients being sicker, in combination with implementation of the SWAT protocol.

Table.

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<td>2.8</td>
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<td>13.8</td>
<td>4.5</td>
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<td>.384</td>
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209 Trends in Rapid Response Team Activations Within 24 Hours of Admission: A Follow-Up Study
Malik DS, Lavine E, Chakupurakal S, Rabrlich J, Shapiro J/Mt Sinai St Lukes Roosevelt Hospital Center, New York, NY

Study Objectives: The rapid response team activation (RRT) is a patient safety system that provides urgent care to inpatients that may be clinically deteriorating. A review of RRTs occurring within 24 hours of admission was conducted to assess the emergency department (ED) management in such cases. Its conclusions were discussed with the hospital staff, and a committee was formed to review such cases monthly from a quality improvement standpoint. After several months of implementation, we describe the structure and function of the review process and assess the efficacy of our initial study’s intervention.

Methods: A multispecialty review committee meets monthly to evaluate RRTs occurring within 24 hours of admission (Figure 1). All cases are reviewed, with particular attention to clinical features identified as high-risk through a previous review of all 24-hour RRTs: admitting diagnosis, abnormal vital signs, high oxygen requirements, and potential communication issues. Prior to committee development, we shared our results with ED staff, educating them on which patients should receive greater consideration for intensive care unit (ICU) consultation. We compare the aforementioned clinical features for RRTs before and after this intervention in an attempt to gauge its efficacy, and to assess the utility of this review process.

Results: Twenty-nine RRTs occurred within 24 hours of admission in a 4-month interval, a quantity similar to our initial study. Twelve of these (41%) required transfer to the ICU, comparable to our initial study (45%). Analysis of these cases showed a marked difference between the cohort requiring ICU transfer and that which did not (Figure 2). These findings differ from our prior study; while there was a comparable fraction of patients with respiratory-related admissions requiring ICU transfer in this study, the frequency of abnormal vital signs and oxygen requirements was equivocal between the two cohorts. Communication issues were primarily related to long ED boarding times; their frequency was similar between the two cohorts. Conclusions: Our committee has developed and implemented a consistent framework within which RRTs occurring within 24 hours can be efficiently analyzed. Those requiring ICU transfer more often had abnormal vital signs or oxygen requirements in the ED. Furthermore, there was a greater prevalence of respiratory-related admissions in this cohort. Our findings continue to support the notion that patients requiring RRTs within 24 hours are a high-risk group, with notable ICU transfer rates. Given the lack of improvement between our initial and follow-up studies, we plan to re-address this topic with our ED staff and consider the development of department-wide guidelines recommending ICU consultation in certain patient cohorts.

210 Increased Identification of Emergency Department 72-hour Returns With Health Information Exchange Data
Kim E, Lowry T, Loo GT, Shy BD, Hwang U, Genes N, Richardson LD, Olesca CF, Shapiro JS/Icahn School of Medicine at Mount Sinai, New York, NY

Study Objectives: Early (72-hour) return visits to emergency departments (ED) are a common quality measure used to improve patient care. Using health information exchange (HIE) data for 72-hour return measurement, which allows identification of visits across multiple hospitals in the HIE, increases identification of relevant visits compared to individual hospitals’ site-specific data. Our objective was to determine if increasing levels of data aggregation (site-specific data [one site, no HIE] versus a smaller HIE [10 sites] versus the same HIE following a merger [31 sites]) led to incremental increases in our ability to identify 72-hour returns.

Methods: De-identified patient data from March 1, 09 to February 28, 14 were obtained from Healthix, an HIE in New York City. We measured (1) site-specific
Assessing US Clinician Gestalt in the Diagnosis of Malaria in a High-Prevalence Area of Sub-Saharan Africa
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Background: Despite a 2010 edict from the World Health Organization requiring confirmatory testing of suspected malaria before treatment, the majority of health care providers in rural Sub-Saharan Africa continue to treat suspected malaria using only clinical judgment. This is also the case with a large number of short-term mission teams, including those from the United States. In the field of global emergency Medicine, clinicians are often expected to make clinical decisions with limited diagnostic resources. In this pilot study, we hoped to assess US clinician ability to diagnose malaria based on clinical gestalt alone versus POCT malaria testing.

Study Objective: In this cross-sectional, observational study, we asked experienced American clinical providers (4 MDs and 2 PAs) on a short-term medical mission team in rural Uganda in December 2014 to rank and document their level of clinical suspicion for all patients in whom there was concern for Malaria. A self-reported, qualitative rank of clinical suspicion for all patients in whom there was concern for Malaria was compared to a patients’ level of clinical suspicion as measured by the RDT or other confirmatory tests. Clinical suspicion was statistically significant (P < .001).

Conclusion: This analysis demonstrates incremental increases in our ability to identify early ED returns using increasing levels of HIE data aggregation. Compared with individual site-specific data, the average ability to identify early ED returns increased by 6.4% using the smaller HIE (10 sites) for return visits and by 11.2% using the larger HIE (31 sites). These results suggest that, when HIE data is used for quality measurement, increasing the size of the HIE should enable more sensitive and accurate measurement.

The Refugee Cascade of Care: Prospective Assessment Reveals Attrition From HIV Care in Nakivale Refugee Settlement in Uganda
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Study Objectives: Refugees in Nakivale Refugee Settlement come from HIV-affected countries and suffer numerous hardships: disrupted social networks, limited livelihood opportunities, and frequent threats to their security. Though HIV testing and ART are free of charge in Nakivale, hardships faced in this environment may increase barriers to care. Our objective was to evaluate the HIV care cascade for refugees and Ugandan nationals in Nakivale.

Methods: We prospectively evaluated newly diagnosed HIV-infected clients from March 2013 until July 2014. Clients underwent a baseline survey including country of origin, years in the settlement, and time spent traveling to clinic. Outcomes assessed included linkage to HIV care (one visit to HIV Clinic), CD4 testing, ART-eligibility, and ART-initiation for eligible clients within 90 days of testing. Descriptive data were reported as frequencies with 95% confidence interval (CI) or median with interquartile range (IQR), as appropriate. The impact of baseline variables on linkage to care was assessed with logistic regression models.

Results: Of 6,850 adult clients tested for HIV, 3,517 (51%; CI 50.3-52.1%) were female; 4,746 (70%; CI 68.7-71%) were refugees; and the median age was 28 years (IQR 22-37). Of those tested, 276 (4%; CI 3.5-5%) were HIV-infected. Among those HIV-infected, 175 (63%; CI 57.7-70%) were female; 95 (35%; CI 28.4-41%) were refugees; and the median age was 30 years (IQR 24-38). Of the HIV-infected clients, 148 (54%; CI 47.6-60%) linked to HIV Clinic, 54 (20%; CI 15-25%) had a CD4 test, 22 (8%; CI 5-12%) had a CD4 test, 41% (CI 37-55%) were eligible for ART; and 17 (6%; CI 3.1-10%) initiated ART (Figure 1). The proportions of nationals and refugees at each step of the cascade were not significantly different (P > .05). No predictors of linkage to care were statistically significant.

Conclusions: Only half of newly diagnosed HIV-infected clients in Nakivale Refugee Settlement linked to HIV care, with another drop off in undergoing CD4 count testing. While this degree of attrition is similar to the attrition described in sub-Saharan Africa, this is a large and unique population. Future research should focus on understanding factors hindering linkage to HIV care and designing interventions specific for this context.
213 Derivation and Internal Validation of the DHAKA Score and DHAKA Tree For Predicting Dehydration Severity in Children With Acute Diarrhea

Levine AC, Glavis-Bloom J, Modi P, Nasirin S, Rege S, Chu C, Schmid CH, Alam NH/ Warren Alpert Medical School of Brown University, Providence, RI; International Centre for Diarrhoeal Disease Research, Bangladesh, Dhaka, Bangladesh; Brown University, Providence, RI; Brown University School of Public Health, Providence, RI

Study Objectives: Diarrhea remains one of the most common and most deadly conditions affecting children worldwide, accounting for nearly 10% of all child deaths. Accurately assessing dehydration status is critical to determining treatment course, yet no clinical prediction models for dehydration have been empirically derived for use in resource-limited settings. While several clinical prediction models have been developed in high-income countries, none have enrolled enough children with severe dehydration to develop a stable model, and it remains unclear how these models would perform in a low-income country context. The Dehydration: Assessing Kids Accurately (DHAKA) study aimed to derive and validate stable clinical prediction models for dehydration in children with both acute cholela and non-cholela diarrhea in a resource-limited setting.

Methods: In this prospective cohort study, we enrolled a random sample of all children under five years with acute diarrhea presenting to the rehydration unit at the International Centre for Diarrhoeal Disease Research, Bangladesh. Enrollment was conducted 24 hours per day, 7 days per week. Local nurses assessed children for clinical signs of dehydration on arrival and then serial weights were obtained as subjects were rehydrated to a stable, pre-illness weight. For each child, the percent weight change with rehydration was used to classify subjects with severe (>9%) dehydration, some (3-9%) dehydration, and no (<3%) dehydration. Clinical predictors were then entered into separate logistic regression and recursive partitioning models to develop the DHAKA Score and DHAKA Tree, respectively. Models were assessed for accuracy using the area under their receiver-operator characteristic curve (AUC) and for reliability through a blinded, repeat exam performed by a second nurse after the initial exam. Bootstrapping methodology was used to internally validate both models.

Results: Eight hundred fifty-five children were enrolled, with 771 included in the final analysis. Median age was 15 months. Overall, 11% of children were classified with severe dehydration, 45% with some dehydration, and 44% with no dehydration. Logistic regression analysis identified four independent predictors, including general appearance, skin pinch, tears, and deep respirations, which were used to construct the DHAKA Score. Recursive partitioning identified three predictors, including general appearance, sunken eyes, and skin pinch, which were used to construct the DHAKA Tree. Both the DHAKA Score and DHAKA Tree had significant AUCs of 0.79 (95% CI: 0.74, 0.84) and 0.76 (95% CI: 0.71, 0.80), respectively, for the prediction of severe dehydration. Additionally, the DHAKA Score and DHAKA Tree had significant positive likelihood ratios of 2.0 (95% CI: 1.8, 2.3) and 2.5 (95% CI: 2.1, 2.8), and significant negative likelihood ratios of 0.23 (95% CI: 0.13, 0.40) and 0.28 (95% CI: 0.18, 0.44) for the prediction of severe dehydration. Both models demonstrated 90% agreement between independent raters and validated well in 1000 bootstrap simulations.

Conclusion: This study is the first to empirically derive and internally validate accurate and reliable clinical prediction models for dehydration in a resource-limited setting. Front-line providers may use these new tools to better manage acute diarrhea in children.

214 Traumatic Injuries at an Emergency Department in Central Haiti

Rouhani S, Elacín HC, Edmond MC, Marsh RH/Brigham and Women’s Hospital, Boston, MA; Hopital Universitaire de Mirebalais, Mirebalais, Haiti

Study Objectives: In Haiti, as in many low-income countries, traumatic injuries are one of the leading causes of morbidity and mortality. Yet little is known about the most common mechanisms of trauma, severity of trauma, or patterns of injuries presenting to emergency departments (EDs) in Haiti.

Methods: This study is a retrospective chart review of all trauma patients presenting to the ED at Hopital Universitaire de Mirebalais, an academic hospital in central Haiti, from October 1, 2013 to March 31, 2014. Patient visits were identified if their electronic ED consultation note identified the visit as due to trauma (a mandatory question). Physical charts were reviewed and data entered into a standardized tool in the RedCAP database. All trauma patients during this time period were included. Mechanism of injury, time from injury to presentation, tests and treatments performed, and disposition were recorded. A serious outcome was defined as death in the ED, admission or spending 2 or more days in the ED, or need for surgery. Data were analyzed in SAS 9.3.

Results: A total of 1,513 potential trauma visits were identified; 16 charts could not be found. Of the remainder, 1,399 were confirmed as trauma visits and entered into the database. The majority of patients were male (66%) and the average age was 20.8 years. Only 8% of patients were children under 5, and 20% were aged 5-15. Most visits were due to road traffic accidents (n=639, 48%) followed by falls (n = 297, 22%) and assaults (n = 238, 18%). Mechanism varied by age (P < .001): falls were the most common mechanism for children under 5 (57/103, 55%) and ages 5-15 (120/262, 46%), versus road traffic accidents for those over age 15 (560/965, 58%). Most road traffic accidents were due to motorcycles (82%). Among those with data on the time of the trauma (n=1055), there were significant delays in presentation: only 18% presented within 1 hour of the trauma, while 15% presented over 24 hours later. Regarding injury patterns, 805 patients (58%) had a skin or soft tissue injury, and 287 (21%) had an extremity or pelvic fracture, of which 18% were open. Only 3% of patients were diagnosed with intracranial injury and 1% with thoracoabdominal injury. Most patients (82%) were discharged from the ED, while 13% were admitted. Of those admitted, 115 (63%) had a surgery during their hospital stay, the majority of which (79%) were orthopedic surgeries. Overall, 244 patients (17%) met the definition for serious injury. The percentage of patients with serious injury varied by mechanism (P = .0015): 21% of those with road traffic accidents had serious injuries, compared to 10% of those with assault and 15% of those with falls.

Conclusion: This study confirms a high burden of traumatic injuries in central Haiti, primarily due to road traffic accidents rather than penetrating trauma. Children represented a minority of trauma patients and sustained different mechanisms than adults, who were more frequently involved in road accidents. This suggests a need for different injury prevention programs by age. The significant delays to presentation, as well as low burden of head and thoraco-abdominal injuries may be attributable to the lack of out-of-hospital EMS systems. Without this, patients may struggle to reach the hospital, and those with serious injuries may suffer mortality prior to hospital arrival. Further study is warranted, as well as comparison with urban areas.

215 Implementation of a Pediatric Emergency Medicine Protocol and Curriculum in the Dominican Republic

Leader A, Desai N, Torres S, Murphy RJ/C, Bentley S/Eastern Virginia Medical School, Norfolk, VA; University of Pennsylvania, Philadelphia, PA; Hospital Infantil Regional Arturo Grullón, Santiago, Dominican Republic; Icahn School of Medicine at Mount Sinai, New York, NY

Study Objectives: This study sought to design and implement an emergency triage protocol and didactic curriculum for the pediatric emergency department (ED) at Arturo Grullón Regional Children’s Hospital (HIRUDAG), an academic tertiary care facility with a catchment of 7.5 million people in the Dominican Republic (DR).

Methods: The house staff and faculty of HIRUDAG and the Arnhold Global Health Institute of Mount Sinai collaborated to assess clinical and educational needs in the ED and to design and implement a pediatric emergency triage protocol and didactic curriculum based on the World Health Organization’s Emergency Triage Assessment and Treatment course materials. The triage protocol redefines patient flow, house staff responsibilities, and hospital charting tools in the ED at HIRUDAG. A three-tiered system of triage classification is used with accompanying didactic materials outlining pediatric resuscitation algorithms. Bi-monthly lectures on pediatric emergency triage are delivered to house staff along with pre- and post-tests to evaluate experiences, attitudes, and knowledge of triage principles. Responsibility for facilitating triage education sessions was transitioned to senior residents at HIRUDAG and the chief resident performs regular monitoring of the triage protocol to ensure ongoing quality implementation.

Results: Fifty-eight members of the pediatric house staff participated over a 16-month period of training. Initially, 80% of house staff respondents had never been
taught principles of triage; 91% felt triage education to be critical to their medical training. Results of pre/post-tests over 16 months indicate that house staff displayed improvement in case-based triage of emergent and urgent patients after the didactic lecture and discussion. Test scores improved from pre/post on both knowledge-based multiple choice questions and case-based decisionmaking questions (pre-test score was 32% vs 78%, P = .03). Additionally, all 58 residents reported increased confidence in triaging patients.

Conclusion: The need for a pediatric emergency triage protocol in an academic tertiary care center in the DR was addressed by integrating a newly designed triage protocol and emergency triage curriculum for house staff. A collaborative approach transitioned responsibility for teaching didactic sessions and monitoring the triage protocol to senior residents at HURUDAC, achieving sustainability of both the protocol and educational initiative. A 16-month review of pre/post surveys indicates statistically significant improvement in house staff’s knowledge of emergency triage principles and case-based triage classification. Studies are underway to determine effects on resident triage behaviors in the pediatric ED and clinical outcomes.

216 EMF Emergency Scene Responses by African Community-Based Emergency First Aid Responders

Mould-Millman N-K, Dixon J, Holmes J, Crockett D, LeBeau S, De Vries S, Patel H, Ginde A, Haukoos J, Wallis LA/University of Colorado, Aurora, CO; Denver Health, Denver, CO; Emory University, Atlanta, GA; Dartmouth University, Hanover, NH; Western Cape Government Health, METRO EMS, Bellville, South Africa; University of Cape Town, Cape Town, South Africa

Background: An emergency first aid responder (EFAR) program has been implemented in resource-constrained communities in South Africa. EFARs are intended to provide timely basic life-saving care to patients until scarce EMS resources arrive on scene. Atlantis is a medically underserved community of 80,000 people with a high burden of acute disease and 120 EFARs. EFAR medical responses and scene care remain unstudied.

Study Objectives: To determine the frequency, characteristics, and distribution of EFAR responses in Atlantis.

Methods: We conducted a prospective observational cohort study in Atlantis. From August 1, 2014, to January 31, 2015, de-identified Atlantis EFAR, EMS, and hospital data (clinical and operational) were manually collected using customized paper-based instruments, and entered into a secure electronic study registry. All adults and children who received an ambulance response in the study period were included. Calls for inter-facility transfers were excluded. Response and clinical data were analyzed descriptively. The frequency of EMS and EFAR responses were classified by neighborhood and adjusted for population size. Ethical review was obtained in South Africa and the USA.

Results: There were 1892 EMS primary responses in Atlantis during the study period, of which 8 (0.4%) had EFAR responses. Non-EFAR bystanders were on scene in 1273 (67.3%) of cases. 846 (44.7%) of the EMS calls were designated by dispatch as high priority (P-1), 1036 (54.7%) mid priority (P-2), and 1 (0.05%) low priority (P-3). EFARs were present on-scene in 4 P-1 responses, 4 P-2 responses, and 0 P-3. Mean EMS incident-to-scene response interval was 18.8 minutes (range 0-85) for P-1 calls and 76.4 minutes (range 0-968) for P-2 calls compared with 24.0 minutes (range 0-85) for EFAR responses. EFARs utilized first-aid skills during every response: guided EMS to scene (n=5), communicated with EMS dispatch (n=2), provided scene control (n=2), emotional support (n=4), basic airway management (n=1), and placed the victim in recovery position (n=3). Mean number of EMS incidents per 1000 population was 29.7 (range 5.90 - 136.8) (Table 1). EFARs responded in 5 of 11 EMS to scene (n=52) for P-1 responses. EFARs utilized physical therapy consult, and for asthma were recording and monitoring of peak flow and receipt of systemic steroids.

Conclusions: There were few EFAR responses (8) relative to the large volume of medical emergencies and EMS responses (1892). This marked discrepancy precludes a robust comparative analysis between EFAR and non-EFAR responses. For P-1 calls, EMS units arrived on scene faster than EFARs which may be one reason few EFARs were noted. EFARs responded in less than half of Atlantis neighborhoods, mostly skewed towards lower EMS response density areas, implying a geographic mismatch or insufficient EFARs. Recommendations to increase EFAR responses include: training EFARs in rural areas with long EMS responses, recruiting EFARs from high incident neighborhoods, and community engagement to sustain EFAR motivation. Given the substantial investment in the EFAR program, further research is needed to assess specific barriers and facilitators to EFAR response in Atlantis.

217 EMF Assessing the Need for Protocolized Observation Care for Stroke and Asthma in Rural Haiti

Rouhani S, Marsh RH, Baugh C, Cheridor JE, Schuur J/Brightman and Women’s Hospital, Boston, MA; Hôpital Universitaire de Mirebalais, Mirebalais, Haiti

Study Objectives: Emergency departments (EDs) in low-resource settings face high patient volumes with limited ED space, inpatient space, and staffing. In high-resource settings, observation medicine (OBS) has been shown to decrease patient length of stay while preserving quality of care. It is unknown if the same benefits would be seen in low-resource settings.

Methods: This is the first portion of a quality improvement study on the implementation of OBS protocols at L’Hôpital Universitaire de Mirebalais, an academic hospital in rural Haiti with a 15-bed ED and 6-bed ED OBS unit. This is a descriptive study of patients who would be potentially eligible for two OBS protocols (stroke and asthma), to evaluate baseline quality and efficiency of care prior to protocol implementation. Patient visits from January-December 2014 were identified by diagnoses from electronic ED consult notes. No OBS protocols were in use during this time. Charts were manually reviewed to verify the patient’s length of stay (LOS) was at least 4 hours and that the patient would have met ED OBS protocol criteria, had the protocols existed at the time. Stroke inclusion criteria were absence of a hemorrhagic stroke, oxygen saturation >90%, BP < 240/120, conscious, and no evidence of atrial fibrillation. Asthma inclusion criteria were wheezing and dyspnea, age over 1 year, room air oxygen saturation >88%, respiratory rate <45, and blood pressure >90/50. Charts were reviewed using an explicit tool and entered into a RedCap database. LOS was the time from ED check-in to hospital departure (from ED or inpatient service). Quality metrics for stroke were aspirin administration, a documented swallow study, and physical therapy consult, and for asthma were recording and monitoring of peak flow and receipt of systemic steroids.

Results: Of 149 ED stroke patients reviewed, 71 were eligible for inclusion. Of these patients, 9 were admitted with the remainder managed in the ED. Average LOS among stroke patients was 24 hours (range 5-94 hours) for those managed exclusively in the ED, and 16.5 days or 395 hours (range 139-904 hours) for those on the inpatient service. A minority, 15%, of stroke patients received aspirin in the ED and 15% received physical therapy consults. Only 7% had a swallow study documented. Of 93 asthma visits reviewed, only 21 were eligible, as most did not meet the minimum LOS. Most were managed in the ED; only 1 was admitted. For asthma patients, average LOS was 16 hours (range 4-61 hours). No asthma patients had a peak flow recorded, and only 11/21 (52%) received systemic steroids.

Conclusion: This baseline data shows significant variability in length of stay among asthma and stroke patients potentially eligible for ED OBS protocols. Notably, few patients achieved target quality of care markers. This indicates a need to focus on quality improvement and standardization of practice when implementing ED observation protocols.
Background: Integrating palliative medicine and hospice services into emergency medicine has become a topic of interest, yet it remains unknown how often emergency department (ED) clinicians recognize that a patient is hospice eligible. This knowledge can substantially impact the quality of care these patients receive by introducing palliative care (PC) earlier.

Methods: A retrospective chart review was used to examine all ED visits of adults 65 years or older at a large academic medical center from September 2013 to November 2013 (n=1886). All physician and social work notes up to and including the visit were evaluated for hospice eligibility from a prognostic standpoint using criteria adapted from the National Hospice and Palliative Care Organization (NHPCO) and Medicare guidelines. We chose to evaluate for hospice eligibility, as no objective method to evaluate for PC eligibility exists. All eligible patients were further reviewed for evidence of a PC discussion, PCC, and hospice referral. Patients already enrolled in hospice were excluded from the study.

Results: Of the 1886 ED visits reviewed, 239 visits (12.7%) met hospice eligibility criteria. Of eligible visits, 115 (48%) were patients who had prior ED visits in the past 12 months, and of those with prior visits, 57/115 (49.6%) had multiple visits. PC discussions were documented at 18 of the 239 (7.5%) visits. A formal PCC (initiated in the ED) occurred in 6/18 (33.3%) visits, and a hospice referral was provided to 6/18 (33.3%).

Conclusions: The majority of hospice-eligible patients over the age of 65 who visit the ED are not recognized (92.5%) and do not have a documented PC discussion in the ED. Despite the presence of a well-established PC service at the medical center, only a fraction of patients who likely would benefit from this service were given the opportunity to utilize it. This information has the potential both to improve the education of ED staff, and to improve the efficiency of electronic medical records via automated alerts occurring when patients meet predetermined criteria. Ultimately, this knowledge could improve the occurrence of early PC discussions, allowing patients to reap the maximal benefits of these services, as well as decrease the number of preventable ED visits by these patients.

Study Objectives: For patients at the end of life, treatment focused on life prolongation can be burdensome, of limited or negative medical utility, and costly. The American College of Emergency Physicians, through the Choosing Wisely campaign, has suggested early referral from the emergency department (ED) for palliative care and hospice services. There is limited data assessing the feasibility of early referral or palliative care interventions in an ED population.

Methods: We undertook an interventional study of a novel, emergency department-based, palliative care intervention for patients with advanced dementia and deemed eligible for palliative care, attempted to address goals of care, and presented options regarding alternative care pathways, during a brief discussion (<1 hour). Care pathways were defined as primarily comfort focused, a combination of comfort focused and life prolongation, primarily life prolongation, or undecided. The primary outcomes of interest, pathway preferences before and after intervention, were recorded before and after the discussion on a structured data form completed by the palliative physician. For additional time-series comparisons, chart review data was collected by the project manager for administrative variables including direct admission to our institution’s palliative care unit and ED-to-hospice referrals during the 6-month period prior to the intervention, and during the 10 months following the initiation of the intervention. All statistics were performed using STATA v.11 (College Station, TX).

Results: During the 10-month intervention period 107 patients were targeted, 2 were lost to follow-up. In both the advanced dementia (n=48) and actively dying (n=57) groups patients were more likely to choose a treatment plan that included comfort measures after palliative intervention than before [dementia: 23% before, 45% after (P = .012); actively dying: 21% before, 48% after (P = .001)]. Overall, patients were significantly more likely following intervention to choose a pathway including comfort-focused care (OR 3.1; 95%CI: 1.7-5.7), and less likely to choose a pathway including life-prolonging therapy (OR 0.7; 95%CI: 0.4-0.8). Among admissions to our inpatient palliative care unit in the pre- and post-intervention periods there was a trend towards an increase in referrals directly from the ED (9% vs 14%, P = .06). Other variables showed no significant changes.

Conclusion: In our institution early palliative care involvement was feasible, and ED patients with advanced illness and their surrogates were often amenable to goals of care transitions. These findings support broader attempts to integrate and research palliative care interventions and alternative care pathways in ED care.

Study Objective: Prognostication is an essential task in many domains of health care, but is of particular importance in end-of-life (EOL) care. Prognostic estimates delineate the EOL period, shape decisions about the goals of care, and trigger advance care planning efforts. As EOL and palliative care are increasingly incorporated into the emergency setting, useful prognostic tools that are valid and reliable for use with emergency patients are needed. The purpose of this study was to evaluate the predictive ability of the modified “surprise question” when used by emergency clinicians in the emergency department (ED) setting.

Methods: Emergency physicians responded to the question, “Would you be surprised if this patient died in the next 30 days?” upon adult and pediatric admissions to a tertiary care center over a six-month period. Excluded were patients taken immediately to the operating room or cardiac catheterization laboratory and direct hospital admissions. Inpatient teams were blinded to the responses. Electronic health records were reviewed retrospectively for clinician’s responses to the surprise question, patient demographics, and hospital discharge disposition. The ability of emergency physician response to the surprise question to predict inpatient mortality was evaluated using chi-square analysis to compare the proportion of patients surviving to hospital discharge as well as with the area under the receiver operating characteristic (ROC) curve.

Results: Data for 4,478 patients were evaluated; 48% were female and the median age was 63 years (IQR 43-77). Physicians responded that they would not be surprised if the patient died (negative response) in 12% (n=556) of cases. Overall, 190 patients (2.4%) died prior to hospital discharge. Emergency clinicians provided negative responses indicating that they would not be surprised if the patient died in a significantly greater proportion of mortality cases (57%, 79/139) than survival cases (14%, 107/752), P < .001. The area under the receiver operating characteristic curve for the ability of the modified surprise question to correctly predict inpatient mortality was 0.613 (95% CI: 0.568 - 0.657), P < .001. The overall accuracy of the modified surprise question for correctly classifying those who did and did not die during hospitalization was 85% (95% CI: 84.2% - 85.8%).

Conclusions: In this setting and sample, emergency physician responses to the modified surprise question were a significant predictor of in-hospital mortality. Due to the exclusion of many high acuity patients who bypassed the usual admission process, the predictive ability of the surprise question may be greater than we observed in this study. Additional research is warranted to determine whether the surprise question is a stronger predictor of inpatient mortality in particular subgroups of the ED population and whether it can accurately predict mortality over the longer-term. Given the simplicity of the modified surprise question, it holds promise as an important prognostic tool to improve the delivery of end-of-life and palliative care in the emergency setting.
Teaching Delivery of Difficult News in Trauma: Simulated Resuscitations With Structured Communication for Emergency Medicine and Surgery Residents

Lambra S, Kulikarni M, Bryzchowski S, Tyrie L, Lambra V, Nagurka R, Holland B, Scott SR, Mosenthal AC/Rutgers New Jersey Medical School, Newark, NJ

Background: Traditional trauma residency training for surgery and emergency medicine (EM) is focused on acquiring the technical resuscitation skills exemplified by the Advanced Trauma Life Support course. Little or no attention is paid to teaching residents how to deliver difficult news (DDN) to a family who is facing high emotional support needs due to the unexpected nature of the traumatic event and with whom there is no prior existing relationship.

Study Objectives: Our project goals are to teach skills of effective communication during high stress, high stakes conversations that follow trauma resuscitation.

Methods: We use two simulated trauma resuscitation scenarios, followed immediately with role-play of DDN and debriefing, to teach interdisciplinary teams of surgery and EM residents how to deliver difficult news of death and of uncertain/poor prognosis to family. Participants were divided into two teams; each team “performed” one trauma scenario with immediate DDN and “observed” the other. Outcomes were assessed using the Team Behavior Anchored Rating Scale (TBAR) to rate team performance (self-report and observer-report) on use of support, global awareness, communication, role clarity and resource utilization. Post-simulation survey asked participants to use a Likert-like scale (1 = strongly disagree to 4 = strongly agree) and rate statements on the training environment, simulation/equipment, instructors, and the overall experience as well as statements regarding gain in knowledge and confidence.

Results: Thirty-one residents participated in the hybrid simulated sessions; EM PGY 1-4 and surgery PGY 1-2. Participants rated simulation team behaviors highly across all five TBAR domains; scores ranged from 5.56 (lowest) for “use of support” to 6.10 (highest) for “role clarity.” Noted trends include: 1) Surgery residents self-rated their overall team performance lower than EM and 2) Though the number of cases/domains precludes statistical significance, residents “performing” simulated resuscitations rated themselves higher than those “observing” in 9/10 instances (P = .01). At the end of the session, statements assessing reaction level indicated very high levels of satisfaction (over 90% strongly agreeing/agreeing) with activity. Attitudinal statements also indicated that a majority of residents felt better prepared (81%), more knowledgeable (77%), and more confident (77%) with the topics covered.

Conclusion: Interdisciplinary EM and surgery resident training that blends simulated technical trauma resuscitations with immediate structured communication/ debriefing to teach how to deliver difficult news to family is feasible. Both EM and surgery residents report high levels of satisfaction with such an educational activity. They also report feeling better prepared with both the technical aspects of resuscitation and the communication aspects of delivering difficult news of death and poor prognosis to family of trauma victims.

Acceptability and Reliability of a Novel Palliative Care Screening Tool Among Emergency Department Providers During Pre-Implementation Testing

Bowman J, George N, Dove-Maguire K, Barrett N, Baird J/Brown University, Providence, RI; University of California San Francisco, San Francisco, CA; Columbia University, New York, NY

Study Objective: Physical and psychosocial suffering are highly prevalent among patients with advanced illness. Most patients who could benefit from inpatient palliative care (PC) consultation are never identified or referred to this service. The emergency department (ED) is an ideal place to screen for unmet PC needs and initiate early PC consultation in order to mitigate unnecessary suffering and reduce costs from invasive interventions that are congruent with patient wishes. We developed the Palliative Care and Rapid Emergency Screening Project (P-CaRES): a multi-phase project facilitating early referral to inpatient PC consultation among ED patients with significant palliative care needs. In the first stage of this project, we derived a novel, content-validated screening tool for patient screening. We previously developed the P-CaRES tool. In this study we report on a pilot trial to test the reliability and acceptability of the P-CaRES tool among ED providers, and assess how both vary based on a provider’s role (attending, residents, and nurses) and level of experience.

Methods: A two-part electronic survey was distributed to ED providers across multiple sites and across the United States. A “gold standard,” against which to compare respondents’ use of the P-CaRES tool, was created based on input from expert palliative care physicians on 10 written case vignettes featuring ED patients with PC needs. The experts’ input was validated using Gwet’s AC1 coefficient for inter-rater reliability. To test external reliability of the screening tool, we then distributed the case vignettes to ED providers at each site, and recorded their responses. These were compared both against the gold standard and against different subsets of ED providers (divided both by role and level of experience). Acceptability of both ED-PC screening in general and of our PC screening tool specifically was assessed using a modified Ottawa Acceptability Scale based on a 1-5 Likert rating. Finally, descriptive statistics were used to report all outcomes.

Results: Two hundred thirteen ED providers employed in three different regions across the country responded to the survey, and 185 completed it. Overall, 78.5% of ED providers self-reported that currently they only screen patients with advanced illness for palliative care needs 10% of the time, or less. Only 10.7% of patients agreed that they already use an effective strategy to screen patients for such needs. The majority of providers felt the P-CaRES tool would be useful in their practice (80.5%); 87.1% agreed that the tool was clear and unambiguous and 87.5% agreed that use of it would likely benefit patients. Using the screening tool, ED providers generated a PC referral in concordance with PC experts at a rate of 88.7% (95% CI 86.4% - 90.6%). Efficacy of the tool was similar across all provider roles and levels of experience.

Conclusion: ED screening for unmet palliative care needs using a brief, novel, content-validated screening tool is both acceptable and reliable in pilot testing. Implementation of the tool and clinical trial is warranted.

Palliative Care Screening and Assessment in the Emergency Department: A Systematic Review

George N, Phillips EM, Zaidi A, Song C, Lambra S, Grudzen GR/Brown University, Providence, RI; The George Washington University, Washington DC; DC, Mount Sinai School Of Medicine, New York, NY; New York University, New York, NY; New Jersey Medical School, Newark, NJ

Study Objectives: Emergency department (ED) providers and policy makers are increasingly interested in developing palliative care interventions for ED patients. Many patients in the ED may benefit from palliative care screening and referral. Multiple ED-based palliative care screening and referral projects have been undertaken, but there has been no study of these projects or their effect. The objective was to conduct a systematic review and critical analysis to evaluate the approaches, methods, and tools used to screen and refer patients to palliative care services in the ED.

Methods: The PubMed database was searched for relevant titles. Three reviewers independently selected eligible studies that addressed palliative care screening and referral in the ED. Eligible studies described and evaluated a palliative care screening tool, assessment, referral modality, or consultation aimed at identifying patients appropriate for palliative care. Studies that evaluated the incorporation of a palliative care approach to the care of an emergency patient or in an emergency situation, including hospice care or end-of-life-care, were also reviewed. Four reviewers independently evaluated the final articles. Two reviewers extracted data on study characteristics, methodological quality, and outcomes.

Results: Four studies met inclusion criteria. All four were reviewed for methodological quality and strength. The studies were synthesized using a narrative approach. Each study developed an independent screening or evaluation tool for palliative care needs; however, evidence base for the screening approach was lacking in three of the four studies. Each study required additional ED personnel to perform screening and referral and success was limited by availability and consistency of these specialized personnel. All four of the studies were successful in increasing overall rates of palliative care referral or screening. Other outcomes varied by study.

Conclusion: Palliative care screening and referral is possible in the ED setting. Further evidence for the development of an effective palliative care screening and referral process is needed. We recommend a screening guide based on a synthesis of available evidence.
Background: Emergency physicians provide treatment to acutely ill patients often without information related to the long-term prognosis. The Palliative Performance Scale (PPS) assesses functional status and is an accurate predictor of survival in palliative care and hospice patients. Its prognostic value in the emergency department (ED) has never been studied.

Conclusion: The PPS predicts mortality in patients admitted to the hospital through the ED. Emergency physicians do not typically predict mortality in the noncritically ill patient. The PPS is a simple tool that allows emergency physicians to identify patients at high risk for death and thus may prompt a palliative care focused discussion in this vulnerable population.

Background: Palliative care and hospice patients. Its prognostic value in the emergency department (ED) has never been studied.

Conclusion: Literature review and expert panel consensus identified key palliative care topics and domains relevant to EM resident training that will hopefully be beneficial to emergency physicians in numerous ways. These recognized areas can serve as the foundation for palliative care education within emergency medicine. Our next steps include mapping these PC topics to emergency medicine accredited council of graduate medical education (ACGME) resident milestones. Concurrently along this mapping, our panel is developing unique palliative care milestones for the EM resident education. In the future, we hope to that our EM-PC milestones from the topic list will serve as a model and starting point for further EM residency education and curriculum. Incorporating palliative care into the beginning of EM training will empower future EM providers and ensure better patient care.

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remains important when clinical presentation is potentially consistent with meningitis.

### Table 1: Lumbar puncture (LP) results and complications

<table>
<thead>
<tr>
<th>Diagnoses resulting from LP (%)</th>
<th>LP-related complication (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>None</td>
<td>208 (89.7)</td>
</tr>
<tr>
<td>Subarachnoid hemorrhage</td>
<td>206 (94.0)</td>
</tr>
<tr>
<td>Any alternative diagnosis</td>
<td>206 (94.0)</td>
</tr>
<tr>
<td>Low-pressure headache</td>
<td>206 (94.0)</td>
</tr>
<tr>
<td>Bacterial meningitis</td>
<td>206 (94.0)</td>
</tr>
<tr>
<td>Vertebral meningitis</td>
<td>206 (94.0)</td>
</tr>
<tr>
<td>Intraventricular hypertension</td>
<td>206 (94.0)</td>
</tr>
<tr>
<td>Intrathecal hemorrhage</td>
<td>206 (94.0)</td>
</tr>
</tbody>
</table>

Study Objective: The diagnosis of subarachnoid hemorrhage (SAH) often requires lumbar puncture; however, in an estimated 10% to 30% of procedures that are traumatic, iatrogenic bleeding can complicate diagnosis. A clinical prediction rule has been recently proposed to differentiate between SAH and traumatic lumbar puncture with 100% sensitivity and a specificity of 91.2%. This rule is based on cerebrospinal fluid findings that included a red blood cell (RBC) count greater than 2000 × 10^6/L and the presence of xanthochromia. If neither of the criteria were present, aneurysmal SAHs can be excluded as a cause of headache. Our objective was to externally validate the prediction rule in two tertiary care hospital-based emergency departments (ED).

Methods: This was a retrospective, cohort analysis of consecutive adult patients presenting to the emergency departments of two academic medical centers during a four-year study period. Participants included all alert patients over 18 with an acute non-traumatic headache who underwent lumbar puncture to rule out SAH. Demographics, co-morbidity, clinical findings, diagnostic testing, and final disposition were obtained from ED records using standardized abstraction forms. A second investigator performed a blinded critical review of a random sample of 20% of the cases. Bivariate analysis was then conducted to identify which clinical factors in our population should be further considered as potential predictors of SAH. We evaluated several alternative models using these clinical factors and compared them by their ability to distinguish between patients with and without a SAH using multivariate logistic regression.

Results: A total of 2315 patients were screened; 367 had abnormal results on cerebrospinal fluid analysis with > 1 × 10^6/L red blood cells in the final tube of cerebrospinal fluid and/or xanthochromia in one or more tubes. Overall, SAH was confirmed in 32 patients (8.7%) after diagnostic imaging. The presence of less than 2000 × 10^6/L red blood cells in addition to no xanthochromia excluded the diagnosis of aneurysmal subarachnoid hemorrhage in 326 patients, with a sensitivity of 78.1% (95% confidence interval 60.0% to 90.7%) and specificity of 97.3% (95.0% to 98.8%). Using statistical modeling, we found no risk factor or combination of clinical factors that would improve ED provider sensitivity without markedly decreasing specificity. The consistency of the data recording was excellent, with a median kappa statistic of 0.86. Conclusions: We were unable to validate a previously described clinical prediction rule to differentiate between SAH and traumatic lumbar puncture. No single clinical finding or combination of findings carried sufficient weight to exclude the diagnosis of SAH.

### 228 Withdrawn

### 229 External Validation of a Clinical Prediction Rule for the Differentiation of Traumatic Lumbar Punctures from Aneurysmal Subarachnoid Hemorrhage

Heiser H, Girmac K, Andrews-Dickert R, Emery M, Jones JS/Michigan State University, Grand Rapids; Spectrum Health Department of Emergency Medicine; Grand Rapids Medical Education Partners, Grand Rapids, MI

Study Objective: Vertigo or ataxia is a common complaint in the emergency department (ED). Although the vast majority of cases are discharged as benign peripheral vertigo, there are cases of ischemic strokes presenting with similar symptoms. Computed tomography (CT) head scans and more recently magnetic resonance imaging (MRI) head scans are often done in the evaluations of these patients. The study objectives are to determine in the vertigo or ataxia patients: (1) the incidence of ischemic strokes, (2) compare the diagnostic capability of CT versus MRI scans, (3) define significant risk factors for strokes.

Methods: Six months retrospective electronic medical records (EMR) review from three community hospitals of patients ≥ 18 with complaints of vertigo or ataxia. Data includes demographics, chief complaint(s), present and past medical history, prior ED visits, physical findings, electrocardiogram (ECG), imaging results, consults, and dispositions. Student t, Chi-squared, Fisher’s, and ANOVA were performed as appropriate. Statistical significance is set at a P = .004 to correct for the Bonferroni effect.

Results: Four hundred forty-five patients met inclusion and exclusion criteria. 282 (65.4%) were discharged from the ED. Vertigo was the complaint in 351 cases (78.9%), ataxia in 65 cases (14.1%) and both in 31 cases (7.0%). There were 29 (6.5%) ischemic strokes, with 18 CVA and 11 TIA. Two hundred seventy-nine patients (62.7%) had CT head scans with only one scan diagnostic (“fetal hemorrhage”). Ninety patients (20.2%) had MRI with 15 showing CVA. Patients with complaint of only ataxia had 28.6% CVA (18/63) versus 2.3% for vertigo-only patients and 9.7% (3/31) for patients with both (P < .001). Increased age (P < .001), hypertension (P = .003), and prior stroke history (P = .003) were all associated with increased risk of CVA/TIA. Cerebellar sign(s) increased the risk from 6.5% to 25.9% (P < .001). Other new neurologic signs increased the risk from 2.0% to 35.7% (P < .001). Nystagmus did not decrease risk for CVA (30.9% vs 33.3%; P = .783).

Conclusion: This multicenter study on vertigo or ataxia found 6.5% ischemic strokes. Only one of 279 CT head scans was diagnostic while 15 of 90 (16.7%) MRI scans were diagnostic. Ataxia was associated with significantly more strokes than vertigo. Increased age, hypertension, prior strokes, cerebellar, or other new neurologic signs were all significant risk factors for strokes.

### 230 Vertigo, Ataxia, and Strokes: An Emergency Department Study

Schneiderman N, Bies C, Chan SB, Garcia C/Presence Resurrection Medical Center, Chicago, IL

Study Objectives: Vertigo or ataxia is a common complaint in the emergency department (ED). Although the vast majority of cases are discharged as benign peripheral vertigo, there are cases of ischemic strokes presenting with similar symptoms. Computed tomography (CT) head scans and more recently magnetic resonance imaging (MRI) head scans are often done in the evaluations of these patients. The study objectives are to determine in the vertigo or ataxia patients: (1) the incidence of ischemic strokes, (2) compare the diagnostic capability of CT versus MRI scans, (3) define significant risk factors for strokes.

Methods: Six months retrospective electronic medical records (EMR) review from three community hospitals of patients ≥ 18 with complaints of vertigo or ataxia. Data includes demographics, chief complaint(s), present and past medical history, prior ED visits, physical findings, electrocardiogram (ECG), imaging results, consults, and dispositions. Student t, Chi-squared, Fisher’s, and ANOVA were performed as appropriate. Statistical significance is set at a P = .004 to correct for the Bonferroni effect.

Results: Four hundred forty-five patients met inclusion and exclusion criteria. 282 (65.4%) were discharged from the ED. Vertigo was the complaint in 351 cases (78.9%), ataxia in 65 cases (14.1%) and both in 31 cases (7.0%). There were 29 (6.5%) ischemic strokes, with 18 CVA and 11 TIA. Two hundred seventy-nine patients (62.7%) had CT head scans with only one scan diagnostic (“fetal hemorrhage”). Ninety patients (20.2%) had MRI with 15 showing CVA. Patients with complaint of only ataxia had 28.6% CVA (18/63) versus 2.3% for vertigo-only patients and 9.7% (3/31) for patients with both (P < .001). Increased age (P < .001), hypertension (P = .003), and prior stroke history (P = .003) were all associated with increased risk of CVA/TIA. Cerebellar sign(s) increased the risk from 6.5% to 25.9% (P < .001). Other new neurologic signs increased the risk from 2.0% to 35.7% (P < .001). Nystagmus did not decrease risk for CVA (30.9% vs 33.3%; P = .783).

Conclusion: This multicenter study on vertigo or ataxia found 6.5% ischemic strokes. Only one of 279 CT head scans was diagnostic while 15 of 90 (16.7%) MRI scans were diagnostic. Ataxia was associated with significantly more strokes than vertigo. Increased age, hypertension, prior strokes, cerebellar, or other new neurologic signs were all significant risk factors for strokes.

### 231 Development and Psychometric Properties of the Stroke Assessment and Treatment Intent Scale

Davis S, Gitchel WD, Jr., Leyman SM, Diaz SR, Martinelli D, Crocco T, Barr T, Otto S, Larrabee H/West Virginia University, Morgantown, WV; University of Arkansas at Little Rock, Little Rock, AR

Study Objectives: The only known psychometrically validated tool for measuring stroke awareness is the stroke action test (STAT), a 28-item scale that asks respondents to associate symptoms with appropriate actions (ie, “call 911”). A significant limitation of this test is that the correct action includes an option other than “calling 911” in the event of stroke. Additionally, there are no questions that assess a respondent’s awareness of thrombolytic therapy. This study sought to create an updated, validated instrument with psychometric properties to measure public stroke knowledge.

Methods: A 44-item scale was developed and included questions measuring: (1) knowledge of stroke symptoms; (2) general stroke awareness; (3) knowledge to call 911 in the event of a stroke; and, (4) the STAT. Patients at least 18 years of age presenting to a tertiary care, academic emergency department (ED) were approached by trained research assistants in this prospective, cross-sectional study. Surveys were also distributed to college students at the affiliated academic research university. The scale was subjected to factor analysis with Promax Rotation to create a final condensed instrument and Cronbach’s alpha was used to assess internal consistency. SAS software was used for all analyses.

Results: The mean age of the 455 respondents was 36.9 years, with significantly more females (61.4%). The factor analysis of the 44-item scale yielded a final 20-item Stroke Awareness and Treatment Intent (SATI) scale that consisted of 3 subscales—“knowledge to call 911” (α=0.806), “knowledge of stroke symptoms”
(α=0.922), and “general stroke awareness” (α=0.723). Both the SAT and the SATI had an internal consistency of α=0.897. The “knowledge of stroke symptoms” (r=0.705) and “knowledge to call 911” (r=0.942) subscales had the highest correlations with the SATI. The SAT had a correlation of 0.630 with the SATI.

Conclusion: The SATI is an updated, psychometrically validated instrument for assessing stroke knowledge and treatment intent that includes measurement of thrombolytic treatment awareness.

232 Disparities in Emergency Department Wait Time Among Patients With Traumatic Brain Injury
He S, Ng A, Klaivar D, Cen S, Renda N, Sanossian N, Mack W/University of Southern California, Los Angeles, CA

Study Objectives: To identify characteristics among patients with traumatic brain injury associated with differences in emergency department wait time. Design/Setting: Secondary analysis of the 2003-2010 National Hospital Ambulatory Medical Care Survey was undertaken. We investigated patient characteristics associated with longer emergency department wait time until physician assessment through survey weighted multivariable analysis adjusting for patient, hospital, and severity factors. Patients: A total of 9,376,323 adult visits (≥18 years old) presenting to emergency departments in the United States with traumatic brain injury. Results: In total, 24.76% (2,321,476) of the visits were emergent (triage levels 1-2) with a mean wait time of 11.33 minutes (95% CI: 9.37, 13.70), and 65.13% (6,106,624) were non-emergent (triage levels 3-5) with a mean wait time of 21.99 minutes (95% CI: 18.28, 26.45) (P < .01). For emergent visits, patients 65+ years old waited 2.79 minutes longer (95% CI: 1.16, 5.19) compared to patients 19 to 64 years old, and African Americans waited 5.72 minutes longer (95% CI: 1.83, 6.55) compared to non-Hispanic white patients. For non-emergent visits, waiting time did not differ by age, but a racial disparity was present. African Americans waited 4.69 minutes (95% CI: 2.57, 6.31) compared to non-Hispanic White patients.

Conclusion: There were age and racial disparities in wait time for traumatic brain injury visits in the emergency department. The racial disparity remained when looking at non-emergent visits. Based on these results, focus should be placed on explaining how patient age and race can affect emergency department wait times.

233 Administration of Adipose-Derived Mesenchymal Stem Cells After Transient Global Cerebral Ischemia has an Additory Stimulating Effect on Intrinsic Neurogenesis
Ryu H, Lee JH, Je SM, Chung TN/Cha University Bundang Medical Center, Gyeonggi-Do, Korea

Study Objectives: Global cerebral ischemia due to ischemia/reperfusion injury is an important cause of poor neurologic outcome after cardiac arrest. Various attempts were tried to overcome serious global cerebral ischemia and to yield a better neurologic outcome, but mostly in vain. Stem cell is considered as one of the most desirable therapeutics for treating many incurable diseases. Effect of adipose-derived mesenchymal stem cells (MSC) on global cerebral ischemia was shown in recent research, which focused on neuroprotection effect of MSC in acute stage of injury (Stem Cells Transl Med 2015). We aimed to assess the effect of MSC on relatively delayed stage of global cerebral ischemia in terms of the effect on intrinsic neuroregeneration.

Methods: Seven minutes of electroencephalography-confirmed transient global cerebral ischemia was performed on four groups (2 groups of 4 and 2 groups of 3) of Sprague-Dawley rats using 2-vessel occlusion method with controlled exsanguination. For the first two groups, human adipose derived MSC (1 × 10^6 cells) and placebo agent were injected intravenously for each group at immediate, 1, 2, and 3 weeks after the insult. Thymidine analog BrdU was intraperitoneally injected twice daily for four consecutive days starting 3 weeks and 3 days after the insult. The number of BrdU (+) cells was counted after sacrifice of the animals at 4 weeks passing the insult to assess intrinsic neurogenesis. For the second two groups, human adipose derived MSC (1 × 10^6 cells) and placebo agent were injected intravenously for each group at immediate after the insult, and the count of live neurons on hippocampus CA1 was measured using immunostaining with monoclonal anti-NeuN antibody 6 weeks after the insult. Mann-Whitney U test was used to compare the count of BrdU (+) cells and live cells between two groups. Values were described as median (interquartile range).

Results: There was a significant difference in the count of BrdU (+) cells between MSC and placebo injected groups (P = .043, 8.3 (5.3-13.1) vs 18.1 (11.5-34.5)) (Figure). However, there was no significant difference in the count of NeuN (+) cells between MSC and placebo injected groups (P = .825).

Conclusion: Administration of adipose-derived mesenchymal stem cells after transient global cerebral ischemia has an additory stimulating effect on intrinsic neurogenesis.

234 Emergency Department Pediatric Transfers to Acute Care Facilities: An HCUP Analysis
Barata IA, Akerman M, Brabham K, Raio C, D’Angelo J, Mahmood Z, Ward MF/North Shore University Hospital, Manhasset, NY

Background: Hospitals vary widely in the services they offer to care for pediatric patients. Reasons for transfer are based on the patient’s clinical needs and the hospital’s available services and resources.

Study Objectives: Analyze the characteristics of pediatric patients transferred from the general emergency department (ED) to an acute care facility.

Methods: Study data was abstracted from the 2010 Healthcare Cost and Utilization Project (HCUP) database. PROC SURVEY procedures in SAS version 9.3 were used to develop the weighted national estimates to account for the stratified two-stage cluster sample design in the database. A multivariate logistic regression was constructed for pediatric patients (<18 years old) who require a transfer to an acute care facility from a general ED. We defined a pediatric ED as > 75% of visits accounted for by patients <18 years of age. The remaining EDs were classified as “general EDs.” Independent variables included in the model were age categories (<1, 1-4, 5-9, 10-14, 15-17, 18+ age in years), sex, insurance/payment method (Private/ HMO, Medicaid, Medicare, No charge, Self pay, or Other), and diseases/body systems using ICD-9 coding (infectious and parasitic, hematology-oncology, endocrine, mental disorders, nervous system, eyes/ears/nose/throat, circulatory, respiratory, digestive, genitourinary, skin, musculoskeletal, congenital anomalies, trauma/injury and poisoning, and other).

Results: In the HCUP sample, 5.5 million ED visits were for children <18 years to 961 EDs, four pediatric; about 1.5% of visits resulted in transfer. Children younger than 1 year had relatively higher transfer rates as compared to 15-17 year old group (OR=1.17, 95% CI 1.089-1.146). Female patients had a 16% lower chance of transfer (OR=0.84, 95% CI 0.83-0.85). Patients with Medicaid compared to private insurance/HMOs, had 4% lower likelihood of being transferred (OR=0.96, 95% CI 0.944-0.976), no pay had 40% higher likelihood of being transferred (OR=1.40, 95% CI 1.15-1.70), and self pay had 9% lower likelihood of being transferred (OR=0.91, 95% CI 0.886-0.945). There was no statistically significant difference in transfer rates between private insurance and those with other insurance and Medicare. Patients with circulatory system (OR=7.54), endocrine (OR=5.39), mental disorders (OR=4.93), nervous system (OR=4.71), congenital anomalies...
(OR=3.81), hematolymphoid disorders (OR=3.79), digestive system, (OR=1.46), and other disorders (OR=1.27), had a higher odds of being transferred as compared to trauma/injury and poisoning; while patients with disorders related to genitourinary (OR=0.93), respiratory (OR=0.78), musculoskeletal (OR=0.59), skin (OR=0.47), infectious and parasitic diseases (OR=0.23), and eyes/ears/nose/throat (OR=0.09), had a lower odds of being transferred as compared to trauma/injury and poisoning.

Conclusion: Children younger than 1 year had relatively higher transfer rates. Transfers also differed by payer; patients covered by Medicaid and self-pay had the lowest likelihood of transfer. Transfer rates varied significantly by condition and several of the high-transfer diagnostic categories were related to circulatory, endocrine, nervous, hematolymphoid-ontology, and mental disorders as well as congenital anomalies which may be related to a lack of ED or inpatient resources to care for children with problems that require more complex care.

**235** Predictive Variables for Abnormal Comprehensive Metabolic Panel Testing and Potential Cost Savings in Children Receiving Pediatric Emergency Department Care

Huckabay MD, Freeman S, Thurmond C, Cooper M, Lokep J/Louisiana State University Health Science Center Shreveport, Shreveport, LA; Medical University of South Carolina, Charleston, SC

Study Objectives: To determine clinical variables predictive of abnormal comprehensive metabolic panel (CMP) test results in pediatric emergency department (PED) patients and then use these predictive variables to determine the potential cost savings of ordering a basic metabolic panel (BMP) versus a CMP.

Methods: Retrospective cross-sectional descriptive study of children (<18 years) at an urban academic PED (annual census of 22,000) who had CMP testing. Demographic and clinical data included 12 clinical variables: present illness (right upper quadrant pain, overdose and emesis), past medical history (liver disorder, malignancy, heart disease and bleeding disorder), and physical examination findings (jaundice, right upper quadrant tenderness, hepatomegaly, ascites/periapical edema and shock) and the 6 CMP (6-CMP) test results not included in a BMP (alanine aminotransferase, aspartate aminotransferase, alkaline phosphatase, total bilirubin, total protein, and albumin). Patients with normal vs abnormal 6-CMP tests were compared to determine the predictive value of 12 clinical variables.

Results: There were 207 children in the study population. The mean age (months) was 95.4 and range 2 to 206 months. There were 106 (51%) males. Clinical variables significantly associated with an abnormal 6-CMP result were history of liver disease (LR 3.57 and P = .00), history of heart disease (LR 2.92 and P = .004), jaundice (LR >10 and P = .045), and hepatomegaly (LR 5.67 and P = .048). The presence of at least one variable had a LR 1.55, P < .001, and sensitivity of 84.1%. The false negative rate (failure of having at least one of the 12 clinical variables identify a patient with an abnormal 6-CMP) was nearly 16%. However, of the 10 patients for whom this false negative rate remained true, the 6-CMP values were marginally abnormal and performance of further investigation of these abnormal results was minimal to none. There were 66 patients with no clinical variables and normal CMP results. With a cost difference of $21 between BMP and CMP, this gives a potential savings of 66 x $21 = $1386 over a 71-day period and $7,125 if extrapolated over 1 year in a relatively low volume PED.

Conclusion: Limiting testing to a BMP for patients with none of the 12 clinical variables has the potential annual cost savings of $7,125.

**238** Moved to 16

**239** The Accuracy of the Yale Observation Scale Score and Unstructured Clinician Suspicion to Identify Febrile Infants Aged ≤60 Days With Serious Bacterial Infections

Nigrovic LC, Mahajan PV, Tzinnetatos L, Alpern ER, Rogers AJ, Simmons T, Casper C, Ramilo O, Kuppermann N/Boston Children’s Hospital, Boston, MA; Children’s Hospital of Michigan, Detroit, MI; University of California, Davis, Sacramento, CA; Lurie Children’s Hospital of Chicago, Chicago, IL; University of Michigan, Ann Arbor, MI; Pediatric Emergency Care Applied Research Network (PECARN) Data Coordinating Center, Salt Lake, UT; Nationwide Children’s Hospital, Columbus, OH

Study Objectives: Both the Yale Observation Scale (YOS) score and unstructured clinician suspicion have been used to predict the risk of serious bacterial infections (SBIs) in young febrile infants. However, the number of infants ≤60 days studied has been limited. Our objective was to assess the ability of the YOS score and unstructured clinician suspicion to identify febrile infants ≤60 days with SBIs.

Methods: We performed a planned secondary analysis of a prospective cohort study of non-critical febrile infants ≤60 days presenting to one of 26 emergency departments (EDs) in PECARN who had blood cultures obtained. We defined a SBI as urinary tract infection (UTI), bacteremia, or bacterial meningitis and only included infants whose SBI status was known. ED faculty and fellow clinicians applied the YOS score and also estimated the risk of SBI (50%) using unstructured clinician suspicion. We used previously described cut-points for the YOS (‘perfect’ score of 6 and ‘normal’ score of 10). We then compared the performance of the dichotomized YOS scores to unstructured clinician suspicion (≥1% and ≥5%) for the prediction of SBIs.

Results: We enrolled 4778 patients, of whom 4592 (96%) had known SBI status. Of these 4592 infants, 445 (9.7%) had SBIs of whom 348 (78% of SBIs) had UTIs. 1467 (32%) were ≤28 days of age. The median YOS score was different in infants with SBIs than those without (6 vs 6. P = .55). Performance of the YOS score and clinician suspicion for SBI is given in the table below. Of the 24 infants with bacterial meningitis, the YOS scores ranged from 6 to 26, with 2 (38%) having a score of 6 and 14 (58%) having a score ≤10. Clinician suspicion varied from 50% with 2 (8%) having risk assessments of <1% and 10 (42%) having risk assessments of ≤5%.

Conclusion: Neither the YOS score nor unstructured clinician suspicion could reliably exclude SBIs in febrile infants ≤60 days, including meningitis, in febrile infants ≤60 days of age. An accurate clinical prediction rule to identify infants at low and high risk for SBIs is needed.
Table. Performance of YOS and clinician suspicion

<table>
<thead>
<tr>
<th>YOS Score</th>
<th>Sensitivity n/N (95% CI)</th>
<th>Specificity n/N (95% CI)</th>
<th>Negative predictive value n/N (95% CI)</th>
<th>Likelihood ratio positive (95% CI)</th>
<th>Likelihood ratio negative (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt; 6</td>
<td>173/440 (39.3%, 34.8-44.1)</td>
<td>2697/4095 (65.9%, 64.4-67.3)</td>
<td>2697/2964 (91.0%, 89.9-92.0)</td>
<td>1.15 (1.01, 1.30)</td>
<td>0.92 (0.85, 0.99)</td>
</tr>
<tr>
<td>&gt; 10</td>
<td>52/440 (11.8%, 9.0-15.3)</td>
<td>3670/4095 (89.6%, 88.6-90.5)</td>
<td>3670/4058 (90.4%, 89.5-91.3)</td>
<td>1.14 (0.83, 1.45)</td>
<td>0.98 (0.95, 1.02)</td>
</tr>
<tr>
<td>≥ 1%</td>
<td>331/437 (75.7%, 71.4-79.6)</td>
<td>1542/4104 (37.6%, 36.1-39.1)</td>
<td>1542/1648 (93.6%, 92.2-94.7)</td>
<td>1.21 (1.14, 1.28)</td>
<td>0.65 (0.54, 0.76)</td>
</tr>
<tr>
<td>&gt; 5%</td>
<td>150/437 (34.3%, 29.9-39.0)</td>
<td>3302/4104 (80.5%, 79.2-81.7)</td>
<td>3302/3589 (92.0%, 91.1-92.9)</td>
<td>1.76 (1.50, 2.01)</td>
<td>0.82 (0.76, 0.87)</td>
</tr>
</tbody>
</table>

Conclusion: These results suggest that both devices have a moderate success rate in all children, including in those less than 8kg, with the EZ-IO potentially have higher success rates although not statistically significant. The EZ-IO, however does have a slower time to placement in all ages and had two minor complications. Data also suggests that IOs are placed more often in younger children with a low survival rate.

Table 1.

<table>
<thead>
<tr>
<th>All Groups</th>
<th>Manual</th>
<th>EZ-IO</th>
<th>Difference</th>
<th>95% CI</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Success Rate</td>
<td>15/27 (56%)</td>
<td>11/16 (69%)</td>
<td>13%</td>
<td>-43%-17%</td>
<td>0.602</td>
</tr>
<tr>
<td>Time (min)</td>
<td>5.17 (N=12)</td>
<td>10.3 (N=9)</td>
<td>5.13</td>
<td>0.39-9.95</td>
<td>0.037</td>
</tr>
<tr>
<td>Mean ESI 1</td>
<td>4.15</td>
<td>6.32</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Deviation (min)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 2.

<table>
<thead>
<tr>
<th>≤ 8kg</th>
<th>Manual</th>
<th>EZ-IO</th>
<th>Difference</th>
<th>95% CI</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Success Rate</td>
<td>13/25 (52%)</td>
<td>3/4 (75%)</td>
<td>23%</td>
<td>-75%-29%</td>
<td>0.751</td>
</tr>
<tr>
<td>Time (min)</td>
<td>4.5 (N=10)</td>
<td>8.67 (N=3)</td>
<td>4.17</td>
<td>-11.28</td>
<td>0.212</td>
</tr>
<tr>
<td>Mean ESI 1</td>
<td>3.92</td>
<td>7.51</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Conclusions: Obese and overweight pediatric patients receive insignificantly lower total doses of ketamine for fracture reduction but have similar length of sedation times and experience similar rates of side effects as normal weight patients.

Table 2.
Methods: Data 12 months pre and post triage was collected using electronic medical records. Differences in utilization were calculated using both a paired t-test and a non-parametric Wilcoxon signed rank test. Multivariate regression was used to model demographic data. Univariate regression was used to model types of service utilization, given that each participant served of their own control. The original intent was to apply average actual cost data to the utilized services and compare these amounts pre and post triage. STATA data analysis and statistical software was utilized.

Results: The study population consisted of 3,036 ED patients, 1038 of whom had documented PCC visits as their sentinel event. The average age was 57 years old, 90% were male, and the majority presented to the ED by 12 noon. The most common complaint was medication refill followed by back pain. Post triage ED visits increased by 0.31 (95% CI -0.005 - 0.622, P < .001), hospital admissions increased by 0.72 (95% CI 0.0063 - 0.138; P < .001), and PCC visits increased by 2.95 (95% CI 2.60 - 3.32, P < .001).

Conclusions: Triage of low acuity ED patients to a primary care clinic and patient-centered medical home increases subsequent utilization of health care services, including ED visits, hospital admissions, and primary care visits. Over the short term of 12 months, costs will therefore be expected to increase. Future study should assess longer term changes in utilization and cost, and determine how this study population might differ from others.

243 Exploring Patient Characteristics and Potential Cost Savings for Home Health as an Alternative to Hospital Admission After Emergency Department Treatment
Crowley C, Brennan J, Stuck AR, Killeen J, Wittgrove A, Martinez T, Castillo E/West Health Institute, La Jolla, CA; University of California, San Diego, San Diego, CA

Study Objectives: Inpatient hospital care represents the largest component of total health care spending in the U.S. With over 50% of inpatients admitted through the emergency department (ED), emergency physicians effectively act as gatekeepers to hospital admissions potentially playing an important role in lowering health care cost. A specific opportunity may exist to develop home-based alternatives. The purpose of this pilot study was to characterize potential patients identified by emergency physicians and to estimate Medicare cost savings of home health care as an alternative to inpatient admissions arising from the ED.

Methods: The pilot was a prospective, cross sectional survey of patients admitted to medical/surgical units in an academic health system with 2 hospitals with a combined annual census of 75,000. Patients were recruited over a seven-month period. A survey tool was used with the patient and emergency physician to obtain patient preference for home-based treatment, were it available as an alternative to inpatient admission. The emergency physician attending was then asked if those patients would be candidates for home-based care. For each candidate, medical record data were queried to characterize the inpatient episode of care. Cost savings were estimated by developing hypothetical home health clinical counterparts to the hospital-based episodes. Functional status and service needs were also assessed. These assessments were then used to complete pertinent line items in the Medicare Outcomes and Assessment Information Set (OASIS) used by home health agencies. OASIS data were then used to estimate county-wide payments for equivalent home health services using a Medicare Home Health Resource Grouper (HHRG). The HHRG payments were adjusted to include average ancillary costs for medications, laboratory, imaging and durable medical equipment (DME). The adjusted HHRGs were then used to calculate the county-wide average DRG payments for the inpatient episodes. A total of 19 patients were included in the study analysis.

Results: Emergency physicians selected 25 of the 63 patients (40%) as candidates for home health instead of admission. Of these 25, 4 were excluded from analysis because they were not admitted and 2 because no DRG was designated. Of the 19 patients included, 15 (79%) indicated they would prefer their health care at home. The top three diagnoses included gastrointestinal disorders (4%), pneumonia or respiratory infection (4) and cellulitis (3). Services needed to enable home-based care included IV antibiotics, IV hydration, and laboratory analysis. For the patients enrolled in the study, the average cost savings between the DRG reimbursement and the constructed home health episode was $4144 ($1828-39857).

Conclusion: The pilot study suggests (1) that emergency physicians would designate certain patient cohorts for home-based care as an alternative to admission following ED treatment and (2) that estimated Medicare cost saving would be significant for this alternative. Future studies are needed both to explore the availability of home health services capable of responding to the needs of ED referrals, and also to confirm the cost savings estimates.

244 Independent Pharmacies: Where Are They Located and Does Location Influence Price?
Terp S, Sood N, Joyce G, Menchine M, Arora S/USC Keck School of Medicine, Los Angeles, CA; USC Schaeffer Center for Health Policy and Economics, Los Angeles, CA

Study Objectives: Primary medication non-adherence leads to worse health outcomes and increases overall health care costs. This is particularly true in time-sensitive acute infections, where the impact of not taking antibiotics is seen immediately via spread of disease, development of sepsis and life-threatening end stage disease complications. Cost is the main driver of unfilled prescriptions, and many cash-pay patients may turn to independent pharmacies in their neighborhood looking for a cheaper price as big chain prices tend to be more standardized. The objective of this study is to describe the proportion of pharmacies in Los Angeles County that are independent in high- and low-income areas, and describe the mean price difference offered for the most commonly prescribed antibiotics for pneumonia.

