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ACEP RESEARCH FORUM
October 29-31, 2017
Walter E. Washington Convention Center
Washington, DC

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S147 Teaching Fellowship Abstracts

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Srikar Adhikari, MD
Peter D. Akpunonu, MD
John Bailitz, MD, FACEP, RDMS
Justin Belsky, MD
Hansoti Bhakti, MD, FACEP
David Blehar, MD
Robert M. Bramante, MD, FACEP
Joshua Broder, MD, FACEP
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Emily Gundert, MD
Jeremiah Hinson, MD, PhD
Ming-Shun Hsieh, MD
Sarath Kalra, MD
Kathryn Kellogg, MD, MPH
Lauren Klein, MD
Kevin Kowalski, MD
Vijaya Kumar, MD
Anthony T. Lagina, MD, FACEP
Sangil Lee, MD
Philipp Levy, MD, MPH, FACEP
Patrick Meloy, MD, FACEP
Joseph Miller, MD
Lisa Mills, MD, FACEP
Trevor Mills, MD, FACEP
David P. Mizlan, MD, FACEP
Alice Mitchell, MD, FACEP
Nathaniel Mintnik, MD
Tiffany Moaddel, MD
Nichola Mohr, MD, FACEP
John Nangurney, MD, FACEP
Sandra Najarian, MD
Brian O’Neil, MD, FACEP
James Patel, MD
James Paxton, MD, MBA, FACEP
Jesse Pines, MD, MBA, MDCE, FACEP
Marc Probst, MD
Matthew Pirone, MD
Mike Puskarich, MD, FACEP
Martin Reznik, MD, FACEP
Robert Rosenthal, MD, FACEP
Mohsen Sadinejad, MD, MBA, FACEP
Bian Salhi, MD
Jon Schrock, MD, FACEP
Kunjal Sethuraman, MD
Robert Shermann, MD
David Sklar, MD, FACEP
Michael Smith, MD, MBA, CPE, FACEP
Mark Sochor, MD, FACEP
Zachary Soucy, DO
Catherine Stanton, DO
Todd Taylor, MD
N. Seth Trueger, MD
J. Scott Van Epps, MD, FACEP
Jody Vogel, MD
Rade B. Vukmir, MD, JD, FACEP
Muhammad Waseem, MD, FACEP
Lori Weichenthal, MD, FACEP
Matthew Wheatley, MD
Kabir Yadav, MDCM, MS, MSHS, FACEP
SUNDAY, OCTOBER 29, 2017

9:00 AM - 9:50 AM

ELECTRONIC PRESENTATIONS

Administration / Practice Management

16 Serum vs Urine Pregnancy Test: The Effect on Emergency Department Disposition Times in Females With Abdominal Pain Requiring Radiographic Study

Fuentes R, Henry Ford Wyandotte Hospital, Wyandotte, MI

17 Emergency Radiology Utilization and Optimization

Hemmert K, Northwestern Memorial Hospital, Chicago, IL

18 Scan, Admit, or Both? Is There a Correlation Between Admission Rate and Computed Tomography Utilization?

Shanin D, Yale University School of Medicine, New Haven, CT

19 Collaborative Application of Guidelines Changes Imaging Utilization and Impacts Length of Stay in Acute Renal Colic

Thom C, University of Virginia, Charlottesville, VA

20 Optimizing Magnetic Resonance Imaging Utilization in the Emergency Department

Koda A, Southern Illinois University School of Medicine, Springfield, IL

21 Success of a Strategy to Reduce Unnecessary White Blood Cell Differentials in the Emergency Department

Eastin C, University of Arkansas for Medical Sciences, Little Rock, AR

Airway

22 Apneic Oxygenation via Conventional Nasal Cannula to Prevent Oxygen Desaturation during Rapid Sequence Intubation in the Emergency Department and Intensive Care Unit: A Systematic Review and Meta-analysis

West J, Lincoln Medical and Mental Health Center, Bronx, NY

23 EMP Mastery Standards for Emergency Medicine Comprehensive Airway Management

Panchal A, The Ohio State University, Columbus, OH

24 PRIER: Patient Recall in Emergency Rapid Sequence Intubation

Juhasz K, UPMC Hamot, Erie, PA

25 Inclined Position Does Not Improve First Pass Success or Laryngoscopic View In Patients Undergoing Endotracheal Intubation in the Out-of-Hospital Setting

Murphy D, University of Washington, DC

26 Is Transient Hypoxemia During Intubation a Patient-Centered Outcome?

Driver B, Hennepin County Medical Center, Minneapolis, MN

27 Rapid Sequence Intubation: Should the Sedative or Paralytic Agent Be Administered First?

Driver B, Hennepin County Medical Center, Minneapolis, MN

Critical Care

28 A Simple Algorithm Reduced Mortality In Near-Hanging Patients

Muralitharan T, MMHRC, Madurai, India

29 Predicting Mortality in the Emergency Department Using an Automated Physiologic Scoring System

Connor-Schuler R, Henry Ford Hospital, Detroit, MI

30 qSOFA Outperforms CRB, CRB-65 and CRB-65 Plus: A Multicenter US Observational Study

Mark K, University of Florida, Gainesville, FL

31 Performance of a Novel Computer-Based Clinical Decision Support Alert and the Impact of Patient Partitioning and Optimization to Identify Septic Patients in an Urban Emergency Department

Sherwin R, Wayne State University, Detroit, MI

32 Predictors of Mortality Among Head Trauma Patients Reaching ICU

Beniameen M, Faculty of Medicine, Cairo, Egypt

33 Procalcitonin Trend Predicts Discharge to Home in Severe Sepsis and Septic Shock Patients

Kramer N, University of Central Florida/HCA GME Emergency Medicine Residency Program of Greater Orlando, Orlando, FL

Disaster

34 Does an In-Hospital START Protocol Predict Admission at the Time of Earthquakes?

Otaka S, Japanese Red Cross Kumamoto Hospital, Kumamoto, Japan

35 Time is Money: The True Cost of Helicopter EMS

Ragich J, University of Massachusetts Medical School, Worcester, MA

36 The Safety and Efficacy of Nitroglycerin Use by Paramedics for Treatment of ST Elevation Myocardial Infarction

Bosson N, Los Angeles County EMS Agency, Los Angeles, CA

37 Supraglottic Airway Use vs Endotracheal Intubation Pre/Post Deployment of the i-gel Supraglottic Airway Device in a Large Ground- and Air-based Emergency Medical Services Agency

Lyng J, North Memorial Health Hospital, Robbinsdale, MN

38 Does EMS Transport of Septic Patients Improve Downstream Processes of Care?

Hofmann E, Los Angeles County, University of Southern California Medical Center, Los Angeles, CA

39 Feasibility of Bystander Administration of Public Access Naloxone for Opioid Overdose

Goldberg S, Brigham & Women’s Hospital, Boston, MA

Cardiovascular

40 Development of a Health-Literate Decision Instrument for Low-Risk Chest Pain in the ED

Moore T, University of Arkansas for Medical Sciences, Little Rock, AR

41 A Baseline and 30-Minute Algorithm for Rapid Rule-out of Acute Myocardial Infarction: Does It Get Any Better Than This?

Nowak R, Henry Ford Health System, Detroit, MI

42 Is the European Society of Cardiology 0- and 1-Hour Algorithm for Opioid Overdose

Mark K, University of Florida, Gainesville, FL

43 Etiology of Myocardial Ischemia in Emergency Department Chest Pain Patients With Two Negative Initial Troponins, Non-Ischemic ECG, and Nonconcerning Vital Signs

Casey M, Icahn School of Medicine at Mount Sinai, New York, NY
SUNDAY, OCTOBER 29, 2017 —cont’d

44 Modified HEART Score Using the Derived 12-Lead Electrocardiogram and Cardiac Electrical Biomarker
Schreck D, Atlantic Health System, Morristown, NJ

45 Effectiveness of Modified Heart Score Versus Emergency Department Assessment of Chest Pain Score Accelerated Diagnostic Protocol for Low Risk Chest Pain: A Prospective Observational Study
Tambe N, Kokilaben Dhirubhai Ambani Hospital, Mumbai, India

SUNDAY, OCTOBER 29, 2017

10:00 AM - 10:50 AM
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Administration / Practice Management

46 The Impact of a Concierge Model on Door-to-Doctor Time and Patient Flow in an Urban Academic Emergency Department
Bove T, New York Presbyterian Brooklyn Methodist Hospital, Brooklyn, NY

47 Impact of an All ABEM Staffing Model and Enhanced Front-End Patient Flow Strategies in a Rural Critical Access Hospital
Allegra P, Guyana Regional Medical Center, Crosby, MN

48 A Novel Approach to Addressing an Unintended Consequence of Direct to Room: The Delay of Initial Vital Signs
Youssef E, Staten Island University Hospital, Northwell Health, Staten island, NY

49 EMF
Designing Emergency Departments to Provide Efficient, Patient-Centered Care: An Analysis of Split Flow and Sub-Waiting Area Models
Easter B, University of Colorado, Aurora, CO

50 Cost Benefit Analysis of Physician-in-Triage Model at Community Hospital Emergency Department
Bastani A, Troy Beaumont Hospital, Troy, MI

51 Dr. Admit: Reducing Admission Decision Time for Clinically Ill Patients
Spiegel T, University of Chicago, Chicago, IL

Diagnostics/Gastrointestinal

52 D-Dimer in Hospitalized Acute Medically Ill Adults and Venous Thromboembolism: Analysis of the DAMIACT Study by Age
Clark C, Oakland University William Beaumont School of Medicine, Royal Oak, MI

53 Analyzing the Components of the Wells Score for Pulmonary Embolus Can Strengthen Unstructured Physician Gestalt
Francis S, Duke University, Durham, NC

54 Physician Gestalt Is the Most Predictive Component Of The Wells’ Deep Venous Thrombosis Score In Diagnosing Subsequent Deep Venous Thrombosis
Francis S, Duke University, Durham, NC

55 History, Physical Exam and Emergency Department Bedside Ultrasound for the Diagnosis of Acute Appendicitis in Pediatric Patients
Hanna M, SUNY Downstate, New York, NY

56 Your Finger or Mine? Patient Preferences on Stool Collection in the Emergency Department
Couperus K, Madigan Army Medical Center, Tacoma, WA

57 Emergency Department Computed Tomography in Early Acute Pancreatitis
Lohse M, Stony Brook University, Stony Brook, NY

Critical Care

58 EMF
The Association of Plasma Syndecan-1 and Mortality in Patients With Septic Shock
Nandi U, University of Mississippi Medical Center, Jackson, MS

59 Does Intravenous Lactated Ringer’s Solution Raise Serum Lactate?
Skaggs Z, University of Nevada, Las Vegas, NV

60 Electrocardiogram Changes in Patients With Acute and Chronic Hyperkalemia
Rafique Z, Baylor College of Medicine, Ben Taub General Hospital, Houston, TX

61 Electrocardiogram Changes Are Not Reliably Associated With Hyperkalemia or its Severity
Rafique Z, Baylor College of Medicine, Ben Taub General Hospital, Houston, TX

62 Hyperkalemia in the Emergency Department: Severity, Treatment, And Outcomes
Singer A, Stony Brook University, Stony Brook, NY

63 Accuracy Of Intraosseous Lab Values Drawn After Fluid Infusion
Montez D, Teleflex Incorporated, San Antonio, TX

Disaster

64 Component Analysis of Three Screens for the Out-of-Hospital Triage of Patients With Uncomplicated Alcohol Intoxication
Dezman Z, University of Maryland School of Medicine, Baltimore, MD

65 Repairing the Stroke Chain of Survival: Exploring Missed Opportunities for EMS Prenotification
Nusbaum J, Mount Sinai Hospital, New York, NY