Methods: There are 164 total zip codes in Los Angeles with a population greater than 10,000, which we ranked from least to most affluent based on median household income. We defined low-income zip codes as those in the bottom quartile of the list (41 zip codes), and high-income zip codes as those in the top quartile of the list (41 zip codes). A complete list of all pharmacies within the resultant 82 zip codes Los Angeles County was obtained from the California Board of Pharmacy. Using a standardized script, research assistants called all independent pharmacies during July 2014 in the top and bottom quartiles of zip codes requesting cash prices for the generic forms of seven 500 mg tabs of levofloxacin and six 250 mg tabs of azithromycin for a hypothetical uninsured patient with pneumonia. Mean price for each antibiotic was compared between high- and low-income areas using an unpaired t-test.

Results: We obtained information from 529 pharmacies with a phone price response rate of 97%. Of 263 pharmacies in high-income zip codes 98 were independent compared with 173 of 266 pharmacies in low-income zip codes (37% vs 65%; P < .01). The mean price for a course of levofloxacin was $37.55 (95% CI $29.06-$46.03) in high-income regions compared with $28.76 (95% CI $23.83-$33.69) in low-income regions (P = .06). The mean price for a course of azithromycin was $27.75 (95% CI $23.16-$32.35) in high-income regions compared with $23.27 (95% CI $21.70-$24.89) in low-income regions (P < .03). In turn the mean price of levofloxacin was 30% (about $9) higher and the mean price of azithromycin was 17% (about $5) higher in high-income regions compared with low-income regions of Los Angeles County.

Conclusion: Independent pharmacies make up a significantly greater proportion of total pharmacies in low-income areas of Los Angeles County. We observed price variation between the regions, with cash-pay patients theoretically saving up to 30% by shopping in low-income neighborhoods. This is likely due to basic economic principles of making goods more accessible for the local population by adjusting the price appropriately. Patients and providers should be aware of the value of price shopping for medications if choosing an independent pharmacy, and this knowledge may help mitigate primary non-adherence.

245 Why Do Patients Come to the Emergency Department After Receiving Care for the Same Problem in Other Health Care Settings?
Burner E, Terp S, Flores EU, Menchine M, Arora S/USC Keck School of Medicine, Los Angeles, CA

Study Objectives: Patients seek care in the emergency department after previous health care encounters in other settings for a variety of reasons ranging from referral for a higher level of care or tests to dissatisfaction with the service they received previously. The magnitude of this "second-visit" in urban, low-income populations is not well described. In this study, we examined the proportion of patients who visited the emergency department (ED) after seeking care elsewhere, and their motivations for doing so.

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Methods: Trained research assistants enrolled consecutive patients age 18-65 in a cross-sectional study at an urban, safety-net hospital from June 2013 to July 2013. Patients reported their primary language, ethnicity, insurance status, and immigration documentation status. Additionally, patients reported any care they received for their chief complaint prior to their emergency department visit. If a patient had seen a health care provider for the same problem, the health care visit was categorized by type of health care encounter. Patients also answered questions about why they came to the ED after receiving care elsewhere, and could choose more than one option. We presented the overall results descriptively. We performed a stratified analysis by language, insurance status, immigration documentation status and ethnicity to examine differences in motivation for “second visit” ED care using chi-squared tests.

Results: Of the 1243 patients who participated in the survey, 346 patients (28%) had previously seen a health care provider for the same problem that brought them to the emergency department. A majority of patients (55%) had been seen at an urgent care or walk-in clinic prior to their ED visit, while 23% had been seen at a previously scheduled routine appointment, 13% had been seen at a different emergency department and 9% had been seen at a scheduled same-day appointment with their regular clinic. Of the 346 patients who sought care previously, 42% (146) reported they came to the ED because they needed tests or services not available in the location they where initially seen, 36% (126) reported that they were sent directly from the previous location, 34% reported they could not afford the medication or tests needed, 22% reported their medical condition had worsened since prior evaluation, and 10% reported they were not satisfied with the care they received at the previous health care encounter. When examining the impact of language, ethnicity, immigration status and insurance, we found that Spanish speakers were more likely to have been referred from a previous health care encounter (30% compared to 24%, P = .04), and less likely to have come to the ED because they needed tests or services not available in their prior health care site (38% vs 50%, P = .03). No other factor had an impact on patients’ prior care or motivations for coming to the emergency department.

Conclusion: In our safety-net ED population, the most common reasons for a second visit after a prior encounter are that patients need services and tests not available in their prior sites and are directly being referred by these previous health care providers. Interventions to steer patients into appropriate care channels will require communication with outside clinics and emergency departments to coordinate care, share medical information appropriately and find the ideal care site for these patients.

Admissions Within Seven Days of an Emergency Department Discharge

Brennan JJ, Chan TC, Vilek GM, Killeen JP, Hsia RY, Tehaney K, Castillo EM/University of California, San Diego, San Diego, CA; University of California, San Francisco, San Francisco, CA

Study Objectives: Patients who are discharged from the emergency department (ED) and return and are admitted within a short period of time can be considered “high risk.” Either their condition progressed, or it may have been misdiagnosed during the initial ED encounter. The purpose of this study is to identify and describe patients discharged from an ED with who are admitted within seven days of the discharge.

Methods: This was a multi-center retrospective longitudinal cohort study of all hospital ED visits in California in 2011 using non-public data from 324 licensed non-military acute care hospitals in the state of California. Visits without a valid patient identifier and patients under the age of 18 years or who expired were excluded. The seven-day post ED discharge admission rates were calculated and the clinical classifications and admission primary diagnoses are reported. Logistic regression was used to assess independent associations between demographic characteristics (age, gender, race/ethnicity and payer) between those who were discharged from the ED and returned within seven days and those who did not return in that period.

Results: During the 12-month study period, 3,750,420 patients with a total of 6,105,015 index ED discharges were identified. A total of 117,884 patients (3.1%) were admitted within the seven-day follow-up period. The majority of patients who returned were between 45 and 64 years of age (35.2%), female (54.0%), non-Hispanic white (55.9%) and had Medicare as their primary payer (42.4%). The top three clinical classifications at ED discharge preceding a 7-day hospital admission were abdominal pain (9.1%), skin and subcutaneous tissue infections (4.1%), and non-specific chest pain (3.9%). The most common admitting primary diagnoses were septicemia (5.5%), other cellulitis and abscess (4.5%) and cholelithiasis (3.1%). In the logistic regression model, patients with Medicare (OR = 2.3, 95% CI = 2.2, 2.3) and Medi-Cal (OR = 2.0, 95% CI = 1.9, 2.0) were more likely to be admitted within seven days compared to private insurance.

Conclusion: In this study of all 324 non-military licensed EDs in California, a substantial number of patients were discharged from an ED and then were admitted within seven days were identified. A large proportion of these patients had been admitted for potentially serious conditions.

Emergency Physician X-Ray Ordering as a Function of the Patient’s Primary Language

Bilal S, Kuo D, Peacock WF, Pillow MT/Baylor College of Medicine, Houston, TX

Study Objectives: To study the effects of the patient’s primary language on emergency physician x-ray ordering.

Methods: This is a retrospective 15-month case control study performed at a Level 1 trauma center in Houston with an annual census of >100,000 patients. Using a convenience sample, patients’ were stratified by triage level (1 = high, 5 = low acuity) and language group divided into English and non-English speakers. Race was self-identified. The inclusion requirements were age ≥18, triage level and self-reported primary language recorded. X-ray ordering was defined as obtaining an ultrasound (US) and/or computed tomography (CT) imaging of any type while in the ED. Univariate analysis was performed and results presented with 95% confidence intervals. We do not report data on triage levels 1 and 5 (n = 80), as x-ray ordering is protocol driven (level 1), or extremely rare (level 5).

Results: A total of 1692 patients met the entry criteria. Of these 1035 were female, 382 spoke English, 674 spoke Spanish, and 636 neither. 50.6% were Latino, 35% Asian/Pacific Islanders, 5.9% African-American, 2.4% Caucasian, and 6.1% other. The mean (SD) age of English speakers was 43.9 (±16.4) vs 55.2 (±13.9) for non-English. Overall, there were no differences in x-ray ordering practices in the higher triage acuity cohorts; however, in the lower acuity cohort (triage 4) non-English speakers were nearly 500% more likely to receive imaging than English language speakers.

Conclusion: Physicians are more likely to order imaging studies for non-English speaking lower triage acuity patients. Mitigating the consequences of limited English language fluency may benefit patient care and ED operational considerations.

<table>
<thead>
<tr>
<th>Triage level</th>
<th>X-ray English % (95% CI)</th>
<th>X-ray non-English % (95% CI)</th>
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<tbody>
<tr>
<td>2</td>
<td>26.3 (16.9-37.7)</td>
<td>24.6 (17.6-31.7)</td>
</tr>
<tr>
<td>3</td>
<td>24.2 (18.5-29.9)</td>
<td>32.0 (27.4-36.6)</td>
</tr>
<tr>
<td>4</td>
<td>2.9 (0.34-10.1)</td>
<td>18.2 (10.3-28.6)</td>
</tr>
</tbody>
</table>

Can Data From a Health Information Exchange Be Used to Describe Frequent Emergency Department Users Within a Region?

Saeif SH, Carr CM, Bush JS, Bartman M, Sender AB, Spearman JB, Zhao W, Su Z, Zhang J, Arnaud C, Obeid J/Medical University of South Carolina, Charleston, SC

Background: A small but significant number of patients make frequent emergency department (ED) visits to multiple EDs within a region. We have a health information exchange (HIE) that includes every ED encounter in all hospital systems in our region. Using our HIE we were able to characterize frequent ED users in our region regardless of hospital visited or payer class.

Study Objectives: Use data from an HIE to characterize patients who are frequent ED users (FEDUs).

Methods: We constructed a database from a cohort of adult patients (18 years of age or greater) who had information in a regional HIE for a one-year period beginning March 2012. Patients were defined as FEDUs (those who made 4 or more visits during the study period) and Non-FEDUs (those who made <4 ED visits).
visits during the study period.) Predictor variables included age, race, sex, payer class, county of residence, and ICD-9 codes. Bivariate (chi square) and multivariate (logistic regression) analyses were performed to determine associations between predictor variables and the outcome of being a FEDU. Payer class was divided into self-pay (no insurance), Medicaid, Medicare, dual payer (Medicaid & Medicare), and commercial insurance. Data were uploaded into SAS (Cary, NC) for analysis. Diagnostic codes were taken from the International Statistical Classification of Diseases and Related Health Problems (ICD-9). Our HIE uses an opt-out method of registration. During the study period no patients opted out of the HIE making our database comprehensive with respect to ED visits within the region. Results: The database contained 127,672 patients of which 9.6% (12,293) were FEDUs. Logistic regression showed the following patient characteristics to be significantly associated with the outcome of being a FEDU (OR, 95% CI): Age = 35-44 years old [1.158, 1.015-1.320]; Race = African-American [1.088, 1.026-1.153]; Payer Class = Medicaid [1.710, 1.574-1.857]; Payer Class = Medicare [1.767, 1.574-1.985]; Payer Class = Dual Pay (Medicaid/Medicare) [2.813, 2.468-3.207]; ICD-9 = 780-799 (Ill-defined conditions) [19.106, 17.900-20.395]; ICD-9 = 280-289 (Diseases of the blood) [15.242, 11.387-20.409]; ICD-9 = 290-319 (Mental Disorders) [12.189, 11.363-14.46]; ICD-9 = 480-799 (Skin and SO Tissue) [11.034-13.593]; ICD-9 = 710-739 (MSK and CT DZ) [11.163, 10.872-12.466]; ICD-9 = 460-519 (Respiratory Disease) [10.248, 9.441-11.125]; ICD-9 = 520-579 (Digestive Disease) [10.150, 9.284-11.096]. No significant differences were noted between men and women. Conclusion: Data from an HIE can be used to describe patients within a region who are FEDUs regardless of the hospital system they visited. This information can be used to focus care coordination efforts and link appropriate patients to a medical home. Future studies can be designed to learn the reasons why patients become FEDUs and interventions can be developed to address deficiencies in health care which result in frequent ED visits.

249 EMF Usability of the Massachusetts Prescription Drug Monitoring Program in the Emergency Department Poon SJ, Greenwood-Eriksen MB, Gish RE, Neri PM, Takharr SS, Schuur JD, Landman AB/Harvard Medical School, Boston, MA; Brigham and Women’s Hospital, Boston, MA; Partners Healthcare, Wellesley, MA

Study Objectives: Prescription drug monitoring programs (PDMPs) are underutilized, despite evidence showing that they may reduce the epidemic of opioid-related addiction, diversion and overdose. We hypothesized that the Massachusetts (MA) PDMP is not optimized for patient care in terms of its information technology (IT) usability, which is a barrier to use especially for emergency providers (EPs) who face intense time pressure during clinical work. We aimed to evaluate the IT usability and efficiency of the PDMP in one state (MA) by emergency physicians, by comparing it to three other common tasks performed by emergency physicians.

Methods: We recruited 20 emergency physicians (15 attending physicians and 5 EM Physician Assistants) at a large urban academic medical center. Participants performed four tasks in a random order: (1) order a CT-PE scan including completing detailed computerized decision support, (2) write a prescription for oxycodone, (3) search the MA PDMP, and (4) search the SureScripts Medication History Service (a patient medication history service) integrated within the hospital’s EMR. A usability research software program, Moraes (TechSmith, Okemos, MI), was used to record user interactions with the system, including the time and number of mouse clicks required to complete each task. We analyzed the data using random effects modeling with bootstrap confidence intervals (BCIs) to account for both the correlations between users and tasks, as well as the small sample size.

Results: The PDMP task took a statistically significant longer time (mean 4.22 mms) and a greater number of mouse clicks (mean 50.3 clicks) to complete than the CT-PE, prescription and SureScripts tasks (all P < .01, 95% BCIs in table). There were no differences in time between the CT-PE, prescription writing, and SureScripts tasks. The SureScripts task took the least clicks to complete.

Conclusion: The MA PDMP is less useful for patient care compared to three other commonly performed tasks. Integrating the data from PDMPs into the EMR, like the SureScripts feature, would improve clinician workflow through less time and fewer clicks, which could increase the use of the MA PDMP. Future research should assess all state PDMPs for ED usability.

Table. Results

<table>
<thead>
<tr>
<th>Task</th>
<th>N</th>
<th>Mean</th>
<th>95% CI</th>
<th>PDMP vs Task</th>
<th>95% BCI</th>
</tr>
</thead>
<tbody>
<tr>
<td>TIME (minutes)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PDMP</td>
<td>17</td>
<td>4.22</td>
<td>3.01-5.44</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>CT-PE</td>
<td>17</td>
<td>1.42</td>
<td>1.24-1.60</td>
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<td>1.77-3.83</td>
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<tr>
<td>SureScripts</td>
<td>17</td>
<td>1.45</td>
<td>1.07-1.83</td>
<td>+2.77</td>
<td>1.86-3.68</td>
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<tr>
<td>PDMP</td>
<td>16</td>
<td>50.3</td>
<td>30.5-70.1</td>
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<td>-</td>
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<tr>
<td>CT-PE</td>
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<td>SureScripts</td>
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<td>19.5</td>
<td>11.4-27.6</td>
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<td>12.3-45.6</td>
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<tr>
<td>PDMP</td>
<td>11</td>
<td>9.5</td>
<td>6.0-13.2</td>
<td>+39.2</td>
<td>22.8-55.7</td>
</tr>
</tbody>
</table>

250 Derivation of a Decision Instrument to Determine Which Patients With Skin and Soft Tissue Infections Are Appropriate For Discharge

Kadera SP, Wilson MJ, Mower W, VanderKraan V, Gupta M, Talan DA/UCLA, Los Angeles, CA; Antelope Vally Hospital, Lancaster, CA; Olive View-UCLA, Sylmar, CA

Study Objectives: Most of the 860,000 patients hospitalized each year in the United States for skin and soft tissue infections (SSTI) have uncomplicated recoveries once antibiotics are administered. High-level hospital interventions, such as surgery or intensive care unit (ICU) therapy, are rare, and mortality is extremely low, suggesting that current admission rates are excessive. We hypothesize that a decision instrument, based on a limited number of criteria with good inter-rater reliability, can accurately identify SSTI patients who are medically appropriate for outpatient management. Potential candidates for outpatient management must have a low risk of mortality and a low risk of requiring intensive inpatient services, such as surgery in the operating room (OR) or admission to the intensive care unit (ICU).

Methods: In this nonconcurrent cohort study, we performed a standardized retrospective chart review of approximately 2,500 randomly selected cases treated at one of three urban or suburban emergency departments (ED) with an ICD-9 diagnosis code of cellulitis, abscess or wound infection in 2013 and 2014. Subjects were excluded from the study if they were under 18 years old, had known or suspected necrotizing fasciitis, diabetic foot infection, peri-rectal infection, genitourinary tract infection, septic arthritis, osteomyelitis, infection of a prosthetic device, decubitus or ischemic ulcers, infection from an animal bite, burns or chronic skin conditions. Our trained abstractors recorded the following data on each patient: age, sex, race, ethnicity, comorbidities, injection drug use, prisoner status, homelessness, SSTI size measurement, SSTI location, abscess, wound infection, prior SSTI at same and different locations, extremes of vital signs in the emergency department, initial laboratory values imaging results, prior antibiotic use, disposition, length of stay, ICU admission, surgery in the OR, bedside incision and drainage and death. We randomly parsed the sample in half to do a derivation to build a decision instrument using recursive partitioning to identify the composite outcome of surgical intervention in the OR, ICU admission, and death. We plan to use the other half of the sample for internal validation.

Results: Of the 1,185 cases in our partitioning, 43 experienced at least one of the composite adverse outcomes. Our derivation analysis found 7 variables that could identify all of these subjects with a sensitivity of 100% (lower 95% confidence limit 91.7%). These variables include: (1) Abnormal advanced imaging (CT/MRI); (2) Creatinine > 1.6mg/dL; (3) Systolic blood pressure < 100mmHg; (4) Abnormal white blood cell count (> 12,000/uL, or < 4,000/uL); (5) Recent prior antibiotics (within 4 weeks); (6) Current prisoner; (7) Large area of erythema (> 75 cm2). 430 subjects (36%) without any of these 7 variables did not experience any of the adverse outcomes, including 41 subjects who were admitted (15% of all admissions).

Conclusions: Our results suggest that a small number of variables can accurately identify SSTI subjects in the ED who are at extremely low risk for adverse events. If prospectively validated, a decision tool based on these criteria could help emergency physicians safely reduce unnecessary hospital admissions and cost.
251 EMF  Inadequate Immune Response to Staphylococcus Aureus in Complicated Abscess Infections

Femling J, Bryan C, Hall P/University of New Mexico, Albuquerque, NM

Study Objectives: Abscess infections frequently present to the emergency department (ED) and are an opportunity to determine the molecular factors that contribute to disease severity. The goal of this work was to determine the concentration of host immune mediators including IFN-γ, IL-17, IL-18, and TNF-α and apolipoprotein B (apoB) in complicated and simple infections caused by Staphylococcus aureus. We hypothesized that complicated infections would have deficiencies in local host immunity and enhanced bacterial virulence. To test this hypothesis we measured both host proteins and bacterial virulence gene expression in complicated and simple abscesses.

Methods: We obtained abscess fluid from subjects presenting to the ED with simple and complicated infections as defined by current clinical guidelines. We then performed multiplex protein analysis on collected abscess fluids and patient serum samples. In addition, we examined S. aureus virulence gene expression by quantitative-PCR.

Results: We found differences in cytokine profiles with complicated abscesses having altered IFN-γ, IL-17, IL-18, TNF-α, and IL-10 responses when compared to simple abscesses. We found that apoB, which disrupts bacterial quorum sensing, was lower in complicated infections. In addition to differences in the local inflammatory responses, several bacterial virulence genes were upregulated in complicated infections. These genes include bacterial toxins and bacterial stress response genes.

Conclusion: Together these findings translate clinical findings of disease severity into molecular determinants of pathogenesis and reveal a potential mechanism by which future antimicrobials could enhance treatment. Specifically, these data identify local host defects in inflammation and control of bacterial communication. These defects are associated with increases in bacterial virulence gene expression and reveal a potential role for quorum sensing inhibitors as a way of augmenting defective host immunity.

252 Comparison of Clinical Characteristics and Outcomes of Medical versus Surgical Management of Peritonsillar Abscess

Souza DL, Cabrera D, Gilani WI, Campbell RL, Lohse CM, Carlson ML, Bellolio MF/Mayo Clinic, Rochester, MN

Study Objectives: Current guidelines for management of peritonsillar abscess (PTA) recommend aspiration or incision and drainage (surgical management) with success rates near 99%. To determine the effectiveness of medical management compared to surgical intervention for initial treatment of PTA and to determine factors that influence treatment failure.

Methods: A consecutive cohort of patients presenting between 2010-2014 with the final diagnosis of PTA (ICD-9 code 475) were included. Peritonsillar cellulitis and tonsillolith infection were excluded. Comparisons between groups were evaluated using two-sample t-, Wilcoxon rank sum, chi-square, and Fisher exact tests depending on the type and distribution of the feature. All tests were two-sided and P < .05 were considered statistically significant.

Results: Among the 297 patients who presented with PTA during the 5-year period, 97 (33%) underwent primary medical management and 200 (67%) received upfront surgical treatment. The decision to pursue medical versus surgical treatment was per clinician judgment. Patients on the surgical group were slightly older (mean age 23.5 vs 22 years, P = .03); there was no difference by sex (P = .42). Regarding presenting symptoms, laboratory findings and imaging utilization, we found no difference in sore throat (P = .1), throat swelling (P = .78), neck pain (P = .55), neck swelling (P = .24), history of prior episodes (P = .84), elevated white blood count (P = .09) or presence of immunosuppression (8% vs 6%, P = .36). There was no difference in the rate of imaging (59% vs 55%). However, patients who received upfront surgical therapy had larger abscesses (2.6 vs 1.3 cm, P < .001), were less likely to have fever (63% vs 51%, P < .05), more likely to have muffled voice (P < .001), drooling (P = .03), peritonsillar bulge (P < .001), trismus (P < .001), uvular deviation (P < .001), and dysphagia (P = .008). There was no difference in the rate of antibiotic (100%) and steroid (65%) administration. Among those who underwent medical treatment, 5% (n=5) failed and required subsequent surgical drainage. Among those who underwent surgical treatment, 3% (n=5) patients failed and required a second drainage. There was no difference in length of hospital stay (P = .27) or complications (2% vs 1%, P = .6). Patients treated medically were more likely to be admitted to the hospital for observation (22 vs 11%, P = .014). A total of 46 patients returned to the ED. There was no difference in return visits (20% medical vs 14% surgical, P = .17) (Table).

Conclusion: The failure rate of medical or surgical management was very low in this cohort, limiting our ability to identify predictors of medical failure. These findings suggest that initial medical management can be considered in patients with less advanced symptoms or smaller abscesses without compromising outcome. Those with drooling, trismus, muffled voice and uvular deviation or large abscess size may benefit from surgical drainage. A prospective randomized trial is needed to further elucidate optimal management strategies in patients with PTA.

253 Electronic Best Practice Advisories Effectiveness in Detecting Sepsis in the Emergency Department

Taii C, Patel K, Vincent A, Zerovska N, Norris D, Tills W, Hafner JW, Jr./University of Illinois College of Medicine at Peoria, Peoria, IL; University of Illinois College of Medicine/OSF Saint Francis Medical Center, Peoria, IL; OSF Saint Francis Medical Center, Peoria, IL

Study Objectives: The incidence of severe sepsis is 750,000 cases per year in the U.S. and Canada, causing significant morbidity and mortality. Current guidelines from the Surviving Sepsis Campaign (SSC) recommend administering appropriate antibiotics within the first 3 hours of recognition of severe sepsis and septic shock; delayed antibiotic treatment is associated with increased morbidity. Best practice advisories (BPAs) are reminder tools within the Epic electronic health record (EHR) system that provide clinical decision support. This study aims to evaluate if BPAs are effective at detecting potentially septic patients in an emergency department (ED) setting.

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Methods: A structured retrospective review of medical records was conducted at an academic urban emergency department (annual visits >85,000) of patients who initially met systemic inflammatory response syndrome (SIRS) criteria after an electronic BPA was implemented (March 1, 2014 to March 30, 2014 and the first 7-day monthly period of April 1, 2014 to September 30, 2014). The BPA Sepsis Risk Scoring System was created based on the SSC guidelines and guided by the Detecting and Treating Sepsis manual from Epic Systems. A score >2.5 meant that a patient met SIRS criteria, is potentially septic, and triggered the BPA. The definitive diagnosis of sepsis for ED SIRS visits was based upon final diagnostic related group (DRG) coding and further established by imaging modalities, urinalysis, and physical exam findings on chart review. BPA’s sensitivity, specificity, PPV, NPV was calculated and 95% confidence intervals (CI) established.

Results: Over the course of the study period, 13,906 records were screened, 565 BPA’s fired and 313 cases of sepsis were confirmed (2.3% prevalence). The BPA’s sensitivity and specificity was 74.5% (95% CI 69.2-79.1%) and 97.6% (95% CI 97.3-97.8%) respectively, with positive and negative predictive values of 41.2% (95% CI 37.2-45.4%) and 99.4% (95% CI 99.3-99.5%) respectively. The BPA’s positive and negative likelihood ratios (LR) (weighted for prevalence) were 0.70 (95% CI 0.62-0.79) and 0.006 (95% CI 0.005-0.008). No significant changes were noted in the BPA sensitivity or specificity when confined to sepsis or septic shock.

Conclusion: BPA’s were an effective EHR-based tool that detected potentially septic patients with moderate sensitivity and high specificity in our ED. The test’s high negative LR and negative predictive value make it valuable in excluding sepsis as differential diagnosis in a general ED population. Future directions for follow-up studies include cost analysis, morbidity/mortality studies, and multicenter comparisons of other quality metrics that can be improved by having a system such as BPA that reduces time to appropriate medical intervention.

Identification of Adults With Cerebrospinal Fluid Pleocytosis at Low Risk for Bacterial Meningitis

McArthur R, Edlow J, Nigrovic L/Beth Israel Deaconess Medical Center, Boston, MA; Children’s Hospital Boston, Boston, MA

Background: The Bacterial Meningitis Score classifies children with cerebrospinal fluid (CSF) pleocytosis and none of the following predictors as very low risk for bacterial meningitis: positive CSF gram stain, CSF absolute neutrophil count (ANC) ≥1000 cells/mm3, CSF protein ≥80mg/dL, peripheral blood ANC ≥10,000 cells/mm3, or a history of seizure prior to or at time of presentation. The performance of this clinical prediction rule in adults has not been evaluated.

Study Objectives: To determine the performance of the Bacterial Meningitis Score in adults with CSF pleocytosis.

Methods: We conducted a single-center retrospective study of all adult emergency department (ED) patients with a CSF pleocytosis (defined as a CSF white blood cells (WBC) ≥10 cells/mm3) between November 2003 and October 2013. We classified case of bacterial meningitis with a positive CSF or blood culture and aseptic meningitis with negative cultures. We then report the performance of the Bacterial Meningitis Score in the study population.

Results: We identified 711 patients with CSF pleocytosis of which 440 (62%) were eligible for study inclusion. Of these, 4 (1%) of cases had bacterial meningitis and 435 (99%) had aseptic meningitis. The Bacteraemia Meningitis Score had a sensitivity of 100% (95% confidence interval (CI) 40.3-100%), specificity 53% (95% CI 46.7-56.4%) and negative predictive value of 100% (95% CI 98.3-100%). If very low risk patients were discharged from the ED, hospital admission rates would have dropped from 85% to 53% (95% CI 46.7-56.4%).

Conclusion: Bacterial meningitis was very uncommon in adult ED patients with CSF pleocytosis. The Bacterial Meningitis Score accurately identified patients at low risk of bacterial meningitis, and might be helpful to assist clinical decisionmaking for adults with CSF pleocytosis.

Effect of Antimicrobial Disinfectant Wipes on Bacteria on Computer Equipment in the Emergency Department

Merritt M, Brown R, Glenn A, Chuadasana Y, Eberhardt M/St Lukes University Health Network, Bethlehem, PA

Study Objectives: Shared computers serve as a potential fomite for the spread of infection in the emergency department between health care workers and patients. The object of this study is to determine the duration of effect of disinfectant wipes on bacteria on computer mice in the emergency department (ED).

Methods: This was an exploratory study of five computer mice in an ED. Physician, nursing and unit clerk computer mice were initially swabbed for a baseline bacteria count. The mice were cleaned with antibacterial wipes. They were then swabbed at 5, 120, and 300 minutes after sanitization period.

Results: All computers showed a decrease in colony forming units (CFUs) immediately post cleaning with 4 out of 5 computers showing no bacterial growth. The number of CFUs varied among the computers from post cleaning and 2 hours and between 2 and 5 hours. All computers sampled showed an increase in bacterial growth after the 5 hours of use. Four out of 5 computers did not show CFUs at high as the pre-cleaning values after 5 hours. Overall there was a higher number of CFUs on the physician computers initially, with a total of 108 compared to nursing and unit clerk computers with 8 and 0, respectively. Post-cleaning cultures at 5 hours were similar when between nursing and physician computers.

Conclusion: In this small study there appears to be a lasting benefit to sanitization at the beginning of a shift to lessen transmission of bacteria between patients and health care workers and vice versa.
Sodium Zirconium Cyclosilicate for Patients With Severe Hyperkalemia: Subgroup Analysis of the Phase 3, International, Multicenter, Randomized, Double-Blind, Placebo-Controlled HARMONIZE Trial

Levy P. Rasmussen HS, Lavin PT, Singh B, Yang A, Peacock WF/Wayne State University, Detroit, MI; ZS Pharma, Inc., Coppell, TX; Boston Biostatistics Research Foundation, Framingham, MA; Baylor College of Medicine, Houston, TX

Study Objectives: Severe hyperkalemia (serum potassium [K+] ≥6.5 mEq/L) is a potentially fatal and urgent electrolyte disorder commonly seen in the emergency department. Sodium zirconium cyclosilicate (ZS-9) is a novel, orally administered selective K+ ion trap (SKIT) that binds K+ throughout the gastrointestinal tract. The safety and efficacy of ZS-9 for chronic K+ reduction have been previously demonstrated in the HARMONIZE study but little is known about the acute effects, particularly in patients with severe hyperkalemia. The study objectives were to analyze the subgroup of patients from HARMONIZE with severe hyperkalemia and evaluate the acute effects on K+ reduction after administration of a single dose of ZS-9.

Methods: HARMONIZE was a Phase 3, multicenter, randomized, double-blind, placebo-controlled trial evaluating ZS-9 in 258 patients with serum K+ ≥5.1 mEq/L. This was a secondary analysis of the first 48 hours of the HARMONIZE study, during which patients received open label ZS-9 10 g (TID for 2 days; doses given at 0, 4, 10, 24, 28, and 34 hours) for the treatment of hyperkalemia. For this analysis, only patients with a baseline K+ ≥6.5 mEq/L were included. We report K+ measurements at 1, 2, 24, and 48 hours after treatment with ZS-9.

Results: Nine patients had baseline K+ ≥6.5 mEq/L, all of whom had a history of chronic kidney disease (89% male; 67% white; 89% on renin-angiotensin-aldosterone system [RAAS] inhibitors); 44% and 78% had concurrent history of heart failure and diabetes mellitus, respectively. Median age was 62 years. Mean K+ at baseline was 6.7 mEq/L. After the first dose of ZS-9, at 1 and 2 hours following administration, K+ declined by 0.7 and 0.9 mEq/L, respectively (P < .01 vs. baseline, all time points). Normokalemia was achieved by 48 hours, with a mean total K+ decrease of 1.8 mEq/L, and mean K+ level of 4.9 mEq/L. No treatment-related serious adverse events were noted.

Conclusions: In patients with K+ ≥6.5 mEq/L, administration of a single 10-g dose of ZS-9 rapidly and significantly lowered serum K+ levels within 2 hours. These findings support the potential use of ZS-9 as an emergency intervention in patients with severe cases of hyperkalemia and warrant further study.

Alcohol Decreases Lactate Clearance in Acutely Injured Patients

Dezman ZDW, Corner A, Narayan M, Scola TM, Hirshon JM, Smith GS/University of Maryland School of Medicine, Baltimore, MD; National Study Center for Trauma and Emergency Medical Systems, Baltimore, MD

Study Objective: Injury is the fourth most common cause of disability-adjusted life-years lost in the United States. Alcohol is both a common risk factor for traumatic injury and it affects liver metabolism. Lactate is also metabolized in the liver, and lactate clearance (LC) as measured by serial lactate levels, is used to help determine whether injured patients are adequately resuscitated. The effect of alcohol on LC in injured patients is unknown. We hypothesized that injured patients with positive blood alcohol content (>BAC) will have a lower LC than those who are sober.

Methods: Retrospective cohort study of acutely injured patients seen at an urban level 1 trauma center between January 2010 and December 2012. Per institutional protocol, the blood alcohol and venous lactate levels are measured of all patients at the time of arrival and repeated six hours later. Patient demographics and test results were extracted from records. Inclusion criteria: (1) transported directly from the scene of injury, (2) two lactates within 24 hours of admission, (3) elevated initial lactate (>3.0 mmol/L). Exclusion criteria: Patients who died within 15 minutes of arrival, those transferred from other facilities, incomplete records, or did not have an elevated initial lactate or serial lactates. LC ((Lactate1-Lactate2)/Lactate1, %) was calculated for all patients. Chi-squared tests were used to compare sober and intoxicated subjects. LC was plotted against alcohol levels and stratified by the extremes of age (14-30 years [Figure 1A], 36.6 years [Figure 1C], 65 years [Figure 1B]) and ISS (ISS < 9 [Figure 1D], ISS ≥ 25 [Figure 1D]). Patients with >BAC above the legal level of care within a trauma system and can lower risk of death by 25%. Severely injured patients transported to local hospitals for initial care and stabilization must be assessed efficiently, including accurate disposition exchange with receiving trauma centers. Presently, published literature on the critical path of patient transfers amid trauma centers is limited.

Study Objective: The purpose of this study is to compare the patient transfer times after the implementation of a collaborative developed Door In/Door Out (DIDO) emergency medical services and level III trauma center protocol.

Methods: Montgomery County Hospital District (MCHD) conducted a retrospective analysis on all consecutive patient trauma transfers from January 10, 2013 through October 10, 2014, at Conroe Regional Medical Center (CRMC). Prior to the deployment, paramedics and emergency department staff received didactic training on the DIDO clinical guideline, which included a primary/secondary evaluation and physician decision within 30 minutes of patient arrival. Structured joint monthly quality meetings were conducted throughout the study period, which included 100% case review by MCHD and CRM trauma coordinators. Patient arrivals at destination, patient transfer times and study descriptive statistics were recorded.

Results: All 460 study patients were included, of these 256 (55%) were pre-DIDO 214 (84%) admitted, 11 (4%) died, 31 (12%) transfer. Comparatively, DIDO 183 (86%) admitted, 2 (1%) died, 28 (13%) transfer. Of the total 59 CRMC trauma transfers recorded, 31 (53%) were pre-DIDO. The mean transfer time pre-DIDO was 210 minutes versus DIDO of 154 minutes, a 27% decrease (P = .016). Injury severity score (ISS) means were pre-DIDO (12.4) and DIDO (13.4) (P = .698). The mean patient age was 34 years (range 2-79 years) and 49 (84%) were male.

Conclusions: The development of this protocol resulted in a significant decrease in throughput times for patient transfers with equivalent ISS to level I trauma centers. Further studies are warranted to evaluate the trauma transfer process which allows severely injured patients expeditious access to specialized resources and equipment.
Sensitivity of NEXUS Criteria in the Setting of Facial Fractures

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Study Objectives: Facial bone fractures have been associated with concomitant cervical spine fractures. However, studies comparing trauma patients with and without facial bone fractures have not identified an elevated risk of cervical spine injury. Clinical screening tools, such as the NEXUS criteria, have been developed and validated to identify patients at low risk of cervical spine injury. While some evidence has questioned the use of such criteria in certain patient populations such as the elderly or young children, the utility of such screening tools has not been examined in the setting of facial fractures.

Methods: Patient records from a single, Level I trauma center were screened for billing codes related to facial and cervical spine fractures over a 3-year period (July 1, 2010 to June 20, 2013). Charts were retrospectively examined for information related to patient demographics, physical examination and laboratory findings.

Results: A total of 73 patients were identified with concomitant cervical spine and facial fractures; 5% of these patients had clinically significant cervical spine fractures. Among patients with facial fractures, the sensitivity of the NEXUS criteria in identifying patients with cervical spine fractures was 94.6% for non-elderly patients (age < 65 years), but only 77.8% for elderly patients (age ≥ 65 years). However, when analysis was limited to patients with clinically significant cervical spine fractures, sensitivity of NEXUS criteria was 92.9% and 85.2% for the non-elderly and elderly patient groups, respectively. When the subjective complaint of neck pain was combined with the NEXUS criteria, the sensitivity in identifying patients with cervical spine fracture was increased to 96.4% for the non-elderly group, and 92.6% in the elderly group.

Conclusion: Our data suggest that, in the setting of facial fractures, NEXUS criteria are less sensitive among patients ≥ 65 years of age than for younger patients in the diagnosis of cervical spine fractures. When patients complaining of subjective neck pain (despite an absence of midline tenderness) are considered high-risk for cervical spine fracture, this sensitivity is improved.

### Table 1

<table>
<thead>
<tr>
<th>Age</th>
<th>Number of Patients</th>
<th>Sensitivity (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 65 years</td>
<td>65</td>
<td>94.6</td>
</tr>
<tr>
<td>≥ 65 years</td>
<td>8</td>
<td>77.8</td>
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Figure 1. Lactate clearance (y-axis) as a function of blood alcohol level (x-axis), stratified by the extremes of age (14-30 years [A], > 65 years [B]) and ISS (ISS < 9 [C], ISS > 25 [D]).

262 Initial Experience With Idarucizumab in Dabigatran-Treated Patients Presenting With Acute Traumatic Injuries: Interim Results From the RE-VERSE AD Study

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Study Objective: Dabigatran, an oral thrombin inhibitor, is widely used in the US for stroke prevention in atrial fibrillation and for treatment and secondary prevention of venous thromboembolism. In clinical trials, dabigatran is associated with fewer and less severe bleeding events than warfarin. Clinical trial results have subsequently been confirmed in large real-world studies. Still, bleeding on dabigatran therapy may occur. Although its activity can be countered by established, nonspecific treatment algorithms, a reversal agent for dabigatran would be helpful, especially in the emergency department (ED) management of acute trauma. Idarucizumab, a humanized Fab fragment directed specifically against dabigatran, rapidly reverses the anticoagulant effects of dabigatran in healthy volunteers and attenuates bleeding in animal injury models. Therefore, idarucizumab has the potential to simplify management of dabigatran-treated patients who present after serious trauma.

Methods: In the ongoing phase III RE-VERSE AD study (NCT02104947), dabigatran-treated patients with uncontrolled bleeding or who require emergency surgery are given 5 g of intravenous idarucizumab. The primary endpoint is the maximum reversal of the anticoagulant effect of dabigatran, based on central laboratory determination of the dilute thrombin time (dTT) or ecarin clotting time. Secondary endpoints include clinical outcomes, extent and duration of bleeding, local aPTT measures, use of other hemostatic therapies, blood product transfusions, and hemostasis at surgery (for patients who require operative management).

Results: Of the first 90 patients given idarucizumab in RE-VERSE AD, 9 dabigatran-treated patients had active, uncontrolled bleeding as a result of acute trauma, and 9 others were not bleeding but required emergency surgery. All 18 injured patients received the reversal agent in open-label fashion, based on the treating clinician’s impression that reversal was warranted. The injuries were: 9 fractures (3 femoral neck, 2 femur, 1 ankle, 1 wrist, 1 hip, 1 femur and spine) all requiring emergency surgery, 6 head traumas (3 subdural, 2 subarachnoid, 1 subarachnoid and intracerebral bleeds), and 3 blunt traumas leading to major soft tissue bleeding (1 retroperitoneal, 2 intramuscular). Mean age ±SD of the 18 patients was 76.53 ± 8.85 y. As measured by dTT, 5g idarucizumab resulted in complete reversal of dabigatran-induced anticoagulation in each case by the end of the infusion. Of the 9 fracture cases, hemostasis during surgery was reported to be normal in 7 cases, mildly abnormal in 1 case, and, due to polytrauma, not directly assessable in 1 case. Of the 9 cases with bleeding related to trauma, bleeding cessation was reported in 4 cases, reduction was reported in 2 cases, and bleeding status was not assessable in 3 cases. Of the 6 head trauma patients, the three subdural hematomas were additionally managed operatively. All 18 patients survived to hospital discharge.

Conclusions: Idarucizumab is a rapid acting, specific reversal agent for dabigatran. Preliminary results from the RE-VERSE AD study suggest that idarucizumab has the potential to streamline and improve the management of dabigatran-treated injured patients who require rapid drug reversal in the ED.
Study Objectives: To evaluate the CCHR in a MinHI cohort, assess physician rationale for CT utilization, and determine outcomes of injury in this presumed lower risk head injury population. To our knowledge this is the first study of its kind in patients with MinHI.

Methods: We conducted a prospective convenience sample of patients with MinHI and their emergency physician in which patients received head CT’s. Research assistants enrolled patients during the narrow window of time between a CT being ordered and the physician knowing the results of the scan. Emergency physician surveyed consisted of ED attendings and senior level residents. Patients were surveyed regarding their perceptions. Patients with positive CT findings had their medical records reviewed for admission length of stay, ICU stay, and any operative or procedural interventions.

Results: A total of 167 patients with MinHI were enrolled. Four (2.4%) patients had head CTs that were positive for ICH. All instances of ICH occurred in patients who were high or moderate risk by the CCHR [2 high risk (age), 2 moderate risk (mechanism)]. No patient with ICH went to the ICU nor had any intervention performed; the average hospital length of stay was 1.25 days. The specificity of the CCHR was 43% (95% CI 35-50). All 69 patients with MinHI who were CCHR negative had a negative head CT (100% sensitivity 95% CI 40-100). Physicians listed MD reassurance (29%), patient reassurance (28%), patient expectation (17%), and reduction of legal liability (13%) as rationale for ordering head CTs in patients with MinHI. Shared decision making was used in 49% of cases.

Conclusions: Risk of ICH in patients with MinHI was very low and without any serious adverse outcome including death, intubation, prolonged hospitalization, or surgical procedure. The CCHR was 100% sensitive in this small cohort of patients with MinHI. Rationale for using CT was multifactorial. If the same results could be replicated in a larger population, an argument could be made that head CT should never or rarely be used in the evaluation of MinHI.

264 Application of the Canadian Computed Tomography Head Rule to a Very Low Risk Minor Head Injury Population

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Background: The use of computed tomography (CT) is a fast and reliable test to determine with high sensitivity the presence of bleeding or other significant intracranial injury. Two high quality clinical decision rules (CDR), the Canadian CT Head Rule (CCHR) and the New Orleans Criteria (NOC) have set the current standards by which to guide clinicians in determining which patients need CT imaging; however, both of these CDRs were derived in patients with minor head injury (MHI) having had loss of consciousness (LOC) or witnessed disorientation. No evidence exists evaluating patients with minimal head injury (MinHI); that is, patients who had head injury but no LOC or disorientation and would have been excluded from the CCHR and NOC trials.

Methods: This is a before and after observational study of all patients who had NIT performed in a four-county EMS system with a catchment area of greater than 1.6 million. The policy change occurred on March 1, 2013. The before group consists of all patients who underwent NIT from May 1, 2007, when electronic patient care reports were introduced, until the date of the policy change. The after group consists of patients who underwent NIT from March 1, 2013 to March 31, 2015. All out-of-hospital records where NIT was performed were queried for demographics, mechanism of injury, initial status and clinical change following NIT. Hospital records were queried for exam findings on arrival to the hospital, any complications from NIT, and final outcome. The Trauma Registry was accessed to obtain Injury Severity Scores (ISS). Information was manually abstracted by study investigators and univariate analysis utilizing chi-squared and two-tailed t-tests was conducted as appropriate. This study was approved by the Community Medical Centers Institutional Review Board.

Results: There were a total of 169 patients in the before group and 103 in the after group. Between the two groups there were no statistical differences regarding age, mean weight, call status, ISS or mechanism. There were more women in the after group (21 vs 23%, P = .03). With regard to survival, there was no difference between the two groups (21 vs 23%, P = .03). No complications of NIT were reported in either group including in the 23 patients who underwent emergency department or operating room thoracotomy.

Conclusions: A change in EMS protocol requiring earlier placement of NIT and use of a longer, large needle in a different location does not change survival; however, it also did not increase reported complications.

265 Intramedullary Effects of Power-Infused Contrast by Intraseous Access

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Study Objectives: Vascular access is critical in managing unstable patients in the emergency department (ED). For difficult vascular access patients, intraosseous (IO) vascular access is an option. Often, they may need computed tomography (CT) scans with contrast for diagnostics; administered by a power injector. IO access to deliver contrast for CT examination has been reported as safe and successful. However, evidence is limited; and consists of a few case reports, preclinical studies and one clinical study with the focus on diagnostic image adequacy. A preclinical study was conducted to examine the immediate effects of power injection of contrast media on the medullary cavity and marrow in mature swine.

Methods: Institutional Animal Care Use Committee approval was obtained. IO access was established bilaterally in the proximal humeri (PH) of anesthetized swine (N=8). One unit of blood was transfused in each site, prior to power injection, as part of another study. One proximal humerus then received power injection of 150 mL of contrast media at a rate of 5 mL/second and the contralateral limb served as the control, yielding a sample size of 7 matched pairs (one infusion malfunctioned). Fluoroscopy was used to evaluate for extravasation. Both PHIO sites were flushed with 10 mL of normal saline post-contrast injection. After the swine were euthanized both front limbs were separated from the body, at a level superior to the PHIO insertion site with the IO needle left in situ. Cross sections of the proximal humeri were cut with a diamond saw to identify the needle tip insertion site and attempts were made to include the needle tract. The pathologist was unaware of which limb had received power injection and was asked to identify any cellular or structural damage to the area immediately adjacent to the injection site in a necropsy examination of both limbs. After rapid decalcification (RDO), cassettes with tissues were processed thru graded alcohols and xylene, infused with paraffin, stained, and observed under light microscopy for lesions. Sections were observed and graded for physical differences including hematopoietic bone marrow wash out, intact stroma/fat, hemorrhage, presence of trabecula, and cortical thickness.

Results: The mean maximum infusion pressure was 80.1 psi (range 61-95). Marrow wash-out varied by one degree or less for each pig when limbs were
compared. The amount of trabecular fracture caused by the placement of the IO needle could not be histologically separated from possible loss of trabecula due to high pressure power-infusion of contrast or administration of blood. Of all samples evaluated, 6 had some degree of hemorrhage in one level, which was graded the same in 4 of the pigs, +1 in the limb without the injection for pig B and +2 for one level in an injected limb for pig F. Hemurine from 2 swine showed small extraosseal extravasations. Limitations of this study include use of a swine model; and the clinical significance of the small extraosseal extravasations is unknown.

Conclusion: In swine receiving power-injected contrast there was essentially no histological difference between the limbs examined post-infusion. This supports the safety of IO power infusion of CT contrast. When considered with previous studies demonstrating CT image adequacy after IO contrast administration, these findings may further support the utility of power-injected contrast delivered via the IO route.

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Patient Satisfaction While Receiving Emergency Medical Care in Chairs

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Study Objectives: Many emergency departments (EDs) across the United States deal with crowding. Numerous strategies have been employed to help combat this issue. One proposed solution is to evaluate certain patients in chairs as opposed to stretchers. Patients’ opinions on this issue are not known. The objective of the study is to determine the satisfaction of ED patients evaluated in chairs.

Methods: This prospective, observational survey study took place at an inner-city academic ED with an approximate annual census of 95,000 visits. From October 2013 to January 2015, adult patients seen and evaluated in a chair for the entirety of their emergency department visit were asked to complete a survey of their ED stay. Non-English speaking patients were excluded. This study obtained IRB approval.

Patients answered eight questions on a 5-point Likert scale. Analysis was performed using SAS 9.4. Each question was analyzed using one-sample chi-square test.

Results: A total of 163 patients (85 male) completed surveys. One hundred forty-six patients (89.6%) strongly agreed or agreed that they want their ED stay to be as short as possible ($P < .001$). One hundred thirty-two patients (81%) strongly agreed or agreed that they would rather be evaluated in a chair immediately than to wait for a stretcher to become available ($P < .001$). One hundred thirteen patients (69.3%) strongly agreed or agreed that they would rather be in a chair than in a stretcher for their condition ($P < .001$). One hundred forty-one patients (86.5%) strongly agreed or agreed that the care provider adequately address their condition while being treated in a chair ($P < .001$). One hundred fifty-three patients (93.4%) strongly agreed or agreed that their privacy was respected while being treated in a chair ($P < .001$). One hundred fifteen patients (70.6%) strongly agreed or agreed they would rather be in a chair than in a stretcher if they were to be seen for a similar condition in the future ($P < .001$). One hundred twenty-eight patients (78.5%) strongly agreed or agreed that they were satisfied with their ED experience ($P < .001$). One hundred forty-three patients (87.7%) strongly agreed or agreed that they would return to our ED for future ED visits ($P < .001$). The average time in the ED for all subjects was 152.4 minutes (SD=89.8). 94 patients (57.7%) received oral medications and 30 (18.4%) received intravenous or intramuscular medication while being treated in a chair. 63 (38.7%) patients required no diagnostic resources (x-ray, CT, labs) while being seen in a chair while 100 (62.3%) required 1 or more diagnostic resource. The majority of final diagnoses were related to musculoskeletal complaints, 86 patients (52.8%). There was no difference in patient satisfaction scores when controlled for the number of resources used ($P = .948$) or when controlled for the categorical type of the patient’s final diagnosis ($P = .598$).

Conclusion: ED patients evaluated in chairs report high satisfaction with their experience.

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A Novel Metric to Quantify Computed Tomography Utilization and the Prevalence of Negative Computed Tomography Scans at a Level One Trauma Center

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Background: Computed tomography (CT) use in trauma has risen dramatically since its widespread availability in the 1990s. This has become the subject of concern, given the harms of CT, which include radiation and IV contrast exposure, cost, resource utilization, overdiagnosis and identification of incidental lesions. We developed a novel metric, the Negative CT Score ($\sum_{CT^-}$) to describe the pattern of CT utilization in trauma patients at our center. $\sum_{CT^-}$ quantifies how often CT imaging identifies important injuries and may be used within and across departments to identify trends, variations in practice, and outliers.

Study Objectives: The purpose of this study is to describe CT utilization in trauma at an urban academic level one trauma center, using a novel metric, the Negative CT Score ($\sum_{CT^-}$).

Methods: Design/Subjects: Retrospective chart review of 552 consecutive intermediate level trauma patients who received CT imaging over a 1-year study period. We abstracted charts for demographic information, body regions scanned, and positive CT findings. We then applied the Negative CT Score ($\sum_{CT^-}$) to quantify the results of CT imaging. $\sum_{CT^-}$, is calculated by subtracting the number of non-extremity body regions (maximum four: head, neck, chest, abdomen) demonstrating an important positive CT finding from the total number of non-extremity body regions scanned. CT findings were classified as important based on explicit, previously described criteria Setting: An inner-city level one trauma center with annual volume of 1,000 trauma patients. Statistical Analysis: Means with standard deviations were calculated for total regions scanned and Negative CT Score.

Results: Of the 552 cases reviewed during the study period, 410 (74.3%) were male and the mean age was 40.3 years (SD±21.2). 57 patients (10.3%) received no CT scans. The remaining 495 cases had at least one CT performed. 1310 CTs were performed. The average number of regions per patient that received CT imaging was 2.36 (SD±1.3), and the average $\sum_{CT^-}$ was 2.05 (SD±1.2). Three hundred and seventy-four (67.8%) patients had no important findings on CT imaging. Of the 178 patients who had at least one positive CT region. 486 patients (88.0%) suffered blunt trauma; 66 (12.0%) suffered penetrating trauma. On average, blunt trauma patients had 2.55 (SD±1.17) regions scanned compared with 0.97 (SD±1.05) in the penetrating trauma group; the mean $\sum_{CT^-}$ in blunt trauma patients was 2.21 (SD±1.17) compared to 0.83 (SD±0.97) in the penetrating group.

Conclusion: In a consecutive series of 552 intermediate trauma patients at our urban trauma center, 2.36 body regions were scanned per patient; of these, 2.05 regions revealed no important CT findings. We hope that these results and the Negative CT Score can be used to quantify CT imaging across and within departments so that CT utilization can be optimized.

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Limited Health Literacy Is Not Associated With Increased Emergency Department Length of Stay

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Background: Previous studies have shown that patients with limited health literacy have higher emergency department (ED) utilization. No studies to our knowledge have examined the impact of health literacy on ED-specific outcomes such as length of stay (LOS) or testing.

Study Objective: Our hypothesis was that limited health literacy would adversely influence ED LOS and lead to increased ED testing.

Methods: Adult English-speaking patients who presented to triage during a 5-month period in 2014-2015 were recruited in a prospective convenience sample in an urban academic ED. Participants completed in-person interviews for health literacy assessment using the Newest Vital Sign tool, a 6-question validated scale. Patients with NVS scores of 0-3 were considered to be at risk for limited health literacy, while those with adequate health literacy were defined as scoring ≥ 4.6. After completion of their ED visit, a retrospective chart review was performed to identify the patient’s ED length of stay (time from registration to time of disposition) and ED disposition. We also captured the number of consults, labs, imaging studies, and EKGs performed during the ED visit, as well as the number of medications given. 72-hour readmission and 30 day ED returns were recorded one month after the ED visit. Mann-Whitney U, chi-squared and t-test was performed, and results were classed as important based on previous described criteria Setting: Setting: Inpatient beds of an academic urban trauma center, New Mexico.

Results: Two hundred fifty patients were recruited during the study period. Sixty-one percent (61%) of this population had obtained only a high school diploma or
Impact of an Asthma Care Pathway on the Emergency Department Management of Asthma

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Study Objective: Introduction of care pathways has been theorized to improve adherence to evidence-based guidelines and improve quality of care metrics. In 2014, an interprofessional team developed and implemented an evidence-based asthma care pathway, including a nursing medical directive and pre-printed order set, supported with education. We sought to assess performance in quality markers of asthma care such as time to corticosteroids and the rational use of diagnostic studies in line with published national and international guidelines for emergency department (ED) management of asthma.

Methods: A retrospective review of ED patients greater than 16 years of age with a discharge diagnosis of asthma was conducted pre- (September 2013 through March 2014) and post-intervention (April 2014 through January 2015). Measures were: use of peak-expiratory flow rate testing (PEFR), chest X-ray (CXR) performance, and time-based outcomes from triage: time to inhaled beta-agonist therapy, time to inhaled anticholinergic therapy, and time to steroid administration. Length-of-stay (LOS) and use of pre-printed orders (PPO).

Results: A total of 495 cases met criteria (pre-intervention N=270 and post-intervention N=225). Improvements were seen for both time based metrics (median, range) and percent utilization of diagnostic testing after the intervention. Pre- and post-intervention groups showed respectively; PEFR performed (23% vs 45%), CXR performed (30% vs 23%), median time-to-inhaled beta-agonist (44 minutes, 233 vs 38 minutes, 505), median time to inhaled anticholinergic therapy (40 minutes, 233) vs 30 minutes (269), median time to steroid administration (105 minutes, 414 vs 91.5 minutes, 502), and median LOS (206 minutes, 1320 vs 184.5 minutes, 884). PPO use in the post-intervention group was 4.4%.

Conclusion: The implementation of an asthma care pathway, despite infrequent use of the PPO component of the pathway at our institution, appears to have led to an improvement in quality measures of ED asthma care. Opportunities for further improvements may be attained through ongoing provider education and increased protocol adherence.

Patients’ Attitudes Regarding Tattooed Physicians: The ART Study


Study Objectives: Many health care institutions have policies prohibiting physicians from having exposed tattoos and facial piercings. Several non-clinical studies have demonstrated that patients feel that medical providers with exposed body art are less competent, approachable, and professional than their traditional counterparts. We sought to determine if the presence of exposed body art had any impact on patients’ perceptions of their physician in actual practice.

Methods: This prospective cohort study utilized a survey-based approach to investigate patients’ perceptions of professionalism, caring, and approachability of the physician providing them care in the emergency department (ED). Physicians in the study served as their own controls. Both male and female residents and attending physicians participated. Physicians had control shifts as well as shifts wearing temporary standardized tattoos (black tribal arm band) and/or nontraditional piercings (any piercing in men, nose stud in women). Patients were surveyed during these shifts, but were not informed that the survey was to evaluate the physicians’ appearance. Patients were surveyed during all shifts and on all days of the week. The survey utilized previously published validated items as well as Press Ganey questions, and was reviewed by a committee of experts for face and content validity. The questions were on a 5-point Likert scale, and both positively and negatively worded questions were used for internal validity. English-speaking patients over the age of 18 were approached by nurses to complete the survey. The surveys were anonymous, but demographic information and triage acuity were collected. Given the high response percentage based on Press Ganey and prior studies at our institution, with a goal confidence level of 90% and a 5% margin of error, our sample size for our primary research question was 97. The study was IRB exempt.

Results: A total of 292 patients were surveyed during the course of the study. One hundred thirty-four encounters involved providers with no exposed body art (45.9%). For the 4 providers in the study, there were no baseline differences in perceived professionalism (P = .79) or skills (P = .52). Patients found all providers equally comfortable to talk with about their problems (P = .72). There were no differences in these same measures for any individual provider comparing presence of exposed body art to no exposed body art (P values ranging from .16-.01). Patients were generally satisfied with their care, with greater than 90% of patients stating they strongly agree with the statement “the doctor was professional” and more than 80% strongly agreeing with the statement “I felt comfortable talking to the doctor about my problem.”

Conclusion: In this study, we found no statistical difference in perception of patient care by patients who were treated by physicians with or without exposed body art. Physician tattoos and facial piercings were not factors in patient’s evaluation of physician competence, professionalism, or approachability.

Qualitative Study: Cost of Emergency Care From the Providers’ Perspective

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Study Objectives: It is well known that health care spending in the United States is increasing at a rapid rate, including emergency care. Less clear, however, is how the
cost of health care translates into the clinical setting for emergency providers and the quality of care delivered. Additionally, little is known about if and how health care spending is incorporated into emergency medicine (EM) resident education. This study aims to evaluate emergency providers’ perceptions on cost of care including care delivery as well as resident education.

Methods: The study population was four classes of emergency medicine residents at George Washington University; 24 residents were surveyed. We employed a 9-item questionnaire with a combination of open- and closed-ended questions, including utilization of a Likert 5-point scale (1 being not important at all; 5 being neutral; 3 being very important). Surveying was conducted solely by the first author, an EM senior resident trained by the second author, an attending emergency physician with expertise in narrative interview. Data were analyzed using grounded theory methodology, with 100% agreement between the authors.

Results: One-third of EM residents have never discussed out of pocket costs with a patient. Nearly two thirds of residents (63%) considered the costs of tests, procedures, and medications at least once per shift; they discussed it with their patients only 21% of the time. The most common reasons why residents considered costs included the potential financial burden on the patient, patient compliance, diagnostic utility and medical necessity, and a feeling of personal responsibility for overall health care costs. In addition, 50% of the time providers learned that a patient was non-compliant secondary to financial reasons from a return emergency visit for the same complaint. Although residents agreed it is important to consider cost of care when making medical decisions (3.8/5), they disagreed (1.8/5) that they know the costs of tests and treatments when ordering them. Finally, the majority of residents (91%) felt they receive too little education on medical costs, with half having received no type of education. Residents felt that the most common ways to educate them on costs of care are through lectures, Grand Rounds presentations, and providing hospital-based price sheets.

Conclusion: The majority of EM residents take cost into consideration when ordering tests and treatments for their patients; commonly cited reasons include financial burden on the patient, patient compliance, and diagnostic utility—all aspects that affect quality of care. Despite an expanding focus on the link between cost of medical care and quality of care, residents feel that they lack knowledge and receive too little, if any, education in regards to the cost of the care they deliver. Incorporating targeted educational tools such as lectures, presentations, and price sheets into resident education may help narrow the gap between the rising costs of care delivered by the provider and the quality of care received by patients. Future studies will investigate the perceptions of trainees in other medical specialties as well as the impact of these educational interventions on the quality of care delivered to patients.

272 Withdrown

273 Contrast Extravasation Prevalence in Emergency Department Patients With Ultrasound-Guided Peripheral Intravenous Catheters

Rupp JD, Ferre RM, Boyd JS, Turer RW, Self WH/Vanderbilt University, Nashville, TN

Study Objectives: Ultrasound-guided peripheral intravenous catheters (USGIVs) are commonly placed in emergency department (ED) patients when traditional attempts have failed. One small prior study suggests deep brachial USGIVs have been described to increase the risk of contrast extravasation in patients receiving contrasted computed tomography (CT) scans. The purpose of this study was to evaluate the prevalence of contrast extravasation and related complications in patients with an USGIV compared to those with traditionally placed peripheral intravenous lines (PIV).

Methods: This was a retrospective cohort study of patients ≥18 years old in a large academic, urban ED who had intravenous contrast administered for a CT scan from January 2009 through April 2014. This study population was generated using administrative billing data of each contrasted CT scan performed in the department. The exposure variable of interest was the type of IV catheter used for contrast administration: USGIV placed by an emergency physician versus traditional IV placed without ultrasound. The study outcome was extravascular extravasation of contrast, which was reported throughout the study period as part of a hospital-wide quality assurance program. Two independent reviewers evaluated each contrast extravasation event to confirm the IV type (traditional PIV vs USGIV), and identify complications that occurred as a result of the extravasation. Extravasation events were classified as having a complication if any of the following occurred: surgical specialty consultation, an otherwise unnecessary admission, or surgical management. The proportion of contrast administration events that resulted in extravasation was compared between USGIVs and traditional IVs using the chi-squared test.

Results: There were a total of 49,365 IV contrast boluses for CT scans, including 445 (0.90%) through an USGIV. A total of 120 contrast extravasation events occurred. The prevalence of extravasation was greater with an USGIV [16/445 (5.60%)] compared with a traditionally placed IV [104/48,920 (0.21%)] (P = .002). Thirty-two (26.9%) of the extravasation events resulted in a plastic surgery evaluation, one hospitalization and no cases of operative management (Table).

Conclusion: USGIVs have a low infiltration rate for contrasted CT scans. Although the complication rates are similar, the incidence of contrast extravasation events with USGIVs is significantly greater than with traditionally placed peripheral IVs.

274 The Impact of Computerized Provider Order Entry on Emergency Department Flow

Gray A, Fernandes C/London Health Sciences Centre, London, ON, Canada

Study Objectives: Computerized provider order entry (CPOE) has been established as a method to improve patient safety by avoiding medication and human errors, though its impact on emergency department (ED) patient flow has had little study. Since CPOE systems can be cumbersome and consume physician time away from the patient, we must examine the effects on ED throughput. We examined three primary variables of ED throughput and crowding in the Canadian health care setting before and after implementation of a CPOE: wait time (WT), length of stay (LOS), and the proportion of patients who left without being seen (LWBS).

Methods: We conducted a retrospective cohort study of all Canadian Triage Acuity Scale (CTAS) level patients 18 years and older presenting to London Health Science Centre EDs during July and August of 2013 and 2014, before and after implementation of a CPOE that became active April 2014. The 3 key variables WT, LOS, and LWBS were compared between time periods. Subgroup analyses were conducted for all three variables within each CTAS level (1-5) individually, as well as for only admitted patients.

Table. ED Patients with a contrasted CT scan, 1/2009 – 4/2014.

<table>
<thead>
<tr>
<th></th>
<th>USGIV</th>
<th>Standard PIV</th>
<th>All Patients</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of Patients</td>
<td>445</td>
<td>48,920</td>
<td>49,365</td>
</tr>
<tr>
<td>Contrast Extravasation Events, n (%)</td>
<td>16 (3.60%)</td>
<td>104 (0.21%)</td>
<td>120 (0.24%)</td>
</tr>
<tr>
<td>Unique Patients with Extravasation Events</td>
<td>16</td>
<td>103</td>
<td>119</td>
</tr>
<tr>
<td>Average Age (yr)</td>
<td>46.6</td>
<td>45.6</td>
<td>45.6</td>
</tr>
<tr>
<td>Complications:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Plastic Surgery consulted</td>
<td>5 (31.3%)</td>
<td>27 (26.2%)</td>
<td>32 (26.9%)</td>
</tr>
<tr>
<td>Admission for Observation</td>
<td>0</td>
<td>1 (0.97%)</td>
<td>1 (0.84%)</td>
</tr>
</tbody>
</table>
Results: After exclusions, 18872 and 17886 patient visits were analyzed before and after the intervention, respectively. Overall, there was a statistically significant increase in WT of 5 minutes ($P = .006$) and LOS of 10 minutes ($P = .001$) after CPOE implementation, while LWBS increased from 7.2% to 8.1% ($P = .002$). The subgroup analysis revealed admitted patients’ ED LOS increased by 63 minutes ($P < .001$), CTAS 3 and 5 patients increased their WT by 6 minutes ($P = .001$) and 39 minutes ($P = .005$), and LWBS proportion increased significantly for CTAS 3-5 patients, worsening from 24.3% to 42.0% ($P < .001$) for CTAS 5 patients specifically.

Conclusions: CPOE implementation at this health care organization detrimentally impacted patient flow in the ED. All throughput variables are involved, some with greater significance than others. The most striking clinically relevant result is the increase in LOS of 63 minutes for admitted patients. One has to ask if the potential patient safety risks outweigh the benefits when considering CPOE implementation.

The Operational Effects of Implementing Electronic Provider Documentation in the Emergency Department

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Study Objectives: The implementation of electronic health records (EHRs) has the potential to improve care in the emergency department (ED) setting, but may also impact ED operations. Previous studies have shown mixed effects on ED efficiency following EHR implementation and have not isolated the effects of individual EHR features. Typically, an EHR is implemented with multiple features simultaneously, such as patient tracking, computerized provider order entry (CPOE), and provider documentation. However, at our institution, we implemented a custom, provider documentation system (eDoc) to replace paper documentation in the setting of existing patient tracking and CPOE. This provided an opportunity to characterize the isolated impact of implementing electronic documentation, perhaps the most time-consuming EHR function, on ED operational performance.

Methods: We performed a retrospective analysis of operational data for 1-year periods before and after eDoc implementation (March 18, 2013) in a single, high-volume, urban ED. We computed operational statistics for each day of the study period (reflecting 60,870 pre-implementation and 59,337 post-implementation patient encounters). The pre-specified primary outcome variable was mean length of stay (LOS); secondary outcomes were mean LOS for admitted (LOSa) and discharged patients (LOSa) and mean arrival time to disposition for admitted patients (TTD). We used regression modeling to identify differences in outcomes while controlling for several pre-specified confounding factors: month, day, daily visits, visits from the preceding day, mean patient age, daily boarding hours, and proportion of (1) female patients, (2) admissions, observation admissions and discharges, (3) patients with ESI ≤2, and (4) arrivals by ambulance. As a sensitivity analysis, we performed coarsened exact matching (CEM) analysis for similar days across the pre- and post-implementation periods based on pre-specified variables of month, day, visits, visits from the previous day, admission rate, proportion of patients with ESI ≤2, and boarding hours.

Results: Primary and secondary outcomes are shown in the Table. In unadjusted analysis, there was a net increase in all outcome variables. Using regression analysis to control for variations in operational variables, there were significant increases in LOS (+0.10 hours) and LOSd (+0.08 hours). CEM analysis was concordant with regression, demonstrating a significant net positive change in LOS (+0.19 hours) and LOSd (+0.17 hours).

Conclusion: In our single center study, the isolated implementation of electronic provider documentation was associated with significant, sustained increases in overall length of stay and length of stay for discharged patients. Though these increases were small in magnitude, our findings suggest that electronic provider documentation may negatively affect patient throughput in the ED. Interventions to mitigate this effect, such as improving EHR usability or adding clinical staff, scribes, or voice recognition software, would be valuable areas of inquiry for future research.

Predicting Emergency Department Patient Throughput Times Utilizing Machine Learning

Otles E, McClay LA, Patterson BW/UW - Madison, Madison, WI

Study Objectives: Patient throughput time in the emergency department is a critical metric affecting patient satisfaction and service efficiency. We performed a retrospective analysis of electronic medical record (EMR) derived data to evaluate the effectiveness of multiple modeling techniques in predicting throughput times for patient encounters in an academic emergency department (ED). Analysis was conducted using various modeling techniques and on differing amounts of information about each patient encounter. We hypothesized that more comprehensive and inclusive models would provide greater predictive power.

Methods: Retrospective medical record review was performed on consecutive patients at a single, academic, university-based ED. Data were extracted from an EMR derived dataset. All patients who presented from January 1, 2011 to December 31, 2013 and met inclusion criteria were included in the analysis. The data were then partitioned into two sets: one for developing models (training) and a second for analyzing the predictive power of these models (testing). The Table lists model types used. The primary outcome measured was the ability of the trained models to accurately predict the throughput times of test data, measured in terms of mean absolute error (MAE). Secondary outcomes were R2 and mean squared error (MSE). Model factors included a mix of patient specific factors such as triage vital signs, age, chief complaint; factors representing the state of the ED such as census and running average throughput time; and timing factors such as time of day, day of week, and month. The most comprehensive models included a total of 29 distinct factors.

Results: Of the 134,194 patients that were seen in the 3-year period of the study 128,252 met the inclusion criteria; the mean throughput time was 183,327 min (SD = 98.447 min). Compared to using a single average throughput time as a naïve model (MAE = 80.801 min), univariate models provided improved predictive abilities. More sophisticated models, using machine learning methods and including all available factors provided greater predictive power with the lowest MAE achieved at 73.184 min.

Conclusion: We have demonstrated that including information about incoming patients and the state of the ED at the time of an arrival can aid in the prediction of individual patients’ throughput times. The Multiple Linear Regression model, including all available factors, had the highest predictive accuracy, reducing mean absolute error by over 9% compared to the naïve model. While this represents an improvement in the current state of the art, we believe there is room for further work to generate high quality individual patient predictions. More sophisticated models based on ED workflows may lead to greater predictive power to prospectively estimate patient throughput times at arrival.

Table. ED Operational Performance Before and After Implementation of Electronic Provider Documentation

<table>
<thead>
<tr>
<th></th>
<th>Pre, hrs (SD)</th>
<th>Post, hrs (SD)</th>
<th>Unadjusted ∆, hrs (CI)</th>
<th>Adjusted ∆, hrs (CI)</th>
<th>CEM, hrs (CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Length of Stay</td>
<td>4.29 (0.72)</td>
<td>4.43 (0.82)</td>
<td>+0.14 (0.03-0.16)</td>
<td>+0.10* (0.05-0.15)</td>
<td>+0.19* (0.04-0.36)</td>
</tr>
<tr>
<td>Length of Stay (Admitted Pts)</td>
<td>6.47 (1.75)</td>
<td>6.66 (2.20)</td>
<td>+0.19 (-0.10-0.48)</td>
<td>+0.02 (-0.05-0.10)</td>
<td>+0.12 (-0.24-0.48)</td>
</tr>
<tr>
<td>Length of Stay (Discharged Pts)</td>
<td>3.49 (0.47)</td>
<td>3.52 (0.41)</td>
<td>+0.03 (-0.03-0.09)</td>
<td>+0.08* (0.03-0.14)</td>
<td>+0.17* (0.05-0.28)</td>
</tr>
<tr>
<td>Time to Disposition (Admitted Pts)</td>
<td>3.00 (0.41)</td>
<td>3.03 (0.38)</td>
<td>+0.03 (-0.03-0.09)</td>
<td>+0.05 (-0.01-0.10)</td>
<td>+0.09 (-0.01-0.20)</td>
</tr>
</tbody>
</table>

SD, Standard deviation; CI, 95% confidence interval; CEM, coarsened exact matching.

*P < .05.
Background: Prior literature has supported that single-item health literacy screening (SILS) may identify individuals with limited health literacy in an outpatient setting. To our knowledge, there are no studies in the emergency department (ED) population. In addition, it is uncertain if single-question screens are comparable to the Newest Vital Sign (NVS), a 6-question validated scale to determine patients at risk for limited health literacy. SILS may be advantageous over NVS in a busy clinical environment given its ease of administration.

Study Objective: The goal of the study was to determine whether either of 2 SILS questions was valuable for detecting patients at risk for limited health literacy in an ED setting.

Methods: Using a prospective convenience sample, English-speaking patients between the ages of 18-99 who presented to triage between November 2014 and March 2015 were recruited and interviewed in an academic urban trauma center. Participants were excluded if they presented with a complaint of altered mental status, if they required immediate clinical stabilization or if they declined to participate. Participants were interviewed using the 6-point NVS screen, as well as 2 single-question literacy screens with 5 possible responses. Those at risk for limited health literacy were defined as scoring a 4-6. SILS1 was “How confident are you filling out medical forms by yourself?” SILS2 was “How often do you have someone help you read hospital materials?” We compared the two SILS questions to the dichotomized NVS using area under the receiver operating characteristic curves (AUC). After dichotomizing the SILS questions based on receiver operating characteristic (ROC) curve cut points, we determined the sensitivity, specificity, positive and negative predictive values, and kappa compared to the dichotomized NVS.

Results: Two hundred fifty participants completed the NVS and the two SILS questions. The prevalence of patients at risk for limited health literacy were 125/250 (50%) based on the NVS. Inadequate health literacy was found in 73/250 (29%) according to SILS1 and in 61/250 (61%) according to SILS2. AUCs are listed in the table. Based on the ROC curves, each question was dichotomized at the best cut point and compared to the NVS as shown in the table.

Conclusions: Agreement between each of the two SILS and the NVS for detecting limited health literacy was fair. Given the high specificity, scores indicating inadequate health literacy on either of the two SILS questions may be helpful in identifying patients at risk for limited health literacy in an academic ED.

Table. Model types used and mean absolute error (MAE) in min.

<table>
<thead>
<tr>
<th>Model</th>
<th>MAE (min)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Naive</td>
<td>80.801</td>
</tr>
<tr>
<td>Univariate - Primary Chief Complaint</td>
<td>76.407</td>
</tr>
<tr>
<td>Univariate - Census</td>
<td>80.551</td>
</tr>
<tr>
<td>Univariate - Hour of Arrival</td>
<td>80.244</td>
</tr>
<tr>
<td>Multiple Linear Regression</td>
<td>73.184</td>
</tr>
<tr>
<td>Lasso Regression</td>
<td>75.538</td>
</tr>
<tr>
<td>Decision Tree</td>
<td>101.157</td>
</tr>
<tr>
<td>Random Forest</td>
<td>75.442</td>
</tr>
</tbody>
</table>

277 Single-Item Health Literacy Screening Validation in Predicting Limited Health Literacy in an Academic Emergency Department

Crum A, Hornor R, Waters Y, Amin H, Ernst A, Weiss S, Sarangam D/University of New Mexico School of Medicine, Albuquerque, NM; University of New Mexico, Albuquerque, NM

Study Objectives: Regulatory changes within the health care market have driven adoption of electronic medical records (EMRs) in the emergency department (ED) with anticipated benefits of improved documentation, compliance, hand-off, and efficiency. Although EMRs in the ED are now nearly ubiquitous, there is still relatively little published experience regarding the operational effects of their implementation. We report the impact of a transition from one EMR (IDX Systems, General Electric) to another (Cerner Millennium, Cerner Corporation) on ED length of stay (LOS).

Methods: Design: Retrospective analysis of routinely acquired operational data. Setting: Tertiary 23-bed ED without an emergency medicine training program. Type of Participants: Visits in the one year (September 5, 2009 through September 4, 2010) prior to EMR transition and the year (September 5, 2010 through September 4, 2011) after EMR transition. We categorized post-transition visits as early (first 180 days; September 5 through March 4) versus sustained (days 181-365; March 5 through September 4) and compared them to a similar time cohort from the previous year. In the primary analysis, we performed a simple pre-post comparison of LOS. In the secondary analysis, we evaluated the effects of both the transition and confounders (patient age, ED daily volume, nursing staffing, physician staffing, and effective hospital occupancy) using univariable and multivariable linear regression models. Statistical analyses were performed using version 9.3 of the SAS software package (SAS Institute, Cary, NC). All tests were two-sided and P < .05 were considered statistically significant.

Results: There were 24,640 visits post-transition (12,325 early and 12,315 sustained) and 23,348 visits pre-transition (12,058 corresponding to early and 11,290 corresponding to sustained). In the primary analysis, mean (standard deviation, SD) LOS in the early phase post-transition was 264 (133) minutes, and in the corresponding dates pre-transition was 241 (131) minutes; the difference was 23 minutes (P < .001). Mean (SD) LOS in the sustained phase post-transition was 248 (129) minutes, and in the corresponding dates pre-transition was 233 (130) minutes; the difference was 15 minutes (P < .001). In the secondary analysis, after adjusting for covariates, the mean LOS increased post-transition by 28 minutes in the early phase (P < .001) and by 20 minutes in the sustained phase (P < .001).

Conclusions: In a single-facility study, transition from one EMR to another was associated with an increase in LOS, even when adjusting for covariates. This increase in LOS was seen in both the early phase after adoption and in the sustained phase as well. While this work is consistent with several previous descriptions of the effects of EMR transition, it is inconsistent with others. It is not clear if our observed association was related to the impact of EMR transition in general, the use of this EMR in particular, local rate factors, or other factors yet to be considered. This work adds to the growing knowledge of the effect of EMRs on ED operations.

278 Effect of Electronic Medical Record Transition on Emergency Department Length of Stay

Didethban R, Lohse CM, Nguyen D, Traub SJ/Mayo Clinic, Scottsdale, AZ; Mayo Clinic, Rochester, MN

Study Objectives: Regulatory changes within the health care market have driven adoption of electronic medical records (EMRs) in the emergency department (ED) with anticipated benefits of improved documentation, compliance, hand-off, and efficiency. Although EMRs in the ED are now nearly ubiquitous, there is still relatively little published experience regarding the operational effects of their implementation. We report the impact of a transition from one EMR (IDX Systems, General Electric) to another (Cerner Millennium, Cerner Corporation) on ED length of stay (LOS).

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Conclusions: In a single-facility study, transition from one EMR to another was associated with an increase in LOS, even when adjusting for covariates. This increase in LOS was seen in both the early phase after adoption and in the sustained phase as well. While this work is consistent with several previous descriptions of the effects of EMR transition, it is inconsistent with others. It is not clear if our observed association was related to the impact of EMR transition in general, the use of this EMR in particular, local rate factors, or other factors yet to be considered. This work adds to the growing knowledge of the effect of EMRs on ED operations.

279 Post-Intubation Care in the Emergency Department Remains Sub-Optimal Despite the Introduction of an Electronic Order Set

Wong N, Tainter C, Lee J, Strayer R, Scofi J, Shah K/Massachusetts General Hospital, Boston, MA; University of California San Diego, San Diego, CA; New York University, New York, NY; Icahn School of Medicine at Mount Sinai, New York, NY

Study Objectives: To determine if the introduction of an electronic intubation order set (OS) improves compliance with standard post-intubation practice in the emergency department (ED) of an urban, tertiary care hospital.

Methods: We conducted a retrospective review of all patients intubated in the ED of an urban, tertiary care hospital, with an annual volume of greater than 100 thousand visits. An electronic airway order set (OS) was introduced on September 4, 2012 to prompt providers entering orders. Data during the 11-month period before (October 1, 2011 to September 3, 2012) and the equivalent 11-month period after (October 1, 2012 to September 3, 2013) the implementation of the OS were compared. Exclusion criteria were any patients whose ED disposition was “deceased.” Primary outcomes included the percentage of patients with time to blood gas (BG)
results in 20 minutes or less and time to chest x-ray (CXR) in 30 minutes or less. The secondary outcomes were the overall percentages of compliance with post-intubation chest x-rays, blood gases, analgesia and sedation drips. Proportions were analyzed with Pearson’s Chi-Squared modeling with multivariable logistic regression.

Results: There were 285 patients included in the study, 118 prior to the implementation of the OS and 167 after. The median age and sex of the groups before and after were 63 years (range 1-99) (43% male) and 65 years (range 1-97) (48% male) respectively ($P=0.460$). The percentage of patients with a documented blood gas within 20 minutes before and after the OS implementation were 11.2% and 24.2%, respectively for an absolute difference of 13% ($P=0.018$), odds ratio = 2.52 ($P=0.02$). Multivariable regression did not show an effect from age, sex, and the presence of CXR, analgesia or sedative. The percentage of patients with a documented CXR within 30 minutes before and after OS implementation were 36.0% vs 37.9% respectively with an absolute difference of 1.9% ($P=0.756$). There was no statistical difference in the secondary outcomes before and after the OS implementation; however, initiation of analgesia or sedation drip approached statistical significance (61.0% before vs 68.9% after, difference 7.9% ($P=0.129$)).

Conclusion: The implementation of an electronic intubation order set resulted in only moderate improvement in compliance with standard post-intubation practices. We observed an increase in blood gases resulted within 20 minutes, although compliance was still low. Compliance with CXR and initiation of analgesia or sedation infusion remained low, even after the intervention. There is still a great deal of room for improvement in patient care after intubation in the ED. Further studies should evaluate additional factors that could lead to improved compliance with expected post-intubation care.

280 Improved Documentation and Coding Utilizing Technological Reminders Within the Electronic Medical Record

Podolsky S, Blaha S, Fertel BS/Cleveland Clinic, Cleveland, OH

Study Objectives: In busy emergency departments (ED) physicians may forget to document all of their work. This incomplete documentation may unintentionally underestimate work effort, decrease communication of important care processes or clinical problems, and create potential for lost revenue (as charts are down coded when certain essential elements are missing). Examples include patients placed in ED clinical decision units (CDU), as well as patients admitted to intensive care units (ICU). In the CDU, charts often need a documented family history to achieve maximum evaluation and management (E&M) levels. For patients admitted to the ICU, clinical encounters often meet criteria for critical care billing, though without necessary documentation cannot be billed appropriately. In order to fully capture reimbursement of work completed, we sought to improve documentation and compliance using two interventions: data transparency and technological reminders.

Methods: We conducted a multicenter, interventional study to evaluate whether data transparency and technological reminders in the electronic medical record (EMR) would improve chart documentation. The study was conducted in three ED: one large, academic medical center and two community practice settings and included 65 emergency physicians. There were two main outcomes measured: (1) documentation of a family history for patients entering an ED CDU and (2) documentation of critical care billing for patients admitted to an ICU. The first intervention involved data transparency via a monthly e-mail to all physicians that included a list of all physician names and the associated number of down-coded charts. The second intervention was a real-time EMR alert that fired to the physician if either of the following scenarios existed: a family history was inadvertently omitted from the patient chart at the time of admission to a CDU, or if critical care was not documented at the time of admission to an ICU. (In the latter case, the question was posed as to the appropriateness of critical care time.) Neither alert forced a provider to enter data. We performed a Chi-square test to compare proportions pre and post intervention.

Results: Pre-intervention data showed that of patients placed in our CDU, 37 of 455 charts (8.1%) were missing a family history. Post-intervention data showed that of patients placed in our CDU, 337 of 6,946 charts (4.8%) were missing a family history, a relative reduction of 37.5% (8.1% vs 4.8%), or an absolute reduction of 3.5%, chi-square test, $P<0.05$. This trend continued to lower. For patients admitted to an ICU, 33 of 159 charts (21%) were missing critical care documentation. Post-intervention data showed that for patients admitted to an ICU, 214 of 1836 charts (11.6%) were missing critical care documentation, a relative reduction of 45% (21% vs 11.6%), or an absolute reduction of 9.4%, chi-square test, $P<0.05$.

Conclusion: Data transparency and physician reminders were highly effective in changing physician behavior related to documentation compliance. These simple interventions improved communication of important care processes or clinical problems and also reduced lost revenue.

281 Integrating Environmental Data into a Personal Health Record for Asthma Patients

Killeen JP, Chan TC, Castillo EM, Griswold WG/University of California, San Diego, San Diego, CA

Study Objectives: Data and systems that support patient empowerment through health information technology (IT) have become increasingly available in recent years and are becoming important for managing acute conditions such as asthma. The objective of this pilot project was to test and demonstrate secure and reliable transmission of real-time patient and environmental data between end-users of National Association for Trusted Exchange (NATE) community health information service Providers (HISPs) and patient-owned personal health records. Our use cases focused on the transport of data for patients with acute asthma.

Methods: This was a prospective one-month pilot study that incorporated existing applications to securely transmit data between a personal health device, environmental sensors, personal health records (PHR), community health information exchange (HIE) and a hospital system electronic medical record (EMR) for asthma patients. Data were incorporated in a continuity of care document (CCD) including the patient’s medications, allergies, problem list, and encounter data. The PHR (Microsoft HealthVault) consumed and displayed the CCD data in a patient-friendly format. A direct message (federal standard) account was established for the patient and connected with the provider’s account within a regional HIE. Study asthma patients extracted their CCD allowing for an open interoperability with personal devices and Microsoft Azure for analytics. Study subjects were provided with a MDI geolocation counter with their inhaler (PropellerHealth tracking inhaler use and location) and an innovative hand-held air quality monitor (measuring ozone, carbon monoxide, nitrogen dioxide levels), and real-time data recorded and paired to the patient’s smartphone and transmitted as secure discrete data. The summary of MDI utilization included the number of times it was used and the geolocation. This data and air quality data were displayed on the smart phone as well as secure Web site for the patient. Data elements were transmitted to an account within Microsoft Azure cloud for analytic summary reports. Reports were automatically transmitted to the PHR (Microsoft HealthVault) and to the patient’s EMR (EPIC). Providers were able to view the data via the EMR.

Results: During the pilot period of January 1, 2013 to February 1, 2013, five asthma patients were selected to carry both the air quality and counter MDI device. During the time period, each subject used the MDI daily multiple times and location, time and frequency were tracked. Air quality was transmitted every 6 seconds to the database. Overall, 3 megabits of raw data were transmitted securely per study subject per day. Patients viewed their data on a daily and weekly basis. Summary data were generated daily and transmitted to the PHR. All study subjects sent the PHR report to the EMR for view by the provider via direct messaging. All 5 patients and 2 providers were satisfied with data reports without receiving the raw data.

Conclusion: This pilot demonstrated the ability for real-time MDI and environmental tracking data to be collected by the patient and sent to the provider EMR through a PHR and NATE-certified HISPs. A larger, longitudinal study is needed to confirm these findings and determine their impact on health behaviors and outcome.

282 NESTED: National Trauma Registry Study of Deprivation

Corfeled A, Pell J, MackKay D/Royal Alexandra Hospital, Paisley, United Kingdom; Institute of Health & Wellbeing, University of Glasgow, Glasgow, United Kingdom

Background: Trauma remains a leading cause of morbidity and mortality in the UK and throughout the world. Social deprivation has been linked with many types of ill health. Previous work has shown an association between social deprivation and
injury in other parts of the world. Much of these data are based on high-level census data or injury surveillance data. We present individual patient data from a national trauma registry.

Study Objective: To investigate the association between trauma incidence, mortality and social deprivation in Scotland. Population of 9,925 individuals admitted to hospital across Scotland in 2011 and 2012.

Methods: Data was extracted from a national trauma registry and combined with data from the Scottish Index of Multiple Deprivation (2012) for individual patients’ domicile postcode to generate deprivation information. Patients were assigned to a deprivation decile from 1 (most deprived) to 10 (least deprived). Probability of survival was calculated using the TRISS methodology based on 2005 AIS codes and observed and expected death rates were calculated for each SIMD decile. Multiple logistic regression was performed to look at variables associated with case fatality following hospitalisation for trauma.

Results: Complete deprivation data was available for 9,238 patients. The least deprived decile of the trauma population has an incidence rate ratio (IRR) of 0.43 (95%CI 0.32 to 0.58, P < .001) compared with the most deprived. This effect is more pronounced for men IRR 0.36 (95% CI 0.27 to 0.47, P < .001) and for penetrating trauma IRR 0.07 (95% CI .01 to 0.56, P = .011). Case fatality following hospital admission for trauma shows a gradient with increasing deprivation, with an extra 2 survivors out of 1000 patients for each more affluent decile (P < .001). This relationship between SIMD decile and observed/expected death ratio is shown in the Figure. On multivariate analysis, major trauma (OR 18.11 95% CI 13.91 to 23.58, P < .001) and penetrating trauma (OR 2.07 95% CI 1.15 to 3.72, P < .001) are independent predictors of case fatality. These data are shown in Table 1.

Conclusion: Social deprivation in Scotland is associated with an increased incidence of trauma requiring hospitalisation. This increased incidence is more pronounced for men and is particularly stark for penetrating trauma. Case fatality is also increased with increasing deprivation. Preventative measures should be aimed at the highest risk groups, young, deprived men at risk of penetrating trauma.

Figure. On multivariate analysis, major trauma (OR 18.11 95% CI 13.91 to 23.58, P < .001) and penetrating trauma (OR 2.07 95% CI 1.15 to 3.72, P < .001) are independent predictors of case fatality. These data are shown in Table 1.

283 The Creation of the Maricopa Integrated Health System Disease Surveillance Project

Kannan V, Lau A, Hodgson N, Goodin K, Mohamed A, McConahey W, LoVecchio F /Maricopa Medical Center, Phoenix, AZ; Maricopa County Department of Public Health, Phoenix, AZ

Study Objectives: The geospatial surveillance of disease finds its roots in the archetypal tracking of cholera during the 1854 Broad Street outbreak by Dr. John Snow. This experiment set the stage for the geographic mapping of disease. With the advent of geographic information systems (GIS) our capabilities have exponentially increased. This technology allows not only for direct visualization of disease patterns, but also for cluster analysis of data to establish the statistical significance of suspected zones of outbreak. Furthermore, by integrating chief complaint data, we are able to appreciate the increased frequency of various constellations of symptoms in real time, a process known as syndromic surveillance. This study describes the methods involved in the creation and implementation of such a system at the Maricopa Integrated Health System (MIHS), collaborating with the Maricopa County Department of Public Health. For our pilot program, we have utilized syndromic surveillance-guided screening of the influenza virus and ArcGIS to perform a cluster analysis of the spread of the influenza virus within the MIHS adult acute care patient population.

Methods: To better capture the true incidence of the influenza virus within our adult acute care population, all patients presenting to the emergency department triage station were screened for symptoms of influenza-like illness as defined by the Centers for Disease Control and Prevention and assigned a score based on the presence or absence of these symptoms. The scoring system was verified by history (1 point), fever measured at triage (temperature > 38 C) (1 point), new headache (1 point), or new or worsening cough within the past seven days (2 points). Patients scoring three or higher were evaluated using the rapid influenza diagnostic testing (RIDT). Data collected included age, sex, address, and RIDT date and result. Data was exported weekly to Microsoft Excel spreadsheets. Addresses were batch-geocoded (converted to latitude/longitude points) using an on-site secure geocoder from the Maricopa County Department of Public Health. Data were then compiled onto an ArcGIS layer, and superimposed over an extant county census tract baselayer. We then performed kernel density estimation analysis, both to better visualize the data and to anonymize patient addresses. Negative results were also included to create a large background layer representing the geographic boundaries of the tested population.

Results: Our study population has a median age of 39 years, with a female predominance of 61%. The influenza A strain (95%) is overwhelmingly more prevalent in this population than the influenza B strain (5%). The influenza virus does indeed cluster to distinct geographic zones within the MIHS acute care patient population. The largest of these zones is immediately southeast of the hospital.

Conclusion: The use of GIS technology is effective in performing cluster analysis to identify geographic regions of interest regarding distinct disease processes. The influenza virus follows a cluster pattern within the MIHS population. The resultant "hot zones" visualized after kernel density estimation may represent high-yield target populations for mass vaccination and disease education programs. We hope these efforts will ultimately serve to reduce the burden of this and other diseases on the emergency department at the Maricopa Integrated Health System.

284 Survey of Barriers to Ebola Preparedness in Washington State Emergency Departments

Wong CH, Stern S, Mitchell SH /University of Washington, Seattle, WA

Study Objectives: The 2014 Ebola virus disease (EVD) outbreak in West Africa remains the largest and most deadly in history. Emergency departments (EDs) are more likely to come into contact with potential EVD patients, especially as more health care workers return home from West Africa. It is important for EDs to be prepared to care for suspected EVD patients. ED medical directors are often charged with directing these preparations. Up to this point, there has been no formal evaluation of the challenges encountered in achieving EVD readiness among emergency departments. Our objective was to understand the perceived challenges experienced by Washington State ED medical directors in EVD preparedness and explore personal attitudes towards the general approach to EVD care.

Methods: An anonymous electronic survey was sent to a convenience sample of ED medical directors, based on availability of contact information, across Washington State between November 2014 and February 2015. The perceived challenges of EVD preparations and attitudes toward EVD preparations were assessed by Likert scale and reported as stratified proportions.

Results: Of 85 medical directors contacted, 59 (69%) responses were received. This includes EDs with annual patient volumes of <20k (20 hospitals, 54%), 20-40k (21, 36%), 41-60k (4, 6.8%) and >60k (20%, 12.2%). Fifteen (25%) critical access EDs were represented. Figure 1 shows responses to perceived challenges in EVD preparations, and Figure 2 shows attitudes toward EVD preparations.

Conclusion: Washington State medical directors have faced significant challenges in ensuring their EDs are prepared to safely care for suspected EVD patients. Attitudes towards EVD preparations are mixed. Varying levels of perceived importance may represent an additional barrier to statewide EVD preparedness and an opportunity for outreach and education.
Figure 1.

Perceived Challenges in EVD Preparation*

<table>
<thead>
<tr>
<th>Hospital Administrative Support</th>
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<tr>
<td>Securing Financial Resource Allocation</td>
<td>28.1%</td>
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<tr>
<td>Securing Adequate Supplies (e.g. PPE)**</td>
<td>28.1%</td>
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<tr>
<td>Staff Shortage***</td>
<td>28.1%</td>
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<tr>
<td>Staff Involvement &amp; Participation</td>
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<tr>
<td>Staff Education &amp; Training</td>
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*For example, building an argument for wearing PPE

Figure 2.

Attitudes Towards EVD Preparedness on 7-point Scale

More than 90% of all respondents agreed with the statement that having an EVD is important for all patients.

Study Objectives: To develop and evaluate effectiveness of extended parallel process model (EPPM)-based brochure to increase intention of Marikina female residents to learn hands-only cardiopulmonary resuscitation (CPR) for out-of-hospital cardiac arrest.

Methods: A community trial that analyzed the effectiveness of EPPM-based brochure to increase intention of Marikina female residents. This study further contributes to the already considerable body of knowledge accrued from application of EPPM.

Conclusion: The EPPM-based brochure showed significant increase in the intention to learn CPR among Marikina female residents. This study further contributes to the already considerable body of knowledge accrued from application of EPPM.

285 Increasing Intention to Learn Hands-Only Cardiopulmonary Resuscitation through an Extended Parallel Process Model-Based Brochure

Cuaño RL, Babasa RB III/St. Luke’s Medical Center, Quezon City, Philippines

Study Objectives: To systematically identify and summarize the existing health care literature on clinical firearm screening/interventions for patients of all ages, among all clinical specialties.

Methods: A systematic search of 4 databases (PubMed, WebOfScience, CINAHL, Psycinfo) and Clinicaltrials.gov was conducted in October 2014. English-language original research on any clinician firearm screening or interventions, or patient/provider attitudes on the same, was included. Two authors independently completed title and abstract review to exclude unrelated studies (editorials, reviews, studies in the justice and education systems). The remaining studies underwent full-text review, structured data abstraction, and quality scoring using the Newcastle-Ottawa Scale (NOS), modified NOS or JADAD by 4 study authors. Discrepancies were resolved by group consensus.

Results: A total of 3260 unique titles were identified and 72 were included (434 excluded by using limits English and human, 1264 excluded at title review, 1463 at abstract review, 27 at full-text review). Fifty-three studies examined clinician attitudes and practice patterns. Screening rates for firearm risk were low across most studies and specialties (emergency, pediatrics, psychiatry, family medicine). Clinicians’ prior training, experience, and expectations correlated with regularity of firearm screening and likelihood of giving anticipatory guidance. Seven articles described patient attitudes, with mixed results on patient willingness to discuss firearm safety. Twelve articles assessed interventions for at-risk populations, of which 2 were high-quality RCTs; a parent counseling intervention increased parents’ rates of safe firearm storage; a collaborative care intervention for traumatically injured youth reduced teens’ 12-month weapon carriage. Overall, study quality was poor. Common limitations included small sample sizes, low response rates and high loss-to-follow-up, use of proxy outcome measures, and reliance on non-validated self-report measures, subject to social desirability and recall bias.

Conclusion: Existing clinical firearm injury prevention research largely focuses on clinician attitudes and practice patterns, with limited evidence regarding effective practices to decrease firearm injury. Methodological quality is generally poor. The few high-quality studies suggest that clinician firearm screening and interventions may be acceptable to patients and providers, and may reduce youth risk of firearm injury. Further research is needed to establish best screening and intervention practices.
Homeless Patients in France: A National Case-Cohort Prospective Study


Study Objectives: Homeless people represent a vulnerable population. Homelessness is associated with reduced life expectancy, increased risk of comorbidities, and increased incidence of psychiatric illness. Public hospitals and their emergency departments (EDs) are known to be used frequently by these patients. They can be seen as difficult to treat, and have an increased incidence of substance abuse and risk of violence in the ED. We aimed to analyse a large sample of homeless patients to determine the quality of care delivered to homeless people in French EDs. We tested the hypothesis that homeless patients experience suboptimal care by the provision of fewer health care resources.

Methods: We conducted a prospective multicenter case-control study in 31 EDs in France. Our institutional review board authorized the study without the need for signed informed consent. We defined a homeless person as a patient who currently lives on the street or in a shelter. During 72 hours from March 5, 2015, all homeless patients who visited the participating EDs were included in the study. One control patient was prospectively recruited after each case was included: the next patient who visited the ED with similar severity triage level (on a one to four scale), similar age (<5 years) and same sex. We retrieved demographic and social characteristics of included patients, along with their vital parameters, and characteristics of ED utilization. The primary outcome measures were length of stay, number of investigations per patient and treatment in the ED.

Results: A total of 212 homeless patients and 212 control patients were included in the study. Mean age was 44 (SD 13) years in both groups, and 87% were male. Homeless patients were more likely to have visited the ED in the past 28 days than other patients (47% vs 10%, P < .001). They presented with similar rates and types of comorbidities than control patients, except for a more frequent history of substance abuse. Heart rate, blood pressure, temperature, capillary blood glucose and Glasgow Coma Scale score were similar in both groups. Chief complaint was “housing demand” for 30 (14%) homeless patients. After excluding them, we found no difference in the type of chief complaint except for alcohol abuse, more frequent in homeless patients (20% vs 4%, P < .001). We found a similar median waiting time to physician assessment in the two groups (58 minutes for both), although mean length of stay was longer for homeless patients than for control patients (6.2 vs 3.9 hours, P < .001). We found no significant difference in the rate of radiological or biological investigations between the two groups. Similarly, we found no significant difference for the rate of oral or parenteral treatment administration, and admission rate was similar in the two groups (9% vs 7%, P = .6). Amongst the 182 analyzed homeless patients that visit the ED beside a housing demand, 53 (29%) were uninsured. Nevertheless, homeless patients visit ED more often for an alcohol-related complaint, are often uninsured and have higher rates of return visit.

Chest X-Ray Findings in Emergency Department Patients Evaluated for Pulmonary Tuberculosis: The Experience of a Large Urban Academic Emergency Department

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Study Objectives: Tuberculosis (TB) is a leading infectious killer worldwide and is far from elimination as a public health threat in the United States. Rapid diagnosis and treatment to prevent spread of this disease is a substantial challenge faced by health care facilities, as widely available testing involves poorly sensitive smears, and cultures that can take up to three weeks to result. Los Angeles County + University of Southern California (LAC+USC) Medical Center is a large, urban, safety-net facility that diagnoses more than 1% of all confirmed cases of pulmonary TB in the United States. Our objective was to characterize the initial chest x-ray (CXR) findings in emergency department (ED) patients evaluated for pulmonary TB in relation to final sputum culture findings.

Methods: We performed a retrospective review of consecutive patients evaluated for pulmonary TB in the ED at LAC+USC Medical Center from January 1, 2010 through April 16, 2010. Patients were defined as undergoing evaluation for pulmonary TB if at least one ED sputum specimen had a TB smear and culture confirmed. The decision to evaluate patients for TB was made by individual ED providers based upon clinical judgment. The results of ED CXRs were categorized retrospectively, based on a final radiologist interpretation, as “normal,” “miliary,” cavitary,” “apical infiltrate,” or “abnormal, non-specific.” Fisher’s exact test was used to compare CXR findings among patients with and without culture-confirmed pulmonary TB.

Results: Among 160 ED patients evaluated for pulmonary TB, the most common CXR findings were “abnormal with non-specific findings” (45%), “normal” (33%), and the presence of an “apical infiltrate” (16%). Seven of 160 (4%) patients evaluated had pulmonary TB confirmed by sputum culture. When compared to patients without culture-confirmed TB, patients with TB more frequently had CXR results with “apical infiltrates” (43% vs 16%, P < .05) or “cavity” lesions (14% vs 3%, P < .05), and less frequently had “normal” CXR results (0% vs 34%, P > .05).

Conclusion: One-third of ED patients evaluated for TB had normal ED CXRs, and none of those with normal CXR results in the ED were later found to have culture-confirmed pulmonary TB. Additional studies (with a larger sample size) are needed to explore the role of CXR as a possible screening tool prior to further TB evaluation.

A Telephone Intervention for Risky Alcohol Use With Injured Emergency Department Patients

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Background: The emergency department (ED) presents an opportune location to identify injured patients with risky alcohol use. Screening, brief intervention and referral to treatment (SBIRT) for alcohol misuse has been previously recommended to be integrated into the clinical care for injured patients but adoption by EDs has been limited. The most often cited barriers are time constraints for providers and financial resources. We reported on an earlier study (DIAL) that demonstrated the potential of a two session telephone-delivered brief intervention delivered to injured ED patients compared to assessment only.

Study Objectives: ReDIAL was a randomized controlled trial of a three-session telephone brief motivational interviewing (TMBl) intervention for injured ED patients with risky alcohol use to decrease alcohol use, impaired driving, alcohol-related injuries and alcohol-related negative consequences compared to a placebo control intervention on fire and burn safety.

Methods: ReDIAL recruited medically stable English-speaking adult injured patients at two urban EDs located in one city from July 2010 until March 2013. Injured ED patients who were to be discharged home from the ED were screened for risky alcohol with ASSIST v3.0 and those screening positive were offered study enrollment. Participants were randomized to the three-session TMBl delivered by
a counselor trained in motivational interviewing over 6 weeks or to the control condition, a scripted educational fire and burn safety intervention also delivered in three calls by a research assistant. Participants were followed for 12 months and assessed for changes in alcohol use, impaired driving, alcohol-related injuries and alcohol-related negative consequences.

Results: Of the 5095 injured ED patients screened, 1,018 screened positive for alcohol misuse and 730 ED patients were randomized; 78% received their assigned intervention by telephone and (72%) completed 12-month assessments. There was an overall decrease over time in these outcomes with no differential effect of TMBI over the control condition. Participants in both groups decreased alcohol weekly quantity use - TBMI: 16.63 (95% CI 14.18-19.08) to 10.62 (95% CI 8.66-12.58) Control: 17.24 (95% CI 14.50-19.08) to 10.07 (95% CI 8.01-12.13); impaired driving in past 30 days - TBMI: 6.82 (95% CI 5.62-8.02) to 4.14 (95% CI 3.11-5.17) Control 6.77 (95% CI 5.58-7.96) to 3.5 (95% CI 2.51-4.49); alcohol-related negative consequences in past 4 months- TBMI: 8.69 (95% CI 7.80-9.58) to 6.05 (95% CI 5.02-7.08) Control: 8.78 (95% CI 7.75-9.81) to 4.69 (95% CI 3.89-5.49), and alcohol-related injuries in past 12 months- TBMI: 1.63 (95% CI 1.41-1.85) to 0.92 (95% CI 0.67-1.17) Control: 1.73 (95% CI 1.50-1.96) to 0.63 (95% CI 0.43-0.83).

Conclusions: Despite the potential advantage of delivering a TMBI in not disrupting ED clinical care, our study found no evidence of its efficacy over a placebo control with both groups demonstrating group-wise improvement in alcohol use, impaired driving and alcohol-related injuries and negative consequences. Potential etiologies for our findings include that an injury requiring an ED visit is enough to create change, participant assessment of alcohol was enough to create change, or the placebo control intervention had active ingredients for alcohol change.

290 Carotid Flow Time as a Predictor of Volume Responsiveness

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Study Objectives: Early administration of intravenous (IV) fluid therapy to patients in shock is the cornerstone of ensuring adequate cardiac output, and restoring euolemia. Under-resuscitating these patients may worsen tissue hypoperfusion and cellular death. On the opposite spectrum, however, the over-resuscitation of these patients can lead to prolonged intensive care stays, ventilator dependence and potentially increase mortality. The ability of the physician to accurately predict the volume needs of patient remains a difficult skill. Using point of care ultrasound (PoCUS) to assess the IVC and its collapsibility index has been studied, but its utility is in question. The concept of using the carotid artery as a substitute for the aortic flow times was first introduced by Marik et al in a study published in 2013. Using a surrogate, the carotid flow time (CFT), the objective is to assess CFT as a predictor of volume responsiveness.

Methods: This is an intensive care unit (ICU)-based study using pulmonary artery catheters (PAC) as the gold standard for volume responsiveness. The ultrasound operator is blinded to all PAC readings. The ultrasound operator performs a carotid flow time (CFT) measurement with the patient in supine position and the head of the bed elevated at 30-40°. A passive leg raise is performed, simulating a fluid challenge. A repeat CFT and PAC measurement is taken. Patients are deemed volume responsive if a 10% change for the CFT and PAC occurs.

Results: We enrolled 20 patients to date. We excluded two patients from the study due to inaccurate PAC measurements, and one patient due to multiple premature ventricular contractions that developed during a part of the study. Data was analyzed on 17 patients. Five patients were deemed volume responders with both the PAC and the CFT demonstrating a change of at least 10% between the pre and post PLRT. Eleven patients showed no evidence of volume responsiveness after PLRT. One patient had a false negative, with a change after PLRT of 9.7%. This yields a sensitivity and specificity of 83.3% and 100% (95% CI are 36.48-99.12 and 67.86-100 respectively). Of the five volume responders, the average change in the CO was 18.94% and CFT change was 19.9%.

Conclusion: In a small cohort of patients we were able to demonstrate that CFT accurately predicted volume responsiveness. Further patient recruitment is ongoing at this time.
AP-IVJ divided by T-IVJ); we collected clinical data (with intra-abdominal pressure and CVP). Analyses were performed using the Stata/SE Statistical Software 13.1. The Mann-Whitney test was used to compare variables between patient groups. Correlations were calculated by means of Pearson or Spearman’s rank correlation coefficients.

Results: Forty-three spontaneous breathing patients were included. The overall median age was 79 years (range 64-81), SAPS II was 34 (29-46); shock was main admission diagnosis. There were significant differences (p 8mmHg regarding IVCDmax, AP-IVJ, IVJ ratio ( 1.8 cm vs 2.2 cm; 6.8 mm vs 9.1mm; 0.55 vs 0.67 respectively). We found a significant positive correlation between IVCDmax and IVJ ratio and CVP: r =0.35, P = 0.02 and r=0.35, P = 0.03 respectively. The anteroposterior IVJ diameter was correlated to CVP: r=0.58, P = 0.0001. The area under the receiver operating characteristics curve to discriminate a low CVP (<8mmHg) was 0.62 95% CI 0.45-0.77 for the collapsibility index; 0.79 (95% CI 0.63-0.91) for the AP-IVJ; 0.66 (95% CI 0.49-0.80) for the IVCDmax; 0.68 (95% CI 0.51-0.82) for the IVJ ratio.

Conclusions: If our results on the correlation of IVCDmax, IVJ ratio and AP-IVJ with CVP in spontaneous breathing patients will be confirmed in future studies, these measures could be used as alternative of CVP. The anteroposterior internal jugular vein maximal diameter and the IVJ ratio seem to predict low CVP better than the collapsibility index of inferior vena cava and the inferior vena cava maximal diameter.

Emergency Medicine Sonographers Can Obtain Similar Doppler Measurements and Have High Inter-Rater Reliability for Overall Function in Diastolic Cardiac Evaluation

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Study Objectives: Longstanding hypertension (HTN) can lead to left ventricular hypertrophy, impaired relaxation and congestive heart failure (CHF) symptoms. When assessing the cardiac ultrasound (US) in a patient with dyspnea, a normal ejection fraction (EF) may be noted; however, it is an evaluation of diastolic function (DF) that is critical to the diagnosis. It is estimated that half of all symptomatic CHF patients have a preserved EF. The US assessment of DF involves: (1) tissue Doppler of the mitral annulus and (2) pulsed Doppler of the mitral inflow. Tissue Doppler is the criterion standard in the evaluation of DF. The objectives of this study were to (1) determine if emergency physicians could obtain similar Doppler measurements of DF and (2) measure the inter-rater reliability for overall DF.

Methods: Eight emergency physicians ranging from PGY-1 through faculty, who had previously met the minimum ACEP requirements for focused bedside cardiac US, participated in a 1-hour session in how to evaluate DF. Each sonographer submitted 5 studies reviewed by the senior author for technical adequacy prior to subject enrollment. Institutional review board approval was obtained. A convenience sample of adult emergency department patients was prospectively enrolled. Patients were preferentially selected if they had a history of CHF or suspected abnormal DF due to chronic HTN. Patients were excluded who were unstable, had known arrhythmias or valvular pathologies, were unable to lie flat or who refused consent. Each patient was assessed by two sonographers. Doppler evaluation of the mitral inflow and tissue Doppler of the septal and lateral mitral annulus were performed. The E wave and septal and lateral e’ waves were measured. Overall interpretations were based on criteria interpreted from the 2009 “Recommendations for the Evaluation of Left Ventricular Diastolic Function by Echocardiography in the Journal of the American Society of Echocardiography.” DF was considered to be abnormal if the septal e’ was < 8 cm/s and if the lateral e’ was < 10 cm/s. In cases of discordance of septal and lateral interpretations, the E/e’ ratio was calculated. A ratio of ≤ 8 was considered normal and a ratio > 8 was considered abnormal DF. Video clips were reviewed by the senior author for adequacy. A fixed effect regression model was used to assess E, septal e’ and lateral e’ measurements. A Kappa coefficient was used to assess inter-rater reliability among sonographers for overall interpretation (normal or abnormal) of DF.

Results: Thirty-two patients were enrolled. Sonographers performed between 7 and 20 studies. Three out of (9.4%) studies were excluded due to technically inadequacy. There was no evidence to conclude that the readings differed among sonographers for the three measurements: E (P = .15), septal e’ (P = .77) and lateral e’ (P = .89). The inter-rater reliability among sonographers for overall interpretation was very high κ = 0.86 (95% CI [0.67, 1.0]).

Conclusion: EM sonographers previously credentialed in cardiac US-obtained similar Doppler measurements of DF evaluation and very high inter-rater reliability for the assessment of overall DF. When assessing a dyspneic patient, a normal EF may lead the physician to search for other non-cardiac causes of the patient’s symptoms. The ability to assess DF can help diagnose this alternate etiology of CHF symptoms.

A Comparison of Ultrasound-Guided and Palpation-Guided Identification of Lumbar Puncture Needle Entry Site in Patients as Body Mass Index Increases

Joseph L, Jeannmonod R, Jeannmonod D/University of California, Davis, Davis, CA; St. Luke’s University Health Network, Bethlehem, PA

Background: Success of lumbar puncture (LP) relies on correctly palpating anatomical landmarks, which can be difficult in patients with high body mass index (BMI). Ultrasound (US) has been shown to improve LP success; however, no study has looked specifically at patients with high BMI.

Study Objective: We postulate that as patient BMI increases, there will be a greater deviation from the gold standard between LP sites identified by palpation and those identified by US.

Methods: Emergency medicine residents were instructed on US use to identify anatomical landmarks pertinent to LP. Volunteers of varying BMI were placed in the lateral decubitus position and LP entry sites were marked at L3/L4 and L4/L5 intervertebral spaces using ultraviolet (UV) light markers by faculty with extensive experience with US-guided LP. This mark was considered the gold standard. Residents then used visible marker to mark LP site by palpation, and the transverse and longitudinal distance deviation from the gold standard mark were measured. Visible marker was removed and residents then marked LP site by US with a 10 MHz-linear array probe and a GE Logic P6 US machine. The transverse and longitudinal deviations were again measured. Data were analyzed with Wilcoxon Rank Sum. The study was IRB exempt.

Results: Forty-six pairs of measurements were obtained. By palpation, the transverse and longitudinal deviations from our gold standard were 4.4mm (SD 3.4, CI 0.99) and 8.2mm (SD 6.6, CI 1.9), respectively. With US, the transverse and longitudinal deviations were 7.8mm (SD 6.5, CI 1.9) and 7.1mm (SD 5.2, CI 1.5), respectively. At a BMI of 20.5, there were no differences between the transverse and longitudinal deviations by palpation as compared to US. At a BMI of 28, there was a smaller deviation from gold standard by palpation as compared to ultrasound (6.0mm vs 10.8mm; P = .01). There was no difference in deviation between longitudinal measurements (P = .77) and lateral e’ measurements.

Conclusion: As BMI increased, there was no greater deviation in LP site identified by palpation versus US as compared to the gold standard. In the patient with BMI of 28, LP sites identified by palpation were closer to the gold standard mark in the transverse distance as compared to US, but not in the longitudinal distance.

Emergency Physician-Performed Bedside Ultrasound in Patients With Undifferentiated Abdominal Pain

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Study Objective: Abdominal pain is a common complaint and comprises approximately 25% of all patients who present to the emergency department (ED). More than 25% of patients presenting to the ED with uncomplicated abdominal pain have computed tomography (CT) scans during their visit. The radiology literature has shown that despite the large number of CTs performed on patients in the ED presenting with abdominal pain, less than half (48%) are actually diagnostic. The objective of this study is to determine if performing a bedside screening ultrasound (US) on patients who present to the ED with undifferentiated abdominal pain can result in a reduction in CT scan usage. We hypothesize that
performing a bedside US will decrease the use of CT imaging in the ED by 15% in patients with abdominal pain.

Methods: This is a preliminary prospective observational study of ED patients at two urban academic medical centers beginning December 2014. Inclusion criteria include all patients between the ages of 18 and 65 who present with abdominal pain and have a CT of the abdomen and pelvis performed. Patients with an extensive abdominal surgical history or those who end up not having a CT are excluded. Emergency physician co-investigators trained in US, blinded to CT results, performed the following studies: a Focused Assessment with Sonography in Trauma (FAST) exam, right upper quadrant US, bilateral renal US, an abdominal aorta US, and a right lower quadrant US. All US results were discussed with the treating physician and any changes in management were documented. Medical records were reviewed for the final results of all CTs.

Results: We calculated a sample size of 200 patients in order to reduce CT scan usage from 25% to 10%. Our preliminary data identified 31 eligible patients of which 28 were enrolled in the study. Three patients have been dropped due to the CT being canceled. Twenty-five patients received both the US and CT in the ED and were included in the analysis. Eleven patients (44%) had a normal US and no significant findings on a subsequent CT, Four patients (16%) had a normal US, but a positive CT. Two of these four had mild hydrothorax on CT that was missed on US and two had more complicated diagnoses of perforating Crohn’s and diverticulitis. Ten patients (40%) had a positive US, of which eight had the same diagnosis confirmed on CT and two patients (8%) had CT findings that differed from the US: one had acute appendicitis on US, but renal colic on CT and one had a possible SBO on US but a rectus muscle hematoma on CT. Ultrasound could have theoretically reduced CT utilization in 32% of patients. Although three patients were dropped, two of those had the CT scan canceled and a change in management based on US findings. The two diagnoses were appendicitis and choledocholithiasis and both had subsequent radiology US confirming the findings. Therefore, our preliminary total theoretical and actual CT usage reduction is 40%.

Conclusions: These preliminary findings suggest that ED performed bedside US in patients with uncomplicated abdominal pain may significantly reduce CT utilization. Bedside US will not replace CT in all patients and subsequent imaging may still be required. However, incorporating US into an abdominal pain algorithm may reduce radiation exposure, length of stay and costs associated with unnecessary CT usage in the ED.
then the iCXR diagnostic approach, nowadays considered the standard of care. When the analyses of all patients enrolled will be completed (expected in June 2015), we will be able to compare the diagnostic accuracy of the iLUS and iCXR diagnostic protocols in a significantly larger sample of patients.

### 298

**End-Tidal Carbon Dioxide Monitoring and the Possibility of Return of Spontaneous Circulation During Out-of-Hospital Cardiac Arrest: A Population-Based Study**

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**Background:** End-tidal carbon dioxide (ETCO2) monitoring is recommended as a chest compression performance indicator during cardiac arrest. However, the frequency of use during out-of-hospital cardiac arrest (OHCA) and its benefits have never been evaluated in real clinical situations.

**Study Objective:** We investigated OHCA patients in Taiwan to evaluate the frequency of ETCO2 use and the effects on return of spontaneous circulation (ROSC).

**Methods:** We utilized a sampled National Health Insurance claims database containing one million beneficiaries. All adult beneficiaries older than 18 years presented with OHCA and received chest compression between January 1, 2005 and December 31, 2012 were enrolled. We further identified patients with ETCO2 use and matched each one with twenty patients without ETCO2 use based on their propensity scores. The Logistic regression model was applied to compare the odds ratios (ORs) of ROSC in the matched cohorts.

**Results:** A total of 5041 OHCA patients were enrolled. The frequency of ETCO2 use was increased after 2010 but still is low. After matching, 59 patients with ETCO2 use and 1180 without were selected. The adjusted OR of ROSC is significantly increased (2.89; 95% CI 1.53-5.48).

**Conclusion:** Patients with ETCO2 use may benefit from better chest compression performance which in turn results in higher possibility of ROSC. However, the overall use of ETCO2 is still low despite strong recommendation in the guidelines.

### 299

**Repeat Lactate Value, Not Lactate Clearance, Best Predicts 24-Hour Mortality in Injured Patients**

Dezman ZDW, Comer AC, Smith GS, Narayan M, Scalea TM, Hinson JM/University of Maryland School of Medicine, Baltimore, MD; National Study Center for Trauma and Emergency Medical Systems, Baltimore, MD

**Study Objective:** Injury is the most common cause of death in people between 1 and 45 years of age. Evaluation of injured patients is often guided by serial venous lactate measurements. Lactate clearance, calculated as a relative percent change, is the most commonly used method of determining a patient’s response to resuscitative efforts, yet no study has compared the different approaches to interpreting serial lactates. The purpose of this study is to determine the best model for predicting 24-hour mortality, using serial lactate values from a large undifferentiated population of injured patients.

**Methods:** The subjects for this single-center retrospective cohort study were patients admitted to the R Adams Cowley Shock Trauma Center directly from the scene of injury between January 2010 and December 2012. All patients underwent resuscitation according to our institutional guidelines, with venous lactate concentrations measured on arrival and again 6 hours later. Documentation of death at 24 hours, lactate levels, and timing of test results was extracted from patient records. All patients in the study had (1) two lactate measurements within 24 hours after admission and (2) an elevated initial lactate level (≥3.0 mmol/L). Patients were excluded if they were transfers from another facility, died within 15 minutes after arrival, had incomplete records, or did not have an elevated initial lactate level or serial lactate measurements. Serial lactate measurements were used to calculate five models of clearance for each subject: actual value of the repeat level (Lactate2, mmol/ L), absolute clearance (Lactate2-Lactate1, mmol), relative clearance (Lactate2-Lactate1/Lactate1, %), absolute rate ([Lactate2-Lactate1]/timeLactate1, mmol/hr), and relative rate ([Lactate2-Lactate1]/[Lactate1]*timeLactate1, %/hr). A receiver operating curve for 24-hour mortality was calculated for each model. We compared the different approaches using the area under these receiver operating curves (AUC). AUCs were compared using Delong’s method (two-tailed, α=0.05) and the cut-off values that optimized sensitivity and specificity for each model were included.

**Results:** A total of 3,395 patients had an elevated lactate level on admission (mean=5.59±2.88 mmol/L), followed by a second lactate (mean=2.55±1.06 mmol/L). The value of the repeat lactate measurement had the highest AUC (AUC=0.743, [Table]). This was significantly higher than absolute clearance (P = .005), absolute rate (P < .0001), and relative clearance rate (P < .0001). There was a trend toward significance when compared with relative clearance (P = .193).

**Table.** Comparison of AUCs and Cutoffs of Models Used to Calculate Lactate Clearance

<table>
<thead>
<tr>
<th>Clearance Model</th>
<th>AUC</th>
<th>Optimal Cutoff</th>
</tr>
</thead>
<tbody>
<tr>
<td>Absolute clearance</td>
<td>0.624</td>
<td>1.7 mmol/L</td>
</tr>
<tr>
<td>Absolute clearance rate</td>
<td>0.509</td>
<td>0.1 mmol/L/hr</td>
</tr>
<tr>
<td>Relative clearance</td>
<td>0.688</td>
<td>31.3%</td>
</tr>
<tr>
<td>Relative clearance rate</td>
<td>0.528</td>
<td>3.0%/hr</td>
</tr>
<tr>
<td>Actual value of repeat lactate</td>
<td>0.743</td>
<td>3.8 mmol/L</td>
</tr>
</tbody>
</table>

**Conclusions:** In this large single-center study of injured patients with serial lactate measurements, the value of the repeated lactate had the greatest ability to predict 24-hour mortality. This simpler approach both predicts mortality the best and is easy to interpret.

### 300

**Focused Cardiac Sonography During Resuscitation of Cardiac Arrest Patients in the Emergency Department**

Luna AC, Babasa R, Gaerlan F/St. Luke’s Medical Center, Quezon City, Philippines

**Study Objective:** Focused sonography may be considered an extension of the physical examination as it allows accurate and rapid recognition of critical conditions. Multiple studies have shown evidence that focused cardiac sonography is a feasible adjunct to cardiopulmonary resuscitation. This study, which is the first known research on this topic in the Philippines, investigated the utility of cardiac sonography performed by emergency physicians to predict the resuscitation outcomes of cardiac arrest patients. The study likewise aimed to determine the utility of ultrasound to direct the management of patients in cardiac arrest and to determine the possible etiology of the arrest.

**Methods:** This is a prospective cohort study which included a convenience sample of cardiac arrest patients seen in the emergency department during the 11-month study period. These patients underwent focused cardiac sonography through the subxiphoid view at the end of each 2-minute cycle during resuscitation. The presence of cardiac activity as well as the possible etiology of the arrest was also noted. End points analyzed as possible predictors of resuscitation included patients’ clinical profile, pre hospital transit time, presenting cardiac rhythm, cardiac activity on sonography, and length of emergency department (ED) resuscitation. Data were then analyzed through MEDCALC and SPSS.

**Results:** A total of 53 patients were included in the study. The results showed that cardiac activity when correlated to return of spontaneous circulation, 24-hour survival and survival to hospital discharge has a sensitivity of 59.1, 66.7 and 50, respectively while the specificity was 64.5, 59.1, and 54.9 accordingly. The negative predictive value for all clinical outcomes was higher than the positive predictive value suggesting that the absence of cardiac activity is a poor prognosticating factor. Among the other patient factors analyzed, number of arrests and transit time were the only variables significantly associated with survival. No possible etiology of the arrest was seen in all 53 patients. Nineteen patients were found to be in PEA but with presence of cardiac activity on ultrasound. Three of these 19 patients were given Atropine and inotropes and all 3 patients achieved return of spontaneous circulation.

**Conclusion:** Although there was no possible etiology of the arrest seen in all patients, this data is important to narrow the differential diagnosis. In addition, the use of inotropes, as the results showed, may be considered in patients found to be in pseudo PEA. Although, the absence of cardiac activity is associated with a poor outcome of resuscitation, it is important that other patient factors are considered. Ultimately, the management of each cardiac arrest patient is unique and dependent on the emergency physician’s clinical judgment.
301 Effect of Adipose-Derived Mesenchymal Stem Cells and Therapeutic Induction of Mild Hypothermia on Transient Global Cerebral Ischemia
Chung TN, Ryu H, Lee JH, Je SM/CHA University Bundang Medical Center, Gyeonggi-Do, Korea

Study Objectives: Global cerebral ischemia is the most important cause of poor prognosis after successful resuscitation from cardiac arrest. Various attempts have been tried to minimize global cerebral ischemia, but none showed better efficacy than therapeutic induction of mild hypothermia (TH), which has been recommended as a mainstay of standard post-cardiac arrest cares. However, new evidences threw the value of TH into serious question (N Engl J Med 2013; JAMA Neurol 2015), which suggested a necessity of alternative or complement for TH. A few studies showed the effect of mesenchymal stem cell (MSC) on global cerebral ischemia, but none compared the effect with TH or assessed possible interaction. We aimed to show the effect of MSC on delayed neuronal death after global cerebral ischemia in terms of comparison with TH.

Methods: Rats were subjected to 7 minutes of electroencephalography-confirmed transient global cerebral ischemia and randomized into 4 groups: placebo control, TH (2 hr, 32 °C), intravenous injection of human adipose derived MSC (1 x 10^6), and combined application of TH and MSC (TH/MSC), along with 4 sham groups treated identically. MSC was derived and cultured from human adipose tissue. Rats were sacrificed 7 days after insult. Fluoro Jade B (FJB), CD11b, IgG, myeloperoxidase (MPO), and 4-hydroxynonenal (4-HNE) immunostainings were performed to detect neuronal death, microglial activation, blood-brain barrier disruption, neutrophil infiltration, and oxidative injury. Predefined 9-point scale was used to quantify the degree of microglial activation (J Neuosci Res 2005). ImageJ software was used to measure % area of IgG leakage and the intensity of 4-HNE. Time to remove tapes on both forepaws was measured to test behavioral function. Analysis of variance with Bonferroni post hoc comparison was used to detect the difference among the experimental groups.

Results: One in control and one in TH/MSC died before 7 days following the insult, while all in sham groups survived: 2 groups of 7, 2 groups of 6, and 4 groups of 3 (sham) were enrolled. There were statistically significant differences of neuronal death at: control (146.83 cells/field) versus TH (66.50 cells/field), MSC (19.85 cells/field), TH/MSC (12.60 cells/field) in hippocampal CA1; differences of microglial activation at: shams versus control (8.55), TH (4.83); sham MSC (0.72) versus MSC (2.97); control versus TH, MSC, TH/MSC (1.74); TH versus MSC, TH/MSC (Figure); differences of IgG leakage at: shams versus control (3.08% area); control versus TH (1.55% area), MSC (1.73% area), TH/MSC (1.18% area); differences of 4-HNE intensity at: 4 shams versus control (214.34); control versus TH (192.48); MSC (179.3); TH/MSC (175.55); TH versus MSC, TH/MSC; differences of tape removal time at control (153, s) versus other groups (46.25, 49.00, 48.50, 42.17, s). No significant difference of neutrophil infiltration was found.

Conclusion: Administration of MSC after transient global cerebral ischemia has a prominent protective effect on delayed neuron death, even compared with TH. There is no negative interaction in combined use of MSC and TH.

302 Transthoracic Hypothermia With Cooled Oxygen Inhalation versus Current Techniques: A Randomized-Controlled Experimental Study
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Study Objectives: Rapid and easy applicable hypothermia techniques have a great value on therapeutic hypothermia. A novel method with cooled oxygen inhalation has been described and tested in a pilot study previously. In this study, we aimed to compare the efficiency of this novel method over current hypothermia techniques in a rat model.

Methods: We conducted an experimental study with thirty-six healthy, adult, Wistar Hannover male rats in a laboratory of a tertiary care setting. After rats were anesthetized with a combination of 50 mg/kg ketamine and 10 mg/kg xylazine, rectal probe was inserted for the continuous measurement of core temperature. Rats were randomly divided into four groups: (1) Group 1: Cooled oxygen group. This group was applied cooled oxygen (+4 °C). Oxygen was cooled with a cooling device designed for this purpose. Rats were intubated and oxygen was administered via balloon-valve-mask (BVM). An additional equipment (Thermoprobe TP), ThermoProbe Inc.) was used at the tip of BVM to measure the temperature of given oxygen. (2) Group 2: IV cold fluid group. In this group IV cold fluid administration was applied as hypothermia technique. Lactated ringer (RL) solution was administered in the degree of +4 °C via tail vein at the rate of 30 ml/kg/h in the first hour and then at the rate of 10 ml/kg/h. (3) Group 3: Surface cooling group. In this group evaporation was applied through ice packs (0 °C) and cooling fan. (4) Group 4: Control group. This group had just standardized anesthesia, and was not applied any hypothermia technique. Rectal temperature was recorded in every 5 minutes as well as other vital signs. Hypothermia techniques were administered in 3 groups until the rectal temperature was reached to 34 °C and the required time was recorded. The targeted temperature was maintained for one hour between 34 to 32 °C. Then hypothermia protocols were terminated and rats were warmed externally with blanket. When they reached to normal body temperature (38 °C) study was terminated. The rats were killed with cardiac puncture. Lung, heart, brain, and kidney samples were collected for pathologic examination. All the samples (blood and tissue) were numbered for blinding of the examiner. Main outcomes were the speed (°C/minute) of temperature decrease (S), and the time required reaching to the targeted body temperature (T).

Results: Cooled oxygen showed significantly better results over control group for both in T and S values (P < .001 for both) (Table). Cooled oxygen group had also lower T values and higher S values over to the IV cold fluid group (P = .003 and P < .0001, respectively). There was a difference between cooled oxygen and surface cooling group in S value but not in T value (P = .001 and P = .06 respectively). IV cold fluid group did not show any difference from the control group in T or S values (P = .94 and P = .730, respectively). No pathologic change in histologic examination was observed in any group.

Conclusion: Our study showed that cooled oxygen inhalation was as effective as other therapeutic hypothermia techniques. It may be beneficial especially in initializing phase of therapeutic hypothermia.
Study Objectives: Survival from traumatic cardiopulmonary arrest has been reported at a rate of 0-4% in the civilian out-of-hospital setting, and many consider resuscitation of this group to be futile. No prior studies have assessed the patients who have received cardiopulmonary resuscitation (CPR) in a combat setting for predictors of survival. Our objective was to evaluate predictors of survival among patients who had received CPR in a combat theater setting.

Methods: We conducted an IRB-approved query of the Department of Defense Trauma Registry to identify patients who received CPR in the out-of-hospital setting or during the first 24 hours of injury in the combat theater setting, between 2007 and 2014. Data included demographics, injury description, duration of transport and CPR, procedures performed, complications, survival to admission and survival to discharge from combat theater hospital. Patients were also grouped according to when cardiac arrest developed: pre-hospital (PH) and hospital (H). The groups were compared and evaluated by injury location and severity, transport time, type of resuscitation, procedures, complications, and survival to admission and discharge. Following univariate analyses, logistic regression models were performed to identify individual predictors of survival.

Results: Five hundred eighty-nine traumatically injured subjects received CPR in the combat theater setting. Seven subjects were withdrawn from the analysis because cardiopulmonary arrest developed more than 24 hours post-injury. Subjects were 24 [21-28] years, male (98%), and US military (67%). In total, 75 subjects (13%) survived to hospital discharge. Survival to admission was lower in PH 45% than H 71% (<0.0001); survival to discharge from combat theater hospital was also lower in PH 8% than H 17% (0.0007). Among PH subjects, survival to admission was associated with injuries to the face and use of hemostatic dressings (<0.0001) or injuries to the chest and the use of hemostatic dressing (<0.0001). Among this group, survival to discharge was associated with injuries to the chest and abdomen (<0.0001) or to the abdomen alone (<0.0001). Survival to discharge was also associated with spinal immobilization (<0.0001). Among the H group, survival was associated with closed chest cardiac massage (<0.0001) and the infusion of therapeutic substances (<0.0001). Differences in injury severity, transport time, any other procedures including open-chest cardiac massage, and complications did not predict survival in either group.

Conclusion: Injuries to the face or chest with the use of hemostatic dressings was found to be a predictor of survival to admission among subjects who developed out-of-hospital cardiac arrest, whereas the combination of injuries to the chest, abdomen, and use of spinal immobilization were found to be predictors of survival to discharge. Among the group that developed cardiac arrest in the hospital, closed chest cardiac massage and the infusion of therapeutic substances were predictors of survival to discharge.

305 Cardiopulmonary Resuscitation for Trauma Patients in the Combat Theater: An Assessment for Survivors

Anderson KL, Bloom AD, Mora AG, Ervin AT, Minnick JT, Maddry JK, Bebarta VS/Baylor College of Medicine, Houston, TX; San Antonio Military Medical Center, San Antonio, TX; United States Army Institute of Surgical Research, San Antonio, TX

Study Objectives: Survival from traumatic cardiopulmonary arrest has been reported at a rate of 0-4% in the civilian out-of-hospital setting, and many consider resuscitation of this group to be futile. No prior studies have assessed the patients who have received cardiopulmonary resuscitation (CPR) in the combat setting. Our objectives were to describe the patients who have received CPR in theater and assess the survival rate among this group.

Methods: We conducted an IRB-approved query of the Department of Defense Trauma Registry to identify patients who received CPR in the out-of-hospital setting or during the first 24 hours of injury in theater, between 2007 and 2014. Data included demographics, injury description, duration of transport and CPR, out-of-hospital.
procedures, type of resuscitation, and survival to discharge. Patients were also grouped according to location of cardiac arrest: pre-hospital (PH) and hospital (H). The groups were compared and evaluated by injury, transport time, type of resuscitation, out-of-hospital procedures and complications, and survival in theater. The primary outcome was survival to discharge from first theater hospital. Categorical variables were analyzed using chi-square or Fisher’s exact tests and reported as frequencies and percentages. Wilcoxon tests were performed for continuous variables and reported as median [Interquartile Range].

Results: Five hundred eighty-nine traumatically injured subjects received CPR in theater. Seven subjects were withdrawn from the analysis because cardiopulmonary arrest developed more than 24 hours post-injury. Subjects were 24 [21-28] years, male (98%), and US military (67%). Of those 88% were battle-related injuries. Injury type was 57% blast, 35% penetrating, 7% blunt, and 1% burn. The median injury severity score was 22 [10-29]. 101 (17%) received open chest cardiac massage. 309 (52%) received blood products. 281 subjects (48%) received CPR in the field (PH), and the remaining 301 (52%) received CPR at a medical treatment facility (H). There was no difference in injury severity score or injury type. Transport time in the PH group 47 minutes [30-65] was longer than the H group 36 minutes [23-60] (0.006). At the hospital, closed chest CPR was lower among PH 77% than H 90%, and there was no difference between open chest CPR between groups. Out-of-hospital procedures (intubation cricothyrotomy, chest tubes, vascular access, oxygen, and fluids) were more commonly performed in PH 3[2-4] versus H 2[0-3] (<0.0001); however, more blood was administered in H 59% vs PH 46% (0.002). Complications (bleeding, electrolyte imbalance, hypovolemia, infection and respiratory events) were reported more frequently in the H group 38% than PH 17% (<0.0001). In total, 75 subjects (13%) survived to hospital discharge. Survival to admission was lower in PH 45% than H 71% (<0.0001); survival to discharge out of theater was also lower in PH 8% than H 17% (0.0007).

Conclusion: Of those receiving CPR within 24 hours of injury, 13% survived to discharge from theater hospital. Survival to discharge was higher in those where CPR was initiated after hospital arrival. The survival rates described are higher than civilan reports of survival from traumatic cardiopulmonary arrest. Additional analysis on 30 day outcomes is ongoing.

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Health Disparities in Emergency Department Wait Time Among Pediatric Traumatic Brain Injury
Ng A, Kiafär D, He S, Cen S, Renda N, Sanossian N, Mack W/University of Southern California, Los Angeles, CA

Study Objectives: To determine whether emergency department waiting time for children with traumatic brain injury are associated with race/ethnicity and payer status.

Methods: Design/Setting: We analyzed the 2003-2010 National Hospital Ambulatory Medical Care Survey. Survey weighted multivariable linear regression was utilized to study the associations between race and payer status with longer emergency department waiting time adjusting for patient, hospital, and severity factors as determined by triage level.