66 Out-of-Hospital Large Vessel Occlusions
Brandler E, SUNY Stony Brook Medicine, Stony Brook, NY

67 Variations in Cardiac Arrest Regionalization in California
Chang B, UCSF, San Francisco, CA

68 An Urban Fire Department’s Experience With Left Ventricular Assist Devices
Goebel M, UC San Diego, San Diego, CA

69 Use of 911 for Rapid Re-triage of Critical Trauma Patients
Bosson N, LA County EMS Agency, Santa Fe Springs, CA

Cardiovascular

70 Multicenter Trial of Rivaroxaban for Early Discharge of Pulmonary Embolism from the Emergency Department
Peacock W, Baylor College of Medicine, Houston, TX

71 PERC Rule to Exclude the Diagnosis of Pulmonary Embolism in Low Risk Emergency Patients: A Non-Inferiority Randomized Controlled Trial
Freund Y, Hospital Pitité-Salpêtrière, Paris, France

72 Predictors of Serious Outcomes After Syncope: A Systematic Review and Meta-Analysis
Sun B, Oregon Health and Science University, Portland, OR

73 Clinical Suspicion and D-Dimer Levels in Venous Thromboembolism Patients With Low and High Clot Burden
Singer A, Stony Brook University, Stony Brook, NY

74 Astaxanthin Pretreatment Attenuates Burn-Induced Heart Injury in Rats
Morinaga K, Tokyo Medical University, Tokyo, Japan
Research Forum Educational Program 2017

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75 Clinician HEART Score Calculation Variability: A Pilot Study
   Villarreal N, Baystate Medical Center, Springfield, MA

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11:00 AM - 11:50 AM
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76 Characteristics Associated With Hospital Admission From an Emergency Department Observation Unit
   Wood S, Icahn School of Medicine at Mount Sinai, New York, NY

77 Patterns of Emergency Department High Utilizers at Grady Memorial Hospital
   Taylor W, Emory University School of Medicine, Atlanta, GA

78 Decreasing Emergency Department Utilization by Patients followed by Pediatric Specialists
   Lee J, Massachusetts General Hospital, Boston, MA

79 Reduced Emergency Department Visits, Hospital Days, and Costs After Implementation of Individualized Care Plans for “Frequent Flyers”
   Podolsky S, Cleveland Clinic Health System, Cleveland, OH

80 Grady Memorial Hospital Emergent Dialysis Program
   Oiyemhonlan B, Emory University, Atlanta, GA and University of California, San Francisco, CA

81 The Effect of Compulsory Provider HEART Score Calculation on Chest Pain Patients Sent to Observation Units
   Osborne A, Emory University, Atlanta, GA

82 The “Gold Card”: A Novel Discharge Process to Guarantee Timely Specialist Follow-up
   Bastani A, Troy Beaumont Hospital, Troy, MI

Education

83 Gender at the Head of the Bed: Does Gender Bias Exist in the Evaluation of Emergency Medicine Residents’ Leadership Skills During Medical Resuscitations?
   Weichenthal L, UCSF-Fresno, Clovis, CA

84 Medical Student Response to Improvisation and Acting Training: Novel Curriculum Pilot Study
   Del Vecchio A, University of South Carolina School of Medicine Greenville, Greenville, SC

85 The Difference of Professionalism Between Emergency Medicine Residents and Faculty Physicians: Multicenter Cross-Sectional Analysis
   Nakashima Y, Tokyo Bay Urayasu/Ichikawa Medical Center, Urayasu, Japan

86 Sentiment Analysis Demonstrates Variability in Medical Student Grading
   Izzo J, Georgetown University Hospital/MedStar Washington Hospital Center, Washington, DC

87 Assessing Compassion Fatigue Among Emergency Department Professionals
   Martin E, University of Florida, Gainesville, FL

88 The EM-Powered Initiative™, Can a Two-Week Selective Be Effective in Promoting Wellness and Professional Development?
   Krywko D, Medical University of South Carolina, Mount Pleasant, SC

89 Global Assessment of Resident Wellness: Comparing the Maslach Burnout Inventory With Additional Validated Wellness Instruments
   Williamson, Kelly, Advocate Christ Medical Center, Oak Lawn, IL

Critical Care

90 Comparison of Emergency Department Antihypertensive Agents on Cerebral Blood Flow
   Tabor A, Henry Ford Hospital, Detroit, MI

91 Impact of Intermittent Versus Continuous Infusion of Fentanyl After Rapid Sequence Intubation on Intensive Care Unit Delirium
   Wolf L, Detroit Receiving Hospital, Detroit, MI

92 Comparison of Early Versus Late Sedative Interventions After Rapid Sequence Intubation Using Rocuronium in the Emergency Department
   Kilber E, The University of Arizona College of Pharmacy, Tucson, AZ

93 Effect of Timing of Adrenaline in Out-of-Hospital Cardiac Arrest Patients
   Al Mulhim M, University of Dammam, Dammam, Saudi Arabia

94 Cost Impact of Hydroxocobalamin as Treatment for Patients With Known or Suspected Cyanide Toxicity Due To Smoke Inhalation Injury
   Sanders K, Pfizer, Inc., New York, NY

95 Safety and Efficacy of Dantrolene Sodium (250 mg/5 mL) in Patients With Exertional Heat Stroke
   Hapner A, Eagle Pharmaceuticals, Woodcliff Lake, NJ

Disaster Medical / EMS

97 Safety of Out-of-Hospital Midazolam in Behavioral Emergencies
   Hern HG, AHS - Highland Hospital, Berkeley, CA

98 EMS Utilization among Patients on Involuntary Psychiatric Holds in Alameda County, April 2014-2016
   Trivedi T, Alameda County Medical Center, Oakland, CA

99 EMS Simple Thoracostomy for Traumatic Cardiac Arrest; Post-Implementation Experience in a Ground-Based Suburban/Rural EMS Agency
   Dickson R, Baylor College of Medicine, Houston, TX