Utilized to study the associations between race and payer status with longer emergency department waiting time adjusting for patient, hospital, and severity factors as determined by triage level.

Results: In total, 17.54% (1,045,087) of the visits were emergent (triage levels 1-2) and 37.6% (2,240,353) were non-emergent (triage levels 3-5). 181,936 (10.9%) had an EEG performed in the ED and (2) who did not have an EEG performed in the ED; (3) family members of adult patients recently diagnosed with seizures; (4) seizure patient advocates; (5) patients with seizures without health insurance coverage. We obtained information about: (1) perceptions of their ED experience; (2) perceptions of their experience obtaining, or not obtaining, an EEG in the ED; (3) perceptions of their treatment during and after the ED; (4) the experience of their follow-up care; (5) perceptions of their experiences after treatment; (6) desired outcomes for their treatment (during and after); (7) perceptions of factors that facilitated or hindered their follow-up care; and (8) perceptions about their care in general. To augment the focus groups, we conducted 6 telephone interviews to increase diversity in the sample and to enhance study findings. We coded and analyzed focus group transcripts using a constructivist approach to grounded theory, utilizing a systematic, multi-step coding process which started with line-by-line coding and used the constant comparison method to derive categories and themes.

Results: First time seizure patients have difficulty remembering and understanding the events surrounding the ED visit. For the majority of patients, the ED is experience is fear inducing, unknown, unexpected, and embarrassing. Patients entrust medical professionals to act in their best interest during this time. Performing medical tests such as an EEG in the ED can offer patients an explanation for their seizure and reassurance to patients and family members. Earlier performance of testing and initiation of treatment also facilitates more expeditious follow-up with an outpatient neurologist. It also decreases patient risk for further seizures and reduces the number of patients who are lost to follow up.

Conclusion: Individuals trust that health care providers will perform the standard of care consistent with the current medical practice for first time seizures. Patients believe that performing EEGs in the ED and initiating appropriate anticonvulsant therapy for those patients who are at high risk for future seizures expedites appropriate follow-up care, decreases risk to patients and society, and offers patients a sense of security and control over their medical condition.

308

Utility of a Brief Training Module on Improving Emergency Physicians’ Ability to Identify Non-Convulsive Seizure on Emergent Electroencephalography Performed in Patients With Altered Mental Status
Sergot P, Chari G, Omurtag A, Pillow MT, Zehtabchi S/Baylor College of Medicine, Houston, TX; SUNY Downstate Medical Center, Brooklyn, NY; University of Houston, Houston, TX

Study Objective: Altered mental status (AMS) is the chief complaint in approximately ten percent of emergency department (ED) patients and presents a significant diagnostic challenge, as it is a manifestation of a wide range of medical syndromes. Non-convulsive seizure (NCS) is the etiology in as many as ten percent of these patients and is associated with significant morbidity and mortality if not diagnosed early. Emergent electroencephalography (EEG) aids in the diagnosis of NCS, but it is not routinely utilized in the ED secondary to several challenges, one of which is a lack of timely interpretation. We hypothesize emergency physicians can be taught to recognize patterns consistent with NCS on EEGs performed emergently in AMS patients.

Methods: Our group, consisting of emergency physicians and epileptology, developed a novel training module for emergency physicians. This module describes the basics of EEG recording and interpretation, with a focus on the recognition of NCS in the appropriate clinical setting, such as patients presenting with altered mental status. The module is a self-administered, interactive slide presentation. To determine the efficacy of the training module, a multiple-choice test was designed. Board-certified or board-eligible emergency physicians will be randomized into two groups: the study group, which will self-administer the training module, and the control group, which will not see the module. Both groups will be asked to review EEGs previously interpreted by two epileptologists and designate them into one of three categories: normal, abnormal but not a seizure, abnormal and seizure.

307

First Time Seizure Focus Group Study
Beverly SK, Davis CS, Hernandez J, Wyman A, Asimos AW/Carolina Medical Center, Charlotte, NC; University of North Carolina-Charlotte, Charlotte, NC

Study Objectives: Seizures comprise an estimated 1%-2% of all emergency department (ED) visits per year. The ED practice standard for uncomplicated first time generalized seizures in adults evaluates patients for electrocardiographic, metabolic and structural causes. If no abnormalities are identified, the patient is discharged with instructions to follow up with a neurologist. An electroencephalogram (EEG) is not typically included in the initial ED evaluation and is deferred to the outpatient setting. Delays in outpatient follow-up can result in the occurrence of additional seizures prior to the initiation of anticonvulsant treatment in patients requiring this therapy. This study evaluates patient perspectives of performing EEGs in the ED and initiating appropriate anticonvulsant therapy prior to discharge from the ED in those patients with a high likelihood of recurrent seizures. The objective of this project was to understand the experience of patients who had first-time seizures and who did, and did not, have EEGs performed in the ED as part of their initial evaluation.

Methods: We conducted five focus groups among (1) patients with seizures who had an EEG performed in the ED and (2) who did not have an EEG performed in the ED; (3) family members of adult patients recently diagnosed with seizures; (4) seizure patient advocates; (5) patients with seizures without health insurance coverage. We obtained information about: (1) perceptions of their ED experience; (2) perceptions of their experience obtaining, or not obtaining, an EEG in the ED; (3) perceptions of their treatment during and after the ED; (4) the experience of their follow-up care; (5) perceptions of their experiences after treatment; (6) desired outcomes for their treatment (during and after); (7) perceptions of factors that facilitated or hindered their follow-up care; and (8) perceptions about their care in general. To augment the focus groups, we conducted 6 telephone interviews to increase diversity in the sample and to enhance study findings. We coded and analyzed focus group transcripts using a constructivist approach to grounded theory, utilizing a systematic, multi-step coding process which started with line-by-line coding and used the constant comparison method to derive categories and themes.

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308 EMF

Utility of a Brief Training Module on Improving Emergency Physicians’ Ability to Identify Non-Convulsive Seizure on Emergent Electroencephalography Performed in Patients With Altered Mental Status
Sergot P, Chari G, Omurtag A, Pillow MT, Zehtabchi S/Baylor College of Medicine, Houston, TX; SUNY Downstate Medical Center, Brooklyn, NY; University of Houston, Houston, TX

Study Objective: Altered mental status (AMS) is the chief complaint in approximately ten percent of emergency department (ED) patients and presents a significant diagnostic challenge, as it is a manifestation of a wide range of medical syndromes. Non-convulsive seizure (NCS) is the etiology in as many as ten percent of these patients and is associated with significant morbidity and mortality if not diagnosed early. Emergent electroencephalography (EEG) aids in the diagnosis of NCS, but it is not routinely utilized in the ED secondary to several challenges, one of which is a lack of timely interpretation. We hypothesize emergency physicians can be taught to recognize patterns consistent with NCS on EEGs performed emergently in AMS patients.

Methods: Our group, consisting of emergency physicians and epileptology, developed a novel training module for emergency physicians. This module describes the basics of EEG recording and interpretation, with a focus on the recognition of NCS in the appropriate clinical setting, such as patients presenting with altered mental status. The module is a self-administered, interactive slide presentation. To determine the efficacy of the training module, a multiple-choice test was designed. Board-certified or board-eligible emergency physicians will be randomized into two groups: the study group, which will self-administer the training module, and the control group, which will not see the module. Both groups will be asked to review EEGs previously interpreted by two epileptologists and designate them into one of three categories: normal, abnormal but not a seizure, abnormal and seizure.
Results: The answers provided by both groups of emergency physicians will be compared to the gold standard interpretations of the two Epileptologists, and the sensitivity and inter-rater agreement (kappa) will be determined.

Conclusion: If successful, the real-time interpretation of EEGs in the ED by emergency physicians may lead to more prompt diagnosis of NCS in patients presenting with altered mental status, allowing for earlier initiation of appropriate therapy and improved patient outcomes.

309 Predictors of Neurosurgical Interventions in Low Risk Patients With Isolated Traumatic Subarachnoid Hemorrhage
Sawas A, Huang E, Vosswinkel J, McCormack JE, Thode HC, Jr., Singer AJ/Stony Brook University, Stony Brook, NY

Study Objectives: Patients with isolated traumatic subarachnoid hemorrhage (tSAH) are often transferred to regional trauma centers for possible neurosurgical interventions (NSI). However, NSI are rarely needed, especially in patients with mild traumatic brain injuries. We explored the association between clinical characteristics and need for NSI in patients with tSAH and a Glasgow Coma Score (GCS) of 15 and attempted to derive a decision rule to identify patients at very low risk of NSI in whom inter-facility transfers would be unnecessary.

Methods: Study Design: Retrospective review of regional trauma registry (2001-2014). Setting: Suburban county serving a population of 1.5 million with 11 local hospitals and one academic level 1 trauma center. Patients: Isolated tSAH (ICD 9 codes 852.0-852.1). Measures and Potential Predictors of NSI: Demographic and clinical characteristics. Outcomes: Death, mechanical ventilation or need for NSI (intracranial pressure [ICP] monitoring, ventriculostomy or craniotomy). Data Analysis: Univariate analysis, (chi-square test) and logistic regression were used to determine the association between predictors and outcomes.

Results: There were 1,088 cases identified. Mean age (SD) was 62 (25) and 48% were male. Mechanism of injury included falls (70%), MVC (15%), and assaults (6%). Comorbidities included bleeding disorders (17%), diabetes (18%), and hypertension (52%). Mean (SD) ISS was 10.3 (2.3), highest abbreviated injury scale (AIS) was 3 for 98% of cases, 2 for 1% and 4 or 5 for 1%. 385 (38%) patients were admitted to the ICU and 22 (2%) were mechanically ventilated. Mortality was 2% and only 0.8% patients required NSI. Mechanical ventilation and NSI were more likely to occur with an increase in AIS (AOR 6.6, 95% CI 2.5-17.0) and with the presence of a bleeding disorder (AOR 2.7 95% CI 1.2-6.0). This model was poorly predictive, with a sensitivity of 5.4% and specificity 100%. Area under the curve was 0.63 (95% CI 0.52-0.75). A second multivariate model found hypertension related to NSI (P = .046) with 88% sensitivity, 48% specificity, 1.3% PPV and 99.8% NPV.

Conclusion: The need for neurosurgical intervention in low risk patients (GCS 15) with isolated tSAH is rare and is associated with hypertension. Due to small sample size we were unable to derive a specific model for predicting neurosurgical interventions in these patients.

310 Prospective Double-Blinded Randomized Field-Based Clinical Trial of Metoclopramide and Ibuprofen for the Treatment of Acute Mountain Sickness
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Study Objectives: Acute mountain sickness (AMS) is very common, affecting 50-80% of high altitude travelers and can be debilitating. AMS is defined as headache combined with nausea, vomiting, fatigue, weakness, lightheadedness, and/or difficulty sleeping that occurs as a result of rapid exposure to high altitude. While acetazolamide is effective at aiding acclimatization and improving AMS, it is not without side effects (sleeping that occurs as a result of rapid exposure to high altitude). While acetazolamide is effective at aiding acclimatization and improving AMS, it is not without side effects (sleeping that occurs as a result of rapid exposure to high altitude). Recent studies have shown some promise for the use of ibuprofen in AMS. There are similarities between AMS and migraine headaches with nausea being a commonly associated symptom. The antiemetic metoclopramide has been well studied and is commonly administered for treatment of migraine headaches in emergency departments across the US. We hypothesized that metoclopramide and ibuprofen may be effective alternative treatment options for both the headache and nausea of acute mountain sickness. Methods: We performed a prospective, double-blinded, randomized, field-based clinical trial of metoclopramide and ibuprofen for the treatment of acute mountain sickness. Enrollment was during the climbing season March-May 2013 and 2015 along the usual approach to Mount Everest in Nepal. Subjects were recruited from tea houses in the villages of Pheriche (4280m) and Dingboche (4358m), the Himalayan Rescue Association clinic in Pheriche, and posted signage. Eligibility criteria were recent increase in altitude over 1000 vertical feet in the last 24 hours and presence of headache plus at least one other symptom required for diagnosis of AMS (including nausea, vomiting, fatigue, weakness, lightheadedness or difficulty sleeping). Patients with severe AMS, HACE, or HAPE were excluded. Subjects were randomized to either 10 mg metoclopramide or 400 mg ibuprofen. Subjects and investigators were blinded to the treatment group. Subjects were assessed by vital signs, Lake Louise Score, and a Virtual Analog Scale for headache and nausea severity immediately prior to ingestion of study medication, and then serially at 30, 60, and 120 minutes following medication ingestion. Results were analyzed by univariate comparisons and logistic regression with P < .05 considered significant.

Results: Analysis of demographic data revealed no statistically significant differences between metoclopramide and ibuprofen groups with respect to age, sex, nights spent at altitude, previous use of medication for altitude illness, altitude of birth, or altitude of residence. Groups did not differ significantly in initial Lake Louise Score, heart rate, or oxygen saturation. Both metoclopramide and ibuprofen were effective in significantly reducing headache severity compared to initial headache over the 2-hour course of the study. Metoclopramide had the additional benefit of reducing nausea to a greater degree than ibuprofen, although both medications reduced overall symptoms of AMS.

Conclusion: Both metoclopramide and ibuprofen were effective at reducing AMS symptoms including headache and nausea. Metoclopramide had the additional benefit of reducing nausea to a greater degree than ibuprofen. Therefore, metoclopramide may be an effective alternative treatment option in acute mountain sickness especially for those patients who additionally report nausea.
Timing of Consent Into a Multicenter Randomized Controlled Traumatic Brain Injury Clinical Trial Conducted Under Exception From Informed Consent

Satzman JG, Lunnøy MP, Harney DM, Vázquez-Benítez G, Birou M, Silbergleit R, Wright DW/Regions Hospitals, St. Paul, MN; Emory University School of Medicine, Atlanta, GA; University of Michigan, Ann Arbor, MI; HealthPartners Institute for Education and Research, Bloomington, MN; University of Minnesota, Minneapolis, MN

Study Objective: Clinical trials conducted under the Exception from Informed Consent (EFIC) Guidelines (21 CFR 50.24) require investigators to attempt prospective consent if possible before enrolling patient under EFIC. Investigators subsequently obtain consent for continued participation for patients enrolled under EFIC when a legally authorized representative (LAR) becomes available. The objective of this study is to describe the timing of patient enrollment into a traumatic brain injury study conducted under EFIC.

Methods: This study is a post hoc analysis of prospectively collected data from a randomized, controlled traumatic brain injury clinical trial evaluating the effectiveness of propofol vs. placebo on patients 18 years and older who have sustained a moderate to severe brain injury (GCS 4-12). The study protocol required study drug to be started within 4 hours from time of injury. Research teams had 60 minutes from time of injury to subsequent consent for patients enrolled under EFIC when a legally authorized representative (LAR) becomes available. If an LAR was identified within 4 hours from time of injury, the study team attempted to obtain prospective consent. If no LAR was identified within that timeframe, patients were enrolled under EFIC and subsequently consented for continued participation at a later time. Descriptive statistics for the patient population were tabulated, and time from injury to randomization and study drug start were calculated for the EFIC and consent groups. Time to consent intervals and Kaplan-Meier curves for the EFIC and LAR consent groups were also calculated.

Results: A total of 882 patients were randomized between April 2010 and October 2013 (442 propofol, 440 control). Patient demographics were balanced between groups, with a median age of 35 years, 73.7% male, 15.2% black, and a median GCS of 7. The most frequent mechanism of injury was a motor vehicle crash. Six hundred fifteen patients were enrolled under EFIC (69.7%). Median time from injury to consent was 2 hours, 55 minutes (IQR 2:25:3:30) for patients enrolled under prospective consent. Patients enrolled under EFIC had a median time from injury to consent for continued participation of 19 hours (IQR 5:14-23:26). The median time from injury to randomization for the EFIC group was lower compared to the consent group [2:45 (IQR 2:19-3:13) versus 3:15 (IQR 2:42-4:08)], as was time from injury to study drug initiation [3:37 (IQR 3:10-3:57) versus 3:54 (IQR 3:31-4:01)]. For the prospective consent group, the cumulative prospective consent rate at 1, 2, 3, and 4 hours from time of injury was 1%, 8%, 56%, and 100%, respectively.

Conclusions: As expected, a larger number of patients were enrolled under EFIC, and patients enrolled under EFIC had faster time to randomization and study drug start compared to patients enrolled under consent. For patients enrolled using traditional prospective consent, the vast majority were enrolled between 2 and 4 hours from time of injury. The range of time to subsequent consent for patients enrolled under EFIC was broad.

Prescription Database Monitoring in Emergency Department Patients With Back Pain

Stover K, Dorman M, Chan SB/Presence Resurrection Medical Center, Chicago, IL

Study Objectives: In 2008, there were 14,800 prescription analgesic deaths, and for every one death there was an estimated 825 people misusing these prescriptions for non-medical uses. Presently, 49 states have some form of prescription drug monitoring program (PDMP). The study objective is to identify high volume narcotic users with a state PDMP and see if such users have demographic similarities.

Methods: Retrospective 6-month community emergency department (ED) chart review of adult patients evaluated and discharged with back pain. Motor vehicle crashes and other trauma were excluded. Demographics, historical features, imaging results, length of stay, medications, and prescription data were abstracted. Illinois prescription drug monitoring program was queried online for previous narcotics or benzodiazepine prescriptions within 6 months of ED visit. Student t, Chi-squared, or Fisher exact tests were used to determine statistical significance as appropriate. Significance was set at 0.008 to correct for the Bonferroni effect.

Results: A total of 293 patients met inclusion and exclusion criteria. The mean age was 48.8 with 49.8% male. One or more prior ED visits for back pain was recorded on 37 patients (12.6%). Allergy to some kind of analgesic was reported by 35 patients (11.9%). Review of the ILPMP database revealed 110 patients (37.5%) with one or more prior narcotic or benzodiazepine prescription. Of concern, 61 patients (20.8%) had filled a mean of 386 pills and 6.8 prescriptions over the prior six months. Demographic comparison between these patients of concern and the other 232 patients showed a significant difference in prior ED visits (29.5% vs 8.2%; P < .001). There was also a trend for these 61 patients to report an analgesic allergy (19.7% vs 9.9%; P = .037). Certain analgesic allergies were significantly associated with patients of concern; particularly morphine allergy at 100%, opioid agonist allergies at 40%, and patients with multiple analgesic allergies at 50% (P = .007).

Conclusion: In this study, patients with prior high volume narcotic or benzodiazepine prescription history had an increased incidence of prior ED visits or increased incidence of reported analgesic allergies. Identification of either of these 2 features should raise concern and prompt further investigation with a state prescription monitoring database if available.

Using Saline Injections to Treat Myofascial Pain Syndromes

Bakrunas C, Bayona A, Roldan C, Rehrer S, Leoni J, Hu N, Bannuelos R/University of Texas Health Science Center at Houston, Houston, TX

Study Objective: Myofascial pain (MP) is regional pain originated in the muscle and fascia. It is characterized by a regional referred pain and the presence of a reproducible trigger point. MP is frequently under diagnosed and undertreated in the emergency department (ED). The prevalence of MP in middle-aged adults is estimated to be between 37 and 65%. Trigger point injection (TPI) is the safest and most effective treatment option for MP in the ED. Conventional medications used for TPI add cost and have potential adverse effects, while normal saline (NS) does not. The objective of this study is to compare the effectiveness of TPI with NS and conventional active drug mix (CADM) in relieving pain in patients diagnosed with MP in the ED.

Methods: We designed a prospective, randomized, double-blinded trial involving adult patients diagnosed with MP of the trapezius, gluteus medius/minimus, iliocostalis thoracis-lumborum, quadratus lumborum, or paraspinal muscles in the ED. We excluded those with a known allergy to lidocaine or steroids, signs of infection at the injection site, pregnancy, prisoners and those unable to consent. Allocation concealment was performed by a third party. Randomization was pre-assigned and included in tamper-proof envelopes. Patients and physicians were blinded to the treatment selection. The subjects were randomized into two groups: TPI with 1mL of NS or CADM (0.1 mL of lidocaine 10 mg/mL + triamcinolone 40 mg/mL). Pain was quantified using a 0 - 10 Numerical Rating Scale (NRS) and it was recorded upon arrival to the ED, before TPI after TPI and upon discharge from the ED. Additionally, we collected information about prior visits and workups done for the same pain. Patients were followed up by blinded scribes 2 weeks after discharge to assess pain intensity, duration of relief, satisfaction with the treatment, and presence of complications or missed diagnosis. The primary outcome measured was the level of pain relief after TPI. The secondary outcome was the duration of pain relief.

Results: Categorical variables were presented as percentages with comparison among the treatment groups analyzed using Fisher’s Exact Test. Quantitative variables
are reported as medians and comparisons are performed using the Wilcoxon 2-sample test. To date, 44 patients age 22-82 have been enrolled. The duration of pain ranged from 2 days to 9 years. Twenty-one patients had previously visited an ED or clinic prior to their presentation where workups were done to rule out a variety of other conditions. On arrival, the interquartile range (IQR) of pain scores was 8-10 NRS. Most patients (78.6%) had taken analgesics prior to TPI without relief of symptoms. Eight patients were lost to follow-up. Immediately post-TPI, the median pain score in both groups was 0. The median duration of pain relief 2 weeks post-TPI was 4 days (IQR: 0-6) for the CADM group and 5 days (IQR: 0-6) for the NS group (P=0.903). At 2 weeks, all patients on average had more than a 50% reduction in pain from baseline.

Conclusions: MP, although often initially unrecognized, can be easily diagnosed and treated in the ED by emergency physicians. TPI with normal saline is equally as effective as conventional drugs to treat MP. They provide similar duration of pain relief at 2-week follow-up. This could provide a safer and cheaper alternative to treat MP.

The first recruited ED patients with LBP of <3 weeks duration. Patients were randomized to minor analgesics with or without focused exercise. Pain and disability scores were comparable four weeks later. The second study included patients who presented to a GP with LBP <3 weeks. All were treated with APAP, and randomized to exercise, sham, or no further treatment. Number of subsequent days with pain was comparable among the groups. The final study randomized patients who presented to a GP to focused exercise + education + bed rest, focused exercise + education, bed rest alone, or none of the above. Patients were stratified based on type of analgesic. The primary outcome, achieving normal functionality, was delayed in those randomized to bed rest, but no different among the other groups.

Conclusions: For patients with acute, non-radicular low back pain, neither spinal manipulation nor exercise therapy improve outcomes more than medical therapy alone. There is insufficient evidence to determine if yoga or massage are beneficial.

Table. Prescriptions for Opioids by Specialty, Numbers of Prescriptions and Pills

<table>
<thead>
<tr>
<th>SPECIALTY</th>
<th>NUMBERS OF PRESCRIPTIONS</th>
<th>CUMULATIVE %</th>
<th>MEAN PILLS/PRESCRIPTION</th>
<th>TOTAL NUMBER OF PILLS</th>
<th>CUMULATIVE %</th>
<th>CUMULATIVE % (EXCLUDING MISSING)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Family Medicine</td>
<td>1,971,401</td>
<td>18.6%</td>
<td>88.8</td>
<td>175,139,177</td>
<td>22.5%</td>
<td>32.6%</td>
</tr>
<tr>
<td>Internal Medicine</td>
<td>1,611,049</td>
<td>15.2%</td>
<td>84.4</td>
<td>135,892,056</td>
<td>17.5%</td>
<td>25.3%</td>
</tr>
<tr>
<td>Anesthesiology/Pain Medicine</td>
<td>593,825</td>
<td>5.6%</td>
<td>95.6</td>
<td>56,784,920</td>
<td>7.3%</td>
<td>10.6%</td>
</tr>
<tr>
<td>Orthopedic Surgery</td>
<td>546,849</td>
<td>5.2%</td>
<td>58.4</td>
<td>31,943,972</td>
<td>4.1%</td>
<td>5.0%</td>
</tr>
<tr>
<td>Emergency Medicine</td>
<td>407,553</td>
<td>3.8%</td>
<td>26.5</td>
<td>10,808,533</td>
<td>1.4%</td>
<td>2.0%</td>
</tr>
<tr>
<td>Surgery</td>
<td>374,700</td>
<td>3.5%</td>
<td>49.9</td>
<td>18,690,391</td>
<td>2.4%</td>
<td>3.5%</td>
</tr>
<tr>
<td>Other</td>
<td>1,548,603</td>
<td>14.6%</td>
<td>69.8</td>
<td>108,083,660</td>
<td>13.9%</td>
<td>20.1%</td>
</tr>
<tr>
<td>Missing</td>
<td>3,563,374</td>
<td>33.6%</td>
<td>67.6</td>
<td>240,765,574</td>
<td>30.9%</td>
<td>N/A</td>
</tr>
</tbody>
</table>
Study Objectives: Femoral fractures are a very common traumatic injury seen in the emergency department (ED). Adequate pain control is often challenging despite the wide availability of pharmacological agents. Femoral nerve blocks (FNB) for pain control have been used for many years showing safety and effectiveness when performed correctly. Ultrasound (US) guidance has dramatically improved its success and safety. In our department, we train residents to perform peripheral nerve blocks (PNB) for pain control and procedural analgesia. In order to maximize the success of US-guided PNB, echogenic needles (micro laser etched near the tip of transducer to increase visibility) are now available. This study aims to determine if a difference in success rate exists between use of standard needles vs echogenic needles in US-guided FNB.

Methods: We performed a prospective, double-blinded, randomized trial involving adult patients presenting to the ED with an isolated femur fracture. Patients at least 18 years old, able to verbalize pain level using a visual analog scale (VAS) 1-10, and mentally competent were included. We excluded pregnant and prisoner patients, also those with significant concomitant injuries, cognitive impairment, unable to verbalize pain, allergic to local anesthetics, severe liver disease, existing peripheral neuropathies in the affected limb, local signs of infection in the inguinal area, and those with coagulopathies or anticoagulated. Allocation concealment was performed by a third party. Needles were included in tamper-proof envelopes. Patients and physicians were blinded to needle selection. Using 0.25% bupivacaine with epinephrine we performed a lateral, medial and posterior perineural injection (5 mL each). Pain score using VAS was recorded prior to and after the FNB (at 15, 30, 45, and 60 minutes). The primary outcome (dependent variable) was the success of the NB measured by pain control. The needle type was considered the independent variable.

Results: We have included a preliminary data set of 10 patients ages 21-81, five males. All received a variety of analgesics prior to the FNB without adequate pain control. Prior to the NB all patients had pain 5-10 VAS despite receiving intravenous analgesics. To assess pain scores between the treatment groups over time, a repeated measures ANOVA was conducted. Based on this analysis, there was no statistically significant difference in pain scores between the groups (P = .298). Similarly, when assessing the pain difference between baseline (enrollment) and 60 minutes after the FNB: the pain scores dropped by a median of 6 points for patients in the regular needle group and 5 in the physician discretion group. At 15 minutes the means were 50.4mm (SD: 31.7mm) and 56.5 (SD: 30.4mm) respectively and at 60 minutes 35.4mm (SD:30mm) and 43.4mm (SD 33.5mm). The mean difference in VAS scores at 15 minutes was 6mm (95% CI: 6.1-18.1mm) and at 60 minutes 7.9mm (95% CI: 4.5-20.5mm). There were no serious adverse events.

Conclusion: The 1 plus 1 hydromorphone protocol had a higher rate of hypoxia than the physician discretion group. There were no significant differences between groups in terms of VAS pain scores at 15 or 60 minutes. In this study, the 1 plus 1 hydromorphone pain protocol conferred no advantage over physician discretion analgesia in a geriatric population, and may be less safe.
including a placebo arm, 5 were judged to be low risk of bias (n=784). Combining this data gave an OR of 1.87 (95% CI 1.18 to 2.96). Four trials reported data for stones <5 mm (n=418), with a non-significant OR 4.16 (95% CI 0.94 to 18.43). The exclusion of trials determined to be at high risk of bias left 3 trials included in the analysis (n=271). OR 3.72 (95% CI 0.53 to 26.04).

Conclusions: We found that in patients with distal ureteric calculi, treatment with tamsulosin was associated with improved passage of stones. Benefit was uncertain with stones less than 5 mm diameter. Further research is required to determine if treatment with tamsulosin is indicated in this group.

320 Effects of Intravenous Oxycodone Alone or in Combination With Naltrexone on End-Tidal Carbon Dioxide: A Randomized, Controlled Study

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Study Objectives: Harmful effects associated with prescription opioid abuse and misuse, particularly when administered intravenously (IV), can lead to respiratory depression and death. Opioid-induced respiratory depression can be reversed by timely administration of an opioid antagonist. ALO-02 is an abuse-deterrent opioid formulation comprising pellets of extended-release oxycodone HCl surrounding sequestered antagonist naltrexone HCl (12% ratio); upon tampering, the naltrexone is released, thereby reducing the pharmacologic effects of oxycodone, including those associated with abuse. There was confirmed in a human abuse potential study wherein IV administration of oxycodone 20 mg and naltrexone 2.4 mg in solution (simulating crushed and dissolved ALO-02 20 mg/2.4 mg capsule strength) significantly reduced “drug liking” and “high” compared with oxycodone 20 mg alone. In the same study, the effects on end-tidal CO₂ (EtCO₂), a surrogate marker of respiratory depression (Mun et al. Acad Emerg Med 2002; 9:275-80), were evaluated and these results are reported here.

Methods: A single-center, randomized, double-blind, placebo-controlled, three-way crossover study (NCT01825447) in nondependent recreational opioid users evaluated the average potential of oxycodone 20 mg + naltrexone 2.4 mg (to simulate crushed and dissolved ALO-02 capsule) compared with oxycodone 20 mg or placebo (0.3% NaCl) administered IV over 4 min ± 15 sec. As a secondary endpoint, EtCO₂ (mmHg) was measured using noninvasive capnography at baseline and postdose intervals, up to 24 h. Respiratory rate and pulse oximetry were also measured (data to be provided in poster).

Results: The safety population (n=35, received at least one treatment) had a mean ± SD age of 26.2 ± 6.0 years and consisted mostly of white (88%), male (88%) participants. Mean ± SEM EtCO₂ measurements at baseline were similar across treatments (33.5 ± 0.9, 33.5 ± 0.8, 34.0 ± 0.7 mmHg for oxycodone 20 mg + naltrexone 2.4 mg, oxycodone 20 mg, placebo, respectively). Following study treatments, mean EtCO₂ for placebo or oxycodone 20 mg + naltrexone 2.4 mg remained approximately at baseline level throughout the 24-h assessment period, whereas administration of oxycodone 20 mg resulted in a slight increase in EtCO₂, mostly during the first hour postdose. Mean maximum value (Emax) of EtCO₂ during the 24-h assessment period was significantly greater for oxycodone 20 mg versus placebo (p=0.0001), whereas Emax for oxycodone 20 mg + naltrexone 2.4 mg was significantly less than oxycodone 20 mg (p = 0.0005) and did not differ from placebo (p = 0.5175) (mean ± SEM: 37.5 ± 0.6, 40.5 ± 0.8, and 36.9 ± 0.6 mmHg, respectively). Similarly, mean change in EtCO₂ from baseline to Emax was significantly less for oxycodone 20 mg + naltrexone 2.4 mg than oxycodone 20 mg (p = 0.0035), and did not differ from placebo (P = 0.1782) (Emax for oxycodone 20 mg was significantly greater than placebo, P = 0.0001).

Conclusion: Results suggest that should ALO-02 be abused by crushing, dissolving and injecting, the naltrexone may attenuate oxycodone-induced elevations of EtCO₂ in nondependent recreational opioid users. Further studies using direct measures of respiratory function are needed to determine if the risk of respiratory depression is reduced when oxycodone is co-administered with naltrexone in the same fixed ratio.

321 Is Serum Bicarbonate Level Associated With Adverse Outcomes in Paediatric Patients?: A Retrospective Cohort Study

Mainprize DG, Poonai N, Travers C, Wong LT, Tryphonopoulos T, Sangha G, Arbeau R, Sarpal A, Lim R/Western University, London, ON, Canada

Study objectives: Early identification of children at risk for adverse outcomes in the emergency department (ED) is important for timely intervention. Physiological parameters do not reliably predict outcome and arterial blood gases are invasive and painful. Serum bicarbonate level is easily collected, non-invasive, and relatively safe. We sought to determine the relationship between initial bicarbonate measured in the ED and adverse outcomes in children.

Methods: To test the hypothesis that a low bicarbonate in the ED was associated with an adverse outcome, we conducted a retrospective cohort study of children aged 0 to 17 years from January 1, 2007 to December 31, 2011 who had a serum bicarbonate measured in the ED. The primary outcome was the predictive ability of bicarbonate for the individual components of the composite outcome that included at least one of intensive care unit (ICU) admission, assisted ventilation, inotropic support, cardiopulmonary resuscitation (CPR), or death. The secondary outcome was the relationship between bicarbonate > 13 mEq/L and the composite outcome. We treated bicarbonate as both a continuous and categorical variable based on pediatric studies in gastroenteritis that a value < 13 mEq/L was associated with increased hospitalization rate. The relationship between categorical variables was analyzed using Pearson chi square.

Results: We reviewed 16,989 patient encounters, of which 492 had an adverse outcome. The median age was 8.7 years and 8693 (51%) of the patients were male. Receiver operating characteristic curve analysis showed that a bicarbonate value of ≤ 18.5 mEq/L optimized sensitivity and false positive rate (Table). Bicarbonate predicted inotropic support with an area under the curve (AUC) of 0.7 (95% confidence interval (CI): 0.60.0.8, P < .001), and death with an AUC of 0.8 (CI: 0.70.9, P < .001). Bicarbonate was a poor predictor of ICU admission, assisted ventilation, and requirement for CPR with AUCs < 0.7. Significantly more patients with bicarbonate ≤ 13 mEq/L had at least one adverse outcome compared to those with bicarbonate > 13 mEq/L (4.4% vs 2.5%, P = 0.001), odds ratio 1.96 (CI: 1.33).

Conclusion: Among children presenting to the ED, the initial bicarbonate is a fair predictor of inotropic support and death but a poor predictor of ICU admission, assisted ventilation, and requirement for CPR. Consistent with previous evidence, adverse outcomes are significantly associated with bicarbonate ≤ 13 mEq/L. Serum bicarbonate should routinely be measured in children at risk of clinical deterioration. It is hoped that our work will inform the development of clinical prediction rules to aid clinicians in early identification of children at risk of adverse outcomes.

322 Publishing Trends in the Field of Pediatric Emergency Medicine From 2004 to 2013

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Study objectives: Since its relatively recent inception, leaders within the field of pediatric emergency medicine (PEM) have emphasized the importance of research to improve the care provided to ill and injured infants and children. The objective of this study is to identify publishing trends within the field of PEM between 2004 and 2013.

Methods: We conducted a retrospective review of PEM articles published between 2004 and 2013, selected from ten journals in the fields of Pediatrics [Pediatrics, The Journal of the American Medical Association (JAMA) Pediatrics, Journal of Pediatrics, Emergency Medicine (EM) [Annals of Emergency Medicine, Academic Emergency Medicine, Journal of Emergency Medicine, General Medicine (GM) [Lancet, JAMA, New England Journal of Medicine], and PEM [Pediatric Emergency Care]. Case reports, editorials, observational studies, and studies including only adult patients were
excluded. Each article was classified by journal type, study design (prospective non-interventional, retrospective, randomized control trial, study specific methods), results (positive or negative/equivocal), age/type of subjects (pediatric only, pediatric and adult, medical providers), major topic (based on headings from Fleisher and Ludwig’s Textbook of Pediatric Emergency Medicine) and subtype (based on the primary outcome measure). Publishing trends were determined by date of publication (stratified to the 2004-2008 or 2009-2013 time period).

Results: A total of 464 PEM articles were analyzed; 38% from pediatric journals, 34% EM, 5% GM, 3% PEM. When stratified by date of publication, 202 articles were published 2004-2008 and 262 in 2009-2013. The majority of included articles were described as randomized controlled trials (47%), with positive findings (70%), including only pediatric patients (68%), with a major topic classified as trauma (35%).

The most common subtopics for all included articles were pain management, asthma, sedation, bronchiolitis, resuscitation, simulation, and ultrasound. The total number of included articles published increased between the two publication time periods for all journal types with the exception of GM (P = .04). There was an increase in the total number of included articles between the two publication time periods when stratified by results, age/ type of subjects, and major topic.

Conclusion: We have identified trends in the publication of PEM articles between 2004 and 2013. By identifying these trends, we hope to encourage researchers to focus on performing studies in the field of PEM where deficiencies lie, to promote collaboration between EM departments and PEM divisions, both nationally and internationally, and to educate health care professionals who care for ill and injured infants and children as to where published, evidence-based PEM studies can be found in the literature.

323 The Effect of Intravenous Infusion Dead Space on Time to Drug Administration in Infants
Gregerson B, Sonnier J, Juergens A/Baylor Scott and White, Temple, TX

Study Objective: Infusion dead space is the internal volume of a catheter and tubing through which a fluid or medication must pass before reaching the patient. It is a known factor in time-to-delivery for intravenous (IV) administration, and can be significant depending on the volume and rate of infusion. We seek to quantify its effect using a patient model, and compare measured and predicted values.

Methods: We simulated a 10 kg infant, receiving an epinephrine infusion with a concentration of 20 mcg/ml at a rate of 0.1 mcg/kg/min. This equals 0.05 ml/min or 3 ml/hr. Commonly used pediatric IV equipment was selected (24 and 22 gauge catheters with extension tubing). Dye was added to saline and placed in a 20 ml syringe pump. The tubing leading from the pump was flushed with the colored saline solution. Then it was connected to the 24 and 22 gauge catheters, both directly and with extension tubing, and the syringe pump was started. The IV solution was allowed to drip onto chromatography paper until color could be seen. Time from start of infusion to visualization of dye was recorded five times for each configuration.

Results: The average time to first visualization of dye was 126.6 seconds for a 24 gauge catheter, and 258.4 seconds with extension tubing added. For the 22 gauge catheter, the average time was 118.4 seconds and 253.6 seconds with extension tubing.

The difference in times between both sizes of catheters was not statistically significant depending on the volume and rate of infusion. It is a significant factor in time-to-delivery for IV administration, especially in small patients and with slow, concentrated drips. Where appropriate, clinicians should consider bolus administration of critical medication before starting a drip. In this model, the dye did appear on the chromatography paper much earlier than anticipated. We believe this is due to diffusion of the dye through the tubing and catheter. Also, our method was very sensitive and would register only a small amount of dye. It is unknown how this would relate to in vivo medication administration, nor how long it would take for a patient to get a fully concentrated solution. Further study is needed to answer this question.

324 Pediatric Laryngospasm and Airway Interventions During Ketamine Procedural Sedation in the Emergency Department

Study Objective: Ketamine is one of the most frequently used medications for procedural sedation in children. Ketamine is one of the most feared adverse events from ketamine. Our goal was to report the incidence of laryngospasm and emergency airway interventions when using ketamine (alone or in combination with additional medications) during pediatric procedural sedation in the emergency department (ED).

Methods: This is a subgroup analysis of a larger systematic review and meta-analysis in pediatric sedation. An expert librarian performed the electronic search among 8 databases (MEDLINE, EMBASE, EBSCO, CINAHL, CENTRAL, Cochrane Database of Systemic Reviews, Web of Science and Scopus) from inception through June 2014 without language restrictions. We included randomized controlled trials and observational studies of procedural sedation in the ED. Data were extracted by 2 independent reviewers. Meta-analysis was performed using a random-effects model and reported as incidence rate and 95% confidence intervals (CI). Comparison between groups was calculated with Wilcoxon/Rank Sum test.

Results: A total of 31 studies including 10,329 procedural sedations with ketamine were included. Laryngospasm occurred in 42 of 8,895 sedations, with an incidence (all reported per 1,000 sedations) of 3.9 (95% CI 2.6 to 5.2); the incidence was 4.1 (95% CI 2.7 to 5.5) in the group with ketamine alone and 3.0 (95% CI 0.2 to 5.9) in the group ketamine with additional medications (P = .4). Bag-valve-mask (BVM) ventilation or positive airway pressure ventilation was performed in 56 of 8,434 sedations, for an incidence of 5.4 (95% CI 3.9 to 7.0). The incidence of BVM ventilation in the group with ketamine alone was 5.6 (95% CI 3.8 to 7.3) and ketamine with additional medications was 4.9 (95% CI 1.3 to 8.4) (P = .8).

Intubation was needed in 2 of 8,883 sedations, with an incidence of 0.4 (95% CI 0 to 0.8). Ketamine alone had an incidence of 0.3 (95% CI 0 to 0.8) and ketamine with additional medications was 2.4 (95% CI 0.1 to 4.7) (P = 1.0). There were no reported aspirations in the 3,229 sedations with an incidence of 1.0 (95% CI 0 to 2.1).

Conclusion: Serious airway adverse events such as laryngospasm, aspiration and requiring intubation are very rare in pediatric procedural sedation in the ED when using ketamine. There was no difference between those who received ketamine alone compared to those who received ketamine combined with another medication.

325 Variations in Emergency Department Pediatric Concussion Discharge Instruction Practices
Wang-Flores H, Rogers A, Zamarrip A, Levasseur K, Benner C, Cohen D, Hoyle JD, Jr., Mahajan PV, Stanley R/University of Michigan Health System, Ann Arbor, MI; William Beaumont Hospital, Royal Oak, MI; Helena DeVos Children’s Hospital, Grand Rapids, MI; Nationwide Children’s Hospital, Columbus, OH; Bronson Children’s Hospital, Kalamazoo, MI; Children’s Hospital of Michigan, Detroit, MI

Study Objectives: To identify and describe practice variation in pediatric concussion discharge instructions among emergency medicine (EM) providers with and without additional pediatric training.

Methods: We developed a case-based survey that varied by patient age and severity of concussion symptoms. Survey questions focused on discharge instructions regarding physical and cognitive rest (sensory, reading, studying, test taking, and returning to school). The survey was conducted at seven emergency departments (ED) in the Midwest including freestanding children’s hospitals, community hospitals, and urgent care centers. Participants included pediatric and emergency medicine (EM) trained physicians grouped by EM trained only versus EM with any combination of pediatric training (pediatrics with pediatric emergency medicine (PEM) fellowship, EM with PEM fellowship, and combined EM/pediatrics). Providers with pediatric training only were excluded. Fisher’s exact test was used to test the association between provider training and some aspects of cognitive rest discharge instructions by age and severity. Providers with additional pediatric training more frequently restricted screen time and reading/studying. See Tables 1A and 1B.

Conclusions: Provider type did not affect pediatric concussion discharge recommendations for physical rest. Pediatric training was associated with an increased
restriction of screen time and reading/studying when compared with providers without additional pediatric training.

Table 1A. Physical & Cognitive Rest Recommendations by Provider Training Stratified by Severity

<table>
<thead>
<tr>
<th>Age 7</th>
<th>PEM/EM &amp; Pediatric Training n (%)</th>
<th>OR</th>
<th>95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physical Rest</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mild</td>
<td>63 (90.0%)</td>
<td>50 (92.6%)</td>
<td>1.4</td>
</tr>
<tr>
<td>Severe</td>
<td>69 (98.6%)</td>
<td>53 (100.0%)</td>
<td>N/A*</td>
</tr>
<tr>
<td>Return to School</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mild</td>
<td>54 (76.1%)</td>
<td>47 (87.0%)</td>
<td>2.1</td>
</tr>
<tr>
<td>Severe</td>
<td>64 (91.4%)</td>
<td>51 (96.2%)</td>
<td>2.4</td>
</tr>
<tr>
<td>Reading/Studying</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mild</td>
<td>52 (73.2%)</td>
<td>50 (92.6%)</td>
<td>4.6</td>
</tr>
<tr>
<td>Severe</td>
<td>59 (83.1%)</td>
<td>50 (96.2%)</td>
<td>5.1</td>
</tr>
</tbody>
</table>

*O’s in the 2x2 table Fisher’s exact test (FET), p=1.00.

Table 1B. Physical & Cognitive Rest Recommendations by Provider Training Stratified by Severity

<table>
<thead>
<tr>
<th>Age 16</th>
<th>PEM/EM &amp; Pediatric Training n (%)</th>
<th>OR</th>
<th>95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physical Rest</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mild</td>
<td>65 (92.9%)</td>
<td>49 (94.2%)</td>
<td>1.3</td>
</tr>
<tr>
<td>Severe</td>
<td>69 (98.6%)</td>
<td>53 (100.0%)</td>
<td>N/A*</td>
</tr>
<tr>
<td>Return to School</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mild</td>
<td>55 (77.5%)</td>
<td>47 (90.4%)</td>
<td>2.7</td>
</tr>
<tr>
<td>Severe</td>
<td>64 (90.1%)</td>
<td>50 (96.2%)</td>
<td>2.7</td>
</tr>
<tr>
<td>Reading/Studying</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mild</td>
<td>53 (74.7%)</td>
<td>51 (96.2%)</td>
<td>8.7</td>
</tr>
<tr>
<td>Severe</td>
<td>58 (81.7%)</td>
<td>49 (96.1%)</td>
<td>5.5</td>
</tr>
</tbody>
</table>

*O’s in the 2x2 table Fisher’s exact test (FET), p=1.00.

326 How Definitive Is Ultrasound for the Diagnosis of Appendicitis in Children and Is Confirmatory Advanced Imaging Necessary?
Claudius I, Kearl YL, Behar S, Cooper J, Dollbaum R, Hardnaimai N, Hardiman K, Kagan I, Rose E, Santillanes G, Berdahl CT/LA County + USC, Los Angeles, CA; LA County + USC Department of Pediatrics, Los Angeles, CA; USC Keck School of Medicine, Los Angeles, CA; LA County + USC, Los Angeles, CA

Study Objectives: To determine the test characteristics and accuracy of ultrasound and magnetic resonance imaging (MRI) in the emergency department diagnosis of appendicitis, and to correlate ultrasound and MRI results with one another.

Methods: This was a retrospective chart review and phone follow-up of pediatric emergency department (ED) visits for patients age 3-21 who underwent ultrasound and/or MRI for suspected appendicitis between 2010 and 2013. Patients who left against medical advice, incarcerated patients, post-surgical patients, and patients with inadequate follow-up were excluded. Patients were categorized as having appendicitis if surgical pathology demonstrated appendicitis or if patients were treated medically for appendicitis. Descriptive statistics, sensitivity and specificity were calculated. Tetrachoric correlation was used to estimate the relationship between US and MRI results. All data collection was performed by pediatric emergency medicine attending physicians, pediatric or emergency medicine residents, or medical students. All personnel received training instructions from one of the study coordinators.

Results: After exclusion criteria, the final analysis included 526 patients. Test characteristics of ultrasound were: sensitivity 81.5% (95% CI 73.9%-87.6%), specificity 93.8% (95% CI 90.8%-96.1%), and AOC .876 (95% CI .841-.912). Test characteristics of MRI were sensitivity 95.2% (95% CI 83.8%-99.4%), specificity 95.2% (95% CI 89.8%-98.2%), and AOC .952 (95% CI .915-.99). Ultrasound was followed by MRI in 158 cases. There was a high correlation between RLQ US and MRI (rho 0.573, P = .0001).

Conclusion: Ultrasound for the diagnosis of appendicitis in children is a reliable diagnostic tool when the appendix is visualized. However, if the appendix is not seen on ultrasound, further imaging such as MRI can be used to more definitively diagnose or exclude appendicitis. There is typically no need to perform MRI to confirm appendicitis if ultrasound results are clearly positive or negative.

327 Does a Single Dose of Dexamethasone for Croup Cause Adrenal Suppression?: A Prospective Study
Gill N, Sirizotti N, Kuczy AS, Tieu A, Urquhart BL, Lim R, Rieder M, Joubert G, Mehrotra S, Poonal N/Children’s Hospital, London Health Sciences Center, London, ON, Canada

Study Objectives: Croup is the second most common cause of respiratory distress in children under the age of ten, with 80,000 Canadian children presenting with croup each year. Currently, oral single-dose dexamethasone 0.6 mg/kg is the standard of care for the treatment of croup in children regardless of mild, moderate or severe symptoms. Although it has been shown to cause adrenal suppression in adults and in children with chronic disease, no study has explored the adrenal effects of single dose dexamethasone in children. The risks of adrenal suppression from single-dose dexamethasone should especially be considered in children with diabetes mellitus, those exposed to varicella virus, and those who are immunocompromised, as they then would have a higher risk of bacterial superinfection. Given what is known in other populations and the widespread use of dexamethasone, it is important to characterize its adrenal effects in children with croup. 6-beta hydroxycortisol is the main unconjugated metabolite of cortisol and constitutes approximately 1-2% of total cortisol metabolites in urine. The ratio of 6-beta hydroxycortisol:cortisol in urine accounts for diurnal variation of these two markers on their own and thus can be used as a reliable indicator for adrenal suppression. We hypothesized that children receiving a single dose of oral dexamethasone for croup will show a transient decrease in urinary glucocorticoid levels.

Methods: This was a prospective, single-arm, cohort study designed to test the hypothesis that a single dose of oral dexamethasone results in adrenal suppression. We included all toilet-trained children over two years of age who were treated with a single dose of oral dexamethasone, 0.6 mg/kg, for croup. The primary outcome measures were urinary 6-beta hydroxycortisol and cortisol levels on days 0.5, 1, 3, and 7 following dexamethasone administration. The secondary outcome was the number of visits for medical care within 7 days of dexamethasone administration. Cortisol and 6-beta hydroxycortisol levels were extracted from urine using an Acqurity ultra performance liquid chromatography (UPLC) system coupled to a Xevo G2-S quadrupole time-of-flight (QTOF) mass spectrometer.

Results: Of 31 children enrolled, 22 children were included in the analysis (4 females and 18 males). The median (IQR) 6-beta hydroxycortisol level immediately prior to dexamethasone administration, day 0.5, 1, 3, and 7 was 80.5 (507.9) ng/mL, 23.1 (62.5) ng/mL, 26.9 (91.6), 79.1 (86.0) ng/mL, and 54.4 (81.1) ng/mL, respectively. The median (IQR) cortisol level immediately prior to dexamethasone administration, day 0.5, 1, 3, and 7 was 52.9 (139.6) ng/mL, 10.5 (75.6) ng/mL, 20.4 (54.9) ng/mL, and 20.4 (54.9) ng/mL, respectively. The median 6-beta hydroxycortisol:cortisol ratio immediately prior to dexamethasone administration, day 0.5, 1, 3, and 7 was 2.8 (2.1), 2.3 (2.8), 2.0 (2.4), 2.8 (2.6), and 2.6 (1.7). Three children returned to the emergency department for visits unrelated to their initial presentation; one for pneumonia, one for rule-out mumps and one for an injury.

Conclusion: A single dose of oral dexamethasone 0.6 mg/kg results in a sharp decrease in urinary cortisol and 6-beta hydroxycortisol, rising steadily over the course of 7 days, but not yet reaching baseline levels. The degree to which these findings have clinical relevance should be further investigated.

328 An Analysis of Predictors for Pediatric Orbital Wall Fracture in the Emergency Department
Paek SH, Jung JH, Jung JH, Kwak YH, Kim DK, Lee JH, Jung JY/Seoul National University Hospital, Seoul, Korea; Seoul National University Boramae Hospital, Seoul, Korea; Seoul National University Bundang Hospital, Seoul, Korea

Study Objectives: Facial trauma including orbital wall fracture is common in children and adolescents, making up the large proportion of emergency department (ED) visits. There is no evidence-based computed tomography (CT) rule for orbital
opioid-related fatalities by medical specialty; however, none have examined all prescription drug-related fatalities differentiated by specialty. We designed a study to compare prescription drug-related fatalities across all medical specialties.

Methods: We conducted a retrospective observational study that compared prescriptions by medical specialty using the 2013 San Diego medical examiner report of all unintentional prescription drug related deaths and twelve months of prescription drug monitoring program (PDMP) data leading up to these deaths. The data were analyzed for each specialty, including number of prescriptions, pills per prescription, type of prescription, doctor shoppers, and chronic users. All data were analyzed using STATA data analysis software.

Results: In 2013, 4.5% of all providers in San Diego County wrote a prescription for a patient who died a prescription-related death. There were a total of 713 providers who prescribed 4366 medications totaling 328,928 pills. The average number of prescriptions given to these patients per provider in one year was 6.1. Overall, emergency physicians gave the lowest number of prescriptions per provider (1.6) and the second lowest number of pills per prescription (18.9). Orthopedic surgeons provided the highest number of pills per prescription (169), while pain management provided the highest amount of prescriptions per provider (12.9). The majority of medications were prescribed to doctor shoppers and chronic users. Over 50% of all prescriptions were given to doctor shoppers (prescriptions from 4 different physicians at 4 different pharmacies over 12-months). Surgeons gave the greatest proportion of prescriptions to doctor shoppers (69%) followed by emergency physicians (64.1%), psychiatrists (55.7%), dentists (50.7%), primary care (47.1%) and pain specialists (37.7%). Approximately 95.8% of all prescriptions were given to chronic users. Pain specialists gave 100% of their prescriptions to chronic users, followed by psychiatrists (97.1%), primary care physicians (96.8%), surgeons (95.4%), dentists (84.8%) and emergency physicians (78.8%).

Hydrocodone was the most frequently prescribed medication to those patients whose deaths were related to prescription drugs. Primary care distributed the greatest proportion of this medication, as well as the greatest proportion of oxycodone, morphine, hydromorphone, methadone, diazepam, and zolpidem. Emergency physicians prescribed the greatest number of chlordiazepoxide pills (48.5%) followed by emergency physicians (64.1%), psychiatrists (55.7%), dentists (50.7%), primary care (47.1%) and pain specialists (37.7%). Approximately 95.8% of all prescriptions were given to chronic users. Pain specialists gave 100% of their prescriptions to chronic users, followed by psychiatrists (97.1%), primary care physicians (96.8%), surgeons (95.4%), dentists (84.8%) and emergency physicians (78.8%).

Conclusion: The results of this study suggest that emergency physicians provide fewer prescriptions and fewer total pills to those patients who die due to prescription drugs, relative to most medical specialties. Emergency physicians do, however, frequently prescribe to doctor shoppers and still account for a significant proportion of total providers in this study. These results highlight the need to utilize PDMP data to closely monitor prescription patterns, to actively avoid duplicate prescriptions and drug interactions, and to provide addiction counseling and referrals when appropriate.

330 Bidirectional Relationship Between Diabetes and Acute Pancreatitis: A Population-Based Cohort Study in Taiwan

Su Y-C/Dalin Tzu Chi Hospital, Buddhist Tzu Chi Medical Foundation, Chieyì, Chieyì County, Taiwan

Background: There is no study about the bidirectional relationship between acute pancreatitis and diabetes investigated on the same source of data. Furthermore, the effects of severity on both diseases have never been fully evaluated.

Study Objective: We address the strength of association for the bidirectional relationship between diabetes and acute pancreatitis.

Methods: The data from 1,000,000 National Health Insurance beneficiaries were utilized. We used two cohort studies with this database to determine the link between diabetes and acute pancreatitis. The first cohort analysis regarding risk of acute pancreatitis among diabetic patients consisted of 42,080 diabetic patients and 672,146 unexposed subjects. The second cohort analysis regarding risk of diabetes among patients with acute pancreatitis enrolled 3187 patients with acute pancreatitis and 709,259 unexposed subjects. All adult beneficiaries were followed from January 1, 2005 to December 31, 2012 to evaluate if outcomes of interest happened. Cox regression models were applied to compare the hazards adjusted for potential confounders.

Results: In the first cohort, the adjusted hazard ratio (HR) of acute pancreatitis was significantly increased by having diabetes. (1.73; 95% confidence interval [CI] 1.52-1.96) In diabetic patients with poor control, the HR was even higher. (6.32; 95% CI 4.54-8.81) In the second cohort, the adjusted HR of diabetes in patients with acute pancreatitis was again increased compared to the general population. (2.15; 95% CI 1.92-2.41) Although in those with severe acute pancreatitis, the HR was also slightly higher (2.22; 95% CI 1.50-3.29), the effect is not significant.

Conclusions: The two cohort studies provided evidence for the bidirectional relationship between diabetes and acute pancreatitis. Moreover, diabetes with poor
control is associated with much higher risk of acute pancreatitis. A reasonable strategy to prevent acute pancreatitis is to achieve better glycemic control in diabetes.

Sex Differences in Emergency Department Utilization Involving Illicit Drug Use and Referral to Detox
Ryo H J, Choo EK/The Warren Alpert Medical School of Brown University, Providence, RI

Study Objectives: Visits to the emergency department (ED) for use of illicit drugs and opioids have increased in the past decade. Efforts to respond with brief interventions and referral for these visits have demonstrated modest results. In the outpatient setting, women seek treatment later and less often, have more severe problems upon entry, have lower rates of completion of treatments, and report specific barriers to accessing and completing treatments. Therefore, community-based interventions have been developed that are tailored to sex-specific referral needs and steps to recovery. In the ED, however, little is known about how sex may play a role in drug-related visits and referrals to treatment. This study performs a sex-based comparative analysis of drug-related ED visits using a nationally representative database.

Methods: This was a cross sectional analysis of data collected between 2004 to 2011 by the Drug Abuse Warning Network (DAWN) of the Substance Abuse and Mental Health Administration. All ED visit data by DAWN was stratified by sex and coded to capture major drug categories: cocaine, hallucinogens, heroin, marijuana, methamphetamine, any illicit drug (any of the above categories), and opioids. We also examined year-to-year changes in percentage of visits involving drug use for men and for women. Logistic regression models were created to find associations between sex and odds of referral to treatment programs. The first model was adjusted for age, race, number of involved substances, and the time of day of the visit. The second model also included the chief complaint of “seeking detox,” meaning that the patient presented explicitly for substance use treatment referral.

Results: Of the 27.9 million ED visits related to drug use in the DAWN database, 18.5% of visits by women involved any illicit drug use (95% CI 16.8-20.2) compared to 37.8% of visits by men (95% CI 35.0-40.6). For every major category of illicit drug, visits by men were more likely than visits by women to involve the illicit drug. No significant year-to-year changes in percentage of visits involving drug use were observed for either men or women. The logistic regression models showed that women were less likely than men to be referred to detox programs for any illicit drugs (1.12, 95% CI 1.02-1.22), for each of the major illicit drug (eg: cocaine: 1.27, 95% CI 1.15-1.40), and for prescription opioids (1.30, 95% CI 1.17-1.43). The significant association prevailed after controlling for the chief complaint of “seeking detox.”

Conclusion: Women are less likely to receive referrals to detox programs than men when presenting to the ED. This sex-based difference persisted even after controlling for sex-based differences in explicit interest in seeking detox. Future research should determine the etiologies of this disparity, whether physician bias, patient preferences or barriers, or other factors. Strategies to improve referrals to detox programs for women in the ED may improve substance abuse treatment utilization, reduce costs associated with recurrent ED visits related to substance abuse, and improve health outcomes.

333 Patient Acuity: Disparity Between Patients and Clinicians
Lightbody A, Mace S/Cleveland State University, Cleveland, OH; Cleveland Clinic, Cleveland, OH

Study Objectives: Prospectively compare emergency department (ED) patients and clinicians perceptions of patient acuity.

Methods: Convenience sample of adult (age ≥18 years), non-critical, non-pregnant, non-psychiatric, English-speaking ED patients who provided informed consent and their clinicians were prospectively surveyed. Both patients and their respective clinicians were surveyed on the same 5-point Likert scale by a researcher during weekdays/ weekends excluding night shifts. Measure of patient acuity was a self-reported Likert scale of “most severe” to “least severe”: Level 1: Critical: immediate care required, Level 2: Emergency: care required within 15 minutes, Level 3: Urgent: care required within 15-60 minutes, Level 4: Semi-Urgent: care required within 2-24 hours, and Level 5: Non-Urgent: care required within several days. Patient socio-demographic data was collected from the ED electronic medical records (EMR). The setting was an urban, tertiary-level, teaching hospital ED that sees 63,000 patients a year.

Results: Of the 612 patients meeting the inclusion criteria seeking care during data collection times, 403 (66%) consented to participate. Patients surveyed were more frequently African American (58.7%), female (60.7%), single (48.2%), publicly insured (47.4%) vs privately insured (35.3%) or uninsured (17.3%), had a primary care physician on file (74.4%), had < 1 ED visits in the past year (84.9%), and did not arrive by ambulance (74.4%). The average patient acuity (2.02 ± 1.13) was significantly different from clinicians’ average acuity (3.40± 1.00), P < .001. Within all acuity levels clinician and patient acuity scores were significantly different (P < .001). For the highest acuity level or critical care (level 1), there was a ten-fold greater difference for patients than clinicians. Patients perceived their acuity to be critical 45.2% of the time vs clinicians’ 4.5% (P < .001, 95% CI: 1.05, 1.13). Patients perceived their acuity to be emergent (level 2) 22% of the time vs clinicians 12.3% (P < .001, 95% CI: 1.28, 1.45). Patients perceived their acuity to be urgent 25% of the time vs clinicians 34% (P < .001, 95% CI: 1.54, 1.67). Patients perceived their acuity to semi-urgent (level 4) 5.8% of the time vs clinicians at 37% (P < .001, 95% CI: 1.82, 1.92). Patients perceived their acuity to be non-urgent (level 5) 4.0% of the time vs clinicians at 12.3% (P < .001, 95% CI: 1.66, 1.87). The need for medical intervention within 60 minutes (critical + emergent + urgent) was 90.2% by patients compared to only 50.8% by clinicians. According to patients, 9.8% felt their visit was semi-urgent or non-emergent compared to clinicians 49.3% of the time. Compared to clinicians, 73.9% of patients overestimated their acuity, 15.7% were in agreement, and the remaining 10.4% underestimated their medical acuity.

Conclusion: Based on clinician perceptions of patient acuity, ED patients do not make accurate judgments of medical acuity. There is a wide discrepancy between clinician and patient scores within all acuity levels. Although patients frequently perceive themselves to be more acute than their emergency clinician, there is a subset of the population that underestimates the acuity of their chief complaint when compared to their respective clinicians’ assessment. Further research into the reasons for patient under and over assessment of their acuity and the disparity between patients and their clinicians is needed.

EMF Preliminary Evaluation of the Lifespan Opioid Overdose Prevention Program
Samuels EA, Mello MJ, Baird J, Yang E/Brown University, Providence, RI

Background: The Lifespan Opioid Overdose Prevention (LOOP) Program is a hospital-community partnership established in September 2014 to prevent opioid overdose deaths and improve addiction treatment referral. LOOP offers patients at risk of opioid overdose take-home intranasal naloxone (NRK), overdose prevention and response education, and consultation with a peer recovery coach.

Study Objectives: To identify patient population characteristics and need, evaluate emergency department (ED) provider program utilization, and assess the impact of LOOP on referral to treatment, connection with overdose prevention services, and on ED clinical flow.

Methods: This is a retrospective chart review of patients who had or were at risk for opioid overdose seen between January 2014 and November 2014 at three Lifespan-affiliated EDs; one Level 1 trauma center and 2 community hospitals combined 2646 screened charts were included in the analysis: 322 from pre-implementation, 212 from early adoption, and 322 from the post-implementation period. Patients were majority white (83.8%), male (63.1%), and between the ages of 30-50 years of age (45%). Demographics did not vary significantly between study periods. While visits were evenly distributed throughout the week, patients were more likely to be seen between 3pm-11pm. Providers identified a substance abuse problem in 75.9% of visits and 34% of patients presented after an overdose. Most patients were discharged (63.8%). In the immediate months after program implementation, 94 naloxone kits were distributed, recovery coaches were consulted 71 times, and there was higher linkage to treatment than before program implementation (15.5% vs 12.3%, P < .001). Post-implementation, 35.5% of patients seen after an overdose were given a NRK. Recovery coach follow-up data shows that 85% of enrolled remained in linkage to treatment, primarily inpatient treatment, detox, recovery housing and outpatient services. ED mean length of stay (LOS) was not significantly different after program implementation (7.32h vs 7.48h, P = .648). Patients receiving a NRK had slightly shorter mean LOS (6.12±7.31, P < .056), and LOS was not changed by recovery coach consultation (6.06h with consultation vs 7.36h without consultation, P < .125).

Conclusions: In the early adoption period, providers had sufficient rates of utilization of LOOP services, but utilization could be improved. Following LOOP
implementation there was an increase in linkage to treatment and connection with overdose prevention services without increasing ED LOS. Future study will examine maintenance of program utilization and provider program evaluation.

334 EMF
Feasibility of Using a Novel Text Messaging Program to Improve Linkage to Outpatient Services for Emergency Department Patients Seeking Treatment for Opioid Abuse
Yanta JH, Kristan JT, Doulahy AB, Sufloetto BP/University of Pittsburgh, Pittsburgh, PA

Study Objectives: Up to 40% of people referred to substance use services (SUS) fail to attend them; these individuals have worse outcomes and cycle back into drug abuse patterns. Given the frequency with which patients present to the emergency department (ED) with opioid abuse, there is a need for interventions to foster follow-up with SUS. This study tested the feasibility of using a novel text messaging program to improve SUS attendance among ED patients seeking treatment for opioid abuse.

Methods: Adult patients presenting to a single, urban, tertiary care ED with an annual patient volume of 75,000, with a chief complaint of opioid addiction were screened for eligibility between December 2014 and April 2015. Inclusion criteria included interest in outpatient addiction treatment, age ≥17, absence of active underlying medical or psychiatric condition precluding outpatient referral, personal ownership of an SMS-capable mobile phone, and English speaking. Participants completed a baseline questionnaire to ascertain the nature and severity of drug use (NIDA-Modified ASSIST), readiness to change their drug use behavior and assess eagerness for treatment (SOCRATES-8D) and level of psychological disturbance attributable to anxiety and depression (PHQ-4). After ED discharge, for up to 5 weekdays, patients received daily text message queries asking whether or not they attended an initial outpatient appointment with addiction medicine referral. Participants who stated they did not attend were asked to report the reason.

Results: To date, a total of ten subjects (20%; mean age 30.8 years) agreed to participate in the study. At baseline, all participants reported daily street opioid use and four reported daily prescription opioid use. SOCRATES-8D scores indicated low recognition of a drug problem (mean score 33.3), moderate ambivalence about their drug problem (mean score 14.6) and moderate action toward taking steps (mean score 32.8), with wide variability of scores across participants. PHQ-4 indicated moderate to severe comorbid psychological distress (mean score 8.8). Seven of ten participants (70%) responded to SMS queries. All non-responders were men and had less than college education. All seven respondents reported attendance at an initial follow-up appointment.

Conclusion: Initial estimates indicate that SMS may be a viable means to communicate with patients seeking opioid addiction treatment after discharge from an ED. Frequent opioid use suggests SMS interventions should interact frequently (at least daily) with patients. Poor recognition of severity of addiction suggests SMS interventions should target self-awareness. Wide variability regarding motivation to change suggests that SMS interventions should target increasing motivations in those with low baseline motivation. Comorbid anxiety and depression suggests that SMS interventions may need to incorporate mood regulation as a target.

335 Effectiveness of the Center for Disease Control and Prevention’s “Heads Up!” to Youth Sports Campaign on Coaches of Pediatric Sports
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Background: To help ensure the health and safety of young athletes, the Centers for Disease Control and Prevention (CDC) developed the “Heads Up!” Concussion in Youth Sports initiative to offer information about concussions to coaches, parents, and athletes involved in youth sports. The “Heads Up!” initiative provides important information on preventing, recognizing, and responding to a concussion.

Study Objectives: (1) To estimate the penetrance (in terms of youth coaches being aware of them) of the CDC “Heads Up!” guidelines. (2) To determine whether these guidelines changed coaches’ practice. (3) To understand whether these guidelines resulted in a decreased number of concussions.

Methods: A cross sectional survey of pediatric sports coaches in the United States was conducted to assess how many had heard of this campaign, and whether it affected their practice. This consumer survey was administered in such a way as to garner a representative sample in terms of sex, location, and basic demographics of coaches of youth sports. Responses were analyzed using JMP 12.0 for the Macintosh.