100 Development of a Peer Assessment Tool to Evaluate Preparedness for Large Mass Casualty Incidents in the United States Yields Critical Lessons
   Abir M, University of Michigan, Ann Arbor, MI

101 Assessment of Stress Markers in Restrained Individuals Following Physical Stress With and Without a Sham TASER Activation
   Sloane C, UCSD Medical Center, San Diego, CA

Cardiovascular

102 Pacemaker and Defibrillator Interrogations in the Emergency Department and Hospital Rarely Lead to Device Reprogramming
   Neuenchwander J, Genesis Healthcare Systems, Zanesville, OH

103 Predictors of Hospital Admission in Emergency Department Patients With Atrial Fibrillation
   Singer A, Stony Brook University, Stony Brook, NY

104 Can Corrected Flow Time Detect Changes in Patients Undergoing Heart Failure Treatment?
   Pare J, Boston University School of Medicine, Boston, MA
Effect of Zero Diversion on Center for Medicare Patient Flow

Effect of Provider in Triage on Center for Medicare Patient Flow

Utilization of Business Intelligence Software for an Emergency Department Dashboard

Utilization of a Standard Scribe Script to Improve Level of Service Charges

Late Breakers – Narrative Abstract That Excludes Specific Data

1. Chest Pain Care Patterns Across the Carolinas: Determining the Readiness for Widespread HEART Pathway Dissemination
   Limkakeng A, Duke University Medical Center, Durham, NC

2. Effectiveness of Provider-Focused Interventions to Eliminate Care Disparities: Results From the Equity in Diagnostic Imaging Trial
   Richardson L, Icahn School of Medicine at Mount Sinai, New York, NY

3. Out-of-Hospital to Emergency Department Data Exchange: A SAFR Transition of Care
   Killeen J, University of California, San Diego, San Diego, CA

4. Serum GFAP and UCH1-L1 Predict Traumatic Injuries on Head CT Scan after Mild-Moderate Traumatic Brain Injury: Results of the ALERT-TBI Multicenter Study
   Bazarian J, University of Rochester, Rochester, NY

5. Pilot of a Modified HEART score and Serial High Sensitivity Troponin T Pathway to Reduce Chest Pain Observations
   Engineer R, Cleveland Clinic Health System, Cleveland, OH

Critical Care

Association Between SIRS Criteria and Bloodstream Infections in Immunosuppressed Patients in the Emergency Department

Analysis of a Multi-Center Survey to Assess Fluid Resuscitation Practice in Patients With Sepsis and Heart Failure

Emergency Providers Adequately Manage Mechanical Ventilation in Critically Ill Patients With Spontaneous Intracranial Hemorrhage and Elevated Intracranial Pressure

Evaluation of Acute Respiratory Distress Syndrome from Two Study Sites of the Protocolized Care for Early Septic Shock Trial

Lactate as a Mortality Predictor in Emergency Department Patients With Gastrointestinal Hemorrhage

Disaster Medical / EMS

Mobile Integrated Health to Reduce Post-Discharge Acute Care Visits: A Pilot Study

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156 High-Fidelity Cadaveric Simulation For Management of Patients with Upper Gastrointestinal Bleed
Nelson M, North Shore University Hospital, Manhasset, NY

157 How to Effectively Integrate Telestroke by Utilizing Mock In Situ Telestroke Training in the Emergency Department
Baer H, Northwell Staten Island University Hospital, Staten Island, NY

158 Caring for a Critically Ill Simulated Left Ventricular Assist Device Patient With or Without a Cognitive Aid Improves Physician Comfort
Einstein N, Advocate Christ Medical Center, Chicago, IL

159 Escape the Conference Room
Nelson M, North Shore University Hospital, Manhasset, NY

160 Validation of a Procedural Checklist for Ultrasound-Guided Internal Jugular Central Lines for Ongoing Evaluation of Attending Emergency Physicians
Hock S, Rush University Medical Center, Chicago, IL

International/Global

161 The Effects of Malnutrition and Diarrhea Type on the Accuracy of Clinical Signs of Dehydration in Children Under Five: A Prospective Cohort Study in Bangladesh
Bilal S, Warren Alpert Medical School of Brown University, Providence, RI

162 Access to a Health Care Facility Impacts Mortality in Brazilian Snake Envenomation: A Geospatial Information Systems Analysis
Ye J, Duke University Medical Center, Durham, NC

163 Assault-Injured Youth in the Emergency Centers of Khayelitsha, South Africa: Population Characteristics and Opportunities for Intervention
Leeper S, University of North Carolina, Chapel Hill, NC

164 Innovative, Scalable Educational Model to Improve Out-of-Hospital Care in India
Koval K, Stanford University Hospital, Palo Alto, CA

165 A Retrospective Observational Study on Epidemiology of Traumatic Injuries Presenting to a Tertiary Care Hospital in Madurai, India
Soundararajan A, Meenakshi Mission Hospital & Research Centre, Madurai, India

166 Access to Emergency Care Services in Brazil: A National Ecologic Study of a 6600-Hospital Health Care Network
Vissoci J, Duke Global Health Institute, Duke University, Durham, NC

MONDAY, OCTOBER 30, 2017

9:00 AM - 9:50 AM
ELECTRONIC PRESENTATIONS

Health Care Policy / Health Services Research

167 Evaluating Patient-Centered Interventions to Reduce Pediatric Asthma-Related Acute Care Utilization
Abir M, University of Michigan, Ann Arbor, MI

168 Effect of New York State Electronic Prescribing Mandate on Opioid Prescribing Patterns
Danovich D, Staten Island University Hospital, Staten Island, NY

169 Informing the Policy, Practice, and Research Agenda for Emergency Medical Services Oversight
Abir M, University of Michigan, Ann Arbor, MI

170 Opioid Prescribing Varies Markedly Between Pediatric and General Emergency Departments for Children, Adolescents and Young Adults With and Without Fracture
Menchine M, USC Keck School of Medicine, Los Angeles, CA

171 Implementation of a Screening and Referral Process for Patients With Sickle Cell Disease in the Emergency Department
Freierrmuth C, Duke University, Durham, NC

Poon S, Brigham and Women’s Hospital, Boston, MA

173 Validity of Code-Based Recording of Alcohol Intoxication Among College Students Presenting to a University Hospital Emergency Department
Ngô DA, University of Virginia, Charlottesville, VA

Education

174 Resident Clinical Experience in the Emergency Department: Patient Encounters by Post Graduate Year
Douglass A, Harbor-UCLA Medical Center, Torrance, CA

175 A Pilot Study of 360-Degree Perceptions of Emergency Physician Professionalism
Hoongpongsimanont W, University of California Irvine, Irvine, CA

176 How Common Are Cognitive Errors in Cases Presented At Emergency Medicine Resident Morbidity and Mortality Conference?
Xiao J, Beaumont Health, Royal Oak, MI

177EMP Development of a Sustainable Curriculum on Substance Use Disorders for Emergency Medicine Residents at Cooper University Hospital
Gruber E, Cooper University Hospital, Camden, NJ

178 A Comparative Analysis of Online vs In-Person Opioid Overdose Prevention Training for First-Year Medical Students as an Adjunct to First Responder Training Using Cardio Pulmonary Resuscitation
Berland N, SUNY Downstate Kings County, Brooklyn, NY

179 Institution of a Palliative Care Curriculum and the Effect on Resident Comfort and Knowledge Regarding End-of-Life Care
Riley J, Wellspan York Hospital, York, PA

Infectious Diseases

180 Effect of SEP-1 Core Measure Compliance on Mortality and Hospital Length of Stay
Gross E, University of California, Davis, Sacramento, CA

181 Early Variation of qSOFA for Risk Stratification in Emergency Infected Patients
Lemachatti N, Groupe Hospitalier Pitité-Salpêtrière, Paris, France

182 Loop Drainage Is Non-Inferior to Traditional Incision and Drainage of Cutaneous Abscesses in the Emergency Department
Schechter-Perkins E, Boston University School of Medicine, Boston, MA

183 Spatiotemporal Patterns and Social Determinants of Community-Associated Methicillin Resistant Staphylococcus Aureus Skin and Soft Tissue Infections Among Emergency Department Patients in North Central Florida
Gul S, University of Florida, Gainesville, FL

184 Can Adjunct Use of Topical Provodine® Improve Healing Rates in Patients With Skin Abscesses?
Olson A, University of Texas Health San Antonio, San Antonio, TX

185 Withdrawn

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**Pediatrics**

186 Pediatric Emergency Care Coordinators in US Emergency Departments<br>Camargo C, Massachusetts General Hospital, Boston, MA

187 The Association of State Gun Laws With Pediatric Mortality from Firearms<br>Goyal M, Children’s National Medical Center, Bethesda, MD

188 Lower Pediatric Patient Volume Is Associated With Higher Mortality in U.S. Emergency Departments<br>Mccormick T, Denver Health Medical Center, University of Colorado School of Medicine, Denver, CO

189 Practice Patterns and Attitudes Towards Universal Sexually Transmitted Infection Screening in a Pediatric Emergency Department<br>Goyal M, Children’s National Medical Center, Washington, DC

190 Pediatric Observation Medicine in the United States<br>Sharaf N, Cleveland Clinic Emergency Services Institute, Cleveland Clinic Lerner College of Medicine, Cleveland, OH

191 Evaluation of Interventions to Improve Pediatric Readiness in Community Emergency Departments: A Mixed Methods Study<br>Mccormick T, Denver Health, Denver, CO

**International/Global**

192 Strengthening Emergency Care Operations in East Africa: Implementation of the South African Triage Scale at Kenyatta National Hospital in Nairobi, Kenya<br>Wangara A, Kenyatta National Hospital, Nairobi, Kenya


194EMF Forging a Locally Driven Public Sector Emergency Care Research Network In Ethiopia<br>Silvestri D, Harvard Affiliated Emergency Medicine Residency, Boston, MA

195EMF The Use of Non-Physician Prescribed Medication in Cambodia<br>Venezia D, Stony Brook University, Stony Brook, NY

196EMF Evaluation of the Utilization and Impact of Point-of-Care Ultrasound in Acute Obstetrical Care in the North East Region of Haiti<br>Bloom C, SUNY Downstate Medical Center, Brooklyn, NY

197 Geographic Distribution of Diagnostic Testing for Acute Coronary Syndrome in Brazil<br>Hertz J, Duke University, Durham, NC

**Health Care Policy | Health Services Research**

198 Impact of a Communication Process Improvement Program on Ambulance Use by Patients With Known Mental Health Diagnoses<br>Cianelli J, Eskenazi/Midtown CMHC, Indianapolis, IN

199 Previous Visits as a Predictor of Revisits: A Retrospective Cohort Analysis<br>Montoy JC, University of California, San Francisco, San Francisco, CA

200 Patients With Acute HIV Infection Present to the Emergency Department With Non-Specific Symptoms<br>Stanley K, USC Keck School of Medicine, Los Angeles, CA

201 Patient Language Is Associated With Complexity of Evaluation, Disposition Decision and Revisit Rate<br>Burner E, USC Keck School of Medicine, Los Angeles, CA

202 Unexpected Benefits of Emergency Department-Based Social Support Intervention for Patients With Diabetes<br>Burner E, USC Keck School of Medicine, Los Angeles, CA

203 Acute Care Redesign and Alternative Payment for Emergency Medicine Within Accountable Care Organizations: A Qualitative Study<br>Lin M, Icahn School of Medicine at Mount Sinai, New York, NY

**Pain Management**

204 “I’m Keeping Them Just in Case”: Patients’ Rationale For Retaining Unused Opioid Pills<br>Neill L, Northwestern University Feinberg School of Medicine, Chicago, IL