Results: The cohort consisted of 56% male. Age range was 17% 18-24 years, 13% 25-34 years, 29% 35-44 years, 21% 45-54 years, 12% 55-64 years, and 8% age 65+. In terms of regional representation, 29% were from the midwest, 21% from the northeast, 27% from the south, and 23% from the west. The majority identified their location as suburban (54%) while 19% reported rural, and 27% urban. Income ranges of the coaches ranged from 0-24K (8%), 25-49K (55%), 50-74K (28%), 75-99K (6%), and over 100K (3%). In terms of sports coached, 32% reported football, 8% martial arts, 12% lacrosse or hockey, 24% basketball, 28% volleyball, baseball or softball, and 17% swimming. A little over half the cohort (5%) had heard of the CDC “Heads Up!” campaign. Similarly, 55% thought pediatric concussion in youth sports was a “big deal” (rated on a Likert scale from 1-10). Coaches who were also parents (58%) were significantly more likely to have heard of the campaign (P = .0032, 95% CI 0.1553-0.5513). Having heard of the “Heads Up!” campaign was significantly associated with how important coaches thought pediatric concussion is (P = .0133, 95% CI 0.0950-0.4960), as was higher income of the coaches (P = .0100, Pearson correlation), and this was significantly correlated with the coach being more likely to call the athlete’s parent at injury (P = .0030, 95% CI 0.1160-0.5471). Of all the sports, coaches of football/soccer were significantly more likely to think pediatric concussion was a “big deal” (P = .0021, 95% CI 0.1374-0.5947). The number of concussions per season ranged from 0-1 (69%), 2-3 (15%), 4-5 (6%), 6-14 (5%), and >15 (4%). A total of 35% reported that the “Heads Up!” campaign decreased the number of concussions on their team.

Conclusions: Despite a tremendous effort to educate our school coaches about the dangers of pediatric concussion, only a small percentage of coaches feel that the “Heads Up!” campaign only a small percentage of coaches feel that the “Heads Up!” campaign was significantly associated with increased knowledge of concussions (P = .0004, 95% CI 0.1060-0.5896).

Study Objectives: To estimate patterns of opioid prescribing and identify strength of association of patient characteristics with opioid prescribing in emergency departments (EDs) of a large health care system. We hypothesized that younger adult patients and those with past documented history of substance abuse would be less likely to receive prescription for opiates.

Methods: A retrospective medical record review of patient care encounters at 4 academic EDs and 4 non-academic EDs from January 1, 2014 to January 31, 2014. Inclusion criteria were: (1) patient age ≤18 years; (2) pain-related chief complaint; (3) numeric pain scale (NPS) >0, (4) discharged to home. Patient predictors included: age in years (18-24, 25-44, 45-65, >65), sex, insurance status (none, any), medical history of substance abuse (based on ICD-9 code 305), and triage NPS score. Outcomes of interest were: (1) opioid prescription (OP; yes, no) and (2) opioid tabs prescribed (0-12, 13-29, >30).

Multivariable logistic modeling was used to measure strength of association of covariates, and results presented as adjusted odds ratios (AOR) with 95% confidence intervals (95% CI).

Results: Among 13,333 patients in analyzed cohort (mean age 41.7 years; 62% female; 11.4% uninsured; 27.7% with substance abuse history), 3,569 (26.7%) received an OP. In multivariable regression, the following covariates were associated with OP: increasing age category (AOR = 1.24; 95% CI 1.20-1.31); male sex (AOR = 1.22; 95% CI 1.12-1.34), history of drug abuse (AOR = 1.15; 95% CI 1.03-1.30); NPS (AOR = 1.27; 95% CI 1.24-1.29). Among 3,457 patients who were prescribed an opioid, 63% were prescribed 0-12 pills, 35% 13-30 and 1.9% >30 pills. In multivariable regression, the following covariates were associated with >12 pills: increasing age category (AOR = 1.21; 95% CI 1.11-1.31), male sex (AOR = 1.16; 95% CI 1.01-1.34), uninsured (AOR = 0.67; 95% CI 0.54-0.85); and history of drug abuse (AOR = 0.74; 95% CI 0.63-0.86).

Conclusions: Older patients, men, and patients with a drug abuse history are more likely to receive an opioid prescription when discharged from the ED after a pain-related visit, independent of reported pain severity. Older patients receive prescriptions for a higher number of pills, but those uninsured and with drug abuse history are prescribed fewer pills. These results suggest that specific patient characteristics influence opioid prescribing behavior in the ED.

337 Then and Now: Psychosocial Emergencies in the Elderly
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Study Objective: As the age and size of the older population group increases, the appropriateness, effectiveness, cost, and outcome of emergency medical care provided...
to them will be of special concern. The aims of this study were to: (1) identify key social problems among the elderly as they present to an emergency department; (2) compare the epidemiology, assessment and treatment patterns with results from a similar study performed at this institution in 1989.

Methods: This was a retrospective, cohort analysis of consecutive patients more than 64 years old who received medical social work (MSW) consultation in the emergency department (ED) at a university-affiliated hospital during a two-year study period (2013-2014). Demographics, medical history, presenting complaints, treatment, and disposition were obtained from ED records. Standardized abstraction forms were used to guide data collection. One investigator performed a blind critical review of a random sample of 10% of the charts to determine reliability. The main outcome criterion was the frequency of key social problems among the elderly. Epidemiology, assessment and treatment patterns were then compared to results from a similar study performed 25 years ago. Discrete variables were analyzed with the use of Yates chi-square test, corrected for continuity; 2-tailed unpaired t-tests and Wilcoxon rank sum tests for continuous and ordinal data.

Results: During the study period, 1,309 consecutive elderly patients received MSW consultation in the ED. The mean age was 78.4 ± 9.1 years; the oldest patient was 100 years old. The majority of elderly lived at home alone (31.4%) or with a family member or caregiver (47.6%). Twenty risk factors were identified that predisposed older patients to psychosocial emergencies, including polypharmacy (47.5%), hospitalization with pain (30.7%), functional disability (20.6%), and memory impairment (18.8%). A total of 18 psychosocial problems were identified; elderly spent approximately 10.0 ± 12.1 hours in the ED. Compared to a similar study at our institution in 1990, the number of MSW consults in elderly patients has increased almost three-fold (370%). There are more male patients (49% vs 39%, P < .001), and each patient has a greater number of risk factors (3.5 vs 2.3, P < .001) and individual psychosocial problems (3.0 vs 1.9, P < .001). The spectrum of psychosocial disease has also changed with significantly more terminal illness, caretaking issues, medication assistance, social isolation, and self-neglect. Despite a net increase in the number of community resources utilized, more patients experienced a change in their living situation after discharge from the ED (43.9% vs 24.9%, P < .001). Significant changes included greater use of short-term hospitalization, subacute rehabilitation centers, hospice care, and psychiatric admissions.

Conclusions: During the past 24 years at our institution, the number and spectrum of psychosocial emergencies in older patients has significantly changed. There are greater numbers of “high-risk” elderly with caregiver exhaustion, financial constraints, functional decline, depression, self-neglect, and social isolation. Although community-based services can be effective in addressing many of these needs, a growing proportion of elderly with psychosocial emergencies require a change in their living situation upon discharge from the ED.

340 Cognition and Risk of Revisits to an Emergency Department in Ambulatory Geriatric Patients
Pimentel L, Ostr G, Schenkel S, Abraham DS, Berges IM, Kostelec T/University of Maryland School of Medicine, Cockeysville, MD; University of Maryland School of Medicine, Baltimore, MD; Mercy Medical Center, Baltimore, MD

Study Objectives: Cognitive impairment has important implications for older persons when seeking emergency care. The objective of this study is to examine the association between cognitive function in the geriatric patient population and revisits to the emergency department (ED).

Methods: Design: A trained clinical interviewer completed face-to-face interviews and chart abstractions at the time of the ED visit. Socio-demographic information obtained included age, sex, race, marital status and living situation. The Montreal Cognitive Scale (MoCA) was used to measure cognition. The scale is a tool that was developed for detection of mild cognitive impairment over six domains: executive, attention, language, abstraction, memory, and orientation. Means (SDs) were reported for continuous measures and percentages for categorical measures. The distribution of MoCA scores was assessed through univariate analysis. Logistic regression models examined the association between cognition and sub-dominant and 30-, 60-, and 90-day ED revisits, with adjustment for relevant variables. Setting: The study population was a convenience sample of 200 patients drawn from a 50-bed emergency department in an urban emergency department (October through December 2014). Type of participants: Inclusion criteria were ambulatory patients aged 65 and older presenting to the ED for care. Subjects were excluded if they were disoriented at triage; transferred from a nursing home or same day surgery; required isolation; or did not speak English.
Results: The mean age was 75 (65-91). Seventy-one percent (71%) were female; 74% were black. Twenty-four percent (24%) were married and 45% lived alone. The mean MoCA score was 17.5 on a scale of 0 to 30; scores below 26 indicate cognitive impairment. Table 1 shows the overall and domain specific cognition scores with normalized Z scores. Overall cognition Z scores for our population were 4.5 points below population norms. In each subdomain, subjects scored below population norms. Our model showed a significant association between cognition and odds of 60 and 90 but not 30-day readmission that persisted after adjusting for age, sex, and comorbidities. Each one-point increase in cognitive score was associated with 24% decrease in the odds of 60 (OR = 0.76, 95% CI: 0.57, 1.00) and 90-day readmission (OR = 0.79, 95% CI: 0.618, 0.99) respectively.

Conclusion: In our urban population, ambulatory geriatric patients discharged from the ED manifested significant cognitive deficits in all six domains of the MoCA. Cognition was significantly correlated with ED revisits at 60 and 90 days. Mild increases in cognitive performance resulted in substantial reduction in the probability of revisiting the ED.

341 GEDI WISE: Association Between Abnormal Geriatric Assessments in the Emergency Department and Subsequent Hospitalization
Dresden SM, Alkhawam L, Sarwark J, Gravener S, Courtney DM/Northwestern University Feinberg School of Medicine, Chicago, IL

Study Objectives: The Geriatric Emergency Department Innovations through Workforce, Informatics and Structural Enhancements (GEDI WISE) initiative utilizes specially trained nurse liaisons to perform a series of validated tests on emergency department (ED) geriatric patients in order to identify geriatric specific needs and provide care coordination. The objective of this study is to evaluate the ability of these geriatric assessments to predict hospitalization in geriatric patients with normal vital signs as a marker of possible “social admissions.”

Methods: This was a prospective observational study of geriatric ED patients from April 2013 to March 2015. Geriatric patients in this study were evaluated by a geriatric nurse liaison (GNI) and had geriatric-specific assessments performed and recorded in the electronic medical record (EMR) including: Identification of Seniors at Risk (ISAR) Short Portable Mental Status Questionnaire (SPMSQ); Katz Activities of Daily Living (Katz ADL); Beers Criteria, Timed Up and Go test (TUG), and Confusion Assessment Method (CAM). All patients age 65+ with normal vital signs, who were evaluated by the GNI were included in this study. Demographics and vital sign variables were categorized as normal and abnormal according to previously reported ED literature, and geriatric assessments results were dichotomized. The primary outcome was hospitalization, including inpatient and observation status. Bivariate analysis was performed between geriatric assessment results and the hospitalization outcome. To adjust for demographics and emergency severity index (ESI), logistic regression was then performed for each of the assessments.

Results: There were 48,229 geriatric ED patients during the study period. 2,559 received GNI evaluation. The abnormal results of completed assessments are as follows: ISAR 1776/2559 (69%), SPMSQ 496/2,294 (22%), Katz ADLs 1,016/2,089 (49%), Beers 789/1339 (59%), TUG 732/778 (94%) CAM 44/126 (35%). For patients with normal vital signs, the unadjusted odds ratios showed significantly increased odds of hospitalization for all geriatric assessments. After adjusting for age, race, and ESI, only ISAR and Katz ADLs were significantly associated with increased odds of hospitalization (Table).

Conclusion: In geriatric ED patients with normal vital signs, most geriatric assessments do a poor job of predicting hospitalization after adjusting for ESI and demographics. This may be because GNIs are able to effectively address the issues they identify through these assessments to prevent “social admissions.” Patients with difficulty performing their ADLs may represent a group for which it is more difficult to effectively coordinate care in the ED. Despite previous literature showing the poor performance of ISAR, in this sample it is associated with increased odds of hospitalization, and may have merit as a screening test for patients at high risk for hospitalization.

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<th>Table 1: Odds ratio for hospitalization</th>
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<td>Abnormal geriatric Assessment</td>
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*Odds ratio adjusted for age, race and Emergency Severity Index (ESI).

342 Cognitive Impairment Among Community-Dwelling Older Adult Emergency Department Patients
Roth JM, Suffoletto B, Callaway C/University of Pittsburgh, Pittsburgh, PA

Study Objectives: To identify risk factors for cognitive impairment and whether the presence of cognitive impairment is associated with 30-day outcomes.

Methods: A prospective observational study of a convenience sample of patients aged 65 years and older recruited sequentially from 3 emergency departments (EDs) in Pittsburgh, PA. Participant sociodemographics and health status were self-reported. Medical history, current medications, ED chief complaints and outcomes were abstracted from the medical record. Potentially inappropriate medicines were designated as those that met Beers criteria. Research assistants administered the Short Blessed Test (SBT), a six-item instrument evaluating orientation, registration, and attention, in the ED. A score of ≥ 4 was representative of cognitive impairment. Outcomes included hospital admission, length of stay, 30-day ED re-visit, 30-day hospital (re) admission and death. We used multivariable logistic regression, presenting adjusted odds ratios (AOR) with 95% confidence intervals (CI) for significant variables in the final model. Model accuracy was assessed using area under the curve (AUC). The beta coefficient for each covariate was used to assign integer point values to each covariate in the final model to calculate a risk score, where best cutoff score sensitivity, specificity, and likelihood ratios (LR) are presented.

Results: Among 806 participants in our cohort, 58.2% (n=469) had cognitive impairment. Only 3% had a medical history of dementia. Using multivariable logistic regression, a model of age>85 (AOR=2.04; 95% CI 1.22-3.13), black race (AOR 1.8; 95% CI 1.3-2.5), less than high school education (AOR 2.1; 95% CI 1.6-2.9); any fall in past year (AOR 1.8; 95% CI 1.2-2.4), any potentially inappropriate medication (AOR 1.4; 95% CI 1.1 to 1.94) has moderate predictive accuracy for cognitive impairment (AUC = 0.66). A score of ≥2 would produce a sensitivity≥72%, specificity=51.6%, LR+=1.49, LR-=0.54. In comparing outcomes in participants with cognitive impairment versus those without, there were no differences in admission rates (50.7% vs 51.2%), length of stay (2.8 vs 2.3 days), 30-day ED re-visit (19.6%) vs 16.6%) and 30-day hospital (re) admission (23.9% vs 27.9%). No patients died.

Conclusions: We found that cognitive impairment is common among community-dwelling older ED patients, that easily obtainable risk factors can modestly identify those at higher risk for cognitive impairment. Black race and those with less education suggest socioeconomic contributors. Age older than 85 years and falls in past year suggest frailty contributors. Potentially inappropriate medications suggest possible
iatrogenic contributors, and supports a role for interventions aimed at pharmacy reviews in older adults. The presence of cognitive impairment, however, was not found to be associated with measured outcomes.

343 Sex Differences in Study Enrollment for a Mechanical Fall Prevention Study
Miller KI, Kane BG, Jacoby JL, Barraco RD, Bhawardy V, Goodwin M, Paterson C, Villanueva KMW, Zegepohone P, Greenberg MR/Lehigh Valley Hospital, Allentown, PA

Study Objectives: Concordant with the National Institutes of Health policy on the inclusion of women in clinical research, emergency medicine (EM) researchers are focusing more on study designs that adequately represent populations impacted by the topic they study. We set out to see if there were sex differences in patients’ willingness to participate in a mechanical fall prevention study and, specifically, what reasons they disclosed for lack of participation.

Methods: After IRB study approval, a randomized control clinical trial designed as an emergency department (ED) intervention to prevent future mechanical falls in high risk individuals was initiated. The trial setting was a suburban Level 1 trauma center in northeastern Pennsylvania with an annual adult ED census of approximately 75,000. A log was kept as potential participants were screened using the Centers for Disease Control and Prevention guidelines for identifying individuals who were vulnerable to falls. Those who screened positive were approached for enrollment. Demographics and reasons for not participating that were not specifically included or exclusion criteria were recorded and assessed.

Results: Between June 2014, and January 2015, 406 adults aged 65 or older were screened for study participation. Of those without missing data, 186 (46%) were male and 218 (55%) were female. Despite having risks such as previous falls, family concerns for falling, and at-risk medications, 68 subjects (16.8%) did not consider themselves or want to be considered as a fall risk (n=27, 12.4% female and n=41, 22.0% male; \( P = .01 \)). One hundred sixty-six subjects were enrolled in the study following a standardized process of informed consent and study participation. Of those enrolled, 100 (60%) were male, with 23% of the eligible participants being female (47.9%) and 25 (52.1%) being male. Of the 118 eligible participants who declined participation, leading reasons for declination were: Lack of interest (n=37, 31.4%), being admitted to the hospital (n=25, 21.2%) and reported pain (n=15, 12.7%). Differences in proportions were observed between sexes for these reasons to decline (\( P < .05 \)).

Conclusions: There were sex-specific differences for subject participation in this trial. In particular, male prospective enrollees were less likely to consider themselves or want to be considered as a fall risk, which is a surprise but due to being stigmatized is unknown and a topic for future investigation. As EM sex-specific research becomes mainstream, researchers will have to carefully deliberate the designs of their trials. Consideration must be given to sex-specific barriers to willingness for study participation and what biases in enrollment they may cause in the selection process, if not controlled for.

344 Serum Microparticle Concentration: A Novel Marker of Moderate and Severe Traumatic Brain Injury
Dezman ZDW, Browne DR, Yang M, Stein DM, Thom SS, Tran QK/University of Maryland School of Medicine, Baltimore, MD

Study Objective: US emergency departments treat 1.5 million cases of traumatic brain injury (TBI) annually. There is currently no method of determining which patients will recover from TBI and which will have persistent symptoms. A non-invasive marker of injury severity would be invaluable in addressing this ongoing public health issue. Microparticles (MP), 0.1-1um anucleated vesicles derived from the membrane of different cell types, have the potential to fill this need.

Methods: Prospective cohort study of patients evaluated at an urban level-I trauma center and referral center. Inclusion criteria: Age > 18, Age < 80, within 8 hours of new TBI, as demonstrated by out-of-hospital Glasgow Coma Score (GCS) of 3-8 (severe TBI [≤GCS3]); or 9-13 (moderate TBI [modTBI]) and only minor associated injuries (Abbreviated Injury Score [AIS] ≤2). Patients outside of the age range, those with severe multi-trauma (any area with AIS ≥ 2), GCS ≥ 14, or pre-existing comorbidities and diagnoses that affect MP expression (e.g., shock, ARDS, renal failure) were excluded. Each sample was refined from whole venous blood taken on arrival to the hospital and then 24 and 48 hours later. The resulting serum was centrifuged and MP concentration measured using flow cytometry. A repeated measure ANOVA was used to determine differences between cases and controls. Pearson coefficient was used to show the time-dependent release of MP. Subjects (or their legal representative) provided consent per our institutional review board approved protocol.

Results: Thirteen patients (64% male, mean=47.7±18.1 years) with TBI (out-of-hospital GCS =9.4±4.6) and 10 controls were enrolled. Injury mechanisms included falls (54%), motor vehicle crashes (38%), and pedestrian-struck (8%). Most patients had multiple injuries on computed tomography (CT) head: subarachnoid (77%) and/or subdural hemorrhage (38%), intraparenchymal contusion (23%), epidural hematoma (8%), and diffuse axonal injury (8%). The average log\(_{10}\) MP concentration on admission of patients with TBI was significantly higher than healthy controls (mean=3.36±0.51 vs. 2.81±0.27, \( P = .027 \), Figure), including subgroups with modTBI (mean=3.40±0.52, \( P = .018 \)) and sevTBI (mean=3.33±0.54, \( P = .029 \)). The MP concentrations of the patients at 24 (mean=3.68±1.42, \( P = .13 \)) and 48 hours (mean=3.08±1.32, \( P = .72 \)) after admission were not significantly different from controls. There was a moderately strong correlation between the time to the first blood draw after injury and MP concentration (\( r = 0.621, \ P = .055 \)).

Conclusions: MP concentration is increased in patients with new TBI compared to uninjured controls. MP concentration also increased with time after the injury, suggesting a time-dependent release of MP after TBI.

345 Bicyclists Struck by Motor Vehicles: Impact of Bike Lanes and Protected Paths on Injury Severity
Wall SP, Lee DG, Sethi M, Heyer JH, DiMaggio CJ, Frangos SG/Bellevue Hospital Center, NYU School of Medicine, New York, NY

Study Objectives: New York City (NYC) recently expanded its bicycle routes by demarcating bike lanes with paint and constructing 30 miles of protected paths that physically separate automobile traffic from bicyclists to address increases in bicyclist fatalities. Our objective was to determine whether bike lanes and protected paths result in safety benefits for bicyclists in NYC. We hypothesized that bike lanes would be associated with reduced injury severity among bicyclists colliding with motor vehicles and that protected paths would be associated with an even greater safety benefit.

Methods: We performed a secondary analysis of bicyclist injury data collected from December 2008 to August 2014 at a Level 1 Trauma Center in NYC. We evaluated the association of protected paths and bike lanes on injury severity while controlling for potential confounders including patient demographics, scene-related and environmental information, helmet use, traffic law compliance, street characteristics, and injury mechanism. Data were obtained from patient interviews and medical records. Injury severity score (ISS) was categorized according to National Trauma Data Bank (NTDB) definitions: mild (1-8), moderate (9-15), severe (16-24) or critical (≥25). Multivariable ordinal logistic regression was used to model the effect of availability of protected paths, bike lanes, and potential confounders on NTDB ISS categories. Odds ratios and 95% confidence intervals were reported. Missing data were estimated with multiple imputation methods. Injury/incident date was obtained from study datasets. Dates of bike lane and protected path installation were obtained from the
NYC Department of Transportation and mapped using shapefiles to verify lane/path availability. We used spatial analysis to identify statistically significant clusters of high and low ISS. We selected a-priori two motor vehicle traffic and bicyclist dense roads (First and Second Avenues) with recently installed bicycle routes to compare the distribution of ISS for events occurring prior to and after installation.

Results: After screening for eligibility, 839 patients qualified for inclusion. In the period prior to installation of bike lanes and protected paths, 21 bicyclist versus motor vehicle incidents occurred on First and Second Avenues; all were mildly severe. In the period after installation, 45 incidents occurred including 6 moderately injured, 1 severely injured, and 1 critically injured. Multivariable ordinal logistic regression modeling revealed that, holding all other variables constant, bike lane availability was associated with nearly 70% increased log odds of a bicyclist having a more severe injury (i.e., moving up one level in ISS categories) compared to having no lane or path available (AOR 1.70 95% CI 1.08-2.67). There was no difference in the log odds of having a more severe injury when protected paths were available (AOR 1.27 95% CI 0.67-2.41).

Conclusion: Installation of demarcated bike lanes was associated with an increase in severe injuries among bicyclists presenting to our NYC trauma center. Installation of protected paths was not associated with significant differences in injury severity. These results may be due to increased bicycle rider volumes and speeds. Additional exposure data are necessary to fully characterize the impact of bike lanes and protected paths on injury severity.

Study Objectives: Anterior shoulder dislocations occur with an estimated incidence rate of 24 per 100,000 person-years in the United States. Although more than 90% of these shoulders are successfully reduced in the emergency department (ED), practitioners do not agree on the best reduction technique. Our aim was to ascertain first attempt success rates of different reduction techniques at an academic urban trauma center. Secondarily, we looked at usage of different methods of analgesia and sedation.

Methods: We retrospectively reviewed the medical records of all patients over age 15 who presented to the ED over a three-year period with an isolated anterior shoulder dislocation. We recorded the reduction technique used, type of analgesia used, and number of attempts needed for successful reduction.

Results: Two hundred forty patients met inclusion criteria for the study. The reduction technique could be identified in the medical record in 156 patients (65%). Providers utilized the Milch/Hennepin (abduction/external rotation) technique most often (71 patients, 30%), followed by the Stimson (prone extension/traction) technique (52 patients, 22%). Other techniques used included the traction-countertraction/ Hippocratic method (20 patients), the Kocher (external rotation) method (9 patients) and the Cunningham (shoulder massage/traction) method (4 patients). In our population, the Milch technique reduced the shoulder on the first attempt in 74.6% of patients and 32% of those patients had procedural sedation. The Stimson technique had a 60% first attempt success rate with no patients receiving procedural sedation. The traction/countertraction method had a 61.5% first attempt success rate but 75% of patients received procedural sedation. Twenty-four shoulders could not be reduced in the ED and required orthopedic consultation.

Conclusion: The results of this study suggest that the Milch technique may be superior to Stimson or Hippocratic methods for reducing anterior shoulder dislocations; however, the Stimson technique never required procedural sedation. The majority of patients were reduced in the emergency department without orthopedic assistance.

Study Objectives: Tube thoracostomies (TT) are performed for a variety of indications including pneumonia, hemothorax, and empyema. The most common technique involves insertion of a finger into the chest cavity with advancement of a Kelly clamped chest tube alongside the finger. Studies have demonstrated complication rates ranging from 1.1-9.5% depending upon the provider level of experience. There have been a few online discussions mentioning the use of a bougie to facilitate thoracostomy tube passage, but to the best of our knowledge, there are no studies assessing its feasibility. The purpose of this pilot study was to assess the feasibility of this approach as an adjunct to the standard TT placement.

Methods: We conducted a pilot, feasibility study of this technique using a fresh human cadaver model. Two experts who have placed more than 50 TT and two senior residents who placed more than 10 TT clinically prior to the study each performed one standard TT insertion and one bougie-guided TT. The insertions were with a 36 French chest tube and there were eight total placements. The providers alternated which approach was performed first, serving as their own case and control. The bougie-assisted approach involved preloading the chest tube onto the bougie (Figure), advancing the bougie alongside the finger after entering the chest cavity, and then advancing the chest tube forward in a Seldinger technique. Two separate physicians confirmed intrathoracic placement by dissection and with ultrasound. The primary outcome was procedural time, which was measured from the first incision to the time when the provider was ready to suture. Secondary outcomes included incision length, percentage correct intrathoracic placement, and complications.

Results: We performed eight total insertions with 100% intrathoracic placement with both approaches. Average procedure time was 48 seconds (95% CI 15-81 seconds) for the standard technique and 40 seconds (95% CI 16-65 seconds) for the bougie-guided technique without significant differences between expert and senior resident subgroups. Of note, the mean incision length was 4.9 cm (95% CI 3.2-6.5 cm) for the standard approach and 3.0 cm (95% CI 2.3-3.6 cm) for the bougie-guided approach. There were no significant complications identified in this sample.
Conclusion: The bougie-guided TT is a novel approach to chest tube insertion and demonstrated excellent feasibility in this pilot study. Further studies should address the use of this technique in larger samples, as well as with more novice providers and obese patients.

Study Objective: Pelvic fractures are one of the common fractures seen in trauma. The risk of associated morbidity and mortality varies especially in patients initially presenting to the emergency department in stable condition. The injury mechanisms and patterns among patients in the sub-geriatric age overlap those seen in both the geriatric and young ages. As a result sub-geriatric pelvic trauma patients initially presenting in stable condition may be considered at lower risk in terms of potential morbidity and mortality. Therefore, in order to properly evaluate and manage stable pelvic fracture patients of the sub-geriatric age, it is important to identify those patients with relatively high risk for poor outcomes. The aim of this study is analysis of data from the national trauma data bank to identify potential high risk(s) among patients of the sub-geriatric ages.

Methods: All trauma patients older than 18 years with any type of pelvic fracture (including acetabulum fractures) from January 2003 to December 2010 were included. Over 150 variables including demographics, injury mechanism and severity, injury location and associated injuries, initial vital signs, blood product use, length of stay, intensive care unit admission, mechanical ventilation, hospital complications, and mortality were reviewed and analyzed. The study intended to compare different variables in three different age groups including patients less than 50 years old (young), patients 50 to 65 years old (sub-geriatric), and patients greater than 65 years old (geriatric).

Analysis of Variance with Bonferroni correction was used for group comparisons. Results: Of the total 29,705 stable pelvic fracture patients due to blunt trauma, 18.66% were of the sub-geriatric age. Ilium fractures had higher mortality (3.77%), injury severity scores (13.50±8.66), blood transfusion rate (4.47%), and hospital complication rates (29.97%) than any other type of pelvic fractures. These results were similar when compared with patients of the geriatric group. Among all stable pelvic fracture patients, patients of the sub-geriatric tended to have the highest ICU admission rate (72.94%), length of hospitalization (9.35±10.48 days), and in-hospital complication rate (27.69%) regardless as to whether the patient was ultimately discharged to home or transferred to another facility.

Conclusions: Different pelvic injury patterns are seen in patients of different age groups. Sub-geriatric aged patients with pelvic fractures had the highest rate of ICU admissions resulting in prolonged hospitalizations and higher in-hospital complications. Special attention needs to be paid to these patients who are diagnosed with ilium and pubis fractures as they tend to have higher rates of internal injuries, morbidity, and mortality.

Study Objective: To evaluate the clinical diagnostic impact of contrast enhanced ultrasound (CEUS) compared to traditional abdominal computed tomography (CT) and standard ultrasound (US) in a Bayesian clinical decision scheme integrating the emergency trauma score (EMTRAS).

Methods: The EMTRAS is comprised of 4 parameters: patient age, Glasgow Coma Scale, base excess, and prothrombin time (PT). For the purposes of our model the EMTRAS was used as pretest probability and stratified as: low risk (0-3 points = 10%), moderate risk (4-6 points = 42%) and high risk (7-12 points = 80%) based on mortality risk. Sensitivity (Se) and specificity (Sp) for US, CT and CEUS was obtained from pooled data and used to calculate negative (-) and positive (+) likelihood ratios (LRs). EMTRAS percentage risk used as pretest probability and likelihood ratios were charted into a Bayesian nomogram to obtain posttest probabilities. Absolute (ADG) and relative diagnostic gains (RDG) were then calculated. ANOVA was used to evaluate strength of association with a p-value set at 0.05.

Results: Data for Se, Sp, LRs+ and LRs- were obtained (Table) for ultrasound (Se=45.7%, Sp=91.8%, LRs+ = 5.57, LRs- = 0.59), contrast enhanced ultrasound (Se=91.4%, Sp=100%, LRs+ = 91, LRs- = 0.09), and CT (Se=94.8 %, Sp=98.7%, LRs+ =73, LRs- =0.05). Ultrasound LRs+ model results showed low risk posttest probability of 38%, RDG of 28% and ADG of 280%, moderate risk posttest of 80%, RDG of 38%, and ADG of 90.5%, and high risk posttest of 96%, RDG of 16% and ADG of 20%. CEUS model results for LRs+, yielded low risk posttest probability of 91%, ADG of 81.0% and RDG of 810.0%, moderate risk posttest probability of 99.0% ADG of 57.0% and RDG of 135.7%, and high risk posttest probability of 100.0%. RDG of 20.0% and RDG of 25.0%. CT LRs+ results were low risk posttest of 89%, RDG of 79% and ADG of 790%, moderate risk posttest of 98%, RDG of 56%, and ADG of 133.3%, and high risk posttest of 100%, RDG of 20% and ADG of 25%. Comparison of CT vs CEUS (Table) did not yield statistically significant differences for LRs+ (P = .9811).

Conclusion: This study found that CEUS performed statistically similar to traditional abdominal CT in an EMTRAS Bayesian clinical decision scheme. The greatest incremental gain was obtained for low pre-test positive likelihood ratio groups. Further validation of this model is needed as well as cost-benefit analysis. Limitations include the retrospective nature of the data and the limited universe of subjects it offers.

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Mothers’ Empowerment as a Mitigator of Pediatric Scald Risk in the Latino Community

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Study Objectives: Despite declining rates of burn injury in the U.S., rates of pediatric scald injury remain high, particularly in minority groups. We aim to explore possible causes for the increased rates of pediatric scald injury in the Latino community.

Methods: Semi-structured, audio-taped interviews were conducted with Latino mothers of children under 5 years of age living in the San Fernando Valley. Interviews were translated from Spanish to English at the time of transcription and reviewed by a bilingual research assistant for integrity. Data analysis comprised an initial thematic analysis of factors influencing implementation of burn prevention strategies, followed by a grounded theory analysis in which emerged the core actionable factors to improve implementation.

Results: Twenty-four interviews were completed. Subjects describe a wide range of knowledge and implementation of burn prevention strategies. Barriers to the use of burn prevention strategies fell into two categories: barriers to knowledge and barriers to implementation. Barriers to knowledge included lack of access to information and low levels of health literacy. Barriers to implementation included social isolation, environmental constraints and a belief in redirecting children’s behavior as a sound prevention strategy. Interaction between several of these barriers augmented the difficulty in achieving the use of prevention strategies. Two factors mitigated these barriers: prior personal experience with burn injury, and high personal empowerment. Empowered mothers modified their environment, made health decisions, asked questions of the pediatrician, and changed their behavior based on new information.

Empowerment was enhanced by several components of social capital, and negatively impacted by social isolation.

Conclusion: Of the two mitigating factors to lack of implementation of burn prevention strategies in the home, only empowerment is actionable. Future interventions for pediatric injury prevention in the Latino community should focus not only on reining information but also on increasing mothers’ empowerment by raising social capital through access to education, alternate childcare, and teaching strategies for communication. Involvement in community groups and parent programs is beneficial, as improved social support will positively impact the implementation of prevention strategies. Given these findings, injury prevention programs of all types will benefit from the incorporation of theories of behavioral change to enhance the effectiveness of current knowledge-based programming.

Prevalence of Horizontal Violence Among Emergency Attendings, Residents, and Mid-Level Providers

VOLZ NB, FRINGER R, WALTERS B, KOWLIENTZKO T/Oakland University William Beaumont School of Medicine, Rochester, MI; Beaumont Health, Royal Oak, MI

Study Objectives: Horizontal violence (HV) in the workplace are acts perpetrated by health care workers against each other. These include bullying, verbal or physical threats, purposeful disruptive behavior, and other malicious behaviors. The purpose of this study is to investigate the prevalence of HV towards emergency department (ED) attendings, residents, and mid-level providers (MLPs). Previous research in HV has focused largely on nursing and not on physicians or MLPs in EDs.

Methods: An electronic survey was sent to attendings (n=67), residents (n=25), and MLPs (n=24) in 3 unique emergency centers within a single multi-hospital medical system. Ninety-one (74.0%) individuals completed the survey. The survey was based on previously published surveys investigating the prevalence of HV behaviors in nursing. The survey consisted of 18 questions that asked participants to indicate with what frequency (never, once, a few times, monthly, weekly, or daily) they have witnessed or experienced a particular behavior in the last 12 months (Table).

Results: Of the 91 respondents, 64.8% were men and 35.2% were women. Attendings represented 41.8%, residents 37.4%, and MLPs 19.8% of respondents. Previous research in HV has focused largely on nursing and not on physicians or MLPs in EDs. The results (Figure) indicate that the prevalence of HV behaviors ranges from 1.1% (Q18: physical assault) to 53.8% (Q5: asked to do tasks below competency). The most frequently reported behaviors include Q3, Q4 (being shouted at), Q1 (humiliated by co-worker), and Q5 (subjected to demeaning remarks). Fourteen of these behaviors were most prevalent in the attending cohort, 6 were most prevalent in the MLP cohort, and 3 of the behaviors were most prevalent in the resident cohort.

Figure 1. Prevalence of responses.

Echocardiography for the Diagnosis of Pulmonary Embolism: A Meta-analysis

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Study Objectives: Many patients with suspected pulmonary embolism (PE) cannot undergo computed tomography or ventilation-perfusion scanning either due to a contraindication or hemodynamic instability. Bedside echocardiography (echo) provides a rapid non-invasive alternative. Studies have investigated the diagnostic accuracy of echo for PE, but a meta-analysis has not been performed. The current meta-analysis set out to determine the diagnostic accuracy of echo for PE.

Methods: We conducted a search of the MEDLINE database to identify all articles on the diagnostic accuracy of echo for PE from 1980 to present. Search terms included Medical Subject Headings (MeSH) and keywords for synonyms of ultrasonography, echocardiography, pulmonary embolism, heart, and ventricle. Inclusion criteria were primary research with data, English language, adult patients, and use of transthoracic echo and a gold standard reference study on all patients (ventilation-perfusion scan, pulmonary angiogram, computed tomography, surgery,

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or autopsy). Studies were excluded if they examined only specific comorbidities (eg, cancer, liver disease, etc); were on pediatric or pregnant patients; used healthy volunteers as controls; did not have a calculable sensitivity (Sn) and specificity (Sp) from the data presented; or were reviews, commentaries, or editorials. All articles were screened for inclusion by two independent reviewers, with 97% agreement; k = 0.77, P < .001. Both reviewers decided a priori to err on the side of inclusion, and if either reviewer selected an article, it was ordered for full text review. A single reviewer then determined if the full text articles met the inclusion criteria, and any questions were discussed with the team to reach a final decision on inclusion. Sn and Sp were combined using equal weighting methods and calculated using Microsoft Excel.

Results: Our search strategy yielded 4,472 articles without duplicates. Of these, 389 were ordered for full text review, and 22 were included in the final analysis. The most commonly cited use of echo to detect PE was through a combination of findings suggestive of PE. These findings were termed and defined variability across 16 studies. Terms for combined measures included: right ventricular (RV) dysfunction, RV strain, and acute cor pulmonale. These combined measures had a Sn of 57% and a Sp of 78%, and those only in point of care studies had a Sn of 60% and an Sp of 87%. The most common (n=7) stand-alone signs used were an increased RV:LV ratio (Sn=64%, Sp=85%), abnormal septal motion (Sn=29%, Sp=96%), and tricuspid insufficiency (Sn=89%, Sp=80%). The most specific test was visualizing a RV thrombus, with a Sp of 100% in 2 studies. However, 3 other markers showed a Sp greater than 95%: RV hypokinesis (98%, n=4), McConnell’s sign (98%, n=3), and abnormal septal motion (96%, n=7). The most sensitive test was an increased RV end diastolic diameter, with a Sn of 78% in 3 studies. The test with the highest diagnostic odds ratio (DOR) was RV wall hypokinesis, with a DOR of 34.7, a Sn of 39% and a Sp of 98% in 3 studies.

Conclusion: Studies have consistently shown a high specificity for echo in the diagnosis of PE, making it potentially adequate as a rule-in test at the bedside in the emergency department for patients unable to get other confirmatory studies. Future research should examine if combining echo with other modalities, such as lung and deep venous thrombosis ultrasound improves accuracy.

354 Emergency Medicine Bedside Ultrasound Utilization in the Diagnostic and Therapeutic Approach to Peritonsillar Abscesses

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Study Objectives: Our previous retrospective, case control study from January 2007 through December 2008 suggested that emergency medicine bedside ultrasound (EMBU) improved successful needle aspiration of peritonsillar abscesses. During that time period, EMBU was utilized in only 20% of cases. This study aims to assess the more contemporary use and impact of EMBU since our initial review.

Methods: This was a retrospective, case-control study of all adult patients with a final diagnosis of peritonsillar abscess, who presented to the emergency department (ED) from January 2013 through December 2014 at an urban academic hospital. Chart review and abstraction were performed. The data were separated into those with emergency medicine bedside ultrasound (US) versus those without ultrasound (NUS). The primary endpoint was successful aspiration with EMBU. Secondary endpoints were frequency of specialty consultation, need for computed tomography (CT) imaging, unscheduled return visits within 1 week, and length of stay. The Fisher Exact method analyzed the frequency data, and the T test was applied to length of stay.

Results: There were 114 patients enrolled, 89 of whom had emergency medicine bedside ultrasound performed (78%). The median age was 32 with a range of 18 to 62. The results are: Successful aspiration by an emergency physician: US 89% vs NUS 4% (P = .001, OR 189.6; 95% CI 23, 1157). Additional Imaging (CT scans only): US 27% vs NUS 65% (P = .002, OR 4.8; 95% CI 1.9, 12.3). Return visit rate: US 4% vs NUS 12% (P < .01, OR 0.34; 95% CI 0.72, 1.66). Length of stay (minutes): US 166 vs NUS 267 P = .0002 (95% CI 146, 309.5).

Conclusion: The increased availability and utilization of emergency medicine ultrasound has impacted our diagnostic and treatment approach to peritonsillar abscesses. Nearly 80% of cases employed EMBU in comparison to 20% in the past. As suggested previously, ultrasound use by emergency physicians seems to improve the rate of successful aspiration of peritonsillar abscesses. Additionally, it appears to decrease specialty consultation rates, CT imaging, and length of stay.

355 B-Lines on Lung Ultrasound in End Stage Renal Disease Patients Post Hemodialysis: Accuracy and Precision-Interim Analysis

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Background: Studies have shown that B-lines on lung ultrasound are an objective method for the evaluation of extravascular fluid and volume overload. The availability, feasibility and sensitivity of ultrasound renders it an important tool for initial bedside evaluation in the emergency department. Training residents to take advantage of this exam can lead to a more precise and rapid assessment of a patient’s volume status.

Study Objective: To evaluate the precision and reliability of measuring volume overload through quantitating B-lines on lung ultrasound by residents following a short training course. Secondary objective was to evaluate the correlation between the B-line scores obtained and the NYHA CHF scores in end stage renal disease (ESRD) patients post hemodialysis (HD).

Methods: Internal medicine and emergency medicine residents were trained by ultrasound-fellowship trained emergency physicians to use ultrasound (Sonosite Edge) to identify B-lines on lung ultrasound in a 3-hour course. This course included a didactics and simulation training portion. All resident investigators had to pass an objective structured clinical examination (OSCE) and 10 question multiple choice exam for eligibility in enrolling patients in the study. Residents then performed lung ultrasound looking specifically for B-lines in patients post HD to assess for volume overload. Patients on HD have a high prevalence of moderate to severe pulmonary congestion, even after achieving dry weight. As validated in a study by Zoccali et al, a total of 28 lung windows were scanned: 16 in the right hemithorax (parasternal, midclavicular, anterior axillary and mid-axillary in the 2nd through 5th interscalene space (ICS)) and 12 in the left hemithorax in the 2nd through the 4th ICS at the same positions. For each scanned window, a 6-second video clip was recorded. A B-line score was calculated and categorized as minimal (0-5 B-lines present), mild (6-13), moderate (14-30) and severe (>30 B) for pulmonary congestion. This score was recorded in real time by the study investigators who were blinded to the patients’ clinical data. Each video clip was reviewed at a later time by two emergency physicians, who were also blinded to the patients’ clinical data. The B-line scores obtained by the emergency physician were compared with the results obtained by the study investigators.

Results: A total of 41 ESRD patients on HD were scanned. Sixty-eight percent were males; mean age 60.83 ± 16.175, mean BMI 28.17 ± 5.347; mean test duration was 15 minutes. The mean number of B-lines found by the study investigators and EPs was 18.24 and 19.53, respectively. The mean and standard deviation for difference was 5.13 and 11.98, respectively. When categorized, there was no significant difference in classification between the study investigators and emergency physicians (significance 0.982). NYHA score correlated with B-lines (P = .003) even after adjusting for other variables.

Conclusion: B-lines on bedside lung ultrasound can provide a reliable indicator for a patient’s volume status assessment in comparison to other validated measures, including the NYHA CHF score. Our study also shows that a short training course can render novice users of ultrasound capable of performing this quick evaluation. This can aid in objectively assessing volume overload in patients presenting to the ED, especially in HD patients who present a unique clinical challenge.

356 Emergency Physician-Performed Echocardiography as a Predictor of Cardiac Events in Patients Presenting With Symptoms of Acute Coronary Syndrome

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Study Objective: Echocardiography (echo) has gained wide acceptance for its utility at the bedside in the emergency department (ED) patients presenting with chest pain. Cardiology literature has demonstrated that both resting and stress echo are reliable in detecting myocardial ischemia and that bedside echo accurately identifies patients who present to the ED with a myocardial infarction. Echo has also been found to be more sensitive than ECG in detecting cardiac events in patients who present with chest pain or acute coronary syndrome (ACS) like symptoms. Regional wall motion abnormalities (RWMA) may precede ECG changes in patients with active myocardial ischemia. The objective of this study is to determine if emergency physician-performed bedside echo can predict cardiac events in patients presenting to the ED with ACS.

Methods: This is a preliminary prospective observational study of ED patients at two academic urban medical centers beginning December 2014. Patients presenting...
with symptoms concerning for ACS are screened for eligibility. Inclusion criteria are: age >21; patients who present with symptoms of ACS as determined by treating physician and who will be admitted to the hospital for further cardiac testing. ST elevation myocardial infarctions are excluded from the study. Bedside echocardiography was performed by one of the study physicians and was considered positive if the overall ejection fraction (EF) is <50% or if there are regional wall motion abnormalities (RWMA). A medical record review was completed to record all results of cardiac testing and interventions and to compare it to the bedside echo data. Cardiac events were defined as the initiation of new medical management for ACS, myocardial infarction (MI), or recanalization. Sensitivity, specificity, and positive predictive values (PPV) and negative predictive values (NPV) were calculated for bedside echo in predicting cardiac events.

Results: Our analysis will include a total of 250 patients and our preliminary data identified 31 eligible subjects, of which 26 were included in the primary analysis. Out of the 26 included subjects, 9 had an abnormal echo of which 4 had an acute cardiac event (1 bypass, 1 PCTA, 2 new medical management) and 5 had no acute cardiac event (1 stress test negative, 1 stress test with reversible ischemia, 2 catherizations showing known stable CAD and 1 catherization showing no CAD). Seventeen patients had a normal bedside echo of which all had normal cardiac testing. Our preliminary results show that bedside echo has a sensitivity of 100% (95% CI 40%-100%), a specificity of 77% (95% CI 54%-91%) a PPV of 44% (95% CI 15%-77%) and a NPV of 100% (95% CI 77%-100%) for predicting cardiac events.

Conclusions: These preliminary findings suggest that emergency physician-performed bedside echo may be an important adjunct in the evaluation of patients presenting with symptoms of ACS. Our early results show that an abnormal bedside echo is sensitive for predicting cardiac events and a good screening test. Incorporating bedside echo into the chest pain algorithm can help further risk stratify patients presenting with ACS.

**357 Effect of Ultrasound as an Initial Imaging Modality in Children With Appendicitis**

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**Study Objective:** The objective of this study was to evaluate whether use of ultrasound as an initial imaging modality increases complication rates in children with appendicitis.

**Methods:** Retrospective review was performed for children ≤17 years old diagnosed with appendicitis in two urban pediatric emergency departments (EDs). Patients with known appendiceal perforation, transfers from an outside hospital, and patients not operated upon were excluded. Patients who had ultrasound as their initial imaging modality were compared to those who had computed tomography (CT) only. Complication rates and time from ED triage to surgical incision were measured. Complications were defined as one or more of the following: perforated or gangrenous appendix on surgical or pathology reports; pertinent unscheduled medical visits, radiology studies, and/or procedures performed within 6 months after appendectomy. Time to appendectomy was expressed using medians and interquartile range (IQR). Mann-Whitney tests were used to compare groups where appropriate.

**Results:** Of the 1471 charts reviewed, 661 patients were eligible for analysis. Those with ultrasound performed initially were not at increased odds of experiencing a complication compared to the CT only group (OR= 0.98 [95% CI 0.70-1.38]). Time (minutes) to appendectomy was not significantly different between the ultrasound group (553 [IQR 385, 846]) and the CT only group (594 [IQR 437, 797], p = 0.24). Of patients in the U.S. group, 103 (28.8%) underwent a subsequent CT scan. This subgroup, compared to the CT only group, had a greater time to appendectomy (867 [IQR 604.5, 1149.55], P < .01) but was not more likely to experience a complication (OR 1.02 [95% CI 0.62-1.68]).

**Conclusions:** Performing ultrasound followed by CT does not increase complication rate compared with performing ultrasound or CT alone. Thus, ultrasound should be offered as the initial imaging modality due to its safety features.

**358 Point-of-Care Ultrasound for Ankle Injuries in the Pediatric Emergency Department**

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**Methods:** This was a prospective study of a convenience sample of pediatric patients aged 8-17 years who presented to the pediatric emergency department from November 2014 to April 2015 with acute ankle injuries. Point-of-care ultrasound was performed by pediatric emergency (PEM) attending physicians with formal ultrasound training or by emergency or pediatric residents who were supervised by PEM physicians with formal ultrasound training. Ultrasound results were recorded and filed prior to ordering the ankle x-rays on each patient. The x-rays were read by a pediatric radiologist who was blinded to the ultrasound results. Six ultrasound views were obtained on each patient using ultrasound gel and a water bath: tibia, fibula, anterior longitudinal view for effusion, Achilles tendon, and medial and lateral ligaments. The primary outcome was to identify the sensitivity, specificity, and predictive values of ultrasound for ankle fractures when compared to standard radiographs.

**Results:** 25 children were enrolled: 15 males and 10 females. Mean age was 13.5 years ± 2.6 (range 8-17 years). The mean time to perform the ultrasound was 12.5 minutes ± 2.8 minutes. 14 patients (56%) had medial or lateral ligament injuries on ultrasound; there were no complete ligamentous tears or Achilles tendon injuries. 7 patients (28%) were noted to have effusions on ultrasound compared with 2 (8%) effusions documented on x-ray reports. Five patients were diagnosed with fractures on x-rays. For detecting fractures in our study, point of care ultrasound yielded a sensitivity of 80% (95% Confidence interval [CI]: 28.4-99.5%) and specificity of 95% (95% CI: 75-1-99.9%). Positive and negative predictive values were 80% (95% CI: 28.4-99.5%) and 95% (95% CI: 75.1-99.9%) respectively. The area under the curve (AUC) was 0.875; P < .05.

**Conclusions:** Compared with ankle radiographs, point-of-care ultrasound may accurately diagnose pediatric ankle fractures. Given the large confidence intervals associated with the small number of patients in our study, further investigation is warranted. Ultrasound has the added advantage of diagnosing soft tissue injuries and ankle effusions compared with standard radiographs.

**359 The Role of Specific Discharge Instructions in Follow-Up for Pregnancies of Uncertain Location**


**Study Objectives:** To determine if the creation of new discharge (DC) instructions for patients diagnosed with pregnancy of uncertain location (POUL) resulted in a change in follow-up compliance.

**Methods:** A retrospective chart review was conducted on all emergency department (ED) patients with the diagnosis of POUL during the year prior to and immediately following the implementation of the new DC instructions. All ED patients with a positive pregnancy test and a pelvic ultrasound performed demonstrating POUL were included. Prior to this change, patients received generic discharge instructions such as “vaginal bleeding,” or “bleeding in pregnancy.” After implementation, patients received the new instructions, entitled: “Threatened Ectopic Pregnancy (TEP).” The study was conducted in the Emergency Department of MedStar Washington Hospital Center in Washington, DC: a 926-bed level 1 trauma acute care urban academic hospital with 87,475 annual ED visits. A chart reviewer, blinded to patient identifying information, reviewed all charts for physician documentation, ultrasound results, and DC instructions. Notation was made as to whether or not the patient was told to follow up in 48 hours, and to whom the patient should follow up with (the ED or their obstetrician). For the post-implementation group, the chart was reviewed to see whether or not the new TEP DC instruction was given. The primary outcome was the rate of follow-up, comparing the pre-TEP instruction group to the post-TEP instruction group. The secondary outcomes were the diagnosis at the second ED visit, and obstetric consultation during either visit.

**Results:** Overall, the percent of patients told to return within 48 hours increased from the pre to post-implementation group (89% versus 93.5%). In addition, it does not appear that obstetric consultation correlates with increased patient follow-up (26% follow-up within 48 hours with obstetrics consultation versus 30% without obstetrics consultation). Finally, the most common diagnosis at second ED visit in the pre and post-implementation groups was “Threatened Miscarriage” (91%).

**Conclusions:** Ectopic pregnancy is a life-threatening diagnosis. Frequently, patients present to the ED and are evaluated too early in pregnancy to determine whether or not an ectopic pregnancy is present. The implementation of the specific TEP DC instruction has ensured urgent follow-up for these cases. Prior to implementing the new DC instruction, various diagnoses were given to patients, masking the potential serious complications of ectopic pregnancy. The TEP DC instruction underscores the indeterminate status of the pregnancy, the potential complications of an ectopic pregnancy, and the importance of the prescribed urgent follow-up. The increase in the number of patients with POUL returning within 48 hours demonstrates the success of this new DC instruction. Limitations include the unknown rate of patients with POUL who elect to follow up with their primary obstetrician rather than the ED. Additionally, patient population characteristics and availability of emergent ultrasound and obstetric consultation may differ at different facilities.
360 Emergency Department Triage Nurse Inter-Rater Reliability of Bedside Point-of-Care Clinical Ultrasound Imaging to Assess Skin and Soft Tissue Infection in Light-Skinned and Dark-Skinned Patients

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Background: The United States Agency for Healthcare Research and Quality endorses the importance of a clinician’s accurate diagnosis of skin and soft tissue infection as a way to improve patient safety especially with the nation wide emergence of community-acquired methicillin resistant Staphylococcus aureus. A reliable and accurate bedside ultrasound classification approach to skin and soft tissue infection may assist the emergency department (ED) triage nurse in safely identifying those patients with skin and soft tissue infection in both light-skinned and dark-skinned patients and help the ED triage nurse stratify those patients who need medical versus surgical therapy.

Study Objectives: To assess the reliability of ED triage nurse-performed bedside ultrasound imaging (inter-rater reliability testing) for the detection and classification of skin and soft tissue infections into surgical vs non-surgical levels of skin and soft tissue infection in patients with light skin and dark skin (Fitzpatrick Skin Color Classification stratification).

Methods: Prospective, blinded, convenience sample, in urban teaching hospital ED. Adult volume approximately 120,000 patients/year. All enrolled patients received bedside ultrasound by an ED triage nurse who underwent point-of-care ultrasonography training and criterion standard image review (experienced RDMS, RSMK ED attending physician) assessed for possible skin and soft tissue infection. Groups were compared via a two-rater linear weighted kappa statistic. A total sample size of 160 patients was determined to attain a desired kappa of > 0.6 in each group.

Results: ED triage nurse pre-ultrasound versus post-ultrasound assessment of patients changed clinical management in 19/163 = 11.7% cases.

Conclusion: ED triage nurses can reliably use bedside ultrasound imaging to evaluate for skin and soft tissue infection. Substantial inter-rater agreement for light skinned and dark skinned patients was revealed. Substantial inter-rater agreement was found overall. ED triage nurse-performed bedside point of care ultrasonography can reliably assist the emergency physician to initiate medical vs. surgical therapy for patients with skin and soft tissue infections.

Table. Reliability of ED Nurse Ultrasound for Detecting Skin-ST Infection in Light & Dark Skin Patients.

<table>
<thead>
<tr>
<th>Light Skinned</th>
<th>Dark Skinned</th>
<th>Overall</th>
</tr>
</thead>
<tbody>
<tr>
<td>N = 104</td>
<td>N = 59</td>
<td>N = 163</td>
</tr>
<tr>
<td>Kappa</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Inter-rater</td>
<td>0.83 (95% CI 0.70</td>
<td>0.76 (95% CI 0.58</td>
</tr>
<tr>
<td></td>
<td>(0.96)</td>
<td>(0.94)</td>
</tr>
</tbody>
</table>

362 Redesigned Acute Stroke Process in the Emergency Department Improves Quality Metrics

Podolsky SR, Ferguson SL, Travis GC, Legenza DC, Foster V, Guzi KL, Thalitzer EA, Roth SM, Meldon SW, Hussain MS, Acute Stroke Process Improvement Team/ Cleveland Clinic, Cleveland, OH

Study Objectives: Improve stroke metrics for patients presenting to the emergency department (ED) with acute stroke-like symptoms. Specifically, this performance improvement project sought to reduce to core quality metrics: (1) patient arrival to physician evaluation and (2) patient arrival to CT brain completion. Data was compared before and after Stroke Alert implementation. Kruskal-Wallis analysis was performed to test for statistical significance.

Results: Pre-Stroke Alert data was collected from October 2012 through February 2013 with 62 patients fitting the inclusion criteria. Time from arrival to physician evaluation was 10 minutes and time from arrival to CT completion was 41 minutes. Post-Stroke Alert data was collected from March 2013 through June 2013 with 56 patients fitting the inclusion criteria. Time from arrival to physician evaluation decreased to 4 minutes and arrival to CT completion decreased to 21 minutes. Both main outcomes measures showed a statistically significant difference between the pre/post metrics ($P < .01$). We have been able to consistently maintain our throughput and process measures over the last 15 months at 6 minutes for arrival to physician and 22 minutes for arrival to CT completion (June 1, 2014 to March 31, 2015).

Conclusion: A redesigned acute stroke process in the ED was associated with a significant reduction in core stroke metrics that included time from patient arrival to evaluation by a physician, as well as patient arrival to the completion of a brain CT. These improved metrics been have sustainable since the process redesign was implemented.

362 Emergency Physician Intracavernous Injection for Priapism Significantly Reduces the Need for Bedside Urological Consultation

Zimmerman P, Fiesseler F, Riggs R, Salo D/Morrisstown Medical Center, Morristown, NJ; Rutgers, Robert Wood Johnson Medical School, New Brunswick, NJ

Background: Priapism is a sporadic disease seen in the emergency department (ED). It requires prompt evaluation and treatment to avoid potentially significant sequelae. Treatment of this disease is highly variable and often performed by specialist rather than the treating emergency physician.

Study Objectives: To determine the treatment modalities used for patients presenting to the ED with priapism and whether any specific techniques reduce the need for bedside urological consult.

Methods: Retrospective cohort study utilizing an electronic ED database. Individual patient charts were extracted using the final ICD9 diagnosis for priapism over a 2-year period (June 2012 to June 2014). Enrolling hospitals (N=15) represent both urban/suburban and academic/community settings. All charts were de-identified and subsequently reviewed for predetermined data points by blinded study personnel. Patients were excluded if the diagnosis was determined not to be priapism or for chart unavailability. Pediatrics was defined as being < 21 years of age. Statistics: Fisher’s Exact Test, with a predetermined significant $P < .05$, two tailed. Study was approved by the IRB.
Results: During the study period 236 patients had the final diagnosis of priapism and 222 fit inclusion criteria. Exclusions: 8 for chart unavailability and 6 with non-priapism diagnosis. Eighty-five percent (N=188) were discharged. Seven percent (N=16) required an operative procedure. Sickle cell patients comprise 20% (N=45) patients. Median age overall was 39 years (IQR 22-52 years). Only 4% (N=9) of patients fit criteria for pediatric. Treatment modality utilized: Adrenergic medication 63% (N=140), intrapeneine injection 55% (N=122), opioids 49% (N=104), cavernous drainage 29% (N=64), and exchange transfusion (N=0). Urology was consulted in 77% (N=170) of patients. Urology ED bedside evaluation/treatment occurred in 52% (N=115). Of the 122 intrapeneine injections, urology performed a total of 80 (66%) injections. Urology also performed 70% (N=45) of the cavernous drainages. Mean turnaround time for those undergoing urological injection/aspiration was 301 (SD 148) minutes versus those undergoing emergency physician penile injection/aspiration was 289 (SD 131). Of patients who underwent injections performed by ED attendings only 11 required in-house ED urology consultations while 104 patients who did not undergo ED attending injections required urology bedside consults (difference of proportions -0.37 95% CI -0.51 to -0.24 (P < .001). Combination of ED IV adrenergic therapy, IV normal saline, opioids and/or injection by ED attending showed no difference in need for urology in-house consultation (difference in proportion 0.023 95% CI -0.14 to 0.19).

Conclusion: Bedside emergency physician intrapeneine injection for priapism significantly reduces the need for bedside urological consults, while other treatment modalities do not.

363 Assessment of an Emergency Department Chest Pain Patient Cohort at Low Risk for Significant Adverse Events During Admission for Acute Coronary Syndrome Perkins J, Jr., Voore N, Sanna S, Patel J, Mann E, Gozu A/Virginia Tech Carilion School of Medicine, Roanoke, VA; Medstar Franklin Square Hospital Center, Baltimore, MD; University of Maryland School of Medicine, Baltimore, MD; Virginia Commonwealth University School of Medicine, Richmond, VA

Study Objective: The American College of Cardiology (ACC) and the American Heart Association (AHA) have recommended telemetry monitoring for all admitted patients that will be evaluated for an acute coronary syndrome (ACS). The assumption is that telemetry monitoring will assist in detecting significant adverse events. This recommendation is not evidence based and leads to broad utilization of a scant and costly resource in patients unlikely to have ACS. Our purpose was to evaluate a cohort of chest pain patients felt to be at very low risk for significant adverse events (eg, ventricular fibrillation [VF], ventricular tachycardia [VT], sudden cardiac death [SCD]) during inpatient admission. We hypothesized that this cohort would have few, if any, adverse events and the characteristics of this cohort could be used for future prospective studies.

Methods: All patients in an electronic medical record system aged 18-49 admitted from a community emergency department (ED) with a primary diagnosis of chest pain from January 1, 2009 through June 30, 2010 were retrospectively analyzed. Patients were excluded if they had an abnormal initial troponin-I level, a history of coronary artery disease (CAD), an initial electrocardiogram (ECG) suggestive or diagnostic of ischemia or dysrhythmia, or had no discharge summary available for review. All subjects were reviewed for occurrence of primary endpoints (VF, VT, SCD) and secondary endpoints (STEMI, NSTEMI or upgrade to a higher level of care). The data was systematically entered into a preformatted Excel spreadsheet and then analyzed using STATA 10 (STATA Corp., College Station, TX). The results were expressed as numbers and percentages.

Results: There were 1519 patients admitted for chest pain and 814 met the study inclusion criteria. None of the study patients suffered VF, VT, or SCD. Four patients were subsequently diagnosed with an NSTEMI while no patients had a STEMI or required upgrade to a higher level of care.

Conclusion: We conclude that our study cohort is a patient population at very low risk for ACS and may be suited for non-telemetry admission when admitted for chest pain. Telemetry admissions are a significant cost and resource burden to every hospital in the United States. There are broad ramifications to inappropriate use of telemetry beds that range from ED crowding to patient safety (ie, potential misinterpretation of telemetry events resulting in further testing) to an inability to downgrade intensive care patients who might require a telemetry bed. Using Medicare cost estimates for a 24-hour charge of telemetry (ie, cost above med/surg bed) of $300 per patient per day, we calculate $244,200 could have been saved by admitting this patient cohort to a non-telemetry bed.

Future prospective studies of patients at low risk for ACS may help stimulate ACC/AHA policy change.

364 Qualitative Study: Cost of Emergency Care from the Patients’ Perspective Gilbert SK, Wen L/George Washington University, Washington, DC

Study Objective: The increasing cost of medical care in the United States has gained widespread attention in recent years. For patients on the receiving end, little is known about their expectations regarding the cost of care they receive and what role the doctor plays in it. Specifically, little is known about patients’ understanding of the cost of emergency care and the emergency physicians’ role in discussing costs of care. We aim to study emergency department (ED) patients’ perceptions of the cost of emergency care they receive by conducting a qualitative study.

Methods: The study population was patients in an urban ED in Washington, D.C. with an annual visit volume of 75,000. The first author (a senior emergency medicine resident) approached patients who had finished their ED visit and were about to be discharged home. A total of 30 patients, selected at random, were interviewed. We employed a 9-item questionnaire with a combination of open- and closed-ended questions, including utilization of a Likert 5-point scale (1 being not important at all; 3 being neutral; 5 being very important). All interviews were conducted by the first author, who was trained by the second author, an attending emergency physician with expertise in narrative interview. Data were analyzed using grounded theory methodology, with 100% agreement between the authors.

Results: Cost of care only slightly (2.2/5) factors into patients’ decision to come to the ED. Although patients felt relatively comfortable (3.8/5) discussing medical costs with their emergency provider, over half (63%) of patients interviewed have never done so. For those who have, it was a patient-initiated discussion most (82%) of the time. Additionally, most patients (83%) did not have concerns regarding tests, treatments, and medications prescribed in the ED. When patients did have financial concerns, however, their provider was aware none of the time. The most common reasons why patients did not discuss their concerns included lack of face-to-face time with the provider, the belief that the provider’s focus should be on how to best care for the patient regardless of price, and the thought that the provider is not the appropriate party to discuss costs of care. Lastly, 27% of patients admitted to not filling a prescription or not attending a follow-up appointment due to cost. The most common reasons cited included the doctor did not ask, it did not seem relevant, they did not want to burden the doctor, and the high volume high acuity ED setting is an inappropriate setting to have this discussion.

Conclusion: Patients feel relatively comfortable discussing costs of care with their emergency provider. Despite this, most patients have never done so. Additionally, most patients do not have concerns about the cost of tests and treatments received in the ED. Those patients who do have concerns, however, are not communicating this to their provider; a consequence is non-compliance. Because the most common reasons why patients do not inform their provider about financial concerns include lack of inquiry by the doctor, notion of burdening the doctor, and perceived unimportance by the patient, perhaps hospitals can consider training emergency providers to empower patients to speak up in regards to cost of their care. Future studies can investigate the influence such a measure has on patient compliance and quality of care in the ED setting.


Background: Pneumonia core measures were instituted by the Centers for Medicare and Medicaid Services (CMS) and the Joint Commission (TJC) in 2002 seeking to improve quality of care. Hospitals made vast improvements in quality of pneumonia care, and “correct antibiotic choice” as well as “antibiotics infused the emergency department [ED]” became the final strategic quality indicators. The Pneumonia Core Measures were retired in December 2014.

Study Objectives: The purpose of this study is to determine the frequency of appropriate antibiotic selection for ED pneumonia patients before and after CMS core measure retirement.
Methods: We performed a retrospective chart review of patients with ICD-9 codes associated with pneumonia on admission between July 1, 2014 and December 31, 2014 as well as January 1, 2015 through April 15, 2015. A total of 269 patients were included. Those excluded were patients who were admitted to the observation unit, discharged from the ED, or miscoded. We collected the pertinent information detailed below.

Results: Between July 1, 2014 and December 31, 2014 there were 152 patients admitted to the hospital versus 117 patients admitted between January 1, 2015 and April 15, 2015 with ICD-9 codes for pneumonia. In the pre-retirement group, 145/152, or 95.4% (95% CI: 90-95%), of patients were given the correct antibiotics. The most common failures included administering azithromycin without ceftriaxone (3/152, 2%, 95% CI: 0.7-5%). These patients also had COPD; however, they were diagnosed as having pneumonia, not a COPD flare or bacterial bronchitis. The second source of errors included ICU patients (3/152, 2%, 95% CI:0.7-5%). These patients often received vancomycin and cefepime (2/152, 1%, 0.6-3%) rather than cipro/cefepime/vanco to adequately cover for pseudomonas, with 1/152 (0.3%, 95% CI 0.2-2%) receiving vancomycin and piperacillin/tazobactam. Lastly, an ESRD requiring dialysis was incorrectly classified and treated as having CAP (1/152, 0.3%, 95% CI 0.2-2%). After core measures were retired, 114/117 (97.4%), 95% CI 93-99%patients were given the correct antibiotic. The fallouts included one patient receiving ceftriaxone and sulfamethoxazole/trimethoprim, another cefepime and vancomycin, and the third vancomycin, rocephin, and moxifloxacin.

Conclusion: Compliance with Pneumonia Core Measure was not affected by retirement of this core measure. Based on this pilot data, we believe that these treatment strategies are hardened into ED clinical culture.

**366 Does the Emergency Department Recognize and Isolate Obvious Clostridium Difficile Diarrhea?**


Study Objectives: The purpose of this study was to determine the emergency department (ED) recognition rate and immediate isolation practice in the hospital admission process with potential Clostridium difficile infection (CDI).

Methods: This was a retrospective chart review completed by emergency physicians at an urban 772-bed tertiary-care teaching hospital. A hospital microbiology database compiled all adult patient charts with positive test results for Clostridium difficile toxigenic stool cultures or molecular PCR assays test results from January 2014 to March 2015. A blinded, experienced physician chart abstractor trained in retrospective research reviewed all electronic medical emergency visit-related documents and order entries using a standardized source document to identify if physician history, review of systems, physical examination, admitting notes, and nursing notes reflected concern or caution for CDI and immediately placed patients on correct isolation precautions. Primary variables included whether or not the ED documented diarrhea and ordered specific Clostridium difficile isolation precautions. CDI was defined based on the standard set by the Centers for Disease Control and Prevention, which includes clinically significant diarrhea and a positive result for Clostridium difficile toxin A/B or a toxin-producing Clostridium difficile organism. Secondary variables included type of admission inpatient unit and timing of Clostridium difficile testing.

Results: The microbiology database identified 202 cases with positive Clostridium difficile test results over 15 months. However, only 64 cases had clinically significant diarrhea in the ED (31.7%, 95% CI: 26-38%). Out of these 64 cases, possible CDI was recognized in 24 cases (37.5%), 95% CI 27-50%) and appropriate isolation instituted in 10 cases (15.6% 95% CI:9-26%). When emergency physicians ordered Clostridium difficile testing for 20 patients, they appropriately isolated 7 patients (35.0%, 95% CI 18-56%). Inpatient physicians ordered testing within 24 hours for 20 patients and within 48 hours for 14 patients (53.13%, 95% CI:41-64%). Half of all patients with positive Clostridium difficile test results 51/102 were admitted to the intensive care unit (26%, 95% CI:18-24%) or intermediate progressive care unit (24%, 95% CI:16-23%). All of these admissions tested positive for CDI within one week of admission, 53 of which tested positive within 3 days of admission (51.96% 95% CI 42-61%).

Conclusion: In this study, approximately one third of patients with Clostridium difficile diarrhea received diagnostic testing in the ED. Appropriate isolation for active Clostridium difficile occurred in only one of seven ED patients. When emergency physicians did not recognize CDI by ordering appropriate testing, inpatient physicians identified over half of CDI. However, this took 48 hours from admission. Based on these results at a large urban teaching hospital, emergency physicians and admitting hospitalists must innovate to improve screening, testing practices, and isolation of patients with CDI signs/symptoms before stool cultures finally reveal CDI. We urge other institutions to critically appraise their practice standards and combat this increasingly prevalent disease.


Hughes GB, Velete J, Heinert S, Brown SB, Purakult JD, Del Riols M/University of Illinois at Chicago, Chicago, IL.

Study Objectives: In 2013, the American College of Emergency Physicians (ACEP) published a revision of its 2006 clinical policy on the evaluation and management of asymptomatic hypertension (HTN) in the emergency department (ED). The update states that in patients with asymptomatic markedly elevated blood pressure (BP), routine medical intervention in the ED is not required but recommends referral for long term treatment. The policy also states that physicians may choose to treat and/or initiate therapy in select patient populations, i.e., those with poor follow-up, limited access to care, older patients (age≥60), and black patients. The goal of this study was to assess adherence to these guidelines in an urban ED.

Methods: We performed a retrospective chart review of patients with markedly elevated BP who presented over a four-month period to the ED of a large urban teaching hospital in Chicago. BP was defined according to the 2003 JNC 7 classification for stage 2 HTN as a systolic or diastolic blood pressure of >160 mmHg or >100 mmHg, respectively on two consecutive measurements. Demographics, medical history, ED medications, ED diagnosis, and follow-up instructions were abstracted from electronic health records. Bivariate logistic regression modeling was used to determine the association between patient characteristics and treatment with an antihypertensive in the ED and discharge with antihypertensive prescription.

Results: Four hundred forty-one patients presented to the ED with markedly elevated BPs. 14% were treated with an antihypertensive during the ED visit, with 13% discharged with an prescription. For non-Hispanic black (NHB) patients, the odds of being treated with antihypertensives in the ED were 2.1 times higher (P = .04) than for other races. Patients without a prior history of HTN were 95% less likely to be treated with antihypertensive in the ED than those with a HTN diagnosis (P = .003). No significant association was found for older patients - age≥60 (OR=0.57, P = .10) or insurance status (OR = 0.85, P = .70). Older patients and those without a prior diagnosis of HTN were less likely to be discharged with a prescription for an antihypertensive (65%, P = .006 and 66%, P = .016, respectively). NHB had 1.98 times higher odds of being discharged from the ED with antihypertensive than other races (P = .054). No significant association was found for insurance status (0.65, P = .29). HTN was not listed as a diagnosis in 79% of patients in this sample and 77% were not provided discharge instructions for HTN. Follow-up with primary care within 72 hours was recommended for 43% of all patients.

Conclusion: The issue of patients presenting to the ED with asymptomatic markedly elevated BP is a frequent treatment dilemma. In our patient population, >10% were treated and/or discharged with an antihypertensive. NHB were given antihypertensives in the ED with a trend towards more frequent prescriptions of antihypertensives upon discharge. Other groups of interest were less likely to be prescribed antihypertensive upon discharge suggesting inconsistent adherence to ACEP clinical guidelines. Moreover, there was an overall failure to provide discharge information or to recommend timely follow-up. Further education of emergency physicians to better manage asymptomatic HTN and help prevent long-term consequences of HTN is needed.

**368 Sonographic Assessment of Inadvertent Vascular Puncture During Paracentesis Using the Traditional Landmark Approach**

Adams A, Raggio A, Wilkerson RG/University of Maryland School of Medicine, Baltimore, MD

Study Objectives: Ultrasound-guided paracentesis has become common practice in many hospitals. This technique offers several potential advantages over the traditional

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landmark-guided approach, including locating the deepest fluid pocket and identifying vascular structures at puncture sites. Previous retrospective studies gave evidence that ultrasound guidance reduces the incidence of paracentesis complications. However, the number of patients at risk for vascular puncture remains unknown.

This study evaluated the prevalence of vascular structures at the landmark sites traditionally used for paracentesis in order to assess the risk of vascular puncture without ultrasound guidance. Data were collected on patients’ past medical history and physical exam findings to evaluate any association with the presence of underlying vascular structures. The fluid depth at each landmark site and the location of each patient’s deepest fluid pocket were recorded.

Methods: This was a prospective, single-site study. Patients included had a known history of ascites and demonstrated clinical evidence of ascites at the time of enrollment, regardless of whether there was a clinical indication for paracentesis at that time. A standard ultrasound exam was performed on all patients at the three landmark sites traditionally used for paracentesis - 2 cm infraumbilical and 4.5 cm superomedial to the right and left anterior-superior iliac spines. The presence of vascular structures and the peritoneal fluid depth were assessed. Data on physical exam findings suggestive of vascular pathology and relevant medical history were collected.

Results: Thirty patients were enrolled. Thirteen patients (43%) had a vascular structure present at one or more of the three landmark sites. Three patients (10%) had vascular structures at all three sites. Additionally, in 19 of 30 patients (63%) the deepest fluid pocket was not located at a landmark site. Two patients were included more than once in the study (one during the same hospital stay and one during a new visit) and the presence of vascular structures varied on subsequent examinations.

Conclusion: This study demonstrated that a substantial number of patients have underlying vascular structures at the sites traditionally used for blind paracentesis. The prevalence of vasculature at these sites can be interpreted to show a meaningful risk of inadvertent vascular puncture during paracentesis without ultrasound guidance. The two patients included twice in the study had different ultrasound findings on subsequent examinations. This highlights the value of ultrasound examination immediately prior to paracentesis as the presence of vascular structures may vary over time. Our results also demonstrated that the deepest fluid pocket is often found at a location other than one of the traditional paracentesis sites. This suggests that successful large volume fluid aspiration is more likely with ultrasound guidance. Taken together, these findings underscore the importance of real-time ultrasound guidance during paracentesis to improve patient safety and procedural success.

| Table 1 |

| Prevalence of vascular structures at landmark sites |
|------------------|-----------------|
| At ≥ 1 landmark site | 13 / 30 (43%) patients |
| 2 cm infraumbilical | 5 / 30 (17%) patients |
| 4.5 cm superomedial to right ASIS | 8 / 30 (27%) patients |
| 4.5 cm superomedial to left ASIS | 10 / 30 (33%) patients |

Methods: The EMR was queried for all patients presenting to our ED from June 1, 2013 and May 31, 2014 with the diagnosis of SCD, sickle cell anemia, SCD related complaints or VOC. From the resulting visits, we abstracted patients with ICD-9 codes for ACS. The diagnosis of ACS was confirmed or excluded based on provider notes and chest imaging. Patients’ presenting vital signs and time of analgesic administration was recorded in a protected online data template. Another query was also made looking for patients presenting to the ED with extremity fracture within the same time frame. These charts were also reviewed to determine the time of analgesic administration. Patients <18 years old were excluded.

Results: Our query identified 1700 patient visits to the ED for SCD, of which 65 were coded as ACS. Fifteen pediatric and 10 erroneously coded patients were eliminated, which left with a subset of 30 patients with confirmed diagnosis of ACS. The median door to first analgesic administration (DTA) time was 105 mins for the 30 ACS patients. Only 5 out of 30 (16.7%) patients met the national guidelines. Median DTA times of patients with one or more abnormal vital signs or pulse-ox <95% were all over 60 minutes (Table 1). Median DTA times for ACS patients were significantly longer than that of patients presenting to the ED with forearm fractures (105 min vs 59 min).

Conclusion: ACS patients with any single vital sign abnormality of fever, tachycardia or pulse ox < 95% did not meet the guideline requirement of 60 mins for DTA. In fact, regardless of the number of abnormal vital signs, analgesia was not administered within the recommended 60 minute time frame. Interestingly, ACS patients waited longer for pain medication than patients with extremity fractures. There is significant scope for improvement in timely administration of pain medication for ACS patients at a large sickle cell referral center.

Background: Pain is the most common complication of sickle cell disease (SCD) and the leading cause for health care utilization. Both the NHLBI and American Society of Hematology recommend that analgesic treatment should be initiated within 30 minutes of triage or within 60 min of registration for any sickle cell patients with vaso-occlusive (VOC) painful crisis. Prior studies have demonstrated that several emergency departments (EDs) fall short of these recommendations.

Study Objectives: (1) To determine if there is a delay in analgesic treatment for sickle cell patients presenting to the ED with acute chest syndrome (ACS) with respect to national recommendations. (2) To determine how the time to analgesic for patients presenting to the ED with ACS compares to that of minor extremity fractures.

Methods: The EMR was queried for all patients presenting to our ED from June 1, 2013 and May 31, 2014 with the diagnosis of SCD, sickle cell anemia, SCD related complaints or VOC. From the resulting visits, we abstracted patients with ICD-9 codes for ACS. The diagnosis of ACS was confirmed or excluded based on provider notes and chest imaging. Patients’ presenting vital signs and time of analgesic administration was recorded in a protected online data template. Another query was also made looking for patients presenting to the ED with extremity fracture within the same time frame. These charts were also reviewed to determine the time of analgesic administration. Patients <18 years old were excluded.

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Table 1

<table>
<thead>
<tr>
<th>All ACS patients (30)</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>ACS + Fever (7)</td>
<td>84 (62)</td>
</tr>
<tr>
<td>ACS + Tachycardia (14)</td>
<td>96 (73)</td>
</tr>
<tr>
<td>ACS + Pulse Ox &lt; 95% (14)</td>
<td>130 (73)</td>
</tr>
<tr>
<td>ACS + 1 abnl vital sign (4)</td>
<td>243 (167)</td>
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<tr>
<td>ACS + 2 abnl vital sign(s) (6)</td>
<td>82 (59)</td>
</tr>
<tr>
<td>ACS + 3 abnl vital sign(s) (9)</td>
<td>114 (75)</td>
</tr>
<tr>
<td>Non sickle cell patients with extremity fracture (10)</td>
<td>72 (59)</td>
</tr>
</tbody>
</table>
Final Stepwise Regression Analysis of Association of Same Day Outdoor Airborne Pollutant Exposure with Emergency Department Presentations for Acute Respiratory Conditions (F-Statistic: 58.6, P < .0001)

<table>
<thead>
<tr>
<th>Independent Variable</th>
<th>Reference Variable (Where Applicable)</th>
<th>Coefficient</th>
<th>95% Confidence Interval</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
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</tr>
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<td>Saturday</td>
<td>Sunday</td>
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</tr>
<tr>
<td>January-March</td>
<td>October-December</td>
<td>1.59</td>
<td>0.14</td>
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<tr>
<td>April-June</td>
<td>October-December</td>
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<td>-6.03</td>
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<td>July-September</td>
<td>October-December</td>
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<tr>
<td>Nitrogen Dioxide</td>
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<td>0.20</td>
</tr>
<tr>
<td>Ozone</td>
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<td>-0.05</td>
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<tr>
<td>PM2.5</td>
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<td>-0.05</td>
<td>-0.08</td>
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</tbody>
</table>

Final Stepwise Regression Analysis of Association of Seven Day Prior Outdoor Airborne Pollutant Exposure with Emergency Department Presentations for Acute Respiratory Conditions (F-Statistic: 64.3, P < .0001)

<table>
<thead>
<tr>
<th>Independent Variable</th>
<th>Reference Variable (Where Applicable)</th>
<th>Coefficient</th>
<th>95% Confidence Interval</th>
<th>P value</th>
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<tr>
<td>Monday</td>
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<td>October-December</td>
<td>1.97</td>
<td>0.51</td>
<td>3.44</td>
</tr>
<tr>
<td>April-June</td>
<td>October-December</td>
<td>-5.23</td>
<td>-7.18</td>
<td>-3.28</td>
</tr>
<tr>
<td>July-September</td>
<td>October-December</td>
<td>-8.77</td>
<td>-8.84</td>
<td>-4.70</td>
</tr>
<tr>
<td>Nitrogen Dioxide</td>
<td></td>
<td>0.34</td>
<td>0.23</td>
<td>0.44</td>
</tr>
<tr>
<td>Ozone</td>
<td></td>
<td>-0.16</td>
<td>-0.21</td>
<td>-0.10</td>
</tr>
<tr>
<td>PM2.5</td>
<td></td>
<td>-0.13</td>
<td>-0.18</td>
<td>-0.08</td>
</tr>
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</table>

Multivariable Logistic Regression Model of Association of Measured Outdoor Pollutant Exposure on Same Day with Odds of Emergency Department Presentation Due to Acute Respiratory Conditions (Hosmer-Lemeshow: \( \chi^2 = 866.02, P \leq .001 \))

<table>
<thead>
<tr>
<th>Independent Variable</th>
<th>Reference Variable (Where Applicable)</th>
<th>Odds Ratio</th>
<th>Lower 95% Confidence Interval</th>
<th>Upper 95% Confidence Interval</th>
</tr>
</thead>
<tbody>
<tr>
<td>African-American</td>
<td>White</td>
<td>1.12</td>
<td>1.08</td>
<td>1.15</td>
</tr>
<tr>
<td>Other Race</td>
<td>White</td>
<td>0.70</td>
<td>0.63</td>
<td>0.77</td>
</tr>
<tr>
<td>Female</td>
<td>Male</td>
<td>0.63</td>
<td>0.62</td>
<td>0.65</td>
</tr>
<tr>
<td>Age</td>
<td></td>
<td>0.954</td>
<td>0.953</td>
<td>0.9541</td>
</tr>
<tr>
<td>Carbon Monoxide</td>
<td></td>
<td>1.01</td>
<td>1.003</td>
<td>1.012</td>
</tr>
<tr>
<td>Nitrogen Dioxide</td>
<td></td>
<td>1.004</td>
<td>1.002</td>
<td>1.006</td>
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<tr>
<td>Ozone</td>
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<td>0.996</td>
<td>0.995</td>
<td>0.997</td>
</tr>
<tr>
<td>PM2.5</td>
<td></td>
<td>1.000</td>
<td>0.999</td>
<td>1.001</td>
</tr>
<tr>
<td>Sulfur Dioxide</td>
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<td>0.999</td>
<td>0.998</td>
<td>1.000</td>
</tr>
<tr>
<td>PM10</td>
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<td>0.993</td>
<td>0.991</td>
<td>0.995</td>
</tr>
<tr>
<td>Lead - Intermittent</td>
<td>Data</td>
<td>0.38</td>
<td>0.05</td>
<td>2.77</td>
</tr>
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</table>

Multivariable Logistic Regression Model of Association of Measured Outdoor Pollutant Exposure During Prior Seven Days with Odds of Emergency Department Presentation Due to Acute Respiratory Conditions (Hosmer-Lemeshow: \( \chi^2 = 823.38, P \leq .001 \))

<table>
<thead>
<tr>
<th>Independent Variable</th>
<th>Reference Variable (Where Applicable)</th>
<th>Odds Ratio</th>
<th>Lower 95% Confidence Interval</th>
<th>Upper 95% Confidence Interval</th>
</tr>
</thead>
<tbody>
<tr>
<td>African-American</td>
<td>White</td>
<td>1.12</td>
<td>1.09</td>
<td>1.16</td>
</tr>
<tr>
<td>Other Race</td>
<td>White</td>
<td>0.70</td>
<td>0.63</td>
<td>0.77</td>
</tr>
<tr>
<td>Female</td>
<td>Male</td>
<td>0.63</td>
<td>0.62</td>
<td>0.65</td>
</tr>
<tr>
<td>Age</td>
<td></td>
<td>0.954</td>
<td>0.953</td>
<td>0.954</td>
</tr>
<tr>
<td>Carbon Monoxide</td>
<td></td>
<td>1.02</td>
<td>1.01</td>
<td>1.021</td>
</tr>
<tr>
<td>Nitrogen Dioxide</td>
<td></td>
<td>1.01</td>
<td>1.008</td>
<td>1.013</td>
</tr>
<tr>
<td>Ozone</td>
<td></td>
<td>0.995</td>
<td>0.993</td>
<td>0.996</td>
</tr>
<tr>
<td>PM2.5</td>
<td></td>
<td>0.997</td>
<td>0.996</td>
<td>0.999</td>
</tr>
<tr>
<td>Sulfur Dioxide</td>
<td></td>
<td>0.999</td>
<td>0.997</td>
<td>1.000</td>
</tr>
<tr>
<td>PM10</td>
<td></td>
<td>0.996</td>
<td>0.991</td>
<td>1.000</td>
</tr>
<tr>
<td>Lead - Intermittent</td>
<td>Data</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
</tr>
</tbody>
</table>

Methods: We conducted a retrospective observational cohort study of all emergency department visits to a six-hospital health care system from July 1, 2008 to June 30, 2013 with primary ICD-9 diagnoses of 460-466 (acute respiratory infections), 480-488 (pneumonia and influenza), 490-496 (chronic obstructive pulmonary diseases and allied conditions) and 786.07 (wheezing). For included study visits, we downloaded from hospital electronic records patient age, sex, race and date of visit. For the geographic region where these hospitals reside, we downloaded for the study period and one year prior Environmental Protection Agency outdoor air monitoring daily maximum and air quality index data on the following airborne pollutants: carbon monoxide, nitrogen dioxide, ozone, particulate matter (PM) 2.5 micrometers, sulfur dioxide, PM 10 micrometers, and lead. We utilized the F test with general stepwise regression to determine the most significant measured airborne pollutants exposure on the same day as presentation and mean exposure over the seven days prior to presentation with emergency conditions.
department visits due to acute respiratory conditions, controlling for day of the week and season of presentation. Similarly, we applied logistic regression to evaluate the association between exposure to the measured airborne pollutants on the same day and seven days prior to presentation and the odds of emergency department visits due to acute respiratory conditions, controlling for age, sex, race, day and season of visit. We report descriptive statistics of the cohort and results of the above analyses with 95% CI.

Results: A total of 67898 visits met inclusion criteria (mean age: 40.3 [standard deviation: 25.2], 59.6% female, 72.8% white, 25.6% black, 1.6% other race). The table shows the results of both the stepwise and logistic regression analyses revealing that rising nitrogen dioxide was most associated with emergency department presentations for acute respiratory conditions.

Conclusion: In this retrospective analysis, rising nitrogen dioxide exposure on the same day and seven days prior was most significantly associated with emergency department presentation for acute respiratory conditions.

Rate and Predictors of Antibiotic Treatment for Patients With Acute Exacerbations of Chronic Obstructive Pulmonary Disease in U.S. Emergency Departments

Tichter AM, Ostrowsky G/Columbia University, New York, NY; New York Presbyterian Hospital, New York, NY

Study Objectives: The aims of this study were to determine the rate with which emergency department (ED) patients with acute exacerbations of chronic obstructive pulmonary disease (COPD) were treated with antibiotics, to compare the relative proportions of antibiotic classes prescribed, and identify predictors of antibiotic treatment.

Methods: This was a retrospective, cross-sectional, secondary analysis of the National Hospital Ambulatory Medical Care Survey (NHAMCS) for the year 2010. The population was defined as patients presenting with acute exacerbations of COPD, identified by ED primary diagnoses corresponding to ICD-9 codes 149.121, 149.122, 149.190, 149.280, and 149.600. Patients with secondary diagnoses corresponding to pneumonia were excluded. The primary outcome was treatment with any antibiotic, either in the ED or prescribed upon discharge. Eight diagnoses corresponding to pneumonia were excluded. The primary outcome was treatment with any antibiotic, either in the ED or prescribed upon discharge. Eight diagnoses corresponding to pneumonia were excluded. The primary outcome was treatment with any antibiotic, either in the ED or prescribed upon discharge. Eight diagnoses corresponding to pneumonia were excluded. The primary outcome was treatment with any antibiotic, either in the ED or prescribed upon discharge. Eight diagnoses corresponding to pneumonia were excluded. The primary outcome was treatment with any antibiotic, either in the ED or prescribed upon discharge.

Antibiotic treatment occurred at an estimated proportion of 43% (95% CI 35.22-50.16), 59.6% female, 72.8% white, 25.6% black, 1.6% other race. The table shows the results of the multivariable logistic regression models to examine independent predictors of being a current smoker.

Conclusion: Despite evidence suggesting benefit, antibiotics are prescribed for just half of ED patients presenting with acute exacerbations of COPD, with only a slightly higher rate among those with the highest disease severity, for whom treatment effect is most substantial.

<table>
<thead>
<tr>
<th>Antibiotic</th>
<th>Proportion (%)</th>
<th>95% Confidence Interval</th>
</tr>
</thead>
<tbody>
<tr>
<td>Macrolides</td>
<td>48.67</td>
<td>32.12-65.51</td>
</tr>
<tr>
<td>Quinolones</td>
<td>43.72</td>
<td>27.23-61.71</td>
</tr>
<tr>
<td>Cephalosporins</td>
<td>18.84</td>
<td>10.02-32.60</td>
</tr>
<tr>
<td>Tetracyclines</td>
<td>7.05</td>
<td>1.86-23.27</td>
</tr>
<tr>
<td>Penicillins</td>
<td>3.17</td>
<td>0.71-13.10</td>
</tr>
<tr>
<td>Glycopeptides</td>
<td>1.77</td>
<td>0.38-7.94</td>
</tr>
<tr>
<td>Sulfas</td>
<td>0.77</td>
<td>0.10-5.53</td>
</tr>
<tr>
<td>Miscellaneous</td>
<td>0.77</td>
<td>0.10-5.53</td>
</tr>
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Multivariable Logistic Regression for Antibiotic Treatment

<table>
<thead>
<tr>
<th>Age (years)</th>
<th>Odds Ratio</th>
<th>95% Confidence Interval</th>
</tr>
</thead>
<tbody>
<tr>
<td>25-44</td>
<td>0.46</td>
<td>0.03-6.29</td>
</tr>
<tr>
<td>45-64</td>
<td>0.51</td>
<td>0.03-7.47</td>
</tr>
<tr>
<td>65-74</td>
<td>0.50</td>
<td>0.04-6.86</td>
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<tr>
<td>&gt;75</td>
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<table>
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<th>Sex</th>
<th>Odds Ratio</th>
<th>95% Confidence Interval</th>
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</thead>
<tbody>
<tr>
<td>Female</td>
<td>1.95</td>
<td>0.77-4.96</td>
</tr>
<tr>
<td>Male</td>
<td>reference</td>
<td>-</td>
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</table>

<table>
<thead>
<tr>
<th>Race</th>
<th>Odds Ratio</th>
<th>95% Confidence Interval</th>
</tr>
</thead>
<tbody>
<tr>
<td>White, Non-Hispanic</td>
<td>0.27</td>
<td>0.06-1.17</td>
</tr>
<tr>
<td>Black, Non-Hispanic</td>
<td>0.36</td>
<td>0.68-1.97</td>
</tr>
<tr>
<td>Hispanic</td>
<td>210.43</td>
<td>13.19-3356.96</td>
</tr>
<tr>
<td>Other, Non-Hispanic</td>
<td>1.57</td>
<td>0.06-1.17</td>
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<table>
<thead>
<tr>
<th>Payment</th>
<th>Odds Ratio</th>
<th>95% Confidence Interval</th>
</tr>
</thead>
<tbody>
<tr>
<td>reference</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Non-Private Insurance</td>
<td>1.46</td>
<td>0.59-3.64</td>
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<tr>
<td>Private Insurance</td>
<td>1.36</td>
<td>0.51-3.66</td>
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<table>
<thead>
<tr>
<th>Mode of Arrival</th>
<th>Odds Ratio</th>
<th>95% Confidence Interval</th>
</tr>
</thead>
<tbody>
<tr>
<td>reference</td>
<td>-</td>
<td>-</td>
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<tr>
<td>EMS</td>
<td>1.36</td>
<td>0.56-3.31</td>
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<tr>
<td>Non-EMS</td>
<td>1.36</td>
<td>0.51-3.66</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Temperature (Fahrenheit)</th>
<th>Odds Ratio</th>
<th>95% Confidence Interval</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.07</td>
<td>1.36</td>
<td>1.33-20.82</td>
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</tbody>
</table>

<table>
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<tr>
<th>Disposition</th>
<th>Odds Ratio</th>
<th>95% Confidence Interval</th>
</tr>
</thead>
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<td>Admit</td>
<td>5.26</td>
<td>1.33-20.82</td>
</tr>
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</table>

<table>
<thead>
<tr>
<th>ICU</th>
<th>Odds Ratio</th>
<th>95% Confidence Interval</th>
</tr>
</thead>
<tbody>
<tr>
<td>ICU</td>
<td>5.26</td>
<td>1.33-20.82</td>
</tr>
</tbody>
</table>

Multicenter Study of Cigarette Smoking Among Adults With Asthma Exacerbations in the Emergency Department, 2011-2012

Silverman RA, Hasegawa K, Egan DJ, Stiffler KA, Sullivan AF, Camargo CA, Jr./North Shore-LIJ Health System, New Hyde Park, NY; Massachusetts General Hospital, Harvard Medical School, Boston, MA; Mount Sinai St. Luke’s and Mount Sinai Roosevelt Hospitals, New York, NY; Akron City Hospital, Akron, OH

Study Objectives: Cigarette smoke is a recognized respiratory irritant and habitual smoking can lead to a decline in pulmonary function and chronic lung disease. Current and former smokers are more likely to need emergency care for a variety of illnesses, including asthma; approximately 10% of emergency department (ED) visits for asthma exacerbations have been attributed to smoking. Previous studies dating as far back as the late 1990’s demonstrated a high prevalence of cigarette smoking in patients presenting to the ED with asthma exacerbations, with smoking rates between 33 and 35%. Despite the clinical and public health importance, there have been no recent multicenter efforts to characterize smoking status in this high-risk patient population. We aimed to update the prevalence of cigarette smoking among ED patients with asthma exacerbations and to identify factors associated with smoking.

Methods: The 36th Multicenter Airway Research Collaboration (MARC-36) study was a multicenter chart review study of 48 EDs across 23 US states that participated in earlier studies during 1996 and 2001. Briefly, we identified all ED patients aged 18 to 54 years with asthma exacerbations during 2011-2012, and then randomly sampled 40 patients per site. We classified patients into three groups based on smoking status: never smoker, former smoker, and current smoker. Smoking status was available for 1801 (90%) of the 2010 patients, and these patients comprised the analytic sample. We fit multivariable logistic regression models to examine independent predictors of being a current smoker.

Results: Of 1,801 ED patients, never smokers accounted for 51% (95% CI, 49%-54%), former smokers 13% (95% CI, 11%-14%), and current smokers 36% (95% CI, 34%-38%). The multivariable model demonstrated several independent predictors for current smoking: older age (age 30-39 and 40-54 years versus age 18-30 years), non-Hispanic white or black (versus Hispanic), having public or no insurance (versus private insurance), and not having an asthma specialist (all P < .05).

Conclusion: This large multicenter study of ED patients with asthma exacerbations demonstrated that one in three patients were current smokers. The observed prevalence of current smoking has not changed from multicenter findings in the late 1990’s. The
Persistently high prevalence of smoking suggests the inadequacy of current measures to manage tobacco use in these high-risk patients with asthma.

373 Prospective Exploratory Pilot Study of Hyperlactatemia After Albuterol Therapy
Ramich JL, Timm EG, Robak N, Ata A, Cohen J. Albany Medical Center, Albany, NY

Background and Study Objective: Case reports and recent sub-analysis of data from an unrelated study have described a potential association between high dose short-acting β2 agonist therapy and elevation in lactic acid concentrations in patients with refractory dyspnea. However, this association has not yet been established in observational cohort studies. It has been postulated that an association can be attributed to altered cellular metabolism, similar to epinephrine creating a Type B lactic acidosis; as opposed to the more common Type A lactic acidosis caused by inadequate tissue perfusion. While a large controlled study will be necessary to establish causation and clinical relevance, we devised a prospective pilot study to explore if there is any association between standard dosing albuterol in patients with mild and moderate dyspnea and increases in serum lactate concentrations. Additionally, we sought to evaluate some of the confounding from worsening of disease by monitoring vital signs during the study period.

Methods: This study was an IRB-approved prospective, observational pilot study. A convenience sample of eligible emergency department (ED) patients requiring albuterol treatment for dyspnea thought secondary to bronchoconstriction were enrolled. Subject demographics, concurrent medications known to cause type B lactic acidosis, prior albuterol administration, and albuterol treatments while in the ED were recorded. Blood sample and heart rate were collected at baseline (prior to albuterol therapy in the ED or as soon as possible) and after 2 hours or at discharge, whichever came first. Blood samples were processed for lactic acid concentrations with results blinded to the treating health care team. All treatment decisions were determined by the primary team. Data was analyzed using a paired t-test.

Results: A total of 44 subjects were enrolled over 3 months, 34 having complete data. The average age of subjects was 54 years old (18-93). Twenty-one subjects were female (62%), 15 had asthma (44%), 9 had COPD (26.5%), and 3 (8.8%) had both asthma and COPD. The average total dose of albuterol was 9.5 mg (2.5-28). Two patients were concurrently receiving metformin. In our population, lactic acid concentrations increased from a mean baseline of 1.38 mmol/L [95% CI [1.17, 1.59]] to a 2-hour concentration of 1.64 mmol/L [95% CI [1.29, 2.0]]. This increase was significant with a P < .05. During this same interval, there was no significant change in average heart rate [(14.5±6mpm 95% CI [10.69, 1.65] (P > .05)].

Conclusions: Standard albuterol administration for the treatment of dyspnea in the emergency department is associated with a statistically significant elevation of serum lactic acid. Our data was consistent with this elevation occurring despite lack of increase in metabolic demand, as measured roughly by patient heart rate. Significant further study is necessary to validate this data, and to characterize any dose response relationship, mechanism, and other associated variables. A deeper understanding of the relationship between albuterol and lactic acid production may prove clinically relevant as alternate explanations for elevated lactate levels in patients receiving albuterol. Additionally, it is possible that an iatrogenic lactic acidosis could lead to increased work of breathing, leading to further unnecessary therapy.

374 Smoking Cessation Intervention Among Adults Hospitalized With Asthma Exacerbation
Bittner JC, Hasegawa K, Silverman RA, Camargo CA, Jr., Massachusetts General Hospital, Boston, MA; North Shore-LIJ Health System, New Hyde Park, NY

Study Objectives: Prior studies have shown a high prevalence of smoking among emergency department (ED) patients presenting with asthma exacerbations, with one recent multicenter study (Silverman et al) confirming that one-third of these patients were smokers at the time of their ED visit. This percentage has not materially changed over the past 15 years, despite steady decreases in current smoking in the overall US adult population. These findings suggest that asthmatic adults who smoke are not receiving effective smoking cessation interventions. In the current study, we investigate the prevalence of smoking among patients hospitalized for asthma exacerbation, and, more importantly, the proportion and characteristics of these patients who received an inpatient smoking cessation intervention.

Methods: We performed a secondary analysis of data from MARC-37, a multicenter chart review study, to determine the proportion of current smokers (patients who smoke or quit smoking within 28 days from hospitalization) at the time of their hospitalization, and whether an inpatient smoking cessation intervention was provided. We identified all adults (age 18-54) hospitalized in 25 US hospitals for acute asthma (ICD-9-CM code, 493.xx) in 2012-2013. Investigators from each site underwent a one-hour training and tested with practice charts before reviewing randomly selected patient charts from their hospital. Of 615 adult patients hospitalized (including hospitalization to the ED observation unit) for asthma exacerbation, 597 (97%) had data on smoking status and were included in this analysis; eligible patients who received a smoking cessation intervention while in the hospital included 215 current smokers. To determine independent predictors for patients who receive the inpatient smoking cessation intervention, we fit a multivariable logistic regression model with generalized estimating equations accounting for clustering of patients within hospitals.

Results: Among the 597 adults, 36% (95% CI, 32-40%) were current smokers and 55% (95% CI, 48-62%) of these current smokers received an inpatient smoking cessation intervention (ie, brief counseling and/or pharmacotherapy). In the multivariable model, compared to having private insurance, having public insurance (OR, 0.34; 95% CI, 0.13-0.91) and no insurance (OR, 0.37; 95% CI, 0.17-0.83) were associated with a lower chance to receive an inpatient smoking cessation intervention. By contrast, a marker of chronic severity (ie, current use of inhaled corticosteroids) was associated with higher chance to receive a smoking cessation intervention (OR, 1.96; 95% CI, 1.04-3.69).

Conclusion: Approximately one-third of adult patients were smokers at the time of their asthma-related hospitalization; however, only half of these patients received an inpatient smoking cessation intervention. We also found significant discrepancies in smoking cessation management by insurance status. Our findings concur with other studies showing a persistent excess of smokers among US patients with serious asthma exacerbations. We extend these findings by showing that the inpatient stay remains an underutilized opportunity to perform a smoking cessation intervention that is likely to improve the patient’s asthma but would also provide many other important health benefits.
ultimately found; chronic obstructive pulmonary disease (COPD) exacerbation (28%), acute pulmonary edema (13%), and anaphylaxis (6%) together comprised nearly onehalf of these asthma mimickers. Life-threatening asthma was confirmed in 237 patients: their median age was 44 years (IQR 30-51); 57% were female, 65% were black, and 72% were arrived by ambulance. In this cohort, 74 patients (31%) received NIV and 54 (23%) received heliox; NIV and heliox were used concurrently in seventeen patients (7%). A total of 63 patients (27%) were ultimately intubated. The proportion of ED patients with life-threatening asthma who received a trial of NIV significantly increased over time, from 16% in 2009 to 41% in 2014 ($P=.016$ by chi-square test for linear trend). In contrast, we did not observe a significant temporal trend in the use of heliox ($P=.18$) or invasive mechanical ventilation ($P=.76$). Eight patients (3%) suffered cardiopulmonary arrest during emergency care and three died; one death occurred in the ED and two in the ICU.

Conclusion: Life-threatening exacerbations of asthma represent 3% of all asthma-related visits at our institution. The proportion of these critical patients receiving a trial of NIV has doubled over the past five years. Prospective study of the effectiveness of NIV in life-threatening asthma is warranted.

A Prospective Feasibility Trial of AccuCath 2.25" Blood Control Intravascular Catheter System With Retractable Coiled Tip Guidewire Placed in Difficult Access Patients in the Emergency Department

Saltarelli NA, VanHouten J, Boyd J, Rupp J, Ferré RM/Vanderbilt University School of Medicine, Nashville, TN

Study Objectives: The primary study objective was to evaluate insertion success rates. Secondary objectives included evaluation of user preference, patient satisfaction, complications, completion of therapy and dwell time of the novel AccuCath 2.25" Blood Control (BC) Catheter System (FDA approved) placed in difficult access patients.

Methods: This was a single-arm feasibility trial evaluating the novel AccuCath 2.25" BC Catheter System in an urban, tertiary care, level 1 trauma center with 90,000 emergency department (ED) visits per year. The study enrolled a convenience sample of difficult intravenous access patients ($\geq 18$ years), which are defined as at least 2 failed initial attempts or a history of difficult access plus the inability to directly visualize or palpate a target vein. The AccuCath BC Intravascular Catheter System is designed to reduce blood exposure once inserted. It consists of a radiopaque catheter with a valve mechanism delivered over a guidewire with atraumatic tip design (notched needle to enhance flashback visualization and safety container to prevent sharp injuries). The retractable coiled tip guidewire device was placed under dynamic ultrasound guidance after identification in the ED using a modified Seldinger technique. All catheters were placed by emergency physicians after a 30-min training session, which included simulated procedures on ultrasound phantoms. Patients were followed daily until catheter removal. Subject’s demographic (age, race, sex); admitting diagnosis; past medical history; baseline information (height, weight, systolic/diastolic blood pressure); primary indication for intravenous line; date, time, and location of first and subsequent intravenous placement attempts; patient satisfaction at initial placement and upon removal using a 5-point Likert Scale; and safety outcomes (number, severity of adverse events) were major documented data points.

Results: Over a 1-month time period 18 patients ($\geq 18$ years) were enrolled and completed the study. Patients had an average of 3.5 (95% CI 3.0-4.0) and median of 3 prior attempts at vascular access by the ED registered nursing team before AccuCath placement. Successful access was gained in 100% of the patients, 14 (78%) on 1st attempt and 18 (100%) within 3 attempts. 14 (78%) patients completed therapy with no moderate or major complications. The average patient satisfaction score on a 5-point Likert scale was 3.77 (range 1-5) at initial placement and 3.94 (range 1-5) at subsequent placement de.

Conclusion: Preliminary results show that the AccuCath 2.25" BC Catheter System has excellent success rates in gaining vascular access in a difficult patient population. The device thus far has not led to any significant complications. Patients were also very satisfied with the procedure.

Infiltration Rates are Similar in Ultrasound-Guided and Traditionally Placed Peripheral IVs in Admitted Emergency Department Patients With Difficult IV Access

Bagian M, Bahi A/William Beaumont Hospital, Royal Oak, MI

Study Objective: To compare nurse-performed ultrasound-guided peripheral intravenous (USGPIV) access versus standard of care peripheral intravenous (SOPCIV) access in emergency department (ED) patients with difficult access.

Methods: An IRB-approved pilot study was completed randomizing patients into two groups, USGPIV or SOPCIV, at a single site, Level I trauma tertiary care facility with over 120,000 annual emergency care visits. In the initial phase of this study, two groups of ten registered nurses (RNs) were trained in establishing peripheral IV access

Spinal Pathology as Assessed by Ultrasound Before, During, and After Long Duration Space Flight

Harrison MF, Garcia K, Ebert D, Sargsyan A, Dulchavsky SA/Henry Ford Hospital, Detroit, MI; Wyle, Houston, TX

Study Objectives: Back pain is one of the most common complaints of astronauts in spaceflight. Most often it is benign and self-limited, however, astronauts’ risk of disc herniation in the postflight period is substantially increased. A common concept is that astronauts get taller in microgravity as a result of the spinal unloading in the Gz-axis. However, the structural changes that occur as a result of microgravity exposure are not well understood. The only diagnostic imaging tool available on the International Space Station is ultrasound.

Methods: We present a summary of ultrasound images and findings in the lumbar and cervical regions of 7 astronauts before, during, and after long duration spaceflight. We compare these results to pre- and post-flight MRI results, the gold standard.

Results: We identified 33 anomalous or pathological findings during the pre-flight ultrasound analysis, and at least 14 new findings or progression of pre-flight findings during the post-flight ultrasound analysis. We also analyzed for changes in intervertebral disc heights, volumes, and angles with preflight, postflight, and infight ultrasound analysis on flight days 30, 90, and 150.

Conclusion: Ultrasound has long been used as the portable and versatile imaging modality for practicing medicine under austere conditions. We have demonstrated its utility in assessing a common musculoskeletal complaint in the most austere outpatient humankind has ever inhabited—the International Space Station.

Comparison of Nurse-Performed Ultrasound-Guided versus Standard of Care Intravenous Access in Emergency Department Patients With Difficult Access

Selva S, Driscoll E, Abendroth T, Buck, S/Brigham and Women's Hospital, Boston, MA

Study Objective: To compare nurse-performed ultrasound-guided peripheral intravenous (USGPIV) access versus standard of care peripheral intravenous (SOPCIV) access in emergency department (ED) patients with difficult access.

Methods: An IRB-approved pilot study was conducted randomizing patients into two groups, USGPIV or SOPCIV, at a single site, Level I trauma tertiary care facility with over 120,000 annual emergency care visits. In the initial phase of this study, two groups of ten registered nurses (RNs) were trained in establishing peripheral IV access

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by either USGPIV (experimental group) or SOCPIV (control group). Both groups received 60 minutes of didactics respectively, and the USGPIV group received additional instruction and credentialing in establishing USGPIV access. The RNs in the USGPIV group were required to perform ten proctored successful USGPIV placements prior to enrolling any patients in the study. Participants were included in the study if they were 18+ years of age, presented to the ED and had a reported history of three or more peripheral IV attempts in a single clinical encounter to establish IV access, and at least one of the following four conditions: necessity for a rescue catheter (PICC or central venous catheter) as a result of that inability to obtain IV access, current or past history of hemodialysis, sickle cell disease, or history of IV drug use. Patients are excluded if IV access was established prior to ED arrival. Outcomes measured include number of IV attempts (one attempt per depercutaneous), time to PIV placement (defined as tourniquet to PIV secured with dressing), successful PIV placement (defined as able to aspirate blood and flush 10 cc normal saline), and patient satisfaction (1-10 subjective scale of patient’s perception of IV experience), duration of PIV, the reason the PIV was removed, and its functional status at the time of removal.

Results: Patient enrollment is an ongoing process. Thus far, 18 patients have been enrolled in the study, with ten randomized to the experimental USGPIV arm. For the number of PIV attempts, 60% of the USGPIV group was successful on the first attempt, while only 25% of the SOCPIV group was successful on the first attempt. For time to placement, USGPIV median was 10.1 minutes versus 17.7 minutes for SOCPIV. For successful IV placement, USGPIV was 80% successful versus 50% for SOCPIV (OR 4.0; 95% CI 0.35, 58.2). For patient satisfaction relating to IV experience, USGPIV median was 8.5 versus 1.0 for SOCPIV. Preliminary data suggests there are no differences between the USGPIV and SOC groups for age, sex, blood pressure, or BMI.

Conclusion: Our preliminary data suggests that nurses trained in placement of ultrasound-guided IV catheters can more successfully achieve difficult IV access when compared to the traditional blind approach. There are several positive outcomes including decreased IV attempts, decreased time to placement, and improved patient satisfaction in the US-guided arm. Appropriately trained nurses should routinely use ultrasound guidance as the primary method in IV placement in difficult access patients. Further recruitment of patients is needed to validate these findings, and patient enrollment is ongoing.

**The Effects of Cardiac Arrest Simulation on Health Care Providers’ Adherence to Advanced Cardiac Life Support Algorithms and Individual Group/Perceived Performance**


Study Objectives: Resuscitating a patient in cardiac arrest is an inherently high-stress situation. It is imperative that health care providers utilize set algorithms along with effective crisis resource management skills to care for these patients. Simulation training allows knowledge to be practiced safely in a controlled environment. The goal of this study is to assess the efficacy of in-situ simulation to teach proper resuscitation through crisis resource management skills and tenants of advanced cardiac life support (ACLS) of the cardiac arrest patient to mid-level health care providers (emergency medicine residents and physician assistants). A secondary outcome is to identify the providers’ weaknesses and strengths along with team dynamics and roles during resuscitation.

Methods: A prospective cohort of health care providers first completed a pre-intervention survey assessing ACLS skills and perceptions of team dynamics. This was followed by the intervention phase of the study, featuring in-situ simulation training sessions during which providers were assessed via a checklist of critical actions by a trained observer and then debriefed using the plus/delta model including a standardized discussion of resuscitation and crisis resource management skills. Participants then completed a post-intervention survey. This data was then entered into SPSS and matched t-tests were performed to determine statistical significance of the intervention.

Results: Preliminary pre-intervention data captured 74 health care providers, and 42 of those completed simulation sessions and post-intervention testing. Participant demographics were normally distributed. The mean scores on a 0-2 Likert scale (0 meaning “I have no clear idea of my role” and 2 meaning “I have a clear idea of my role”) for “knowledge of one’s role” were 1.17 and 1.36, pre-intervention and post-intervention, respectively (P = .73). The percentage of correct knowledge-based questions significantly improved from 54.76% to 69.64%. This represented a absolute increase of 14.88% (95% CI 9.16 - 20.60, P < .05). There was no significant correlation among any of the demographic data and the knowledge of ACLS and resuscitation roles.

Conclusion: The above data supports the hypothesis that in-situ simulation and de-briefing may improve provider knowledge in resuscitation, with a trend towards improved crisis resource management skills. Preliminary data demonstrates no significant change in participants’ perception of roles between pre-intervention and post-intervention. Post-hoc analysis applying similar post-intervention surveys to the same providers immediately after participating in real cardiac arrests shows improved perception of team dynamics. Limitations of the study include small sample size and level of simulation fidelity. Further studies and simulations are required to capture more health care providers and improve the power of the study.

**Prospective Randomized Crossover Study Evaluating the Comparative Effectiveness of Telesimulation versus Standard Simulation for Teaching Medical Students the Assessment and Management of Critically Ill Patients**


Study Objective: To evaluate the comparative effectiveness of telesimulation vs. standard simulation in teaching medical students how to evaluate and manage critically ill patients.

Methods: We conducted a prospective, randomized crossover study of 32 fourth-year medical students at a university medical simulation center. Students were oriented to the human patient simulator, then randomized to the standard simulation (SIM) or telesimulation (TeleSIM) group between September 2016 and February 2015. The SIM group experience included participating in a live, fully immersive simulation case followed by a group debriefing with an instructor/moderator, their SIM cohort, and a live TV Internet connection to the TeleSIM group that was observing their scenario. The TeleSIM group experience included remotely observing the live simulation case at an offsite location, followed by a shared group debriefing with their instructor/moderator, their TeleSIM cohort, and a live TV Internet connection to the SIM group that participated in the scenario. All subjects’ assessment and management skills were then evaluated with a written evaluation tool. During a second instructional session, the students crossed over and participated in a different simulation case using the opposite modality (if they were previously in the SIM group, they were crossed to the TeleSIM group, and vice versa) and similar assessments were conducted. Mean evaluation scores of the groups were calculated along with 95% confidence intervals and were analyzed via linear regression, conditional on the student and controlling for simulation case. Our secondary outcome was a survey evaluating the perceptions and attitudes the participants held between the two simulation modalities (TeleSIM vs SIM).

Results: Of 33 eligible students, 32 participated in the study (97.0%). We found no significant difference in the mean evaluation scores of the two groups; SIM group mean 91.0% (95% CI 94.5 - 98.6) and TeleSIM group mean 94.8% (95% CI 94.8 - 98.9). The odds ratio for the SIM group having a higher evaluation score was 0.82 (95% CI 0.29 - 2.26). We also found no significant difference in the favorability of teaching modality (TeleSIM vs. SIM) on the survey. The mean score on the survey that used a five-point Likert scale was 4.78 (95% CI 4.73 - 4.83) for the SIM group and 4.82 (95% CI 4.77 - 4.88) for the TeleSIM group.

Conclusion: In our prospective randomized crossover study evaluating the comparative effectiveness of telesimulation vs. standard simulation, we found no significant difference in evaluation scores amongst the two groups. There was also no significant difference found in the favorability of one teaching modality over the other on a post educational session survey. Our data support and highlight the capability of telesimulation to provide educational benefit to learners who do not have direct access to simulation resources.

**Comparison of Intubation Performance by Emergency Medicine Residents Using Video Laryngoscopy versus Direct Laryngoscopy in a Simulated Angioedema Cadaveric Model**

Grubish LK, Walsh R, Bothwell J, Knuston T, Mattlock A/Madigan Army Medical Center, Tacoma, WA

Study Objective: Airway management can often be a difficult skill to acquire with an initial success rate for direct laryngoscopy of 35-65%. Although direct laryngoscopy
 methods: A prospective crossover design using a single cohort of emergency medicine residents was used for this study. The primary objective was to measure the time to intubation using DL versus VL. The secondary objectives were measuring success rates of intubation, mean ratings of perceived difficulty of intubation, and overall preference of intubation technique.

Results: Mean time to intubation using DL was 55.14 seconds while mean time to intubation using VL was 79.46 seconds. Mean DL difficulty rating was 7.61 while mean VL difficulty rating was 7.25. The difference in time to intubation was significant (P = .004) while the difference in difficulty rating was not (P = .439). Overall success rate for DL was 71.4% while overall success rate for VL was 85.7%. This difference did not meet statistical significance (P = .344). Overall preference was divided with 32% of participants preferring DL and 68% of participants preferring VL.

Conclusion: DL demonstrated a significant decrease in time to complete intubation when compared to VL. This difference may be related to experience of the participants with DL. Although the differences in the difficulty rating between DL and VL was insignificant, the participants preferred VL to DL when surveyed.

Methods: We conducted a prospective multicenter (n=4) randomized trial on multidisciplinary teams that work in an emergency department (ED). Each team included a core of one resident, two nurses and one care giver. They participated in simulation-based training that included a scenario of a 35-year-old man in the ED with ventricular fibrillation due to Brugada syndrome. We randomly assigned each team to one of the two following groups: the patient has return of spontaneous circulation after three shocks (life group [LG]), or the patient ends in asystole after the third shock (death group [DG]). To ascertain the death in DG, the learners were told that the patient was declared dead following 45 minutes of advanced life support. Participants were aware that they participated in a trial designed to study emotional responses in the field of emergency medicine. We sought to assess the impact of simulation based training with unexpected manikin death on the learners’ anxiety when facing a life-threatening situation.

Methods: We conducted a prospective cohort study conducted in warm months in two urban areas in the northeastern region of the United States. A convenience sample of typical adult smokers was enrolled consecutively between April 2012 and April 2014. SpCO, SpMet and SpO2 levels were assessed using a Masimo Rad 57 CO oximeter before, during, and after the subject smoked a cigarette in their usual manner. Additional information was obtained about volunteer’s demographics, smoking habits, and co-morbid illness. Descriptive statistics were calculated for all available parameters and summary data analyzed to calculate average CO level before, during and after smoking.

Results: Ninety-two people were approached for enrollment and 85 volunteers were enrolled. The mean age of participants was 31.48 (SD ± 11.05 years). The mean number of years smoked was 12.8 (SD ± 10.35). Mean SpCO levels before, during or after smoking were 2.660 (SD 2.62), 2.62% (SD 2.5), and 3.09% (SD 2.91) respectively. There was no correlation between any recorded variables to either the during-smoking SpCO level or the rate of rise CO increase and fall.

Conclusion: Volunteer outdoor cigarette smokers encountered before, during, and after smoking had a mean CO level < 5%, which calls into question the practice of accepting a threshold CO level of < 10% as “normal” as measured by a non-invasive CO-energizer methods. Of 38 smokers, 35% had CO levels of < 10% in ED patients with a history of smoking may not be “normal”; suspicion for CO exposure at these levels is warranted and may aid clinicians in detecting occult poisoning.

Isopropyl Alcohol Nasal Inhalation Intervention for Nausea in the Emergency Department: A Randomized Placebo-Controlled Human Trial

Beadle K, Heibling A, Love S, Hunter C/SAMMMC, San Antonio, TX

Study Objectives: To evaluate the use of nasally inhaled isopropyl alcohol (ISO) to provide immediate nausea relief in patients presenting to the emergency department (ED) with an undifferentiated cause of nausea, prior to the administration of any traditional antiemetic.

Methods: We conducted a randomized, prospective, double blinded placebo-controlled trial in an urban military-level-1 trauma center. A convenience sample of 84 patients aged 18-65, able to breathe nasally, and able to read and write English, who presented to the ED from May to August 2014 with complaint of nausea and vomiting was enrolled. Exclusions were pregnancy, ISO allergy, use of medications with antiemetic or disulfiram effect, recent URI, or clinical intoxication. Subjects described pain and nausea with an 11-point Verbal Numerical Response Score (VNRS) at 0, 2, 4, 6, and 10 minutes (min). At 0, 2, and 4 min the patient inhaled from the study packet for 60 seconds. A 3-point change on the VNRS was set as significant difference. Patient satisfaction levels were recorded on a 5-point Likert scale at the study conclusion.

Results: Eighty subjects completed the study without any reported adverse events. 72.9% of the ISO group received significant nausea relief within 4 minutes compared to placebo.
Clinical Characteristics of Pediatric Patients With Carbon Monoxide Toxicity

University of Maryland School of Medicine, Baltimore, MD

Study Objective: To describe the clinical presentations of pediatric patients exposed to carbon monoxide (CO) and treated with hyperbaric oxygen therapy (HBOT).

Methods: Design: Retrospective review of data from patients discharged with CO poisoning after consultation with HBOT physicians at the R Adams Cowley Shock Trauma Center (STC) and University of Maryland Medical Center (UMMC) between 2008 and 2012. Setting: Data were collected from the out-of-hospital, transferring hospital, and STC/UMMC settings and analyzed descriptively. Participants: Patients <19 years of age.

Results: Over the 5-year study period, 47 pediatric patients were treated for CO poisoning. Their mean age was 8.9 (SD 5.0) years; 55% were male; and 45 had been exposed to CO accidentally, one was an intentional suicide attempt and one was unknown. Forty-one (97.6%) were transported directly from the scene by ambulance and five patients had missing data. Nineteen (40.4%) were transferred after initial evaluation; their median length of stay in the transferring hospital was 178 minutes (IQR 134-262). The average first measured serum carboxyhemoglobin (COHb) level was 14.3% (SD 8.3). The most common presenting symptoms were headache and nausea/vomiting. Chief complaints of burns, being unresponsive, and smoke inhalation had the highest serum COHb levels. The table shows the relationship between initial symptoms and COHb level. Several patients had more than one presenting symptom. Two patients were asymptomatic but had serum COHb levels similar to symptomatic patients. The Rad57 SpCO level averaged 26.1 (SD 11.7) and the average ambient CO level was 724 ppm. Most incidents occurred between October and March, correlating with the use of furnaces, radiators, and indoor heating units. Five patients were admitted to the ICU. Thirty-nine patients (83.0%) were admitted to the ICU. Fifty patients were admitted to the ICU.

Conclusions: The severity of presenting complaints varied in this population and did not correlate with serum COHb levels. Although neurologic symptoms that caused concern were common, the serum COHb level was >25% only for patients who were unresponsive or had smoke inhalation/burns. Symptoms vary among pediatric patients suffering similar exposures, complicating the decision to treat mild to moderate CO toxicity with HBOT. There is little published literature describing CO poisoning in pediatric patients. Our observations can be used as the basis for further study of the relationship between serum COHb level and initial presentation and outcome in pediatric patients.

Table. COHb Levels Associated with Emergency Department Presentations

<table>
<thead>
<tr>
<th>Symptom*</th>
<th>No. of Patients (%)</th>
<th>Median CO Level (IQR)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Syncope/presyncope</td>
<td>8 (17.0)</td>
<td>10.1 (9.0-13.9)</td>
</tr>
<tr>
<td>Headache</td>
<td>15 (31.9)</td>
<td>10.3 (8.4-22.4)</td>
</tr>
<tr>
<td>Asymptomatic</td>
<td>2 (4.3)</td>
<td>10.5 (7.9-13.1)</td>
</tr>
<tr>
<td>CO exposure NOS</td>
<td>8 (17.2)</td>
<td>11.6 (10.0-12.3)</td>
</tr>
<tr>
<td>Seizure</td>
<td>1 (2.1)</td>
<td>11.7</td>
</tr>
<tr>
<td>Nausea/vomiting</td>
<td>11 (23.4)</td>
<td>12.6 (9.0-16.0)</td>
</tr>
<tr>
<td>Dizziness</td>
<td>8 (17.0)</td>
<td>13.3 (6.8-22.9)</td>
</tr>
<tr>
<td>Altered mental status</td>
<td>1 (2.1)</td>
<td>20.8</td>
</tr>
<tr>
<td>Smoke inhalation</td>
<td>4 (8.5)</td>
<td>25.4 (24.5-27.8)</td>
</tr>
<tr>
<td>Unresponsive</td>
<td>6 (12.8)</td>
<td>27.1 (7.6-30.1)</td>
</tr>
<tr>
<td>Burns</td>
<td>1 (2.1)</td>
<td>30.1</td>
</tr>
</tbody>
</table>

*Multiple patients had more than one presenting symptom.

387 Hypoglycemia in Acetaminophen-Induced Hepatic Failure: What Is the Significance?
Levine M, Pizon AF, Steilfug SJ, Wiegand T, Villano J, Peak D, Thomas SH/University of Southern California, Los Angeles, CA; University of Pittsburgh, Pittsburgh, PA; Regions Hospital, St. Paul, MN; University of Rochester Medical Center, Rochester, NY; University of California, San Diego, San Diego, CA; Massachusetts General Hospital, Boston, MA; Harnad General Hospital/Weill Cornell Medical College, Qatar, Doha, Qatar

Background: Acetaminophen (APAP) toxicity is a common cause of acute hepatic failure in the United States. Hypoglycemia is a well-known complication of hepatic failure. However, the prognostic implications of a single episode of hypoglycemia in APAP-induced hepatic failure is not known.

Study Objectives: The primary objective of this study is to assess the significance of a single hypoglycemic episode in patients admitted with acute APAP-induced hepatic failure.

Methods: This study is a multi-center, retrospective study of patients admitted with acute liver injury due to APAP toxicity between January 1, 2008 through June 30, 2013. Adult subjects (age > 15 years) with known acetaminophen ingestion, with transaminase elevation, defined as an AST > 1000 IU/L were included. Those subjects with transaminase elevation due to other etiologies were excluded. Hypoglycemia was defined as a single glucose < 50 mg/dl at any point during the hospitalization. Data was abstracted using standardized chart review methodology. Hypoglycemia was compared against death. Logistic regression was performed to assess confounding variables.

Results: During the study period, a total of 233 cases were identified. Hypoglycemia was identified in 18 subjects. 28 subjects died, and 10 received a liver transplant. The median (IQR) maximal AST was 6374 (3222-10261) IU/L, and the median (IQR) maximal prothrombin time was 33.6 (23.3-52.5) seconds. After comparing for initial blood glucose and nadir pH, hypoglycemia was significantly associated with the composite endpoint (OR 4.59; 95% CI 1.42-14.8).

Conclusions: In this series of patients admitted with APAP-induced hepatic failure, a single episode of hypoglycemia was highly predictive of death.

388 Long Acting Death: Methadone
Egnratios J, Lev R, Petro S, Castillo E, Vilke G/UC San Diego School of Medicine, San Diego, CA; Scripps Mercy, San Diego, CA; University of Southern California Medical Center, Los Angeles, CA; UC San Diego, San Diego, CA

Study Objectives: To describe accidental overdose deaths in San Diego County for the year 2013. To determine correlation between toxicology reports and Prescription Drug Monitoring database Information. To compare methadone deaths to other deaths by prescription drugs (PDMP).

Methods: This retrospective, observational study analyzed all prescription related deaths occurring in San Diego County during the 2013 year with a specific focus on methadone-related deaths. All patients designated by medical examiner to have died by unintentional prescription were then referenced in the California PDMP, the Controlled Substance Utilization Review and Evaluation System (CURES). All categorical variables were analyzed with chi squared analysis.

Results: As a whole, patients who died had a high number of average prescriptions, 21, and averaged 4.5 different providers and 3 different pharmacies. Methadone-related deaths (MRD) accounted for 46 out of the 254 total patient deaths (18.1%). Methadone prescriptions were found in 14 patients with PDMP reports, 10 of whom had Methadone on toxicology report. Notably, 100% of methadone prescribed by primary care specialists. While MRD patients were as likely to have data in the PDMP (73.9% vs 73.1%, P = .90, respectively) they were less likely to have toxicology reports matching PDMP data compared to other related drug deaths (20.6% vs 61.2%, P < .0001). Of the 46 methadone deaths, only 10 (29.4%) had prescriptions for methadone recorded in the database. The majority of patient deaths (203/254; 79.9%) occurred in the presence of multiple drugs as determined by autopsy. Out of the 51 patients with only one drug recorded at death, methadone was most common (n=12; 23.5%). While all deaths had a notably high rate of chronic prescriptions at death (68.8% compared to 2% for all patients in CURES), there was no significant difference between MRD and other drug-related deaths (73.5% vs 67.8%, P = .68, respectively). MRD patients were less likely than other drug patients to have matching PDMP data without any illicit substance or alcohol (14.7% vs 41.4%, P = .003, respectively).
Conclusion: Methadone is a long acting opioid that carries a higher risk profile than other opioids. In San Diego, the great majority of methadone deaths came outside the PDMP system. A risk benefit analysis should be made to consider changing laws that would allow for OTP to input data into PDMP, similar to other addiction medication such as buprenorphine. OTP should make it standard of care to check PDMP data on their patients. Methadone prescribed for pain management should be limited to the most compliant patients.

**389 Electronic Cigarette Vapor Exposure and Symptoms: Hey Doc, Is that E-Cig Making Me Sick?**
Gartner M, Graff O/Celerion, Lincoln, NE

Study Objectives: Public reporting of symptoms attributed to exposure to electronic cigarette vapor is on the rise. The objective of this study was to evaluate symptoms and short-term first- and second-hand exposure to electronic cigarette vapor in a confined space.

Methods: This was a parallel group pilot study in which 6 healthy adult males (3 experienced vapers, 3 nicotine-free subjects) were seated in close proximity in a 21.5 m³ room in the clinic. During the 15-minute exposure session the 3 vaping subjects self-administered 3-second inhalations from the vaping product containing a 1.8% nicotine in 13C3-labeled propylene glycol (PG) solution every 30 seconds for a total of 30 inhalations. Labeling of the PG allowed for differentiating exposure to the electronic cigarette vapor from other other sources such as the diet. All subjects remained in the exposure room for 2 hours after commencing product administration and blood samples were taken over 8 hours to assess plasma concentrations of nicotine and 13C3-labeled PG.

Results: Nicotine and 13C3-labeled PG concentrations in the vaping subjects peaked within 5 minutes of completing the vaping session (baseline-adjusted range = 8.89-22.7 ng/mL and 1930 - 3970 ng/mL, respectively) and dropped steadily during the remaining 8-hour sampling period. In contrast, no appreciable increases above the limit of quantitation for either compound were noted in the non-vaping subjects, indicating minimal second-hand exposure during the exposure session. A single episode of vomiting occurred in one of the vaping subjects approximately 7 minutes following completion of the vaping session, but no adverse events occurred in the non-vaping subjects.

Conclusion: These results indicate that short-term second-hand exposure to electronic cigarette vapor in a small space is unlikely to produce significant uptake of e-liquid constituents, and that healthy adults in the vicinity where these products are being used are unlikely to experience symptoms associated with nicotine or PG toxicity under similar circumstances.

**390 Comparison of Coagulation Parameters in Copperhead versus Other Crotaline Envenomation**
Gerardo CJ, Brown MW, Nickenig Vissoci JR, Bush SP/Duke University School of Medicine, Durham, NC; East Carolina University, Brody School of Medicine, Greenville, NC; Duke Global Health Institute, Durham, NC

Study Objective: Coagulation derangements in copperhead envenomation are considered less severe than other crotaline envenomations. A prospective, blinded, multicenter, randomized clinical trial comparing the effectiveness of F(ab')2 versus Fab antivenom enrolled copperhead envenomation patients between May 2008 and September 2011. We determined the difference between coagulation parameters in copperhead compared to other crotaline envenomations in this trial.

Methods: We performed an analysis comparing the coagulation parameters (platelets and fibrinogen) prospectively obtained in this clinical trial. All patients received antivenom in one of three treatment arms [F(ab')2 with maintenance, Fab(ab')2 with placebo maintenance, or Fab with maintenance]. Coagulation parameters were measured during the acute hospitalization, day 5, day 8, and day 15 post-envenomation. Platelet and fibrinogen point estimates with distribution for copperhead compared to other crotaline envenomations are presented graphically over time. A linear mixed models analysis was used to determine the difference between the two distribution curves.

Results: One hundred twenty-two patients were enrolled in the study. There were 22 patients with copperhead (CH) envenomation, 93 with other crotaline (RS) envenomations (92 rattlesnake and 1 cottonmouth), and 7 that could not be definitively determined. The mean age was 44 (SD 21) years. There was a minimal pretreatment difference in mean baseline platelet count between CH (239 x10^9/L, 95% CI 238, 240) as compared to RS patients (194 x10^9/L, 95% CI 193, 194). The platelet counts in each population rapidly improved and converged during the acute post-treatment phase and remained similar. There was a modest difference (mean difference of 60 mg/dL, 95% CI 2, 119, P=0.05) in mean fibrinogen level. The mean lowest fibrinogen was significantly higher (P<0.05) in CH patients (300 mg/dL, 95% CI 299, 301) as compared with RS envenomations (217 mg/dL, 95% CI 217, 218). The mean fibrinogen level in CH patients was substantially lower at baseline and during the acute phase, but converged during the recovery phase.

Conclusion: In this crotaline envenomation patient population treated with antivenom, the mean platelet count in copperhead and other crotaline patients were similar throughout their clinical course. However, the fibrinogen level was both clinically and statistically significantly lower in non-copperhead patients, and did not recover during the acute phase of treatment. When comparing a population of copperhead versus other crotaline envenomation patients treated with antivenom, the difference in severity of coagulation derangement was primarily in the fibrinogen level as opposed to the platelet count.

**391 Emergency Department Visits for Sexual Assault by College-Aged Women: Is Alcohol a Factor?**
Tadros A, Layman SM, Davidov DM/West Virginia University, Morgantown, WV

Background: Sexual assault on college campuses is a growing concern. High rates of alcohol use in college-aged populations may be associated with increased risk for sexual assault victimization and perpetration. There is little data on emergency department (ED) visits for sexual assault in the US in college-aged women.

Study Objectives: To analyze ED visits by college-aged women for sexual assault and determine if alcohol consumption by the patient was noted in the ED chart. Rates of Sexual Assault Nurse Examiner (SANE) evaluation, prophylaxis for pregnancy, HIV, and STIs were also determined.

Methods: This study was a retrospective chart review of patients aged 18-25 presenting to a tertiary care ED located in a college town between January 1, 2012 and December 31, 2014. Cases with a chief complaint of "sexual assault" or "rape" were abstracted and reviewed. The following information was extracted from each relevant
case: age, delays in seeking care, evaluation by SANE nurse, prophylaxis for HIV, STI and pregnancy, and if alcohol consumption by the patient was mentioned in the record. For analysis of alcohol use, cases were grouped into the categories of ages < 21 and ≥ 21.

Results: There were a total of 81 cases. The mean age of the cohort was 19.96 years and 70% of visits were in those under age 21. SANE nurse evaluation was conducted in 88.6% of cases and 91.1% of patients were prophylaxed for gonorrhea and chlamydia. Only 27.8% elected to initiate HIV prophylaxis. Pregnancy prophylaxis was declined by only 11.4% of women who were not already on contraceptives. Of those aged < 21, 70.4% reported alcohol consumption around the time of the assault, in contrast to 48% of those ≥ 21 (P = .055). Of those reporting alcohol use, 56% were evaluated on the day of the assault compared to 60.7% of those not reporting alcohol (P = .055).

Conclusions: ED visits for sexual assault in college-aged women were more common in the younger patients. Alcohol use occurred more frequently with patients who were under the legal drinking age (< 21 years); and, if alcohol was involved, ED presentation was more likely to be delayed. There were high rates of prophylaxis for STIs and pregnancy but not for HIV. The majority of patients received a SANE evaluation. Rates of alcohol use in this cohort may actually be higher than what are reported here, as this retrospective chart review relied on patient self-report of alcohol use as well as provider documentation. Awareness and primary prevention programs on college campuses should include information on the associations between rates of sexual assault and alcohol use as well as the importance of receiving prompt medical attention after sexual assault, regardless of age and alcohol consumption.