205 Opioid Prescriptions Given in the Emergency Department Have Decreased from 2015 to 2017<br>Jean-Noel N, Morristown Medical Center, Morristown, NJ

206 Safety of Single- vs Two-Physician Procedural Sedation in a Small Community Emergency Department<br>Joseph C, Tahoe Emergency Physicians, South Lake Tahoe, CA

207 Management of Dental Pain in the Emergency Department<br>Singer A, Stony Brook University, Stony Brook, NY

208 Low-Dose Intravenous Ketamine for Acute Migraine in the Emergency Department: A Randomized Placebo-Controlled Trial<br>Etchison A, Carilion Roanoke Memorial Hospital, Roanoke, VA

209 Cadaveric Study of Serratus Anterior Block<br>Alired C, Harbor-UCLA Medical Center/LA Biomed, Torrance, CA

**Geriatrics**

210EMF Changes in Health-Related Quality of Life for Geriatric Patients after an Emergency Department Visit<br>Dresden S, Northwestern University Feinberg School of Medicine, Chicago, IL

211 Emergency Department Revisits Within 3 Days of an Emergency Department Discharge for Urinary Tract Infection among Geriatric Patients<br>Castillo E, University of California, San Diego, San Diego, CA

212 The Prevalence of Benzodiazepine Use in a Geriatric Emergency Department Population<br>Minns A, University of California, San Diego, San Diego, CA

213 High Diagnostic Uncertainty and Inaccuracy in Older Adult Emergency Department Patients With Dyspnea<br>Hunold K, Ohio State University, Columbus, OH

214 A Prospective Study of Screening, Triage, Referral and Follow-Up of Screen-Positive Depressive Patients in a New Geriatric Emergency Department<br>Keyes D, University of Michigan, Ann Arbor, MI
### Health Care Policy / Health Services Research

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**EMS**

Development of a Brief Motivational Interview Intervention to Promote Advance Care Planning for Older Adults after Leaving the Emergency Department  
*Ouchi K, Brigham and Women's Hospital, Boston, MA*

**216**

A Quality Improvement Intervention that Promotes Goals of Care Discussions Between Emergency Physicians and Patients Near the End of Life  
*Loffredo A, Cedars Sinai, Los Angeles, CA*

**Pediatrics**

**217**

Making the Diagnosis of Concussion in the Emergency Department: Are We Hitting the Mark?  
*Myers K, Rutgers New Jersey Medical School, Newark, NJ*

**218**

Incidental Findings on Pediatric Abdominal Computed Tomography at a Pediatric Trauma Center  
*Philip A, Staten Island University Hospital, Staten Island, NY*

**219**

Long-Term Outcomes following Pediatric Traumatic Brain Injury Presentations to the Emergency Department  
*Gupta N, Icahn School of Medicine at Mount Sinai, New York, NY*

**220**

Adherence to the PECARN Head CT Rule: 2013 to 2015  
*Myers K, Rutgers New Jersey Medical School, Newark, NJ*

**221**

Do Practitioners Still Recommend Rest for Acute Concussion Management?  
*Fong J, Children’s National Medical Center, Washington, DC*

**222**

The Pediatric Blast Injury: Prehospital and Emergency Department Resuscitation and Resource utilization in Iraq and Afghanistan  
*Schauser S, US Army Institute of Surgical Research, JBSA Fort Sam Houston, TX*

**Psychiatry**

**223**

Effect of the Affordable Care Act Medicaid Expansion on Psychiatric Boarding Times in the Emergency Department  
*Moore PQ, The University of Chicago Medical Center, Chicago, IL*

**224**

“13 Reasons Why” Pediatric Psychiatric Presentations to an Emergency Department In Relation to Release Date  
*Salo D, Morristown Medical Center, Morristown, NJ*

**225**

Does Telepsychiatry Help Disposition Psychiatric Patients Faster?  
*LeBaron, Johnathon, New York Presbyterian Queens, Flushing, NY*

**226**

Adverse Childhood Events Scores in Opioid-Misusing Patients Presenting to the Emergency Department  
*Brucker K, Indiana University School of Medicine, Indianapolis, IN*

### Pain Management

**233**

Effectiveness of Rural Emergency Department-Based Pain Contract on Emergency Department Visits Among ED frequent Users  
*Alburaith A, University of Maryland Shore Health, Annapolis, MD*

**234**

Safety and Efficacy of Intravenous Lidocaine for Pain Management in the Emergency Department: A Systematic Review and Meta-Analysis  
*e Silva LOJ, Mayo Clinic, Rochester, MN*

**235**

Whose Pain Is It Anyway? Qualitative Research Exploring How the 0-10 Pain Score is Used in Practice Within the Adult Emergency Department  
*Sampson F, University of Sheffield, Sheffield, United Kingdom*

**236**

Adjunctive Nitrous Oxide to Lidocaine Anesthesia During Emergency Department Incision and Drainage of Abscess in Adults: A Randomized Controlled Trial  
*Herres J, Einstein Medical Center, Philadelphia, PA*

**237**

A New Method for Assessing Pain in the Emergency Department  
*Im, Dana, Brigham and Women’s Hospital, Boston, MA*

**238**

A Randomized Clinical Trial of Naproxen + Placebo, Orphenadrine, or Methocarbamol for Acute Lower Back Pain  
*Irizarry E, Albert Einstein College of Medicine, Bronx, NY*

### Geriatrics

**239**

Mortality of Motor Vehicle Accidents by Elderly Drivers: A Nationwide Hospital-Based Registry in Japan  
*Matsuyama T, Kyoto Prefectural University of Medicine, Kyoto, Japan*

**240**

Association Between the Elderly Frequent Attender to the Emergency Department and 30-Day Mortality: A Retrospective Study over 10 Years  
*Shen Y, Singapore General Hospital, Singapore, Singapore*

**241**

Responding to Older Adults in the Emergency Department: A National Survey of Geriatric Emergency Departments  
*Magidson P, University of Maryland Medical Center, Baltimore, MD*