392 EMF
Withdrawn

393 Utility of Ultrasonography as Adjuncts in Risk Stratification for Pediatric Septic Arthritis
Patel PS, Cochon L, Baez AA/University of Florida, Gainesville, FL; Jackson Memorial Hospital, Miami, FL

Background: Pediatric hip pain is a common emergency department (ED) presentation. While the etiology is commonly something benign such as transient synovitis, septic arthritis is always in the differential. Differentiation between septic arthritis and transient synovitis of the hip in children can be difficult given their similar, non-traumatic presentations. Because of the high morbidity associated with septic arthritis, it is important to make this diagnosis in a timely manner. The Kocher criteria were derived to identify factors important in distinguishing septic arthritis and transient synovitis. While this clinical decision rule works fairly well in children falling on either extreme of the criteria children in the intermediate range may need further workup or intervention. The intervention is often an arthrocentesis, an invasive procedure that can be stressful for children.

Study Objective: To determine whether the imaging modalities of ultrasonography, plain film radiography and magnetic resonance imaging (MRI) can improve the pretest probability of the Kocher criteria.

Methods: The Kocher criteria consists of four clinical yes/no questions: (1) ability to bear weight, (2) fever, (3) ESR>40mm/hr and 4)WBC > 12,000 cell/mm3. The pretest probability of having septic arthritis ranges from 3% for 1 point to 99% for 4 points. Using these pretest probabilities, a Bayesian nomogram was constructed using pooled sensitivity and specificity estimates for plain radiography, ultrasonography, and magnetic resonance imaging, in order to derive post test probabilities for each imaging modality.

Results: The pooled sensitivity, specificity, positive and negative likelihood ratios for plain radiography were 59%, 79%, 2.81, and 0.52. For ultrasonography, they were 86.4%, 89.7%, 8.30, and 0.15. For MRI, they were 79%, 100%, 790, and 0.21. Each of the imaging studies helped to improve the pretest probability, and the most incremental gain was seen in the moderate risk category (2 points on Kocher criteria), which clinically is most helpful. Of the 3 imaging modalities, ultrasonography provided the best relative gain using the negative likelihood ratio. Specifically, ultrasonography decreased the pretest probability from 40% to 7%, representing a relative gain of 77%.

Conclusion: Patients with a moderate Kocher score present the biggest diagnostic dilemma. In this group, performing an ultrasound of the hip significantly improved the ability to rule out septic arthritis.
Predictors of Successful Age 12-Month Follow-Up in a Multicenter Study of Infants With Severe Bronchiolitis

Wu V, Abo-Sido N, Espinola JA, Tierney CN, Sullivan AF, Camargo CA, Jr. / Massachusetts General Hospital, Boston, MA

Study Objectives: Obtaining participant follow-up is critical to the success of prospective cohort studies. Identifying characteristics associated with successful follow-up can help inform efforts to retain participants in the study. We examined the characteristics that predict successful telephone follow-up with parents of acutely ill children at age 12 months.

Methods: We analyzed data from a 17-center, prospective cohort study of infants (age <1 year) hospitalized with bronchiolitis. Infants were enrolled during three consecutive winter seasons (November to April) in 2011 to 2014. Site investigators collected baseline interview and medical record data during the index hospitalization. We called parents at 6-month intervals (based on the child’s age) after discharge to assess the child’s respiratory problems, subsequent emergency department visits or hospitalizations, and other factors related to recurrent wheeze development. Respondents were coded as unreachable after 28 days of unsuccessful efforts to reach the parent. All children whose parents we attempted to contact for the age 12-month follow-up interview were included in the present analysis. To identify predictors of age 12-month follow-up completion, we used chi-square, Fisher’s exact test, and multivariable logistic regression clustered by site. Two-tailed \( P < .05 \) was considered statistically significant.

Results: Among 918 children, median age at enrollment was 3 months (interquartile range 2-6). Of these, 798 (87%) completed the age 12-month interview. In unadjusted analyses, age 12-month follow-up completion was more likely if the child was female, had private health insurance, an annual household income \( \geq $60,000 \), and from the Northeast, Midwest, or West regions (all \( P < .05 \)). Follow-up was less likely among non-Hispanic black children, and Hispanics (all \( P < .05 \)). In adjusted analyses, follow-up completion remained more likely among parents of female children (odds ratio [OR] 1.52; 95% confidence interval [CI] 1.04-2.23; \( P = .03 \)), those with an annual household income \( \geq $60,000 \) (OR 1.63; 95% CI 1.01-2.64; \( P = .045 \)) and, compared to the South, those in the Northeast (OR 1.91; 95% CI 1.22-3.01; \( P = .005 \)), Midwest (OR 1.97; 95% CI 1.23-3.14; \( P = .005 \)) and West (OR 1.64; 95% CI 1.01-2.66; \( P = .046 \)). Additionally, compared to non-Hispanic white children, non-Hispanic blacks (OR 0.53; 95% CI 0.35-0.82; \( P = .004 \)) and Hispanics (OR 0.63; 95% CI 0.43-0.91; \( P = .014 \)) were less likely to complete the age 12-month follow-up interview.

Conclusion: Female sex, white race, greater annual household income, and residing in the Northeast, Midwest, or West predicted successful age 12-month follow-up. These findings suggest potential benefits from developing and implementing better follow-up methods, particularly for families of participants who are male, minorities, or from the South.

Predicting Flow in the Pediatric Emergency Department: Are Holidays Lighter?

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Study Objectives: One of the major aspects of emergency department (ED) operations is matching patient demand with staffing and resources to ensure efficient throughput. It is common belief among providers that there are fewer visits on holidays in an ED. The objective was to determine the effect of national holidays on patient volume in an urban pediatric emergency department (PED).

Methods: Login dates and times were obtained for all patient visits to an urban PED between July 1, 2006 and June 30, 2013. Visits were coded for the day of the week, tour, season, and whether they occurred on a holiday or non-holiday. Comparisons between the median number of visits on holidays vs. non-holidays by season, days of the week and tours were performed. Additional comparisons of the five Monday holidays (Martin Luther King Day, Washington’s Birthday, Memorial Day, Labor Day, and Columbus Day), as well as New Year’s, Thanksgiving, and Christmas Days to non-holidays were also performed. Group comparisons were performed via Mann-Whitney U tests and Kruskal-Wallis tests (alpha= 0.05, 2 tails).

Results: There were 101 holiday and 2,456 non-holiday days, for a total of 2,557 days between July 1, 2006 and June 30, 2013. There were 223,677 total visits, with an average yearly census of 31.954. Volume peaked on Mondays versus the other days of the week (99 vs 76-91). The summer season demonstrated the fewest visits per day relative to the other seasons (74 vs 89-91; \( P < .001 \)). Compared to non-holiday Thursdays within the fall season, there were fewer visits on Thanksgiving (81 vs 92; \( P < .001 \)). Compared to non-holidays within the winter season there were fewer visits on Christmas (72 vs 90; \( P = .031 \)). There was no significant difference between numbers of visits on Monday PED with same day of week non-holidays within their seasons. Tour 1 (12am-8am) demonstrated more patients on holidays compared to non-holidays during the winter (16 vs 12; \( P < .001 \)), spring (21 vs 12; \( P < .001 \)), and summer (18 vs 11; \( P < .001 \)). Tour 2 (8am-4pm) did not demonstrate any significant difference in number of visits for any of the seasons. Tour 3 (4pm-12am) demonstrated fewer patients on holidays vs. non-holidays during the fall (33 vs 38; \( P = .027 \)), winter (34 vs 38; \( P = .001 \)), and summer (31 vs 34; \( P = .017 \)).

Conclusion: There are fewer patient visits on Thanksgiving and Christmas, as well as during late afternoon/evening on several other holidays. Our findings suggest potential for adjustments in staffing and resource planning for a PED.

Pediatric Triage Decisionmaking in a Large-Scale Pediatric Disaster

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Background: Children are profoundly vulnerable during a mass casualty event and yet are an often neglected group in emergency planning. Although triage is a critical task to be completed whenever there is a surge of patients, research on current triage algorithms have not included which group of providers is best able to perform the task of patient triage.

Study Objective: The primary goal of this study is to determine if health care professionals not board certified in pediatric care make the same triage decisions in a mass casualty event with a high level of confidence compared to providers trained in the field of pediatrics. A secondary goal is to analyze key patient characteristics and clinical factors that are used by providers in assigning pediatric triage classifications.

Methods: This is a survey-based study conducted at Carilion Roanoke Memorial Hospital (CRMH) using 11 case scenarios. Subjects were recruited from the departments of pediatrics and emergency medicine and asked to read each case and assign a triage classification based on the JumpSTART triage algorithm with each color designation assigned a numerical value- green=1, yellow=2, red=3, and black=4. They were also asked to rate their level of confidence using a Likert Scale ranging from 1 to 5 with 1 being not at all confident and 5 representing very confident. Finally, they were asked to answer whether the patient needed to be seen at a children’s hospital and to state in 1-2 sentences the key elements in the case on which they based their answers to each question. An extended version of Kappa coefficient was used to create an inter-rater agreement. Mean values for reported confidence scores were determined. Categorization and qualitative analysis of clinical factors cited was also undertaken.

Results: Determination of Kappa coefficient revealed fair agreement amongst raters from the pediatric department (kappa= 0.38), moderate agreement within the emergency medicine department (kappa= 0.44), and moderate agreement across all raters (kappa= 0.42). Both departments reported high confidence in their triage decisions with mean confidence scores of 4.37 (pediatric department) and...
4.54 (EM department). Clinical factors cited in decision making fell into 1 of 4 categories: vital signs (cited 75 times), physical exam findings (170), mechanism of injury/history of present illness (152), or anticipation of the patient’s future needs (58).

Conclusions: Fair to moderate agreement across raters suggests the need for increased training of providers on the use of the JumpSTART triage algorithm. This is supported by analysis of key clinical factors used in decisionmaking which suggest the algorithm was not consistently and appropriately applied by providers. Lack of agreement also indicates deficiencies in the triage system itself. High confidence levels from both groups aid in emergency planning by indicating either group of providers is capable of the task of triage in a large scale disaster.

Additional work surveying providers under conditions that more intentionally simulate a mass casualty event and including providers from other departments can further this research.

398 Application of the National Emergency X-Ray Utilization Study Criteria and the Canadian C-spine Rule Among Children Aged 8 to 17 Years in the Emergency Department: A Retrospective Review


Study Objectives: Clinical rules have been developed to identify acute trauma patients who require imaging of the cervical spine. While the computed tomography (CT) scan is highly sensitive for detecting cervical spine injury (CSI), unnecessary ionizing radiation is of concern, especially in children. The clinical rules have been more extensively tested in adults; however, there is support in the literature for National Emergency X-Ray Utilization Study criteria (NEXUS) to reliably detect injury in children over 7 years old. The Canadian C-spine Rule (CCR) has also been considered but unlike the NEXUS, validation testing has not been performed in this pediatric age group. Our goal is to determine the number of cervical CT scans that could have potentially been avoided had NEXUS and CCR been applied to children aged 8 to 17 years with acute trauma.

Methods: We conducted a retrospective chart review of children aged 8 to 17 years who received a cervical CT scan for blunt trauma in the emergency departments (ED) of an adult and pediatric level 1 trauma center from January 2010 to November 2013. Clinical variables deemed equivalent to NEXUS and CCR were established prior to chart review. Reviewers were blinded from CT results, and the need for CT scan based on risk of CSI was determined using NEXUS, validation testing has not been performed in this pediatric age group. Our goal is to determine the number of cervical CT scans that could have potentially been avoided had NEXUS and CCR been applied to children aged 8 to 17 years with acute trauma.

Results: A total of 24 (13/322) had abnormal cervical CT scan findings reported, and 1% (4/ 342) of the children had clinically significant CSI requiring intervention. The injuries requiring intervention included C4, C5 compression fracture; C5, C6 avulsion fracture; C1/C2 rotary subluxation; and C7 fracture. NEXUS indicated imaging in 400 (53,435) of return visits were due to mental health conditions, 10.1% (n=5,415) were due to trauma, 2.5% (n=1,319) were due to poisoning, and 45.1% (n=24,150) were due to other reasons. Mean time to the next utilization (ED or inpatient) was 11.7 days (median 9, standard deviation 8.6). Male sex (Odds ratio [OR], 1.08; 95% Confidence interval [CI], [1.06-1.10]), increased chronic comorbidities (test for trend, P < .0001), prior ED and inpatient utilization (test for trend, P < .0001; 4 visits vs 0 OR=5.26 [4.55-6.25]), a history of mood disorders (OR=1.32; 95%CI, [1.18-1.49]), and increasing age (test for trend, P < .0001) (Figure) were associated with increased likelihood of ED return visit or inpatient admissions within 30 days. These findings remained significant with a subsequent time to event analysis.

Conclusions: A number of factors strongly associated with return acute care visits, which will enable clinicians to make more targeted interventions during initial evaluation.

399 Withdrawn

400 Emergency Department Visits for Mental Illness: Evaluation of Patterns and Risk Factors of Return Visits from Claim Database: 2005-2013

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Study Objectives: Mental health-related visits account for up to 12 percent of all emergency department (ED) visits in the United States. EDs are frequently used for the initial evaluation of mental health emergencies and return visits to the hospital may represent avoidable health care utilization. The primary objective was to determine risk factors associated with return ED visits or inpatient admissions following an initial mental health-related ED visit.

Methods: A retrospective study was performed using Oprem Labs Data Warehouse, a large nationally representative database containing administrative claims data on privately insured and Medicare Advantage enrollees. We identified all patients presenting to the ED with a primary diagnosis of a mental health condition between 2005 and 2013. The index ED visit for an individual was defined as the first mental health ED visit which did not result in a subsequent inpatient admission. A wash-out period of one year was applied to the study cohort to ensure initial index ED visit identification. Study inclusion required continuous insurance enrollment for 12 months prior to the defined index visit and ED visits within 30 days after the visit. Logistic regression models were used to assess independent associations of patient characteristics with return ED visits or inpatient admissions within 3, 7, and 30 days. Risk factors included sex, medical comorbidities, age, ED and inpatient utilization in the year prior to the index ED visit, calendar year and the type of mental health condition identified during the index visit. Subsequently, a time to event analysis was conducted to test the robustness of the associations.

Results: A total of 366,305 ED visits due to mental health condition were identified during 2005-2013, among which 14.6% (n=53,435) returned to the ED or had an inpatient admission within 30 days due to mental health. Among those, 45.2% (n=23,062) of return visits were due to mental health conditions, 10.1% (n=5,415) were due to trauma, 2.5% (n=1,319) were due to poisoning, and 45.1% (n=24,150) were due to other reasons. Mean time to the next utilization (ED or inpatient) was 11.7 days (median 9, standard deviation 8.6). Male sex (Odds ratio [OR], 1.08; 95% Confidence interval [CI], [1.06-1.10]), increased chronic comorbidities (test for trend, P < .0001), prior ED and inpatient utilization (test for trend, P < .0001; 4 visits vs 0 OR=5.26 [4.55-6.25]), a history of mood disorders (OR=1.32; 95%CI, [1.18-1.49]), and increasing age (test for trend, P < .0001) (Figure) were associated with increased likelihood of ED return visit or inpatient admissions within 30 days. These findings remained significant with a subsequent time to event analysis.

Conclusions: A number of factors strongly associated with return acute care visits, which will enable clinicians to make more targeted interventions during initial evaluation.
Study Objective: Nonsexual self-injury (NSSI), the deliberate destruction of one's body tissue (e.g., self-cutting, burning) without suicidal intent, has consistent rates ranging from 14% to 24% among youth and adults. Moreover, youth who enact NSSI are at risk for repeated NSSI, interpersonal difficulties, additional psychiatric symptoms, and, in some cases, suicide. With more youth using video-sharing Web sites (YouTube), this study will examine the accessibility and content of nonsexual self-injury videos online.

Methods: This is a retrospective content analysis study. Using YouTube's search engine, data was collected by searching for videos on YouTube using the keywords “self-injury” and “self-harm.” These videos were identified and viewed between October 2014 and December 2014. Standardized forms were used for data abstraction. Beyond coding for video purposes, video tones (e.g., educational, encouraging, angry) were also examined. Many videos may have more than 1 NSSI method depicted; many may also have more than 1 body location. Viewers' comments from the NSSI videos on YouTube were examined as an index of viewer response using two coding rubrics, one for the global nature of comments and one for recovery-oriented themes. All videos were analyzed independently by 2 researchers and disagreements resolved by an arbitrator. Descriptive statistics and frequency tables were used to describe research findings. Interrater reliability was determined using the Kappa score.

Results: During the 3-month study period, 92 YouTube videos of depicting NSSI were identified. The videos were collectively viewed over 10 million times; the mean number of views per video was 236,811. These videos were marked as a “favorite” a total of 224,734 times with an average of 2470 times per video. Specifically, 84% of videos had visual depictions (e.g., photographs) of NSSI. Overall, cutting was the most commonly depicted NSSI method, followed by self-embedding, burning, and then, less frequently, acts including hitting, biting, skin picking, and wound interference. Forty videos (43%) featured a live person (e.g., character videos) and 52 were non-character videos. Noncharacter videos depicted more graphic NSSI imagery and multiple NSSI methods (e.g., cutting, burning). The majority of the people (88%) identified in the videos were Caucasian; 84% were female. The estimated age of participants was 10 to 15 years in 23% of the videos, 16-20 years in 59%, and > 20 years old in 18%. Only 27 of these videos (29%) posted trigger warnings, intended to warn users that Web site content may trigger NSSI. The majority of NSSI videos had informational content (e.g., presented NSSI facts) and/or “melancholic/helpless” (e.g., emphasized emotional pain) messages. Responses consisted of viewers sharing their own NSSI experiences (41%), validating or praising uploaders for their videos (22%), or encouraging the uploader (13%). Few discussed or mentioned NSSI recovery; most comments indicated that the individual was still suffering.

Conclusions: The depiction of NSSI on YouTube represents an alarming trend among youth and young adults. Graphic videos showing self-injury are frequently accessed and received positively by viewers. Professionals working with adolescents who enact nonsexual self-injury need to be aware of the scope and nature of NSSI on YouTube. Future research is needed to better understand how these videos impact youth directly.
current psychiatric care, or any history of psychiatric hospitalization would identify patients more likely to be admitted or transferred.

Methods: A structured retrospective chart review using a pre-specified data protocol and blinded raters was performed of all patients presenting in two EDs after the onset of mandatory screening from September 1, 2011 through February 28, 2012. A simple query was performed of the electronic medical record for patients that answered yes to a simple triage screening question about suicide, with additional data abstracted from the record. Multivariate logistic regression analysis was used to compare odds ratios [OR] of variables on being admitted or transferred.

Results: A total of 432 patients screened positive for a simple SI screening question (approximately 14.0 patients per 1000 presentations) with an average ED length of stay of 66.5 minutes. Only slightly more than half of the patients (235 or 54.4%) were actually admitted or transferred, with the remainder being discharged home or leaving the emergency department. In evaluating the seven additional screening questions, logistic regression revealed that self-harm in the past 12 months (OR1.8 [1.2,2.7]) and future intent (OR 1.9 [2.3,2.9]) were predictive of the need for admission or transfer. Patients who ultimately were discharged home from the ED accounted for a total of 1775 hours of ED bed time over 6 months (averaging 9.7 hours a day).

Conclusion: Patients who answer yes to a simple question about suicidal ideation are almost as likely to be discharged as admitted/transferred. More in-depth screening targeted at patients who are likely to benefit may make better use of ED resources.

405 Do Emergency Department Patients Seeking Treatment for Opioid Addiction Get Treatment? Tadros A, Tillotson R, Layman SM, Burrell C/West Virginia University, Morgantown, WV

Study Objective: Opioid abuse is a major problem in the United States, and is a particular problem in the state of West Virginia. Patients seeking treatment for opioid abuse may present to the emergency department (ED), often assuming they will be admitted into a treatment program at the time of the visit. This study sought to determine: (1) if patients requesting detox for opioids are subsequently admitted into a treatment center, (2) factors associated with variability in admission rates.

Methods: This was a retrospective chart review of patients who presented to our tertiary care, academic ED requesting opioid detox between 2013-2014. The following were extracted from each patient medical record: age, sex, insurance status and disposition. Other factors recorded were pregnancy status, suicidal ideation (SI), and co-dependence on alcohol or benzodiazepines. Analyses included descriptive statistics and chi-square cross tabulations to determine significance between categories. Differences were considered to be statistically significant at P < .05.

Results: There were a total of 843 patient visits for the treatment of opioid detox. The mean age of this population was 30.1 years and there were significantly more males presenting to the ED (57.5%; P < .001). Almost one-quarter (190) of patients also reported abuse of alcohol and/or benzodiazepines. The majority (82.1%) of this group were admitted for treatment. There were 499 patients with isolated opioid dependence and only 28.9% of this opioid-only group were admitted from the ED to a treatment program. Approximately 189 (22.4%) patients had SI and 94.7% of them were admitted (P = .001). Medicaid covered 51.1% of this population (P < .001), 23.6% had private insurance, and 21.8% were self-pay. Patients insured by Medicaid (53.8%; P = .001) were significantly more likely to be admitted than those with private insurance (38.2%) or self-pay (38.6%). Thirty three of the patients were pregnant women.

Conclusion: Patients seeking treatment for opioid addiction often present to the ED as the first step in seeking treatment. Based on these data, less than one quarter of patients with isolated opioid abuse were placed into a treatment center from the ED, likely due to shortages of beds in treatment facilities or insurance factors. Patients reporting SI had higher rates of admission, as did those reporting concomitant alcohol and benzodiazepine abuse. Medicaid was the insurer for the majority of patients. The population seeking treatment for opioid detox was quite young and males were more heavily represented. Future research should seek to determine other specific factors predicting admission to treatment in this patient population.

406 Racial and Ethnic Differences in Behavioral Risk Factors Among Young Adult Male Emergency Department Patients Chaudhary F, Johnson R, Cyr JM, Brice JH/University of North Carolina at Chapel Hill School of Medicine, Chapel Hill, NC

Study Objectives: Young adults frequently lack a primary care provider and seek care more consistently in the emergency department (ED) than any other age group. The primary objective of this study was to assess the risk-taking behaviors of young adult males, identifying as white, black, or Hispanic and gauge their willingness to participate in ED-based risk-taking interventions.

Methods: A prospective cross-sectional study was completed in the ED of a level 1 academic trauma center. Participants were adult males aged 19-34 years of White, Black, and Hispanic descent who sought treatment in the ED. A 60-item questionnaire, developed by the research team, measured subjects’ demographics, queried risk-taking behaviors, and gauged willingness to participate in interventions regarding participants’ risk-taking behaviors. Results were analyzed with chi-square tests, independent samples t-tests, and ANOVAs. Results were considered significant at p<0.05.

Results: Two hundred six participants were identified for the study, 56 participants did not meet eligibility criteria, resulting in a total enrollment of 150 participants. Of the sample, 51 participants were white, 50 were black, and 49 were Hispanic. Most subjects were single and were evenly split between those with education beyond high school and those with a high school diploma or less education. For the entire sample, we found 81.2% sought regular medical care but only 51.3% had a primary care physician. Risk-taking behavior was as follows: 12.2% did not use seat belts, 25.7% drove under the influence of alcohol, 32.4% were passengers in cars driven by drunk drivers, 51.0% did not wear bicycle helmets, 23.3% were positive for CAGE screening, 51.4% smoked, 17.5% had depressive thoughts, 2.7% has suicidal ideation, 19.9% had a sexually transmitted disease, 25.9% practiced unprotected sex, 1.5% used intravenous drugs, 42.9% used marijuana, 5.6% used cocaine, 2.3% used heroin, 2.3% used methamphetamine, and 9.6% used ecstasy. We found that Hispanics were less likely to seek any medical care (P < .01) and blacks were more likely to seek unscheduled (ie, ED or walk-in clinic) care (P < .01). Hispanics were also more likely to have had an STI in the past (P < .05) and more likely to self-identify as being at risk for HIV (P < .01). Hispanics were less likely to use bicycle helmets regularly (P < .05). Blacks were more likely to use cigarettes (P < .05) and more likely to have been tested for HIV (P < .05). After assessing willingness to receive ED-based interventions about participants’ risky behaviors, we found Hispanics were more willing to take an HIV test (P < .05) and talk about alcohol use with a health care provider (P < .01). Blacks were found to be less willing to discuss smoking cessation with a health care provider (P < .05).

Conclusion: The results indicate that although Hispanic patients are less likely to seek medical care, they are more open to changing their risk-taking behaviors (ie, HIV testing and discussing alcohol consumption) compared to the other patient groups. We also found that even though Black patients are more likely to smoke, they are less likely to discuss smoking cessation. Black patients who smoke may not be as receptive to smoking cessation interventions in the ED, but their increased risk of smoking warrants further investigation into appropriate cessation interventions.

407 EMF Identification of Emergency Medicine Fatigue At-Risk Periods Using Actigraphy and Computer Modeling: A Pilot Study Fox C, Hall V, Schaefer T, Wolford R/OSF Saint Francis Medical Center, Peoria, IL

Study Objectives: Medical error is the third leading cause of death in the United States. An Institute of Medicine publication in a 2008 on resident duty hours stated “the science on sleep and human performance is clear that fatigue makes errors more likely to occur.” However, the incidence and severity of emergency department (ED) resident fatigue is unclear. The objective of this study is to identify, using a commercially available actigraph and computer software, the occurrence of less than optimal resident effectiveness (market of fatigue) during clinical shifts in the ED.

Methods: A prospective study of second year emergency medicine residents during their ED rotations at an academic ED seeing approximately 87,000 visits per year was conducted. At the beginning of their ED rotation, residents were issued a wrist actigraph (Readiband, Fatigue Science), after receiving informed consent and voluntarily agreeing to participate. They wore the device continuously. At the end of the rotation, data was downloaded from the device and analyzed using Fatigue Avoidance Scheduling Tool (SAFTE, Fatigue Science) software. The software analyzes the resident’s amount and quality of sleep and calculates the resident’s mental effectiveness (fatigue level) and risk of making errors, as compared to a well-rested individual. Ideally effectiveness should be greater than 90%. As effectiveness drops below 80%, the risk of making errors increases. An effectiveness of 70% is similar to an individual with a blood alcohol of 0.08%. The project was approved by the institutional research review board and was supported by an internal departmental research grant.

Results: In the initial pilot, 5 residents participated. An example of the SAFTE output is demonstrated: During this week, the resident’s shift (indicated by the black
bars at the bottom) show an effectiveness of 90-100% during the first two day shifts, but it dipped to near 70% during the 5 shifts ending at 3 AM. Overall, the 5 residents’ effectiveness for the rotation was greater than 80%, 88% to 96% of the time. All residents had intervals of effectiveness in the 70 to 80% range (3.4 to 10.5% of the rotation) and 4 of the 5 residents effectiveness dropped below 70% at times (total 0.8 to 3.8% of the rotation).

Conclusions: This pilot demonstrates the real-time measurement of resident effectiveness (fatigue and risk of error) is possible. It shows, as measured by this method, decreased effectiveness (increased fatigue and risk of error) is an issue for our scheduling of emergency medicine residents during their ED rotation at times. A larger study is being conducted at this time to collect additional data and to identify opportunities to improve the level of resident effectiveness. The data from this type of study may also be beneficial in the scheduling of attending physicians.

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**Sepsis-Associated Pulmonary Complications in Emergency Department Patients Monitored With Serial Lactate Measurements**

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**Study Objectives:** Severe sepsis and septic shock are highly morbid conditions with increasing incidence. Septic shock results in global tissue hypoxia and end-organ dysfunction; pulmonary manifestations include acute respiratory distress syndrome (ARDS) and respiratory failure. These complications portend worse clinical outcomes and remain extremely difficult to treat, suggesting that prevention is an important tenant of critical care management.

For patients with sepsis, serial lactate monitoring is a useful and practical tool to gauge global tissue hypoxia and patient response to clinical intervention. However, the influence of this monitoring strategy on the incidence of sepsis-associated pulmonary complications is unknown. We hypothesized that severe sepsis patients undergoing serial lactate monitoring in the emergency department (ED) would demonstrate a decreased incidence of pulmonary complications compared to those resuscitated without this management strategy.

**Methods:** Retrospective observational cohort study of adult severe sepsis and septic shock patients with an initial lactate level ≥ 4 mmol/L presenting to a large academic ED. 245 enrolled patients were assigned to serial lactate monitoring (SL, n = 152) or no serial lactate monitoring (NL, n = 111). The primary outcome of interest was a composite of two major pulmonary complications: (1) development of ARDS and (2) new respiratory failure after hospital admission. Patients developing ARDS were also analyzed separately and an a priori subgroup of patients receiving mechanical ventilation while in the ED were evaluated for progression to ARDS.

**Results:** Twenty-eight patients (21%) in the SL group and 37 patients (33%) in the NL group developed the primary outcome (P = .03). Multivariate analysis demonstrated an association between the NL group and the development of major pulmonary complications (aOR 2.1, 95% CI 1.15-3.78). Mechanical ventilation in the ED was independently associated with ARDS (aOR 3.5, 95% CI 1.8-7.0). In the subgroup of patients mechanically ventilated in the ED (n = 97), those who subsequently developed ARDS received higher tidal volumes when compared to patients who did not develop ARDS (87.2 ml/kg PBW [IQR 7.6-9.0] vs 7.6 [IQR 6.8-9.0], P < .01).

**Conclusion:** Serial lactate monitoring is associated with a decrease in major pulmonary complications in severe sepsis and septic shock. The incidence of ARDS is also influenced by ED-based mechanical ventilation. These results provide two potentially modifiable variables that could be targeted in future studies to prevent pulmonary complications in this subset of critically ill patients.

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**Comparison of Non-Invasive Methods of Assessing Fluid Responsiveness in Critically Ill Patients**

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**Study Objectives:** The ability to accurately assess fluid responsiveness (FRes) is central to guiding fluid management in critically ill and septic patients. Evidence is accumulating that both inadequate and excessive fluid resuscitation are associated with increased morbidity and mortality, and there is a growing body of literature underscoring the importance of achieving this balance early in the patient’s course of treatment. Emergency physicians need to take an approach to initial fluid management that has the goal of rapidly giving the patient as much fluid as they need, but no more. It is thereby becoming increasingly important to have access to point-of-care tools that may be easily integrated into emergency department practice to assist clinicians in tailoring their fluid resuscitation strategy to the needs of the individual patient.

In this pilot study, we evaluate FRes prediction using clinical judgment and ultrasound in critically ill patients using non-invasive cardiac output monitoring as a gold-standard measure.

**Methods:** We evaluated fifteen patients admitted to the medical intensive care unit. Patients over the age of 18 with any admitting diagnosis were screened for inclusion in the study. Patients for whom there was a clinical decision being made about fluid management as per the clinical team were enrolled in the study. We asked the attending physician to predict whether the patient would be fluid responsive based on their clinical judgment, and also asked them to rate how certain they were of their assessment. We then obtained bioreactance cardiac output measurements (Cheekar NICOM) and ultrasound measurements pre- and post-passive leg raise. Ultrasound measurements obtained included inferior vena cava-caval index (IVC-CI), left ventricular outflow tract maximum flow velocity (Vmax), carotid artery Vmax, and femoral artery Vmax. Ultrasoundographers were blinded to admitting diagnosis, attending physician clinical assessment of FRes, and bioreactance cardiac output measurements.

**Results:** Using bioreactance cardiac output monitoring as a gold standard measure, we found that clinical judgment accurately predicted FRes in nine of fifteen patients. Left ventricular outflow tract Vmax also accurately predicted FRes in nine of fifteen patients. Carotid Vmax accurately predicted FRes in ten of fifteen patients. Femoral Vmax accurately predicted FRes in seven of fifteen patients. IVC-CI ultrasound accurately predicted FRes in six of fifteen patients. Of the six patients in whom clinical judgment failed to accurately predict FRes, ultrasound accurately predicted FRes in four. In five of the seven patients for whom the attending physician rated their judgment as ‘somewhat certain,’ and in all three of the three patients for whom the attending physician rated their judgment as ‘not at all certain,’ ultrasound accurately predicted FRes.

**Conclusion:** Using bioreactance cardiac output monitoring as a gold standard measure, we found that ultrasound did not predict FRes better than clinical judgment in critically ill patients. Left ventricular outflow tract Vmax and carotid artery Vmax were comparable to clinical judgment in their ability to predict FRes. Ultrasound may be a useful adjunct to clinical judgment, especially in patients where the clinician has uncertainty regarding the patient’s fluid status.

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**Increased Mortality Demonstrated in Hemodynamically Stable Septic Patients Who Develop Hypotension After Antibiotic Administration and Hospital Admission**

Maier R, Jr., Felton B, Khoury A, Zaszczyznycki J/Michigan State University/Sparrow Health Systems, Lansing, MI; Michigan State University, East Lansing, MI

**Study Objectives:** Sepsis is a common disease process encountered in the emergency department with an overall mortality of 35-60%. Although there is an abundance of literature in patients with severe sepsis, a literature review found only one study by Glickman et al which showed that emergency department (ED) patients admitted for sepsis can deteriorate to severe sepsis and septic shock within 72 hours; however, blood pressure (BP) was only examined every 24 hours. The progression to hypotension in these patients may be related to an increase in 30-day mortality.

**Methods:** The first aim of this study is to determine the incidence of normotensive sepsis patients who receive antibiotics and subsequently develop hypotension defined as a systolic blood pressure (SBP) of less than 90 mmHg in the first twelve hours of treatment. The second aim is to determine in-hospital mortality following antibiotic administration in normotensive sepsis patients who present to the emergency department (ED) and become hypotensive following admission. **Participants:** All admitted patients from the ED 18 years of age and older presenting with two of four SIRS criteria and a suspected source of infection receiving antibiotics in the ED. Subjects who were initially hypotensive were excluded, as there are well-established
3.6% of patients developed a thromboembolic event during hospitalization. We found (OR 1.1, 95% CI 0.89-1.39, analyzed; there were insufficient outcomes to enable multivariate analysis. There was no association between this outcome of interest, and either the amount of FFP administered (odds ratio 1.22, 95% CI 0.84-1.77, P = .29) or the infusion rate of FFP (OR 1.1, 95% CI 0.89-1.39, P = .40). Conclusions: In a large cohort of patients receiving emergency warfarin reversal, 3.6% of patients developed a thromboembolic event during hospitalization. We found no evidence that FFP dose or rate of infusion increase this risk; however, the low frequency of this event may have limited our ability to detect a true but small effect.

412 Intraosseous Pressure Monitoring in Critical Care Patients
Saltzman JG, Frascone RJ, Zagar AE, Burnett AM, Loken NM, Wewerka SS/Regions Hospital, St. Paul, MN

Study Objective: Rapid access to the vascular system for fluid resuscitation and medication administration via an intraosseous (IO) line has become a common practice in emergency medicine. However, if vascular dynamics can be determined from the intramacular space, more invasive types of monitoring may be able to be avoided. The objective of this proof of concept pilot study is to describe IO pressure measures and their relationship to blood pressure obtained via external blood pressure cuff in intensive care unit patients.

Methods: This is a prospective, convenience sample, proof of concept pilot study conducted in the medical and intensive care units at an urban, Level I trauma center. Patients were identified in the emergency department and enrolled under a waiver of informed consent granted by the HealthPartners Institute for Education and Research Institutional Review Board. Inclusion criteria included age ≥ 18 year old, presence of an IO placed by EMS or in the emergency department as standard of care, and planned admission to the medical or surgical intensive care unit. Patients were excluded if they had anticipated surgery within 12 hours of IO placement, current infection at the placement site, or prisoner of the state. A pressure transducer was attached to the IO catheter as soon as the line was no longer required for clinical care. External cuff pressure readings were recorded every 15 minutes, and IO pressure data were recorded continuously for up to 12 hours. IO systolic, diastolic, and mean pressure (IO SBP, IO DBP, IO Mean) readings were summarized for the minute before and minute following an external cuff pressure reading. The ratio of IO pressure to external cuff pressure (IO Systolic Blood Pressure / Cuff SBP, IO DBP / Cuff DBP, IO Mean / Cuff Mean) were calculated.

Results: Ten patients were enrolled between January 2014 and April 2015. Average patient age was 60 (range = 45-81), and 80% were male. Primary diagnoses were as follows: acute respiratory failure (4), meningitis (1), ingestion (1), hemorrhagic shock (1), congestive heart failure (1), cardiac arrest (1), and altered mental status (1). The average IO SBP, IO DBP, and IO Mean were 39.47±12.73 mm Hg, 31.51±7.59 mm Hg, and 34.96±8.83 mm Hg respectively. The ratio of IO SBP to cuff SBP, IO DBP to cuff DBP, and IO Mean to cuff mean are 34.5±13.4%, 40.5±22.3%, and 40.1±17.1% respectively. There were no adverse events reported during the monitoring period.

Conclusions: In this convenience sample of severely ill and injured patients, IO pressure was reliably obtained and appears to be 35-40% of blood pressure readings obtained via external blood pressure cuff. This method of pressure monitoring may be an appropriate alternative invasive monitoring option in the future.

413 Is Routine Chest Radiography Necessary After Ultrasound-Guided Right Internal Jugular Vein Catheterization?
Hourmozdi JJ, Markin A, Johnson B, Fleming PR, Miller JB/Henry Ford Hospital, Detroit, MI

Study Objectives: Central venous catheter (CVC) placement is a common procedure performed on critically ill patients. Routine chest radiographs immediately after CVC placement is considered standard practice and the use of CVCs are commonly delayed until the chest radiograph is performed and read. Ultrasound-guided right internal jugular (IJ) CVCs are the most common type of CVC placed. We hypothesize that the rate of clinically relevant complications of ultrasound-guided right IJV catheterization is extremely low.

Methods: This study is a retrospective chart review of all (n=1,322) ultrasound-guided right IJV CVCs attempts at an academic tertiary care hospital system over a one-year period (January 2014 to January 2015). Demographic and clinical information including age, sex, race, body mass index (BMI), history of chronic obstructive pulmonary disease (COPD) and end-stage renal disease (ESRD) was obtained. Standardized procedure notes for all ultrasound-guided right IJV CVC attempts were reviewed for number of attempts, success of placement and documented complications. Chart review was performed on each patient to verify hospital location and mechanical ventilation at the time of CVC placement, and complications including pneumothorax or significant misplacement. The clinical relevance of these complications (intervention for pneumothorax or misplaced CVC) was also assessed. Analysis included descriptive statistics and logistic or Poisson regression to model variables associated with successful placement and complications.
Results: The overall success rate of ultrasound-guided right IJV CVC placement was 96.9%. The average number of attempts was 1.3 attempts. The hospital location of CVC placement was 52% in the intensive care unit, 47% in the emergency department and 1% in the general wards. 56% were mechanically ventilated at the time of CVC placement. There was only one pneumothorax (0.08%), and this patient required chest tube placement and did not develop tension physiology. The rate of significant misplacement was 1.29% (17 patients: 15 brachiocephalic or subclavian vein, 1 in the inferior vena cava, and 1 presumed RV). Thirteen of these CVCs were replaced or adjusted. There were no arterial placements found on chest radiography. Adjusting for age, BMI, mechanical ventilation and history of COPD or ESRD, female sex was associated with higher odds of successful placement (OR 2.3, 95% CI 1.2-4.6, P = .013). Adjusting for these same covariates, female sex was marginally associated with greater odds of misplacement (OR 1.9, 95% CI 0.94-3.9, p = .007). ESRD, BMI, and mechanical ventilation were not associated with greater odds of misplacement.

Conclusion: In a large teaching hospital, the overall rate of clinically relevant complications of ultrasound-guided right IJV catheterization is exceedingly low (0.08% for pneumothorax and 0.98% for misplacement). Routine chest radiographs after this common procedure is an unnecessary use of resources and delays use of the CVC in critically ill patients.

414 Supra-Physiologic Tidal Volumes Delivered by Mechanical Ventilation After Emergency Department Intubation

Prekker ME, O’Brien-Lambert A, Hottinger DG, Ambur S, Roehl AE, Adams AB, Hennepin County Medical Center, Minneapolis, MN; University of Washington, Seattle, WA

Study Objectives: Empiric settings for invasive mechanical ventilation are made soon after a patient is intubated in the emergency department (ED), often with incomplete diagnostic or anthropometric information. Low tidal volume ventilation (<8 mL/kg predicted body weight (PBW), mimicking physiologic spontaneous tidal breathing) has been associated with improved clinical outcomes in intubated patients in the ICU and operating room, yet ED mechanical ventilation practices are poorly studied. We characterize early mechanical ventilation practices in our ED to identify potential areas for improvement.

Methods: We conducted a retrospective review of mechanical ventilation practices following ED intubation at our institution, an urban, Level 1 Trauma Center with 105,000 annual ED visits, between 2007 and 2014. Historically, a respiratory therapist has been responsible for initial ventilator settings, in consultation first with the intubating emergency physician and later with a critical care physician. We excluded patients <18 years of age, patients missing data for tidal volume or height (the latter was used to calculate PBW), and patients who died or were extubated or on a spontaneous mode of ventilation by 24 hours. We collected data immediately post-intubation in the ED (T0), at ICU arrival (T1), and after 24 hours in the ICU (T24).

We employ descriptive statistics, chi-square test, and logistic regression to analyze univariate associations between variables of interest and tidal volume.

Results: We identified 2,335 adults with complete data who were intubated in our ED over 7 years. The median ED length of stay was 1.8 hours (IQR 1.2 to 2.8 hours) and 99% of patients were ventilated with an assist control-volume mode. Overall, a minority of patients (28%, N=665) received a tidal volume <8 mL/kg PBW within 24 hours of intubation, although the proportion of patients ventilated with low tidal volumes increased over time (P = .03, chi-square test for linear trend). Patients in the lowest quartile of PaO2/FIO2 ratio (ie, those with the most impaired oxygenation) were significantly more likely to receive low tidal volume ventilation compared to the highest quartile of PaO2/FIO2 ratio (odds ratio 1.51, 95% CI 1.09 to 2.10, P = .014);

we did not observe a similar association between low tidal volume ventilation and quartiles of respiratory system compliance at T1 [calculated as tidal volume/plateau pressure - PEEP], where the lowest quartile represents the most impaired mechanics] (OR 0.79, 95% CI 0.61 to 1.01, P = .06). Plateau pressure was not recorded in the ED in 69% of cases. We observed little variability (mean ± SD) in the distribution of tidal volumes between T0 (9.0 ± 1.4 mL/kg PBW), T1 (8.9 ± 1.3 mL/kg PBW), and T24 (9.9 ± 1.4 mL/kg PBW). ED and ICU tidal volumes were strongly correlated (r=0.95 between T0 and T24, P < .001). 218 patients (9%) underwent tracheostomy and hospital mortality was 9%.

Conclusion: Over three-quarters of intubated ED patients are initially prescribed supra-physiologic tidal volumes (>8 mL/kg PBW), which are rarely modified in the first 24 hours, and may represent an inadvertent, unnecessary risk for ventilator-induced lung injury. We recommend timely measurement of patient height to determine PBW and early introduction of protective tidal ventilation.

415 Time Is of the Essence: Early Intravenous Fluid Resuscitation in Patients With Severe Sepsis and Septic Shock

Leiseman D, Wie B, Ward MF, D’Amore J/North Shore University Hospital, Manhasset, NY

Study Objectives: Evaluate effect of time to fluid resuscitation from severe sepsis/septic shock identification (SS/SS ID) on in-hospital mortality, length of stay (LOS), and intensive care unit (ICU) utilization.

Methods: Prospective cohort study of patients with SS/SS over 13 months at an urban tertiary care center (90k emergency department [ED] visits yearly). SS/SS was defined as 2+ SIRS criteria and Lactate ≥ 2.2, SBP <90 or acute end-organ dysfunction. Exclusion criteria were <18y, advanced directives precluding the bundle, declined interventions, or admission to palliative care. Data collected included time from SS/SS ID to fluid resuscitation, demographics, admission unit, LOS, and in-hospital mortality. In-hospital mortality, ICU utilization, and LOS were compared between patients who received fluid resuscitation in 30m and those who did not with independent samples t-test, LIFETEST procedure, or chi-square analysis. Time to IV fluid resuscitation as a predictor for in-hospital mortality was tested using logistic regression adjusting for age, sex, race, payer, serum lactate, case mix index (CMI), MS-DRG product line, and other bundle interventions. A multivariable Cox proportional hazards regression was performed to examine the effect of 30m fluids on LOS adjusting for the same covariates and censoring for mortality. The model’s “event” was discharge alive so a HR >1.0 indicates shorter LOS. Fluid resuscitation within ≤30, 31-60, and 61-180m were also compared to subjects receiving fluids in >180m or not at all.

Results: 64% of 1867 patients received fluids within 30m. The Table shows demographic and clinical differences between groups. In multiple logistic regression analysis ( Hosmer and Lemeshow χ²=1.90, df=8, P=0.98), fluid resuscitation in >30m was associated with a 1.53 times increased mortality risk (OR = 1.53; 95% CI: 1.15-2.04, P = .004). In the Cox model, ≤30 min fluids was associated with 13.5% shorter LOS (HR = 1.15, P = 0.008, 95% CI 1.038-1.287). In the model comparing fluids ≤30, 31-60, and 61-180 min to a reference group receiving fluids in >180 min or not at all, there was significant mortality reduction only within the ≤30 minute group (OR: 0.60, P = .006, 95% CI 0.41-0.87) ( Hosmer and Lemeshow χ²=4.20, df=8, P = .84). In Cox regression comparing the same groups’ association with LOS, the ≤30 minute group had a 26% shorter LOS (HR: 1.26, 95% CI 1.09-1.46, P = 0.002), the 31-60 minute group had a 29% shorter LOS (HR: 1.29, 95% CI 1.05-1.58, P = 0.016), and the 61-80 minute group showed no significant difference compared to the reference group.

Conclusion: Fluid resuscitation within 30m of sepsis identification was associated with significant reductions in mortality, LOS and ICU days for patients with severe sepsis and septic shock.

<table>
<thead>
<tr>
<th>All Subjects</th>
<th>≤30m Fluid</th>
<th>Control</th>
<th>P value</th>
<th>31-60m Fluid</th>
<th>60-180m Fluid</th>
<th>Control</th>
<th>P value</th>
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<tr>
<td>N</td>
<td>1,866</td>
<td>1,193</td>
<td>673</td>
<td>176</td>
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<td>319</td>
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<td>Serum Lactate</td>
<td>2.8 ± 0.1</td>
<td>3.0 ± 0.1</td>
<td>2.6 ± 0.2</td>
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<td>2.6 ± 0.2</td>
<td>2.7 ± 0.3</td>
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<tr>
<td>Case Mix Index</td>
<td>2.03 ± 0.08</td>
<td>1.91 ± 0.08</td>
<td>2.25 ± 0.17</td>
<td>&lt;.001</td>
<td>2.19 ± 0.30</td>
<td>1.96 ± 0.20</td>
<td>2.43 ± 0.25</td>
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<tr>
<td>Mortality</td>
<td>282 (15.1%±1.6)</td>
<td>13.3% ± 1.9</td>
<td>18.3% ± 3.0</td>
<td>.004</td>
<td>16.0% ± 5.3</td>
<td>16.9% ± 5.6</td>
<td>19.7% ± 4.3</td>
</tr>
<tr>
<td>ICU Admission</td>
<td>528 (28.0%±2.0)</td>
<td>26.0% ± 2.5</td>
<td>32.0% ± 4.0</td>
<td>.007</td>
<td>25.0% ± 6.0</td>
<td>30.0% ± 7.0</td>
<td>37.0% ± 6.0</td>
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<td>LOS (days)</td>
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<td>6 (6-7 days)</td>
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<td>&lt;.001</td>
<td>7 (6-7 days)</td>
<td>7 (6-8 days)</td>
<td>8 (7-9 days)</td>
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<tr>
<td>ICU Days</td>
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<td>3 (3-4 days)</td>
<td>4 (4-5 days)</td>
<td>.023</td>
<td>4 (3-7 days)</td>
<td>4 (2-5 days)</td>
<td>5 (5-6 days)</td>
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</table>
416 Video Triage Project: Can an Informational Video Improve the Patient Experience?

Williams M, Dean D, Brickman K, Fink B, Briggs J, Davis WN, Cairl N, Kazan V/The University of Toledo, Toledo, OH

Study Objectives: To improve the patient experience in the emergency department (ED) by providing education of the triage process through an information video.

Methods: We enrolled randomly selected ambulatory patients of age 18 years and above presenting to the emergency department at the University at Toledo Medical Center over the course of 2014. Patients who bypassed triage or arrived by EMS were excluded. Patients were shown a brief video outlining the ED/triage process from door entry to final disposition. Patients answered a short questionnaire that obtained both pre and post video knowledge of the ED/triage process as well as the patient’s level of anxiety. A 5-point Likert scale graded zero to five was used to quantify these responses.

Results: A total of 200 patients were enrolled in the study. All patients underwent the triage process and completed both the pre and post video survey. Using the 5-point Likert scale, average patient knowledge (5-point Likert scale, average patient knowledge (5 = very knowledgeable, 1 = not knowledgeable at all) of the ED/triage process increased from 3.27 before viewing the video to 4.74 after viewing the video (P < .05). Similarly, patient anxiety (5 = very anxious, 1 = not anxious at all) decreased from 2.63 pre video to 2.39 post video (P < .05). In addition, 70.5% (141/200) of participants stated that watching an informational video helped them to better understand the triage process.

Conclusion: Showing a brief informational video to patients undergoing ED triage showed an increase in understanding and knowledge of the ED/triage process and a reduction in anxiety which could help improve the patient experience. An informational video is an inexpensive intervention that could reduce patient anxiety by providing triage education in the emergency department.

417 False Negative Point-of-Care Urine Pregnancy Results in the Emergency Department: Quantifying a Needle in the Haystack in the Clinical Setting

Woo K-M, Director T, Sweeney C, Cristales D, Dejuila J, Baumiull K/Mount Sinai Beth Israel, New York, NY

Background: Although false negative point of care (POC) urine pregnancy (UPreg) results are infrequent, the large number of tests ordered in a high volume emergency department (ED) can be expected to yield a significant cohort. OSOM hCG Combo ( Sekisui Diagnostics, San Diego, CA) is a commonly used brand of POC UPreg test in EDs. Recent literature suggests that OSOM has inferior sensitivity at very early stages of pregnancy, greater chance of misinterpretation, and higher rates of hook effect interference that can yield false negatives. Suboptimal urine samples, user technique, and documentation likely further impact this rate.

Study Objectives: To quantify the rate of false negative UPreg results using a common POC test amid routine ED conditions. Secondly, to review cases for potentially missed diagnoses and assess staff reporting of occurrences.

Methods: Over a one-year period in our academic, large volume, urban ED, we compared all positive results–both POC UPreg and quantitative serum hCG results as documented in our electronic medical record (EMR) system - against same or consecutive visit POC UPreg results up to three months apart. UPreg results re-documented at < 5 minutes were eliminated as duplicates.Charts were reviewed to determine if UPreg discordances were plausibly explained by clinical condition (eg, new pregnancy, recent delivery or miscarriage) or were likely false negatives. Canned discordant UPreg results for reasons of “additional information obtained” were also analyzed.

Results: A total of 17,227 POC UPreg results were documented on 12,764 patients, with 1268 positive results. 9% of visits with negative UPreg results had same-day serum hCG testing. We discovered 154 instances of false negative UPreg results over 146 visits for 137 patients, leading to a false negative rate of 10.8% (95% CI 9.3-12.6) per result, or 10.5% of visits (95% CI 8.9-12.2). Cases included at least 11 new ectopic pregnancies with two missed diagnoses (one discharged, one left without being seen) as well as one molar pregnancy. When same-day serum hCG’s were available, 61% (80/131) of incidences occurred at < 200 mIU/mL. Two of the newly diagnosed ectopies presented with serum levels of 138 and 141, and an acutely rupturing ectopic failing methotrexate therapy had a serum hCG of 22. While false negatives at serum hCG < 200 may be due to low test sensitivity, false negatives at higher levels of serum hCG are more likely influenced by a combination of user misinterpretation, hook effect interference, or erroneous EMR documentation. No formal incident reports were filed; only 5% of instances (8/154) were reported to department administration.

Conclusion: Our institution’s rate of false negative POC UPreg results using OSOM hCG Combo tests was unacceptably high. Poor outcomes included both near-and actual-miss cases of ectopic pregnancy. While technique and faulty EMR documentation are likely contributory, regular staff inserviceing and the ability cancel and correct prior EMR entries reduces this possibility. Since only a fraction of negative UPreg results had corresponding serum hCG levels, and not all repeated false negatives are documented again, our false negative rate may be an underestmate. Systematic methods of discovering false negative UPreg results in the clinical setting are necessary, as staff rarely report occurrences.

418 The Medical-Legal Exposure of Blood Cultures Obtained in the Emergency Department on Discharged Patients

Jordanova R, Jayaparakash N, Gill J, Rivers EP/Henry Ford Hospital, Detroit, MI

Background: Obtaining blood cultures in the diagnosis of infection in inpatient settings have established therapeutic and outcome implications. The benefits of blood cultures obtained in emergency departments (ED), however, remains unclear. The clinical utility of blood cultures in ED patients who were ultimately admitted has been well studied. However, no studies to date have evaluated blood culture use in the outpatient setting for patients discharged from the ED or the medical legal risk exposure in the absence of follow-up.

Study Objectives: To examine the incidence of bacteremia over a one-year period in adult patients presenting to the ED who were subsequently discharged. To assess the patient characteristics, the incidence of a positive blood culture and the follow-up in this study population.

Methods: The results of blood cultures obtained on ED patients who were discharged from January 2014 to December 2014 were examined. In addition to culture results, patient demographics, culture results and follow-up encounters were examined.

Results: A total of 1148 patients received blood cultures before discharge from the ED. Of the total, 1104 patients (96%) had negative blood cultures and 44 patients (3.8%) had positive cultures with a median age of 53 years. Of the positive cultures 24/28 (86%) were clinically significant pathogens that would necessitate inpatient antibiotics. Of these patients only 14 (50%) responded to a call for a return visit. These 50% were admitted with varying degrees of sepsis necessitating hospitalization. The remaining 50% were lost to follow-up.

Conclusions: Obtaining blood cultures in the ED management of infection leads to significant medical legal risks. Although the incidence of bacteremia is low, those patients who do have positive cultures are at a considerable risk for mortality, especially in the absence of follow-up. This risky practice should be examined for standardization and follow-up before becoming generalized behavior in the ED. Point-of-care technologies for bacteremia are currently being developed that may diminish this problem.

419 Health Care Effectiveness Data and Information Set Criteria for Lower Back Pain Imaging in Emergency Department Observation Unit Patients: Compliance and Association With Early Intervention

Richmond L, Halvorsen J, Pena M, Martus W, Coba Y/ST. John Hospital and Medical Center, Detroit, MI; St. John Macomb Oakland Center, Warren, MI

Background: Acute low back pain is a common presenting complaint to the emergency department (ED) and is associated with high medical costs. These costs include imaging and early procedural and surgical interventions. Currently, Healthcare Effectiveness Data and Information Set criteria (HEDIS-C) for acute low back pain are used to help clinicians identify patients at highest risk for serious abnormalities or disease in an effort to reduce unnecessary imaging.

Study Objective: Our objectives were to investigate compliance with HEDIS-C for lower back pain imaging in ED patients placed in an ED observation unit (EDOU) and then compare patients with and without HEDIS-C for imaging types and early procedural or surgical intervention.

Methods: This was a multi-center retrospective cohort chart review of adult ED patients with acute low back pain who were placed in an EDOU from January 1, 2013 to December 31, 2013. Data collection included presence of HEDIS-C including history of back trauma, IVDA, cancer or presence of neurologic deficits; demographics; imaging performed; and any early procedural or surgical intervention performed within 30 days of index EDOU visit. Data were collected using the hospital electronic medical record. Univariate and multivariate were analyzed for statistical significance. P < .05.

Results: There were a total of 280 ED patients placed in an EDOU for acute low back pain in 2013; 174 (62.1%) without HEDIS-C and 106 (37.9%) with HEDIS-C. Patients with and without HEDIS-C were similar: mean age 58.5 years vs 57.4 years
Hypoglycemia in the Emergency Department: Rate of Iatrogenic Etiology and Treatments Administered

Driver B, Moore J, Prekker M/Hennepin County Medical Center, Minneapolis, MN

Background: Hypoglycemia is frequently encountered in the emergency department (ED). The current practice of treating hypoglycemia in the ED has not been well defined, nor is it known how many ED cases of hypoglycemia are a result of iatrogenesis.

Study Objectives: To describe ED treatments for hypoglycemia and to quantify the proportion of hypoglycemia that develops during an ED stay.

Methods: Retrospective database query of all adult patients with a chief complaint of hypoglycemia or an ED diagnosis of hypoglycemia, or an ED glucose value of less than 60 mg/dL between January 2009 and June 2013. Patient demographics, chief complaint, glucose values, treatments administered, and ED diagnoses were pulled from the electronic medical record directly. Data were analyzed descriptively.

Results: A total of 1,872 patients had hypoglycemia during the timeframe; 923 and 914 had a chief complaint and ED diagnosis of hypoglycemia, respectively; 849 had a glucose less than 60 mg/dL. Mean initial glucose was 70 mg/dL (95% CI 65-74; range 35-141). Of patients who had imaging performed, 41% had at least one HEDIS-C and 59% had no HEDIS-C. Patients with HEDIS-C were as likely as patients without HEDIS-C to have an X-ray (43% vs 41%, P = .74), CT scan (18% vs 19%, P = .92), MRI (49% vs 39%, P = .08) and consultation by spine specialist (63% vs 55%, P = .18). Patients with HEDIS-C had no associated difference with a procedure or surgery performed within 30 days compared to patients without any HEDIS criteria (22% vs 16%, P = .18).

Conclusions: Less than half of EDOU patients who underwent lower back imaging had one HEDIS criteria and likely not the sole indications for radiographic imaging. HEDIS-C was not associated with radiographic utilization and failed to identify 16% that had one HEDIS criteria and likely not the sole indications for radiographic imaging.

Social Work Screening Identifies Unmet Psychosocial Needs Amongst Sickle Cell Patients in the Emergency Department: A Qualitative Study

Freiermuth C, Johnston J, Rutherford C, Tanabe P/Duke University, Durham, NC

Study Objective: Prior research has shown that psychological and social factors contribute to pain complaints in the sickle cell population. Patients with sickle cell disease (SCD) frequently seek treatment in the emergency department (ED) for pain crises. The objective of this study was to identify unmet psychosocial needs amongst patients with SCD who seek care in the ED.

Methods: A psychosocial screening tool was implemented as part of a larger study designed to improve the quality of ED care for patients with SCD. The tool was developed based on prior research, with input from physicians, nurses, social workers and patients on a quality improvement (QI) team. Questions were designed to identify concomitant psychiatric conditions, substance abuse, unstable living situations, insurance coverage gaps, and social support. The screening tool was implemented in an urban ED with 16 hours of social work coverage during the week and 24 hours of coverage on the weekends. An automatic page was sent to the social worker upon registration of an adult patient with sickle cell disease. Social workers completed a face-to-face interview with patients willing to participate. Completed screens were faxed to the SCD program social worker to follow-up on addressing the patients’ needs. De-identified screens were then faxed to the QI team. Direct quotes from interviews were entered into a Word document and arranged into common themes. Themes were agreed upon amongst the QI team.

Results: A total of 147 interviews were conducted over the course of 16 months. Qualitative review and thematic organization revealed a variety of problems that may contribute to increased visits to the ED. Common themes that emerged were: lack of transportation to clinic appointments, difficulty scheduling clinic appointments, insufficient funds to obtain prescriptions, problems with insurance, depression, anxiety, and frustration with the care they received. Narratives revealed feelings of helplessness, with statements such as “I feel overwhelmed by my illness” and “I want to go out, but then get sick and stuck.” Patients also expressed desire to avoid the ED, explaining that “People judge you like a drug seeker” and “Doctors do not understand the severity of pain.” Social workers reported that they learned a significant amount about sickle cell disease and resultant complications as a result of this screening process and patients reported that they appreciated that someone cared enough to ask these questions. The SCD social worker was able to follow up with individual patients to provide further resources.

Conclusion: Sickle cell patients in the ED have unmet psychological and social needs. These were identified with a short screening tool designed to be administered by social workers, case managers, nurses or physicians. Implementation of this screen can lead to referrals that address these unmet needs and potentially lead to decreased use of the ED.
and low triage levels was similar among Italian nurses (4-level TEM v2) and the Swedish nurses (5-level RETTS): high order 28.3% (TEM v2) vs 43.5% (RETTS); 71.7% (TEM v2) vs 56.5% (RETTS). The overall inter-rater reliability was moderate-strong for RETTS: K = 0.42 (CI 95%; 0.37-0.47), ICC = 0.96 (CI 95%; 0.65-0.98); good–almost perfect for TEM: k=0.66 (CI 95%; 0.61-0.71), ICC = 0.98 (CI 95%; 0.97-0.99). The 4-level TEM showed a similar good inter-rater reliability among all triage acuity levels: K inter range from 0.60 (code 2) to 0.74 (code 4). The 5-level RETTS had the lowest reliability for code 4 (K inter =0.25), the best for code 1 (K inter =0.6).

Conclusion: The four- and five-level triage scales tested in this study showed a similar good inter-rater reliability. Our results are in contrast with previous studies which showed better performance of 5-level scales. Limitation is that there are triage scenarios and not real patients.

423 Nailing the First Poke: A Systematic Review and Meta-Analysis of Randomized Controlled Trials of Peripheral Intravenous Catheterization Interventions

Parker SIA, Benzies KM, Hayden KA, Lang ES/University of Calgary, Calgary, AB, Canada

Study Objectives: Peripheral intravenous catheterization (PIC) is among the most commonly performed procedures in emergency departments and inpatient units. Health care professionals are often unsuccessful on the first attempt causing increased pain, and putting patients at risk for treatment and diagnostic delays, extravasation, infiltration, and infection. We sought to determine strategies associated with PIC first attempt success in adult emergency department patients and inpatients. Other outcomes of interest were procedure time and overall success.

Methods: In this systematic review and meta-analysis, we included randomized controlled trials of PIC techniques for the administration of therapies versus standard of care. Between November 2014 and December 2014, we searched MEDLINE, EMBASE, CINAHL, and databases of unpublished literature. We included English reports without date limits. Two independent reviewers screened the first 100 titles and abstracts with 99% interrater agreement. Disagreement was settled by consensus. One reviewer completed data extraction using a published tool that had been piloted and refined. Potentially duplicate reports were compared and the most recent report included. One author assessed for risk of bias using the Cochrane Collaboration’s risk of bias tool. Meta-analysis was considered if there were two or more homogenous studies of a specific intervention included.

Results: We included 14 randomized controlled trials involving 3201 participants. Interventions included the AccuVein vein viewing system, AccuCath catheter system, ultrasound guidance, safety catheters, and topical anaesthetic use during PIC. Randomization was adequate in 64 percent of the studies; however, only 14 percent of the studies adequately reported blinding of outcome assessors or registered the study protocol. Three studies compared AutoGuard safety and Insize non-safety catheters and were suitable for meta-analysis. There was no difference in first attempt success between these catheters with a relative risk of 0.95 (95% confidence interval -0.04, 0.04). Meta-analysis could not be completed for other interventions due to only one trial examining an intervention, unclear reporting of study methods and results, and between study heterogeneity.

Conclusion: Ideally, interventions should be chosen based upon empirical evidence from well-designed and conducted randomized controlled trials. Unfortunately, there was insufficient evidence to determine the relative efficacy of the AccuVein vein viewing system, AccuCath catheter system, ultrasound guidance, or topical anaesthetics during PIC in hospital. We found the AutoGuard safety catheter did not negatively affect first attempt success during PIC. There was limited evidence to support the use of ultrasound for adults during PIC. To date, studies have included small sample sizes, inconsistently defined difficult venous access, or did not clearly report the ultrasound technique. Valid and reliable tools to prospectively identify patients with difficult venous access are needed. Further, well-designed and reported randomized controlled trials examining the effectiveness of ultrasound compared to standard of care are warranted.

Registration: PROSPERO registration: CRD42014015428.

424 Factors Associated With Clinical Course in Mild Traumatic Brain Injury With Intracranial Hemorrhage

Kretzler N, Hart K, Betham B, Lindsell C, Adeoye O/University of Cincinnati, West Chester, OH; University of Cincinnati Medical Center, Cincinnati, OH

Study Objectives: Emergency department (ED) management of mild traumatic brain injury (mTBI) patients with traumatic intracranial hemorrhage (tICH) is variable. Since 2000, our center has used a resource intensive approach of obtaining repeat head computed tomography (CT) 6-24 hours after initial imaging. Patients are only discharged if clinical and CT findings are stable. For patients with a Glasgow Coma Scale (GCS) score of 15 with tICH, we derived a decision tree to identify patients at minimal risk for an unfavorable clinical outcome.

Methods: This retrospective cohort study included patients presenting to the ED with blunt mTBI, GCS 15 and stable vital signs between January 2000 and December 2010. Patients with tICH on initial head CT who had a repeat head CT within 24 hours were included. We abstracted data using a standardized case report form and data dictionary. The first 30 cases underwent dual abstraction, and 50 additional cases were randomly selected for dual abstraction to confirm accuracy of abstraction. For this analysis, cases were excluded for injury >24 hours, pregnancy, concomitant non-minor injuries, or a bleeding diathesis, including lab measures of INR >1.4, aPTT >39 seconds, or platelets <50,000. Our composite outcome was death, need for neurosurgical procedure, hospitalization greater than 48 hours, or worsening tICH on repeat CT. The model variables included age, medications that affect clotting, headache, nausea, focal neurological deficit, and CT findings. CT findings were classified as subarachnoid, epidural, subdural, or intraparenchymal hemorrhages. We used classification and regression trees (CART) to determine predictors of the composite outcome. CART has the advantage of being able to consider non-linear relationships, complex interactions and co-linearity. To create a strong “rule-out” model, we weighted detecting an unfavorable outcome as four times more important as a favorable outcome.

Results: Of 1,011 patients with two head CTs performed in a 24-hour period, 240 (24%) met inclusion criteria and had an initial GCS of 15. Median time between CT scans was 6 hours (Range 0 - 23 hours, IQR 2). There were 562/240 (23%) patients with an unfavorable outcome, including two patients who died and one who required neurosurgical intervention. Factors in the final model in order of importance were cerebral contusion or intraparenchymal hemorrhage on initial head CT, age, nausea or vomiting, subarachnoid hemorrhage, and headache. The Figure shows the decision tree. In this model of patients with a GCS of 15, 93% of patients with unfavorable outcomes and 22% of patients with favorable outcomes were correctly classified. No patient who died or required a neurosurgical procedure was misclassified by the model. Sensitivity was 93% (95% CI 81.9% - 97.7%), Specificity was 26.5% (95% CI 20.6% - 33.4%).

Conclusion: The model correctly classified 93% of patients with an unfavorable outcome. Further refinement and validation in an independent cohort may render the model useful for identifying ED patients with tICH who have a low probability of poor outcome and may be safely discharged home.

425 Cost Analysis of Diagnosing Clinically Important Traumatic Brain Injury in the Pediatric Patient

O’Connor A/Johns Hopkins Hospital, Baltimore, MD

Study Objectives: The Pediatric Emergency Care and Research Network (PECARN) rules for head computed tomography (CT) give definitive guidance for the majority of children presenting to the emergency department (ED) with traumatic brain injury. This study seeks to use cost analysis to advise a systematic approach to diagnosis of the roughly 30% of patients who fall into the intermediate risk category, for whom PECARN rules provide little clinical direction.

Methods: This study employed decision analytical modeling to compare two theoretical strategies, a CT-all strategy and an observe-all strategy, to a model of current practice using reported rates of 35% CT use in the intermediate risk group. Because data suggest an observation period does not lead to clinically relevant delay in diagnosis,
effectiveness metrics were not included; this reduced assumptions made in the model and increased in global applicability. Risk of malignancy associated with CT scan was also excluded from the final model; inclusion of this risk increased the cost of the CT-all and current practice strategies, but the science of radiation-associated malignancy is inexact and significant cost savings can be demonstrated even without this inclusion. Patients with positive but clinically insignificant head CT findings were assumed to undergo a short observation stay of less than two days; a conservative false-positive rate was used in deference to the low observed n of positive head CT with and without clinically important traumatic brain injury (cTBI). Iterative one-way and probabilistic sensitivity analysis was performed.

Results: The cost per patient of the CT-all diagnostic strategy is the highest at $1706.40 per patient; 35% of that cost represents the CT itself, with 65% representing hospitalization costs for clinically insignificant head CT findings. The cost per patient of the current practice is $606.34, and the cost of an observe all strategy is $98.62. The marginal cost of diagnosing one cTBI using the scan-all strategy over the observe-all strategy is $162.50. With estimates of 600,000 ED visits for head trauma in the United States annually, 180,000 of which fall into the PECARN intermediate risk category, the observe-all strategy represents a $290 million annual savings over the CT-all strategy and $92 million savings over current practice.

Conclusion: Although CT and observation are traditionally presented as equivalent strategies for PECARN intermediate risk head trauma, an observe-all strategy presents negligible clinical risk and represents significant potential economic savings. Because physician ability to predict cTBI in this intermediate risk group is poor - one study documents 0.75% cTBI rate in clinically observed patients vs. 0.87% in patients with immediate CT when initial diagnostic decision is provider-driven - using cost data is a reasonable approach to improve practice. Consideration of the risk of radiation-associated malignancy suggests an observation strategy would be life-saving as well as cost-saving. Further study of clinical implementation of this strategy to demonstrate safety would strengthen these recommendations.

426 Angel Dust Trauma: Do Trauma Patients With Phencyclidine Positive Urine Drug Screens have Increased Morbidity or Mortality?
Gallagher R, Dangers J. Thornton SL/University of Kansas Hospital, Kansas City, KS

Study Objectives: Phencyclidine (PCP) use can lead to agitation and injury. It is frequently screened for in trauma patients via urine drug immunoassays (UDS) but little is known about PCP’s effect on trauma patients’ clinical outcomes. We sought to determine characteristics of trauma patients with a PCP positive UDS and if they had increased morbidity or mortality.

Methods: A five-year retrospective review of a level 1 trauma center’s trauma registry identified patients with a PCP positive UDS. Data collected included age, sex, race, vital signs, Glasgow coma score (GCS), mechanism of injury, injury severity score (ISS), rate of endotracheal intubation, ventilator days, ICU days, hospital days, disposition (home, jail, rehab), mortality and serum ethanol level (EtOH). This group was then compared to 3 age- and sex-matched control groups from the same trauma registry: one which had no EtOH detected and a negative UDS (Drug Free group), one which had no EtOH or an other-than-PCP positive UDS (Other Drug group) and one matched for similar EtOH (Same EtOH group). Further analysis was performed comparing PCP-positive patients with undetectable EtOH to PCP-positive patients with detectable EtOH. Statistical significance was determined using Student’s t-test and Pearson’s chi-squared test where appropriate.

Results: The registry contained 7770 patients of whom 156 met inclusion criteria. The mean age was 33.4 years (range 19-63) and 77% were male (n=121). Seventy-nine (51%) had a measurable EtOH and 117 (75%) were positive for another substance on their UDS. The characteristics where statistically significant differences existed between the PCP positive group and at least one of the other groups is shown in the Table. Significantly more patients in the PCP-Positive group were black than compared to the other three groups. The ISS was significantly lower in the PCP group than in the Drug Free and Other Drugs groups but did not differ from the Same EtOH group. No difference was seen in vital signs, mechanism of injury, ventilator days, ICU days, total hospital days, disposition, or mortality between the any of the groups. When PCP-positive cases with detectable EtOH were compared to PCP-positive cases with no detectable EtOH no statistically significant differences was noted for any characteristic. This study is limited by its retrospective nature and lack of confirmatory drug testing for PCP or other substances.

Conclusion: In this study we were unable to demonstrate any increased morbidity or mortality among PCP-positive trauma patients. The utility of screening for PCP in trauma patients warrants further investigation.

Table. Select Characteristics and Statistically Significant Differences.

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>PCP Positive</th>
<th>Drug Free</th>
<th>Other Drug</th>
<th>Same EtOH</th>
</tr>
</thead>
<tbody>
<tr>
<td>% Black (N)</td>
<td>76 (119)*#</td>
<td>18 (28)*</td>
<td>22 (34)#</td>
<td>22 (34)*</td>
</tr>
<tr>
<td>% Intubated (N)</td>
<td>17 (26)*</td>
<td>44 (68)*</td>
<td>54 (84)</td>
<td>45 (70)</td>
</tr>
<tr>
<td>% ICU</td>
<td>39 (63)*#</td>
<td>44 (68)</td>
<td>54 (84)#</td>
<td>45 (70)</td>
</tr>
</tbody>
</table>

Admission (N)

| Mean Serum (mg/dL) [SD] | 58 [91.67]* | 0 [NA] | 103 [116.79]* | 55 [89.01] |

427 Implementation of a “Safety Bundle” at a Large Annual Motorcycle Rally: Effect on Crash-Related Trauma Activations, Intracranial Injuries, and Deaths
Bedolla J, Radzikowski J, White S, Perry C, Cabanas J, Ziebell C/University of Texas at Austin, Austin, TX

Study Objectives: Motorcycle rallies are popular mass gatherings, with millions of yearly participants. They are associated with significant rates of accidental injury and death. The objective of this study was to determine if a safety bundle introduced by organizers and local officials decreased the incidence of crash-related trauma activations, intracranial injuries and deaths at one large, annual motorcycle rally.

Methods: This was a retrospective before-and-after cohort study. The Republic of Texas (ROT) Rally is a large annual multi-day gathering of mostly un-helmeted motorcyclists that attracts approximately 200,000 participants and spectators. In 2012, in reaction to increasing injury and crash rates, ROT Rally organizers, state officials and the local police collaborated to adopt a bundle of safety features that included a public awareness campaign; separation of motorcycle and regular traffic; police escorts during mass movements; strict enforcement of drinking and driving statutes; and a curfew at the motorcycle campground. Mandatory helmet use was not part of the safety bundle. To measure the impact of these initiatives, we manually searched trauma center emergency department records to identify all rally-related trauma activations during the ROT Rally dates for 2009 through 2011 (3 years before bundle implementation) and 2012 through 2014 (3 years after bundle implementation) with a documented mechanism of injury associated with a motorcycle crash. We used official rally registration as reported by the event organizers as our measure of exposure. We report the incidence of trauma activation, intracranial injury and death per 1,000 participant-days for both time periods, and compare these measures using rate ratio with 95% confidence interval.

Results: Official participation in the ROT rally remained relatively constant over time, with 98,000 registrant-days of exposure between 2009 and 2011, and 96,000 registrant-days of exposure between 2012 and 2014. There were 43 rally-related motorcycle crashes resulting in trauma activations pre-safety bundle (0.44 per 1,000 registrant-days) and 29 rally-related motorcycle crashes resulting in trauma activation post-safety bundle (0.30 per 1,000 registrant days). The ratio was 0.68 (95% CI 0.42-1.13). There were 15 intracranial injuries pre-safety bundle vs. 8 post-safety bundle, for a rate ratio of 0.54 (95% CI 0.20-1.37). There were 8 deaths pre-safety bundle vs. 4 post-safety bundle, for a rate ratio of 0.51 (95% CI 0.11-1.91). Helmet use was similar for patients encountered during the two periods: 19% for 2009-2011 and 21% for 2012-2014.

Conclusion: Incorporation of a motorcycle rally safety bundle decreased the observed rate of crash-related trauma activations, intracranial injury and death even though mandated helmet use was not part of the safety bundle. Although the changes did not achieve statistical significance, they are clinically meaningful. Further work is needed to determine if the improvements in safety are sustained over a longer period of time, to explore whether the safety bundle has any impact on non-crash-related injury, and to evaluate the effectiveness of the safety bundle at other motorcycle rallies.

428 Incidence of Delayed Intracranial Hemorrhage in Patients Treated by Anticoagulants Who are Victims of a Head Injury
Versielle G, Piez J, Jodot D, Renaud A, Gil-Jardine C, Glize B, Fautoux S, Pluduin A, Valdenaire Q/Pelletrin University Hospital, Bordeaux, France; Laveran Military Hospital, Marseille, France

Study Objectives: To measure the impact of delayed intracranial hemorrhage in patients treated by anticoagulants who are victims of a head injury.
Methods: We conducted a prospective study within two university hospitals. Every patient treated by anticoagulants and victim of a head injury was included. Upon their arrival in the emergency department, they had a physical examination with determination of the Glasgow Coma Scale (GCS), and a blood test to measure the international normalized ratio (INR). A brain computed tomography (CT scan) was then carried up in the next hour. In case of intracranial hemorrhage, an antagogenization of the anticoagulant activity was immediately performed. Otherwise, patients were monitored in the emergency department, and a second brain CT scan was realized 24 hours after the fall. The primary endpoint was the occurrence of an intracranial hemorrhage at the second CT scan.

Results: Between July 2013 and December 2014, 419 patients were included. The average age was 81.1 ± 12.0 years and the sex ratio 0.79. 334 patients (79.8%) were treated with anti-vitamin K. 73 (17.4%) with new anticoagulants, and 12 patients by a low-molecular-weight heparin (2.9%). 407 patients (97.1%) had a GCS on arrival at 13 or 14, and 12 patients (2.9%) had a GCS at less than 13. 35 patients (10.4%) had an INR lower than 1.5, 201 patients (48.0%) had an INR between 1.5 and 3, 98 patients (23.3%) had an INR higher than 3. 43 patients (10.3%) had an intracranial hemorrhage at the initial CT scan [95% CI 7.4-13.2]. For 7 patients (1.7%), the second CT scan showed a delayed intracranial hemorrhage, despite a normal initial CT 1.7% [95% CI 0.4-2.9]. Six patients with an intracranial hemorrhage were treated by anti-vitamin K, and one patient by dabigatan. The INR of the three of these patients was between 1.4 and 3. They all received a treatment for antagonist the anticoagulant activity. No patient had required a neuronal surgery process.

Conclusion: Our study confirms the possibility of delayed intracranial hemorrhage in patients with anticoagulation who are victims of a head injury. The systematic implementation of a control CT scan 24 hours after the fall allows the detection of these lesions, and the therapeutic management.

429 The Impact of Obesity on Cervical Spine Injuries in Trauma Patients
Holden J, Moriarity R, Sterling S, Thompson J/University of Mississippi Medical Center, Jackson, MS

Background: Previous research suggests that obesity affects incidence and outcomes of traumatic injuries. The impact of obesity on cervical spine injury in trauma patients is unknown.

Study Objective: To determine the association between obesity and cervical spine injury with and without spinal cord injury in patients with blunt traumatic injuries.

Methods: A retrospective analysis of tertiary, academic emergency department (ED) databases was conducted for patients with cervical spine injuries over an eight-year period from January 2005 to December 2013. Patients were included if they presented to the ED for any blunt traumatic injury, had a documented cervical spine injury, and documented height and weight data. No additional exclusion criteria applied. Data was extracted from the ED electronic medical record, as well as the Trauma Registry for our institution. Cervical spine injury was categorized as: (1) Isolated spinal cord injury (SCI), or SCI without a cervical fracture; (2) Cervical spine fracture, with or without SCI. The incidence of each cervical spine injury was assessed with 95% confidence intervals (CI) for each body mass index (BMI) category (Underweight [UW, BMI<18.5], Normal weight [NW, BMI 18.5-24.9], Overweight [OW, BMI 25.0-29.9], and Obese [BMI ≥ 30.0]). Fisher exact test was used for statistical analysis, as appropriate with P < .05 considered statistically significant.

Results: A total of 897 patients met inclusion/exclusion criteria. Of those patients with cervical injury, the incidences of cervical fracture by BMI category were as follows: The incidence of Category 1 patients (isolated SCI) by BMI category were as follows: 7%/10% in UW patients (CI 0.03, 0.17), 330/330 (10%) in NW patients (CI 0.07, 0.13), 25/325 (8%) in OW patients (CI 0.05, 0.11), 12/136 (9%) in Obese patients (CI 0.04, 0.14) and 12/37 (3%) in the Ext Obese (CI 0.02, 0.25). Category 2 (SCI with fracture) 65/71 (92%) in UW patients (CI 0.85, 0.98), 302/330 (92%) in NW patients (CI 0.88, 0.95), 300/325 (93%) in OW patients (CI 0.90, 0.96), 126/136 (93%) in Obese patients (CI 0.88, 0.97) and 32/37 (86%) in the Ext Obese (CI 0.75, 0.98). No statistical difference was found for either type of injury when comparing the obese versus non-obese groups.

Conclusion: In this analysis of patients with known cervical spine injuries, BMI was not associated with cervical spine fracture or spinal cord injury.

430 Alcohol Use Among Pedestrians Struck by Cars Is Associated With Increased Injury Severity and Hospital Length of Stay
Shah K, Bassem E, Rahman A, Slaughter D, Ali I, Moshier E, Galler A, England P, Agniantonis G, Keesler S, Ulmann J/Chahn School of Medicine at Mount Sinai & Elmhurst Hospital Center, New York, NY; Bellevue Hospital Center, New York, NY, Bridgeport Hospital, Yale New Haven Health, Bridgeport, CT; North Shore-LIJ University Hospital, Manhasset, NY

Study Objectives: Pedestrians comprise a significant proportion of traffic accident injuries and fatalities. This is especially apparent in New York City (NYC), where in 2013 pedestrians comprised 60.8% of all traffic fatalities which was well above the national mean. We seek to evaluate the effect of alcohol influence on pedestrian injury in NYC by evaluating the population in Queens, NY.

Methods: Funded by the NY State Governor’s Traffic Safety Committee, we performed a prospective study between March 2012 and August 2014 at Elmhurst Hospital Center (EHC) in Queens, NY. Trained research assistants collected data in the emergency department via patient interview and chart review of pedestrians/cyclists who were struck by a motorized vehicle. Patients were assessed for a number of variables including demographics, patient behaviors including alcohol use, environmental factors, hospital length of stay (LOS), and mortality. Injury Severity Score (ISS) was calculated. Statistical analysis was performed by independent statisticians using SAS Version 9.4. We utilized multiple univaried and binomial regression models where appropriate.

Results: A total of 416 patients (207 male; 209 female) were enrolled in the study. 36 (8.7%); 95% confidence interval [CI] 6.0-11.4% pedestrians struck had used alcohol with a predominance of males (83%) versus female (17%); P < .0001. When comparing the cohort of “no alcohol involved” versus “alcohol involved,” there was no significant difference between the two groups with respect to age, insurance status, or primary language. Median ISS for injured pedestrians who used alcohol was higher than those who did not (10 vs 1; P < .0001). Pedestrians who used alcohol were more likely to have a ISS > 15 (42% vs 9%; P < .0001; prevalence ratio [PR] = 4.67; 95% CI 2.74-7.95). Pedestrians who used alcohol were more likely to have head and neck injury (PR = 2.12; 95% CI 1.29-3.48), facial injury (PR = 3.19; 95% CI 1.59-6.39), chest injury (PR = 0.91; 95% CI 0.56-1.48), abdominal injury (PR = 0.40; 95% CI 0.26-0.63), and extremity injury (PR = 2.51; 95% CI 1.68-3.74) when compared to pedestrians who did not use alcohol. With regard to disposition, pedestrians who used alcohol were more likely to be admitted to the hospital (54% vs 23% P < .0001; PR = 2.35; 95% CI 1.65-3.36), had longer median LOS (1 vs 0 days; P < .0001), and were also more likely to be admitted for 10 days or more (29% vs 9%; P < .0010) when compared to those who did not use alcohol. There was no significant difference in mortality.

Conclusion: Pedestrians who are injured while using alcohol are more likely to sustain severe injury and experience longer LOS.

431 Effects of Burn Location and Investigator on Burn Depth in a Porcine Model
Singer AJ, Toussaint J, Chung W, Raut V/Stone Brook University, Stony Brook, NY; Arterioocyte, Inc., Cleveland, OH

Study Objectives: In order to be useful, animal models should be reproducible and consistent regardless of sampling bias, investigator creating burn, and burn location. We determined the variability in burn depth based on biopsy location, burn location and investigator in a porcine model of partial thickness burns. We hypothesized that burn depth would be similar for both investigators and among biopsy locations.

Methods: Twenty-four partial thickness burns (2.5 by 2.5 cm each) were created on the backs of two anesthetized pigs by two investigators (one experienced, one inexperienced) using a previously validated model. In one of the pigs, the necrotic epidermis covering the burns was removed. Five full thickness 4 mm punch biopsies were obtained one hour after injury from the four corners and center of the burns and stained with Hematoxylin and Eosin and Mason’s Trichrome for determination of burn depth by a board certified dermatopathologist blinded to burn location and investigator. Comparisons of burn depth by biopsy location, burn location and investigator were performed with T-tests and ANOVA as appropriate.

Results: The mean (SD) depth of injury to blood vessels (the main determinant of burn progression) was 1.8 (0.3) mm, which included 75% of the dermal depth. Debrided burns were 0.24 mm deeper than non-debrided burns (P < .001). Burn depth increased marginally from cephalic to caudal, but not from midline to lateral. Burn depth was similar for both investigators and among biopsy locations.

Conclusion: Burn depth was greater for debrided and caudal burns, but did not differ based on investigator, biopsy site, and medial-lateral location.
Study Objective: Emergency medicine (EM) providers must balance treating pain, while avoiding inappropriate prescribing of opioid analgesics. Prescription drug monitoring programs (PDMPs) are generally underutilized in emergency departments (ED) and nationwide enrollment is low among emergency physicians. PDMP design and functionality may conflict with ED operational factors. There is no consensus for best practices for PDMP design and each state has developed their own independently. The study’s objective was to develop consensus recommendations for PDMP policy and design to optimize their functionality and use in the ED.

Methods: We assembled a technical expert panel with key stakeholders in EM, public health, and public policy. The panel consisted of academic and community-based emergency physicians, a pediatric fellowship trained emergency physician, a medical toxicologist, a public health expert, a patient advocate, a legal expert, and two state PDMP administrators. The panel was co-chaired by two of the academic emergency physicians. The research group compiled a comprehensive list of PDMP policies and characteristics, and organized them into domains based on user-PDMP interaction. The panel convened for three rounds in which the policies and characteristics were introduced, discussed, and modified in an iterative fashion using the nominal group technique to achieve consensus.

Results: The process yielded consensus statements with majority agreement. The panel determined 18 recommendations (Table) within these main themes: (1) enrollment should be mandatory with an automatic process to mitigate the workload; (2) registration should be open to all prescribers; (3) states should work to integrate their PDMPs into hospital electronic health records; (4) delegates be employed to alleviate workload burdens; (5) patient look-up should be mandatory, based on objective criteria; (6) PDMP content should be standardized between states, updated in a timely manner and contain comprehensive patient and prescription information; and (7) states should promote PDMP design that allows for interstate data sharing.

Conclusions: An expert panel identified 18 recommendations that can be used by states and policy makers to improve PDMP design to allow for increased use in the ED setting.

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EMF2 Inter-Hospital Transfer Is Associated With Increased Mortality in Severe Sepsis: An Instrumental Variables Approach

Mohr NM, Harland KK, Shane D, Ahmed A, Fuller BM, Torner JC/University of Iowa

Study Objectives: Severe sepsis is a life-threatening condition that has doubled in incidence over the past decade, now constituting 17% of US in-hospital deaths at a cost of almost $21 billion. Sepsis mortality is higher in low-volume emergency departments (EDs), but the effectiveness of transferring patients to tertiary centers is unclear, especially since inter-hospital transfer is associated with delays in completion of sepsis resuscitation bundle elements. The objective of this study was to evaluate the effect of inter-hospital transfer on sepsis mortality, with the hypothesis that transfer would reduce in-hospital mortality.

Methods: Cohort study of patients admitted from an ED to a hospital in rural state (n = 122) with severe sepsis between 2005 and 2013 based on state hospital association claims data (using Angus 2001 definition). Patients were stratified by those who were transferred to another hospital as part of their care vs. those who were admitted to the presenting hospital. Data on demographics, patient-level comorbidities (Elixhauser definition), hospital rurality, hospital size, ED volume, and clinical outcomes were collected. In addition to using linear and logistic regression models to capture the effects of transfer on sepsis mortality, an instrumental variables approach clustered on presenting ED was used to account for selection due to the difficulty of measuring sepsis severity from administrative claims. Distance to a top-decile sepsis volume hospital was used as the instrument because distance is highly correlated to likelihood of transfer but plausibly unrelated to sepsis mortality (except through care delivered).

Results: The total number of severe sepsis cases was 17,284, of which 58% were transferred between hospitals. The mean age was 69.8 (SD 18.0) years, and most patients (60%) had pneumonia or urinary tract infection. The median hospital length of stay was 6 days, and 16% died during hospitalization. Hospitals in the top and bottom quintiles of ED volume transferred patients at significantly lower rates, so the analysis was restricted to the middle 3 quintiles (n = 10,530). Distance to top-decile sepsis volume hospital was a strong instrument to predict inter-hospital transfer (F-statistic = 456). Adjusting for age, year, infection type, and Elixhauser comorbidities, inter-hospital transfer was associated with 9.3% increased mortality (P = .024). No significant endogeneity was measured in the final model (P = .689), suggesting that risk adjustment using measured covariates was adequate.

Conclusion: Inter-hospital transfer is associated with increased hospital mortality among patients who present to intermediate-sized hospitals in a rural state. This effect could be explained by delayed early resuscitation among transferred patients. Future research should focus on influential factors in the critically ill that may govern transfer decisions, and strategies to improve regionalized sepsis care.

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EMF3 Mechanisms of Injury and Implements Used in Physical Elder Abuse: Preliminary Findings from a Pilot Study of Highly Adjudicated Cases

Rosen T, Bloemen EM, LoFaso V, Clark S, Reisig C, Floemenbaum NE, Lachs MS/Weill Cornell Medical College, New York, NY

Study Objective: Elder abuse is common and has serious health consequences, but is under-appreciated and poorly understood. Little is known about mechanisms or implements used in physical elder abuse and how these affect injury patterns. Our goal was to describe these mechanisms and implements and their relation to injury patterns in highly adjudicated cases of physical elder abuse.

Methods: Partnering with a large, urban district attorney’s office, we closely examined a pilot sample of 76 successfully prosecuted physical elder abuse cases from 2003-2014, which resulted in 166 injuries. We evaluated law enforcement, legal, and medical records from these highly adjudicated cases, focusing on police and victim statements, and photographs of injuries. Results are presented as proportion of injuries.

Results: Mechanisms of injury included: blunt assault with hand/foot (44%), feet/knee (2%), both hand/foot and feet/knee (16%), object (14%); grab/twist/pinch (4%); penetrating assault with object (4%); strangulation/suffocation (4%); pulling hair (1%); push/shove (1%); spray with chemical (1%); and unknown (10%). Implements

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**EMF4**

**Characterization of Emergency Presentations at Regional Referral Hospital in a Low-Income Country**

Bisanzo M, Saboda K, Nambazira R, Wangoda R, Ziwa G, Dreffuss B, Hammerstedt H, Periyaniyagam U, Tugumisirize F, Rice B. Global Emergency Care Collaborative/UMASS, Worcester, MA; University of Arizona, Tuscon, AZ; Global Emergency Care Collaborative, Boston, MA; Maaisha Regional Referral Hospital, Masaika, Uganda; Idaho Emergency Physician, Boise, ID; Brigham and Women’s Hospital, Boston, MA; New York University, New York, NY

Study Objectives: Emergency care remains largely underdeveloped and underfunded in low-income countries. There is little information about the epidemiology of emergency presentations in these countries, which leaves educators and policy makers with little guidance when developing educational programs and allocating resources toward emergency care. Furthermore, lack of pre-intervention outcome data complicates assessment of the impact that newly introduced emergency care programs have on important patient-oriented outcomes. This study documents the epidemiology and outcome of patients with emergent illnesses and injuries at a Ugandan Regional Referral Hospital.

Methods: This was a prospective cohort of acutely ill and injured patients presenting for care between November 1, 2014 and February 28, 2015 at Masaika Regional Referral Hospital in central Uganda. A database of emergent patient visits was created and data was collected on all patients presenting to the hospital emergency department and on all patients under twelve years of age who reported to the outpatient clinic. A standardized protocol that had previously been developed in Uganda was used to follow-up all patients three days after their index visit. Patients who remained in the hospital three days after presentation were followed up on the ward. Those who were discharged or were discharged from ward before the third day had follow-up attempted via phone call.

Results: A total of 8,549 patient presentations occurred during the study period, of which 4,554 were triaged to the emergency department (ED). Of patients triaged to the ED 18.5% were under 5 years, 14.3% were between 5-18, and 7.9% were over 65 years old. Fifty patients (0.6%) either expired in the ED or were dead on arrival. Providers tested 25.8% of ED patients for malaria (5.5% were positive). Less than 1% of all patients were tested for HIV. Trauma accounted for 22.9% of all ED visits and 65.6% of traumatic deaths (21 of 33) occurred in the ED. Three-day mortality for the ED cohort was 3.5% for all patients and 3.2% for trauma patients. Three-day mortality for children under five was 5.1%. Three-day follow-up rates improved from 53.8% to 72.8% over the first four months of the program.

Conclusion: This regional referral hospital emerges a mixture of communicable and non-communicable diseases. There is a very high acuity as evidenced by in-ED mortality rate and three-day mortality rate, but overall mortality rate was lower than expected. Using a standardized protocol allowed for three-day follow-up of approximately 70% of patients over the study period.

**TF2**

**The Core Curriculum of Medical Toxicology**

Walsh SJ/Einstein Medical Center, Huntington Valley, PA

Introduction: The core content of medical toxicology was established by toxicology experts from emergency medicine, pediatrics, and preventative medicine. It outlines the content and organization of the medical toxicology certification and cognitive expertise examinations. These topics contained in the core content are essential to the unsupervised practice of medical toxicology.

Study Objectives: To provide medical toxicology fellows instruction on the core content of medical toxicology, and prepare them for the unsupervised practice of medical toxicology. An additional objective of this curriculum is to prepare fellows for the American Board of Emergency Medicine’s medical toxicology qualifying examination.

Methods: This project utilizes a variety of teaching methods to provide the fellow with instruction on the core content of medical toxicology. The methods used in this novel curriculum include self-directed reading sessions, traditional lectures, "TED-Talk"-style lectures, small-group discussions, journal club, peer-to-peer teaching, high-fidelity medical simulation, and site visits. The primary textbooks used include Goldfrank’s Toxicologic Emergencies (Ninth Edition), Critical Care Toxicology: Diagnosis and Management of the Critically Poisoned Patient (First Edition), and Clinical Environmental Health and Toxic Exposures (Second Edition). The curriculum includes 16 quizzes that assess the fellow's comprehension of the core content. Additionally, a 200-question in-training examination will be administered annually prior to the formal in-training examination administered by medical toxicology fellowship programs in May.

Conclusion: The anticipated goals of instituting a formalized curriculum in the core content of medical toxicology at our institution include preparing fellows for the unsupervised practice of medical toxicology as well as a 100% pass rate on the medical toxicology qualifying examination. Surrogate goals include demonstrable clinical improvement from the first to second year of training, as well as improved performance on the medical toxicology in-training examination. Considering that the curriculum has been instituted in the last year, formal results are pending.

**TF1**

“From Head To Toe!” Developing Competency in Adult Trauma Resuscitations

Stobart-Gallagher M/Einstein Medical Center Philadelphia, Philadelphia, PA

Introduction: At our institution, trauma is run through a combined cooperative of the emergency medicine (EM) and surgical residency programs. A formal curriculum is currently lacking for the PGY1 EM residents rotating on this service, who are then expected to become proficient team leaders in combined resuscitations. Competency is defined as the ability to do something successfully and efficiently. ACGME currently requires that residents demonstrate “competency in adult trauma resuscitations” as a key index procedure prior to graduation. Therefore, the primary learners are first year residents rotating through the trauma service to these introduce concepts early. The curriculum will also be available to surgical residents as secondary learners if desired.

Study Objectives: The primary goal is for the learner to achieve competency in adult trauma resuscitations: by identifying injuries, perceiving when life-saving interventions are required and acting upon it. The secondary objective is to evaluate if initiating this curriculum will have an impact on in-training exam (ITE) scores in the trauma subcategory.

Methods: This curriculum is designed as a self-guided, self-paced instructional system based in a modular asynchronous format. The entire curriculum will be available using Google Classroom. Each learner will perform a pre-test assessment prior to initiating the curriculum; administration will have the ability to review. This will allow our program to monitor the learner’s progress. The modules use interactive power point presentations using a visual diagnosis theme. The educational content is derived from both written emergency medicine and trauma texts as well as published on-line FOAM Ed (Free Open Access Medical Education). These FOAM Ed resources encompass evidence-based Web sites, emergency medicine specific training Web sites, and You Tube videos produced specifically for education. Each module will include self-assessment questions with answers provided and at the end of the rotation, each resident will receive a direct clinical skills evaluation using a provided checklist during a live trauma resuscitation. Using multiple assessment techniques will provide the resident with a well-rounded evaluation of their performance early in residency. To evaluate the impact of the curriculum, ITE scores before and after initiation will be compared.

Conclusion: It is essential for emergency medicine residents to have competency in adult trauma resuscitations for daily use as a well-rounded physician. As junior residents, they are placed on a designated trauma service for 4 weeks and therefore, a self-guided modular curriculum allowing them to work at their own pace while participating in resuscitations on a daily basis will not only introduce the material, but also aid in retention and hopefully in reproduction as senior residents.
**TF3 Medic 5 Calling: Teaching On-Line Medical Direction via Simulation**
Nable JV/MedStar Georgetown University Hospital, Washington, DC

Introduction: Emergency physicians must be proficient at providing on-line medical command (OLMC) for out-of-hospital providers. Some emergency medicine (EM) residency programs, however, are located in jurisdictions in which local emergency medical services (EMS) protocols require relatively little OLMC, limiting training opportunities. An OLMC curriculum was developed utilizing simulation scenarios. The primary learners are residents at an EM residency.

Study Objectives: The learners’ goals are to have an understanding of their local jurisdictional EMS protocols and to become competent at providing OLMC.

Methods: This curriculum involves a self-instructional module to be completed by EM interns during their EMS rotation. In this module, the learners are introduced to the concepts of out-of-hospital protocol development and familiarized with the role of emergency physicians in providing real-time EMS medical control. The module teaches learners a standardized method of receiving out-of-hospital radio reports and providing OLMC. The interns also review their local jurisdictional EMS protocols. A protocol test at the conclusion of their EMS week assesses their knowledge of these protocols. During simulation sessions, EM residents are exposed to OLMC scenarios. In the course of a regular simulation setting (for example, managing an emergency department, noting that a out-of-hospital provider is requesting medical command), a simulated nurse hands the resident a radio, noting that a out-of-hospital provider is requesting medical command. Each OLMC scenario has critical criteria that must be met in order for the resident to pass. At the conclusion of the scenario, a faculty preceptor discusses the case with the learner, providing immediate feedback and reinforcing key concepts.

Conclusion: Providing OLMC is an important role of practicing emergency physicians. Many EMS protocols have reduced the need to contact physicians for medical orders, limiting opportunities for residents to learn this skill while in training. This novel curriculum introduces the concepts of OLMC through a self-instructional module. Various simulated OLMC scenarios are then utilized to provide exposure and feedback to learners.

**TF4 Understanding and Navigating the Emergency Medicine Job Market: A Community Practice Perspective**
Uller JR/UCSF-Fresno Medical Education Program, Fresno, CA

Introduction: While residency programs do a good job in clinical training of emergency medicine, there is often little to no formal curriculum teaching residents the business side of our specialty to help them find a job that is a good fit for their professional and personal needs. To introduce financial planning topics frequently encountered during the first few years out of residency.

Methods: A formalized job search curriculum done over 4 breakout interactive sessions. They are a mixture of lecture and small-group discussion, each about 55 minutes in length. The target audience is senior level residents who are about to begin their job search. The first session covers an introduction to EM group business structures and a general framework to the job search process. The second session involves a CV and cover letter creation workshop, as well as tips on how to prepare for job interviews. The third session focuses on how to compare jobs, including red flags to look out for, and sections on negotiating and contract issues. The final session covers financial planning topics commonly encountered by emergency physicians in their first few years out of residency. Participants will do a pre-course and post-course survey that reflects their comfort level with the material. Ultimately, success will be determined by their ability to find a job that is a good fit for them. Brief electronic email surveys will be sent out to graduates at 2 years and 5 years intervals to follow up on their overall job happiness as well as to measure job turnover rate. Participants will also give feedback regarding the curriculum, so the material can be updated and modified to their experiences in the job market.

Conclusion: High job turnover remains a problem in emergency medicine. Formulation of a more structured job search curriculum may help residents choose jobs that better match their personal and professional needs and help decrease the chance of career burnout. Surveys at 2 and 5 years will measure curricular impact.

**TF5 Teaching Effective Opioid Prescribing Through a Simulation Curriculum**
Boyle KL/University of Massachusetts Medical School, Worcester, MA

Introduction: The epidemic of opioid-associated deaths poses a daily challenge for emergency medicine physicians as they strive to treat pain. The goal of this work is to develop an educational curriculum for residents regarding safe and evidence-based opioid prescribing. To assess the effectiveness of the curriculum, we will determine the number of prescriptions written by residents for specific diagnoses before and after implementation of the curriculum. These diagnoses were identified as conditions in which opioid prescribing was not recommended in the 2012 American College of Emergency Physicians (ACEP) Clinical Policy: Critical Issues in the Prescribing of Opioids for Adult Patients in the Emergency Department. This curriculum was developed as part of a project supported by the 2014 Medical Toxicology Foundation Drug Abuse Prevention Award.

Study Objectives: The goals of this curriculum are to: (1) Describe existing guidelines regarding prescription of opioid pain medications upon patient discharge from the emergency department (ED); (2) Use a simulation curriculum to offer examples of how to navigate difficult patient conversations and teach residents how to provide effective counseling for patients receiving opioid prescriptions; and (3) Use small group discussion to develop lists of best practices, behaviors to avoid, and predictors of opioid misuse in the ED. The overall objective is to decrease the number of inappropriate opioid prescriptions written by EM residents for patients upon discharge from the ED as defined by the ACEP clinical policy.

Methods: The curriculum begins with a short lecture to introduce the scope of the opioid abuse epidemic, as well as the prescribing guidelines that exist for EM providers, specifically the ACEP clinical policy. The majority of the curriculum focuses on a simulation encounter using a standardized patient with video recording, debriefing, and small group discussion. The encounter is conducted with a resident volunteer and standardized patient, and is projected for the entire group to watch. After the encounter, small group discussions are held using five discussion points focused on defining best practices for opioid prescribing by EM providers, as well as strategies for dealing with difficult encounters. At the end of the small group discussion, there is a final simulation encounter performed by the same resident, this time using strategies the group developed during their discussion. To measure the effectiveness of the curriculum, the number of opioid prescriptions written by the group of learners on patient discharge from the ED will be collected for a 3-month period prior to the delivery of the curriculum, and after completion of the curriculum. Additionally, the learners will be asked to complete surveys assessing the extent of their training regarding opioid prescribing and their comfort with prescribing opioids prior to data collection, directly after participation in the curriculum, and after completion of data collection.

Conclusion: Safe and effective prescribing of opioid pain medications is an important skill for EM providers. Aside from published guidelines, there is still a paucity of formal educational training available regarding prescribing of opioid medications. This curriculum addresses the urgent need for formal training in residency education regarding opioid prescribing on patient discharge from the ED.

**TF6 Implementation of the Flipped Classroom Model Using VirtualACEP to Teach a Cardiology Curriculum to Emergency Medicine Residents**
Diller D/Oregon Health & Science University, Portland, OR

Introduction: The "flipped classroom" is an educational model that allows educators to deliver didactic content and new material to students outside the classroom, while using classroom time to address students’ questions and reinforce...
learning through higher order educational methods. VirtualACEP uses a Web-based synchronized audio and slide capture platform that allows for streaming content to be viewed on computers, smartphones, or tablet devices. VirtualACEP contains over 230 hours of educational content delivered at ACEP’s annual conference, and has been approved for AMA PRA Category 1 Credits.

Study Objectives: The goals of this project are to demonstrate the feasibility of a flipped-classroom educational model using VirtualACEP to deliver a cardiology curriculum to an emergency medicine residency program and to assess learner satisfaction scores with regards to the curriculum. The objectives are to educate learners on topics including ACS, hypertension, aortic dissection, syncope, CHF, AICDs, IVAIs, cardiac arrest care, and the diagnosis and management of cardiac arrhythmias.

Methods: The cardiology curriculum will be delivered through the previously described flipped classroom model, using VirtualACEP to deliver new materials via didactic content to emergency medicine residents. Residents will take pre- and post-lecture quizzes on the VirtualACEP online platform to demonstrate compliance with pre-conference material. In-conference activities will range from 1-2 hours each during weekly resident conference, and will include the following: team-based learning through EKG analysis, small group case-based discussions with faculty facilitators, team-based learning question and answer sessions featuring both Individual and Group Readiness Assurance Tests (IRAT and GRAT), mock oral boards, and simulation. At the completion of the cardiology curriculum, a mandatory formative assessment will be given to residents, in the form of a 20-30 question take-home multiple-choice quiz. Questions will be selected and modified from the VirtualACEP pre- and post-lecture quizzes. Accompanying the formative assessment will be a five-question evaluation on the curriculum itself. Evaluation will also be sought through resident focus group interviews and analysis, performed at the completion of the curriculum.

Conclusion: Through a flipped classroom curriculum using VirtualACEP, emergency medicine residents will receive didactic content delivered by some of the country’s best speakers before arriving to conference. In-conference educational content would be delivered through instructional modalities that promote active learning, which has been associated with enhanced learner knowledge and improved standardized exam scores. The cardiology curriculum described in this project would serve as a pilot program for the implementation of an entire emergency medicine residency curriculum through a Web-based, asynchronous approach, using the flipped classroom model to promote further learning. If successful, future studies would look at resident in-service exam scores, and pre- and post-curricular change, to evaluate for differences in learner knowledge retention.

An Enhanced Deliberate Practice Approach to a Simulation-Based Learning Module

Rice JC/Johns Hopkins Hospital, Baltimore, MD

Background: Deliberate practice (DP) is a method of mastery learning, which employs participants’ full concentration during practice in an effort to continuously improve performance. The basic tenets of DP are described as having a well-defined goal, a motivated learner, feedback during practice and many opportunities for repetition. After learners master a brief task, the task should then be embedded in more complex contexts to fully integrate the skill into the learners’ repertoire. Studies show a DP approach to learning improves performance in procedural skills, resuscitation performance and teamwork dynamics in simulated scenarios, making DP a valued component of simulation-based education. Recently Dr. William McGaghie, a leader in mastery education, challenged educators to stop reporting data that DP is superior to traditional methods of simulation-based education and to start investigating how to best engineer mastery learning environments. Our residency program currently uses DP in simulation-based modules during which emergency medicine residents repeat a case with a mentor until learning outcomes are met. Our first module is the management of supraventricular tachycardia (SVT). This approach employs the basic tenets of DP, but fails to place the resident in more complex contexts to test and master their skill.

Study Objectives: The objective of this project is to create an enhanced DP style simulation-based learning module for the acquisition of mastery knowledge of SVT management. A secondary goal is to determine if the enhanced DP style leads to greater skill retention in resident learners.

Methods: A review of emergency medicine practice guidelines and texts was performed for best practices in SVT management. Six case scenarios were created to highlight important aspects management in different patient populations. Primary learning objectives were defined for each case and a corresponding checklist evaluation tool. Secondary learning objectives included the initial approach to critically ill patients and communication skills with ancillary staff. The cases were ordered in increasing difficulty to form a 2-hour module. Residents complete assigned reading on the management of SVT before participating. An individual resident will begin the module with the first case scenario and repeat that case until all learning objectives are met. An instructor will provide feedback between each repetition of the case. They will then proceed to the next case and repeat this process until either they complete all 6 cases or 2 hours elapse. A 10-minute SVT management assessment case was developed with a corresponding checklist evaluation tool. Residents who participated in both the original simulation module and the enhanced DP module will complete the assessment 6-12 months after the SVT module to compare knowledge retention.

Conclusion: Best methods for the use of deliberate practice to encourage mastery learning have not been well defined. By increasing the difficulty of cases in a simulation-based learning module, educators can provide more complex contexts for learners to apply newly acquired skills.

A Team-Based Learning Curriculum Incorporating Simulation for Emergency Medicine Residents

Desmond C/University of Chicago, Chicago, IL

Introduction: Team-based learning (TBL) has been used extensively in undergraduate medical education to various successes. In TBL, education is learner directed, with direct faculty facilitation. One of the objectives of graduate medical education (GME) is to assist trainees in the development of self-directed learning habits and techniques. TBL would be an ideal method for resident learning, but has been rarely studied as a GME-level educational modality. One of the challenges of implementing TBL is dedicated time allocation for the educational activities. Emergency medicine would be the ideal place to test and use TBL. Emergency medicine is one of the few GME programs with 4-5 hours of weekly dedicated conference time, which is ideal to implement this modality. TBL usually has a home learning component followed by an individual and then a team assessment in the classroom. A group discussion and sometimes debate is used to cement the subjects the assessments covered. The last step of TBL is usually an application of the learning. Traditionally this has been another type of assessment with an essay or MCT quiz. However, with the popularity of simulation increasing in medical education it was thought the application portion of the TBL would be the ideal situation to utilize simulation.

Study Objectives: The objectives of the program will be to use TBL to help emergency medicine residents: (1) discuss assigned readings in a team environment, (2) interpret and analyze problems related to the assigned topic, and (3) demonstrate what they have learned in a team-based simulation.

Methods: The residents will be divided into six teams of 8 participants per group which could be adjusted based on the size of the residency. Each team has an even division of interns, PGY2s and PGY3s. With resident schedules, it is unlikely that each team will have a full eight participants and all activities will be done with whoever is present that day. Every team will have the same reading assignment based on a specific topic related to the module. The reading assignments are shorter readings from blogs or other FOAMed (free open access medicine education) sources to introduce new and efficient learning. At the beginning of each session, there is a short individual assessment followed by a team assessment. Subsequently, a faculty member will facilitate a discussion and directed learning based on the assessment. Finally, each team performed a relevant simulation case with debriefing based on the subject matter. A checklist assessment based on critical actions of the team will be done by a faculty member during the simulation case to assess TBL effectiveness. At the end of the educational year the residents will complete an evaluation.

Conclusion: In emergency medicine resident education there is always a need and desire to change the traditional lecture format while also encouraging self-directed learning to create lifelong learners outside of residency. TBL is an ideal format to do both of these things by introducing the learner to new educational resources, encouraging home learning, and also utilizing simulation to practice new learning. So far, residents have enjoyed and found the TBL sessions interesting and useful.
TF9  Simulation X-Craze: An Innovative, Problem-Based, Online Curriculum to Teach Plain Film Radiology Interpretation in Emergency Medicine

Sayegh JS/University of California Irvine Medical Center, Orange, CA

Introduction: There is currently no standardized curriculum for teaching emergency medicine residents (EMRs) and medical students (MS) the fundamentals of plain film radiographic interpretation. Patient management is frequently based on the physician interpretation of plain film radiographs. Misinterpretation of radiographic studies is a common source of medical error in the emergency department (ED) and can be a source of liability. Simulation X-Craze, an online, problem-based, plain film radiology tutorial, was designed to teach plain film interpretation to residents and MS. The primary target audience is MS rotating through the ED. The secondary target audience is EMRs and off-service residents.

Study Objective: To use asynchronous, problem-based learning to teach plain film radiology interpretation and associated patient care to MS and EMRs.

Methods: The curriculum incorporates 3 major components: (1) pre and post-assessment; (2) online training modules, which serve as asynchronous learning tools; and (3) flipped classroom discussion to solidify the learning gained from the online modules. Students are given a pre-test to identify knowledge gaps in plain film interpretation and patient care prior to each module. They are then required to complete the module, which includes a problem-based case with significant findings on plain film, such as flash pulmonary edema, bone fractures, etc. Each module begins with a video tutorial on how to read a normal x-ray for the anatomic region presented in the case. The student is then presented with a patient scenario in the ED. Guided questions are placed throughout the module to help the student learn to associate signs and symptoms with particular pathology on an x-ray, and to direct patient management. The use of expert modeling is employed to enhance the learning experience and reduce the cognitive load on the learner. The student is then presented with an x-ray revealing the pathology, is asked to interpret the film, and compare their response with that of an expert radiologist. They are given a post-case x-ray tutorial that directly compares the case pathology to a normal film. Students are then given a post-test to ensure understanding of image interpretation and case management. Lastly, the case and images will be reviewed in a flipped classroom small group discussion to solidify student knowledge during weekly conference.

Conclusion: To ensure quality and accuracy prior to implementation, the online module was field-tested using academic emergency physicians as subject matter experts. It was also piloted on a small group of 4th year MS rotating in the ED. The emergency physician agreed that the module fostered critical thinking skills when managing the ED patient, and that it was an engaging way to teach radiology to students. All MS agreed that the module led to more interactive learning, and relayed that they would like to incorporate this type of learning into their medical education. Emergency physician are often required to read plain films without the aid of a radiologist, so learning to interpret radiological plain films provides great benefit in the appropriate disposition of patients in the ED. Because no formal curriculum currently exists to teach plain film radiology to EMRs and MS, this novel learning module can be used as a learning tool for residents and students, and as a reference for more experienced providers.

TF10  Resident Teaching Skills for a New Era

Schnaap BH/The Mount Sinai Hospital, New York, NY

Introduction: Medical education has seen rapid change in the last few years. New teaching modalities, such as free, online, open-access medical education (FOAM) have changed what it means to be an educator, allowing nearly instant access to thousands of learners and the most cutting-edge research. At the same time, bedside teaching and examination skills have receded; reliance has increased on advanced laboratory and imaging tests just as patients are asking for more face-to-face time with empathetic doctors. As a four-year residency program which sends many residents into academic medicine, it is essential that our trainees are prepared to educate in this new environment. A new “teaching resident” rotation was designed to foster the development of third-year residents as educators by teaching them a variety of educational techniques.

Study Objectives: To help residents become well-rounded modern clinician-educators, including acquiring skills in bedside teaching, precepting, simulation, procedure education, social media and blogging.

Methods: The “teaching resident” rotation was designed as a month-long experiential learning rotation. Residents are provided with an interactive, multimedia curriculum that allows them to acquire new skills at their own pace and guides residents towards evidence-based effective teaching modalities for specific topics and learners. A daily blog post to SinaiEM.org and tweet to the 1500 followers of the @SinaiEM residency account are mandatory, as many residents are unfamiliar with the mechanics of teaching and learning medicine online. With the balance of their time, the resident may choose among a menu of activities (eg, bedside teaching, precepting, simulation, blogging, podcasting, lecturing, procedure labs, auditing documentation, direct observation, morning report), allowing them to build confidence and proficiency at their own pace, based on their specific, personal areas of interest and supported by the online curriculum and expert educators in the department. On going feedback is available to the resident teacher via learner feedback forms after each activity. At conclusion of the rotation, the resident submits a required log and portfolio of their activities for the month, including learner evaluations and products produced (eg, lectures, posts, tweets) and is given an overall evaluation of their performance by medical education faculty.

Conclusion: This new curriculum allows for the development of not just resident educators, who gain a variety of new skills with modalities they may be unfamiliar with, but also medical students and junior residents who benefit directly from their teaching. Portfolios and learner evaluation forms continue to demonstrate the effectiveness of this intervention.

TF11  Emergency Department Scribes: A Two-Step Training Program

Heaton HA, Samuel R, Farrell KJ, Colletti JE/Mayo Clinic, Rochester, MN

Introduction: Emergency medicine (EM) providers commonly spend time after shifts completing charts in a timely manner. Published studies estimate EM providers spend as much as 43% of their time on data entry compared to 28% on direct patient care. Scribes perform numerous functions and services that do not involve direct patient contact, allowing EM providers to devote more time to patient care. As a result, interest in scribe programs and their implementation in emergency departments has grown considerably. Scribes perform numerous functions and services that do not involve direct patient contact, allowing EM providers to devote more time to patient care. As a result, interest in scribe programs and their implementation in emergency departments has grown considerably, evidenced by the growing number of private scribe companies and institutions implementing their own programs. There is no standardized approach to the education and training of scribes resulting in varied methods.

Study Objective: Design a curriculum that develops pre-health students into subject matter experts on emergency physician documentation and billing and coding. Scribes should accurately contribute to the electronic medical record, providing real-time documentation services.

Methods: Scribes are provided a training manual prior to their first shift; they are instructed to review the manual in its entirety and memorize the medical terminology. The manual includes sections on the role of scribes, an introduction to the charting system in the emergency department, billing and coding, computer programs utilized in the emergency department, and medical abbreviations and terminology. Additionally, a training shift checklist is included and serves as a tool to help scribes prioritize their learning. Eight training shifts are scheduled with a gradual increase in the scribe's responsibility. Training shifts allow scribes to actively use the information learned from the manual and work through goals set forth from the checklist. New scribes are paired with senior scribes who serve as trainers for the course of their emergency department orientation; experienced scribes give constant feedback on charting throughout the shift. Furthermore, consultation occurs between the senior scribe and physician during each training shift in order to provide targeted feedback to the trainee. Formal evaluation occurs through written quizzes on shifts 1-4, as well as at the end of the training process by the physician scribe coordinator. Scribes are also evaluated each shift by the provider they work with.

Conclusion: Scribes were implemented in the Mayo Clinic Rochester Emergency Department in February 2015, staffing the department during afternoon and evening hours coinciding with patient volume peaks. Although scribes feel the learning curve is steep, the training manual and training shift process provides a basis for the accelerated learning needed for this type of employment.
TF12 More Effective Strategies in Transitions of Care for Geriatric Patients in the Emergency Department
Mehta M/Seton Medical Center, Austin, TX

Introduction: The Joint Commission, the World Health Organization and the Centers for Medicare and Medicaid have all recognized that ineffective patient handoffs are a leading cause of medical errors. Elderly patients are especially vulnerable to poor transitions of care from one health care setting to another. To address issues related to transitions of care, the ACGME has stated that learning effective communications during transitions of care should be a residency requirement. Currently, there is no formal strategy in place at our institution to teach emergency medicine residents and faculty about ensuring safe transitions of care. The goal of this educational project was to introduce faculty, emergency medicine residents and medical students to the importance of improved patient handoffs, focusing specifically on geriatric patients.

Study Objectives: During this module, learners will be expected to (1) review components of effective transitions of care from the emergency department (ED); (2) identify barriers to safe transitions; (3) learn how poor patient handoffs can impact patient care; (4) discuss how to implement changes in ED practice to improve transitions of care for geriatric patients.

Methods: The learning module has three components. First, the learners will be given pre-conference reading material that outlines the key concepts in transitions of care. Next, the learners will attend a presentation highlighting the importance of safe transitions for ED geriatric patients, the impact of poor handoffs on patient safety, and common transitions made from the ED (ED to inpatient, ED to home and ED to nursing home), including the pitfalls unique to each transition. Additionally, the lecture will help identify optimal elements to ensure a safe transition of care. The lecture will be followed by small group work using cases to identify strategies for effective transitions of care. Each group will be given a case that highlights patient handoffs unique to the ED. The groups will consist of residents, faculty, medical students and either a hospitalist, community geriatrician, case manager or a community volunteer. Collaboration with other individuals who play a part in transitioning patients will help emergency medicine residents understand the issues that confront patients when they leave the ED. Students will fill out a pre and post module self evaluation to determine their understanding of the material.

Conclusion: After completing the module, residents and faculty will have a better understanding of the impact of inadequate transitions for patient care and how to implement changes in their daily practice to ensure stronger transitions of care during discharge or admission of geriatric patients.

TF13 Development of a Procedure Curriculum to Train and Assess Competency of Emergency Medicine Interns
Crichlow A/Johns Hopkins University, Baltimore, MD

Introduction: The milestones were developed to provide targets for resident performance. One of the areas of evaluation is procedural competency. The emergency medicine residency program needed a standardized approach to evaluate its incoming emergency medicine interns in their ability to perform common emergency medicine procedures. The curriculum was developed to both teach the interns on common procedures performed in emergency medicine and also provide a standardized approach to procedure competency assessment.

Study Objectives: The primary objective of the curriculum is that at completion the interns will be able to demonstrate the ability to perform the selected procedures successfully. The secondary objectives are that the intern will be able to state the indications and contraindications, the complications to avoid and the equipment needed to perform each of the selected procedures.

Methods: The procedures addressed were venipuncture, peripheral intravenous access, intraosseous access, arterial puncture, arterial catheter placement, lumbar puncture, central venous access (ultrasound-guided internal jugular vein catheterization) and basic laceration repair. The curriculum was developed to utilize asynchronous learning modalities and simulation with deliberate practice. The curriculum consists of two components: (1) online modules and (2) procedure sessions. The modules are developed with the software program Adobe Captivate. The modules consist of basic knowledge about the procedures including (1) indications and contraindications; (2) complications to avoid; (3) relevant anatomy; (4) the equipment needed; (5) a stepwise approach on how to perform the procedure; and (6) a video demonstrating how to perform the procedure. The interns will be provided access to the online modules at the beginning of intern orientation. During the two-week intern orientation, there will be time allotted for the procedure sessions. A checklist was developed for each procedure to serve as the performance standard which would be used by the faculty preceptor to evaluate the intern. The interns will perform the procedures on task trainers and will use the same equipment to perform the procedures that is used in the emergency department. The format of the procedure sessions will use the educational method of deliberate practice as follows: (1) the intern will perform the entire procedure while the faculty preceptor observes against the standard of the checklist; (2) when the intern has completed the task, the preceptor will review the steps of the procedure with the intern and correct any errors made; (3) the intern will perform the procedure again and the preceptor will stop the learner whenever an error is made, provide corrective feedback, and the intern will restart the procedure from the beginning; (4) the intern must perform all the steps in the checklist without error for the procedure to be considered successfully performed; (5) the intern must perform the procedure successfully three times for the intern to be considered to have reached the milestone target for each procedure.

Conclusion: The milestones were developed to provide targets for resident performance. The development of this procedure curriculum using asynchronous learning modalities and simulation with deliberate practice will allow for both the training and the assessment of incoming emergency medicine interns.

TF14 Development of the Open Access Airway Course
Pester JM/St Luke’s University Hospital, Bethlehem, PA

Introduction: Emergency airway management is a crucial skill for emergency physicians. Easily accessible formal training for airway management is somewhat lacking. Many of the existing airway courses are not learner-focused and require the learner to travel to a central location at a specific time. Expert faculty time is then divided between lecturing and staffing task trainers. We created a modular curriculum to teach basic and advanced airway skills to a broad audience via asynchronous learning technologies. This should significantly decrease faculty time commitment and shift the teaching focus from conveying facts and methods to one-on-one instruction in a simulation environment. The primary learners for our curriculum are residents training in emergency medicine (PGY1-4). Our secondary learners include any personnel tasked with emergency airway management. This includes advanced practitioners, medical students, EMS providers, emergency medicine faculty, and critical care faculty.

Study Objectives: After completing this course learners will be able to assess airway anatomy, predict difficult airway issues, and demonstrate proficiency in securing the airway in multiple complex environments.

Methods: In developing this curriculum, we began with a faculty-led resident focus group. This group consisted of six emergency medicine residents, PGY1-4, who are currently in training. We elicited feedback from residents regarding their current airway training. Using this feedback we developed a curriculum outline. The curriculum consists of two major components: asynchronous content development and delivery, and a hands-on high fidelity simulation environment. Content consists currently of twenty-two modules covering a variety of topics specific to airway management. Modules were designed using the ADDIE instructional design model (analysis, design, development, implementation, evaluation). Each module contains learning objectives, educational content, and an integrated knowledge assessment. Educational content for each module varies, but typically consists of short video segments demonstrating techniques or principles in detail. Modules are accessible via a publically accessible Web site and may be viewed in a non-linear fashion. Once a particular module is completed, the learner then schedules a time to meet with an expert provider in our simulation laboratory for deliberate practice. We have designed simulation scenarios to most closely represent complex practice scenarios including massive hematemesis, airway obstruction, and persistent hypoxemia. This allows learners to process events dynamically, rather than simply learning to perform a task. There is a checklist of critical events which was developed to objectively evaluate the learner. This is a simple two-column checklist which is marked as either requiring remediation or competent. We also utilize the ACGME Emergency Medicine Milestones to provide feedback to our learners.

Conclusion: Emergency airway management is critical to the practice of emergency medicine. Teaching airway management is a time-consuming process. Development of this curriculum shifts the educational focus from the faculty to the learner, and maximizes the learner’s one-on-one time with expert faculty. This
curriculum can be easily and rapidly modified or appended as new research is published or new devices are developed.

**TF15 The “Resus” Elective: Emergency Medicine-Critical Care Resident Elective**
Stull MJ, Kreitzer NP, Wray T, Knight WA/University of Cincinnati, Cincinnati, OH; Washington University, St. Louis, MO

Introduction: The rapid identification, diagnosis, and management of the critically ill patient are the hallmarks of a well-trained emergency physician. The initial care provided in the first few hours to the ICU-bound patient significantly impacts their hospital course. Therefore, the emergency physician must have a firm grasp on the critical care and resuscitation medicine that underlies their daily practice. This elective serves as an introduction to key critical care medicine (CCM) principles that directly impact the care residents provide to the ED patient.

Study Objective: By the end of the elective, residents are expected to: (1) Appreciate the complexity and time sensitive dynamic changes of critically ill patients in the emergency department (ED); (2) apply concepts of critical care into the management of the acutely ill patient in the ED; (3) discuss the foundation literature contributing to resuscitation efforts in the ED; (4) value leadership skills and interprofessional team dynamics during ED resuscitations.

Methods: This 2-week elective, open to PGY2-4 residents, serves as an opportunity that facilitates a pathway to a critical care fellowship, or enhances the quality of care EM residents provide to critically ill patients, depending on the resident’s interests. The elective is learner-centered with flexibility as determined by the initial meeting with elective directors but at minimum includes 4 core experiences:

- **Clinical Experience:** a minimum of 20 clinical hours working in the Shock Resuscitation Unit without other formal patient care responsibilities to observe the complex and dynamic pathophysiology of the acutely ill and follow their clinical course beyond the ED.
- **Formal Teaching:** 5-8 one-on-one, didactic sessions with course faculty on common EM-CCM issues (ie, CPR, stroke and ICH management, sepsis identification and management, and code team leadership).
- **Simulation:** 2 one-on-one simulation sessions revolving around management of complex acutely ill patients involving high-fidelity simulation (ie, approach to undifferentiated hypotension, asthma ventilator management, and polytrauma management).
- **Journal Club:** Review of the “top 10 resuscitation articles” impacting care provided in the ED. Individuals taking the elective will also have opportunities beyond the core requirements depending on their interest. This includes ED nursing shifts, ultrasound sessions, online didactic coursework, CCM pharmacy rounds, or production of ED-CCM focused content for departmental peer-reviewed online publication. The elective is evaluated based on learner feedback via in-person meetings with elective faculty. Learners are asked to self-reflect over the duration of the elective regarding the impact of course topics to their practice. Lastly, course directors aim to longitudinally compare milestone achievements of those taking the elective versus those not on elective.

Conclusion: The “Resus” elective is a novel, effective opportunity to promote residents’ skills in the management of critically ill patients in the ED. Learner evaluations have been markedly positive regarding the utility of the elective on their practice and specifically cite enhancing their ability and comfort in leading resuscitations as a result of their elective experience.

**TF16 Evidence-versus Eminence-Based Medicine: Implementation of a Novel Approach to the Deep Dive**
Pitottti C/San Antonio Military Medical Center, San Antonio, TX

Introduction: Current emergency medicine residents use more than traditional methods (ie, books, journals) to inform their clinical decisions. As educators we must adapt to the challenge this presents to education and patient care. We have implemented a monthly grand round session that juxtaposes traditional evidence-based approaches with current, arguably eminence-based, Free Open Access Medical Education (FOAM) for the month’s chosen clinical controversy. Using a flipped classroom approach and shared objectives the result is a session that responsibly utilizes traditional and new media to inform clinical decisions.

Study Objectives: The primary objective of this educational curriculum is to demonstrate resident proficiency in utilizing primary, secondary, and new forms of medical literature to achieve evidence-based practice opinions on clinical controversies. Additional objectives include demonstrating the ability to evaluate the strength of evidence based on evidence type and to communicate evidence-based opinions in an open format.

Methods: Residents are introduced to evidence-based medicine and FOAM early in the curriculum through intern orientation, winter research symposium, and grand rounds. These resources are augmented by access to hospital library resources and residency association memberships for each resident to facilitate discussion at these sessions. This session exercises those skills to answer a controversial question. One or two clinical questions are chosen based on relevance to the block theme, controversy, and feasibility. Chief Residents choose class leaders to ensure predictability and to guide discussion. Senior emergency residents read and summarize critical and controversial primary literature. Second-year residents review FOAM for the most recent opinions. First-year residents obtain relevant review articles and applicable clinical guidelines. Each individual resident will come prepared to present 2 to 3 articles or FOAM-informed opinions. The discussion is guided by a Rules of the Game which encourages debate and minimizes anecdotes. Discussion can be facilitated by a game show template or debate format with Pro and Con teams. The facilitator accesses the relevant article or FOAM Web sites real-time for detailed discussion. Residents are evaluated on their presentation, as well as a worksheet completed pre- and post-session that guides them through evidence-based decision making.

Conclusion: This innovative educational module engages the resident directly into forming evidence-based opinions and enables them to access the most recent trends in thought. FOAM is presented in an environment where both staff and residents are armed with their own detailed research that can shape interpretations. Residents present 20-30 references in each session and can quickly become experts in the topic area. FOAM searches stimulate valuable discussions that would be missed in a standard educational model. The module format is constantly updating and directions for growth include residency wiki site, PI projects and publications tied directly from the work.

**TF17 Geriatric Emergency Medicine Educational Module for First-Year Residents**
Pham TV/University of Maryland, Baltimore, MD

Introduction: The geriatric population, defined as people 65 years of age and older, is the fastest growing population worldwide. With this trend, emergency care providers are evaluating and treating more geriatric patients. These patients can be challenging: they often have multiple comorbidities, take an array of medications (prescription and over the counter), and present with atypical signs and symptoms. Moreover, they have the highest morbidity and mortality rates associated with common diseases such as influenza, pneumonia, and appendicitis. Because of the timing of their clinical rotations and normal patient flow patterns, emergency medicine residents, especially interns, might not have many opportunities to interact with sick elderly patients. To close this educational gap, our residency will incorporate an interactive PowerPoint module into our curriculum to introduce geriatric emergency medicine to emergency medicine interns during their rotations at the Veterans Affairs (VA) medical center affiliated with our training program.

Study Objectives: To introduce PGY1 residents to geriatric emergency medicine and ensure they have the opportunity to learn core concepts regarding the assessment and therapeutic management of elderly patients.

Methods: During orientation, new interns will be asked to complete a survey to determine their comfort level with and knowledge of the special attributes of geriatric patients. Residents in our program rotate for two 1-month blocks through the emergency department of our affiliated VA Medical Center, during which their clinical duties include the management of elderly patients. The interns will be required to view and participate in an interactive PowerPoint module during their rotations on their own time within each block. This interactive module incorporates core concepts regarding geriatric medicine with a knowledge assessment questionnaire. Interns’ completion of the presentation will be documented through our departmental intranet. After they complete the module, a post-participation survey will be generated.

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automatically, posing questions similar to those in the survey they completed during orientation week.

Conclusion: Residency training should include a formal curriculum that teaches basic core concepts in geriatric emergency medicine. This interactive PowerPoint module will be incorporated into our residency curriculum to provide fundamental concepts about the management of the complex geriatric patient population.

TF18 Mindfulness in Emergency Medicine
Chung AS/Maimonides Medical Center, New York, NY

Introduction: Burnout among medical students is depressingly common. Studies estimate the prevalence of burnout to be anywhere from 40 to 76%. More distressingly, a recent study reported that 9.4% of fourth-year medical students and interns admitted to having suicidal thoughts during the previous two weeks. These findings have prompted a small number of medical schools to create targeted wellness programs for their students. The most promising interventions focus on a concept known as mindfulness training. In particular, students planning a career in emergency medicine may benefit from mindfulness, as the emergency department is often a crowded, chaotic, and uniquely high-stress environment in which to practice. Described here is an innovative wellness curriculum integrated into a four-week emergency medicine clerkship for senior medical students that uses mindfulness techniques to reduce their risk of burnout.

Study Objectives: After participation in this curriculum, learners will be able to: (1) explain foundational wellness concepts; (2) practice a regular schedule of meditation; (3) create a wellness plan using mindfulness strategies to address their individual risk factors for developing burnout.

Methods: This curriculum uses self-directed learning theory to build relatedness, competence, and autonomy to cultivate mindfulness. Students have readings and short written assignments prior to each of the four weekly 60-minute classroom sessions. Each session includes techniques to encourage active participation and collaboration, such as icebreakers to create community; brainstorming on current stressors; brief didactics; role-play to foster value; and meditation exercises to promote efficacy. To create the value and skills required for sustained behavioral change, the students also practice a regular schedule of meditation and track their progress via an online journal. Their final assignment is to develop a long-term individual wellness plan using mindfulness techniques. Evaluation takes place on multiple levels. Following completion of the curriculum, learners fill out reaction scales for content, methods, and quality of teaching. Students also complete pre- and post-curriculum forms that include a burnout scale, multiple-choice knowledge questions, and a self-assessment of attitudes and behaviors related to wellness and mindfulness. Six months later, students complete the post-curriculum form again, as well as participate in semi-structured interviews and email correspondence to assess for any sustained changes in knowledge, skills, attitudes, or behavior.

Conclusion: This curriculum provides a uniquely flexible and targeted method to address burnout in medical students. It can be adapted for any third- or fourth-year clinical rotation to help all students manage stress, not just those planning a career in emergency medicine. In this way, we can potentially give all of our future physicians the tools to combat burnout during the early years of residency and beyond.
2016 ACEP Research Forum
October 15-16 — Las Vegas, NV
Abstracts Due April 29, 2016

Abstract Submission Information
The American College of Emergency Physicians’ 2016 Research Forum is dedicated to the presentation of original research related to emergency medicine by investigators in clinical and basic science.

Abstract Submission Requirements
Abstracts must meet the submission criteria detailed below.

1. Abstracts should represent original research that has not been published or presented at a national scientific meeting.* Case reports or subject reviews are not considered original research. Abstracts presented at an international or regional meeting are accepted.

2. Abstracts will be submitted online. Instructions will be available on ACEP’s Web site beginning in March, 2016. Abstracts must be received by 5:00pm Central Time, Friday, April 29, 2016.

3. Abstracts must include the following subsections, consistent in style with those appearing in Annals of Emergency Medicine: title, study objectives, methods (include design, setting, and type of participants), results, and conclusion. The abstract should be written in complete sentences using grammatically correct English. Spell out all abbreviations on first usage. Abstracts are limited to 3000 characters not including spaces. Accepted abstracts will be published as received; no copy editing will be performed.

4. Illustrations are discouraged; however, small tables may be accepted. Figures and photos must be black and white with at least 300 dpi. Authors should not be identified in any way on the page containing the abstract.

Abstract Review Process
Abstracts will be peer reviewed for presentation at the 2016 Research Forum. Abstracts will be accepted that are judged scientifically valid and that yield important information which will ultimately affect patient care. Abstracts submitted or the resultant manuscripts must not appear in a referenced journal before publication of the meeting abstracts in the October 2016 issue of Annals and must not have been presented at a national meeting.

Oral presentations will be allowed 10 minutes followed by discussion. Electronic presentations will be grouped by topic and will be scheduled during the program. The Research Committee will review abstracts blinded to authors. Notification letters will be mailed on or before July 1, 2016. We regret that we cannot give notification by information by telephone.

Awards
The Emergency Medicine Foundation will present an award to the outstanding established researcher and a special award to an outstanding young investigator.

An annual Excellence in Research Award (Best Paper) will be presented to an investigator based on the abstract, presentation, discussion, and subsequent publication of research manuscript.

An annual Best Presentation by a Young Investigator Award will also be chosen. Investigators at the assistant professor level or below with fewer than five years of faculty appointment may request that their abstracts be considered for review in the young investigator category.

The ACEP Research Committee will also present awards for best medical student paper and best resident paper. The Best Medical Student Paper Award will be given to a medical student who is the primary investigator of an outstanding abstract presentation. The Best Resident Paper Award will be given to a resident who is the primary investigator of an outstanding abstract presentation.

All four awards will be presented at the 2017 ACEP Research Forum.

*Presentation at the ACEP16 by EMF grant recipients does not constitute previous presentation at a national meeting