**242**

Adverse Events After Falls Among Thai Elderly Emergency Patients: A Prospective Study  
*Sri-on J, Vajira Hospital, Navamindratiraj University, Bangkok, Thailand*

**243**

Physical Therapy: Impact on Emergency Department Revisit Rates Among Seniors With a Ground-Level Fall  
*Lesser A, West Health Institute, La Jolla, CA*

**244**

A Four-Year Descriptive Analysis of Geriatric Patients Visits to The Emergency Department  
*Kreshak A, University of California, San Diego, San Diego, CA*
No Pain, No Gain? Parental Valuation of Watchful Waiting versus Catheterization in the Diagnosis of Urinary Tract Infection in Very Young Children
Kelly C, NewYork-Presbyterian Brooklyn Methodist Hospital, Brooklyn, NY

A Pre-Operative Clinical Scoring System to Distinguish Perforation Risk With Pediatric Appendicitis
Bonadio W, Maimonides Medical Center, Brooklyn, NY

Performance of Clinical Gestalt in Predicting Pediatric Appendicitis: Does Experience Matter?
Kene M, Kaiser Permanente Northern California, San Francisco, CA

A Clinical Pathway for the Management of Febrile Infants Ages 29-60 Days Improves Antimicrobial Stewardship
Boch K, University of Connecticut, Farmington, CT

A Systematic Review of the Literature on Survival Time of Torsed Testicles
Mellick L, Augusta University, Augusta, GA

HIV and Syphilis Testing and Antibiotic Administration in Adolescents Diagnosed With Pelvic Inflammatory Disease in Pediatric Emergency Departments
Jichlinski A, Children’s National Health System, Washington, DC

Food Insecurity and Frequent Emergency Department Use
Estrella A, New York University, New York, NY

Geospatial Analysis of Opioid Overdose-Related Emergency Medical Service Calls for Targeting Public Health Interventions
Dworkis D, Harvard Medical School, Boston, MA

Are Demographic Variations Among Homeless Patients Associated With Emergency Department Utilization?
Strouse K, Wayne State University School of Medicine, Detroit, MI

Rates of Naloxone Prescriptions Following Implementation of a Take-Home Naloxone Program from the Emergency Department
Lebin J, University of Washington, Seattle, WA

Long-term Mortality in Pediatric Firearm Assault Survivors: A Retrospective, Multi-Center, Comparative Cohort Study
Shaahinfar A, UCSF Benioff Children’s Hospital Oakland, Oakland, CA

Validating AUDIT Using Serum Phosphatidylethanol
Hoopongsimonant W, University of California, Irvine, Irvine, CA

Evaluation of Mobility and Fall Risk among Seniors Presenting to the Emergency Department
Tolia V, University of California, San Diego, San Diego, CA

The Acute Otitis Media Decision Aid: Pathway to Shared Decisionmaking
Anderson J, Mayo Clinic, Rochester, MN

Rod Microglia in Traumatic Brain Injury
Akhter M, University of Arizona College of Medicine–Phoenix, Maricopa Integrated Health System, Phoenix, AZ

Engagement of Accountable Care Organizations in Acute Care Redesign: Results of a National Survey
Schuur J, Brigham and Women’s Hospital, Boston, MA

A Qualitative Investigation of Emergency Department Provider Perspectives on Benzodiazepine-Opioid Co-Prescribing
Kim H, Northwestern University, Chicago, IL

Food Insecurity and Frequent Emergency Department Use
Estrella A, New York University, New York, NY

Geospatial Analysis of Opioid Overdose-Related Emergency Medical Service Calls for Targeting Public Health Interventions
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Shaahinfar A, UCSF Benioff Children’s Hospital Oakland, Oakland, CA

Validating AUDIT Using Serum Phosphatidylethanol
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Schuur J, Brigham and Women’s Hospital, Boston, MA

A Qualitative Investigation of Emergency Department Provider Perspectives on Benzodiazepine-Opioid Co-Prescribing
Kim H, Northwestern University, Chicago, IL
Anticipated Impact of Alternative Payment Models for Emergency Medicine
Lin M, Icahn School of Medicine at Mount Sinai, New York, NY

Epidemiology of Lumbar Punctures in Hospitalized Patients in the United States
Vickers A, UAB, Birmingham, AL

Neurology

Machine Learning Models Identify Mild Traumatic Brain Injury Patients With Significant Depressive Symptoms Over 6 Months of Recovery Using A3 Biomarker Blood Test
Van Meter T, ImmuneArray, Richmond, VA

Rethinking the Standard of Care for Patients With Central Retinal Artery Occlusion
Wagner B, Hennepin County Medical Center, Minneapolis, MN

The Relative Frequency of Akathisia from Parenteral Antidopaminergics: A Systematic Review and Meta-Analysis
Goldberger E, Albert Einstein College of Medicine, Bronx, NY

Identification of Unrecognized Delirium in Senior Emergency Department Patients
Tolia V, University of California, San Diego, San Diego, CA

The Effectiveness Of Fasudil Hydrochloride Administration To Prevent Cerebral Vasospasm After Intervention For Subarachnoid Hemorrhage
Funakoshi H, Tokyobay Urayasu Ichikawa Medical Center, Urayasu,

A Comparison of Headache Treatment in the Emergency Department: ProChlorperazine versus Ketamine
Zitek T, University Medical Center of Southern Nevada, Las Vegas, NV

Quality and Patient Safety

Patients Have Poor Recall for Prior CT Exposure: A Multicenter Study of Urban Emergency Department Patients
Colvin G, CHRISTUS Health, Texas A&M, Corpus Christi, TX

Implementation of an Opioid Detoxification Management Pathway Reduces Emergency Department Length of Stay
Bellew S, Vanderbilt University, Nashville, TN

A Broader View of Quality: Identifying Other Specialties’ Choosing Wisely Recommendations With High Relevance to Emergency Care
Maughan B, Emergency Physicians Integrated Care, Salt Lake City, UT

Emergency Providers Did Not Adequately Manage Patients With Spontaneous Intracranial Hemorrhage and Suspected Intracranial Hypertension
Strong J, University of Maryland, Baltimore, MD

Development and Testing of a Patient-Reported Outcome Measure for Use With Emergency Department Patients Who Are Discharged Home
Vaillancourt S, St. Michael's Hospital, University of Toronto, Toronto, ON

An Observational Study to Determine the Feasibility and Compliance Rates for Patients Turning in an Emergency Department for Pressure Ulcer Prevention
McManus J, Augusta University, Augusta, GA

Pilot Study to Test and Refine an Emergency Department Trigger Tool
Griffey R, Washington University School of Medicine, Barnes-Jewish Hospital, St. Louis, MO

PEDIATRICS

Assessing Fluid Status With Ultrasound in Pediatric Emergency Department
Hwang S, Seoul Nat'l Univ Hospital, Seoul, Korea, Republic of Korea

Intranasal Ketamine For Peripheral Venous Access: A Randomized Double Blind and Placebo-Controlled Study
Lago P, Universidade Federal Do Rio Grande Do Sul, Porto Alegre, Brazil

Intranasal Ketamine for Procedural Sedation in Children: A Randomized Controlled Pilot Study
Elise S, Western University, London, ON

Pediatric Out-of-Hospital Analgesia in Iraq and Afghanistan
Schauer S, US Army Institute of Surgical Research, JBSA Fort Sam Houston, TX

Sedation and Analgesia Use in Lumbar Punctures at a Pediatric Tertiary Care Center
Naik V, University of Minnesota, Minneapolis, MN

Incidence and Predictors of Elbow Injury in Children With Distal Forearm Fractures
Rubinstein M, Medicine Hasbro Children's Hospital and Alpert Medical School of Brown University, Providence, RI

TRAUMA

Optimizing Enrollment Strategies for Traumatic Brain Injury Clinical Trials: A Secondary Analysis of the ProTECT III trial
Ellis M, Wayne State University School of Medicine, Detroit, MI

Can Patients Who Present With Isolated Traumatic Subarachnoid Hemorrhage With Normal Mental Status Be Discharged from the Emergency Department?
Zackary J, Kaiser Permanente San Diego, Carlsbad, CA

Biometric Analysis of Cervical Movement During Ambulance Trauma Transport
Wampler D, UT Health Science Center San Antonio, San Antonio, TX

Predictive Accuracy of Adding Shock Index to the American College of Surgeons Major Resuscitation Criteria for Adult Trauma Triage
Haukoos J, Denver Health Medical Center, Denver, CO

Who Gets tPA? Beyond the Basic Demographics
Toy J, Western University of Health Sciences, College of Osteopathic Medicine of the Pacific, Pomona, CA

Palliative and End-of-Life Care

Emergency Department-Based Palliative Interventions
Marshall A, Northwestern University Feinberg School of Medicine, Chicago, IL

Early Palliative Intervention in Sepsis Patients Reduces Health Care Utilization
Manfredi R, George Washington University, Washington, DC

MONDAY, OCTOBER 30, 2017

4:00 PM - 4:50 PM
 ELECTRONIC PRESENTATIONS

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MONDAY, OCTOBER 30, 2017 —cont’d

**Neurology**

294 Treatment of Headache in the Emergency Department: Haloperidol in the Acute Setting
McCoy J, Western Michigan University Homer Stryker M.D. School of Medicine, Kalamazoo, MI

295 Inter-hospital Transfer is Not a Predictor of In-Hospital Mortality for Patients With Nontraumatic Intracranial Hemorrhage
Yip M, Yale-New Haven Hospital, New Haven, CT

296 A Novel Use of Out-of-Hospital Telemedicine to Decrease Door-to-Computed Tomography Results in Acute Strokes
Shah A, The Reading Hospital, West Reading, PA

297 Utility of a Brief EEG Training Module on Improving Physicians’ Ability to Identify Non-Convulsive Seizure
Zehtabchi S, State University of New York, Downstate Medical Center, Brooklyn, NY

298 Who Gets tPA? Beyond the Basic Demographics
Ganti L, University of Central Florida/ HCA GME Emergency Medicine Residency Program of Greater Orlando, Orlando, FL

299 Inter-Observable Reliability of Assigning NIHSS Between Emergency Medicine and Neurology Residents
Wolfe Y, Albert Einstein Medical Center, Philadelphia, PA

**Quality and Patient Safety**

300 Incidence, Causes and Outcomes of Return Visits To Emergency Department in King Fahad University Hospital Within 72 Hours
Alsubaie A, KHUH, Bahrain, UOD, Dammam, Saudi Arabia

301 Barriers to Prescribing Stroke Prophylaxis for Atrial Fibrillation in the Emergency Department: A Qualitative Provider Perspective
Kea B, Oregon Health & Sciences University, Portland, OR

302 Use of a Modified Early Warning Score to Predict Early Clinical Deterioration in Admitted Emergency Department Patients
Glick J, Hospital of the University of Pennsylvania, Philadelphia, PA

303 Early Identification and Intervention in Patients With Atrial Fibrillation in the Emergency Department Can Significantly Improve Guideline-Based Anticoagulation and Reduce the Risk of Stroke
Schwab K, Sharp Chula Vista Medical Center, Chula Vista, CA

304 The Effect of Emergency Department Crowding on Mechanical Ventilation Practice Patterns: An Observational Study
Kim J, Icahn School of Medicine at Mount Sinai, New York, NY

305 Language Assistance for Limited English Proficiency Patients in the Emergency Department: Determining the Unmet Need
Taira B, Olive View-UCLA Medical Center, Sylmar, CA

**Pediatrics**

306 Utility of Steroid Use in Prevention of Biphasic and Protracted Anaphylaxis
Hanna M, SUNY Downstate, New York, NY

307 Early Transport versus On-Scene Management of Pediatric Out-of-Hospital Cardiac Arrest
Banerjee P, University of Central Florida, Orlando, FL

308 Hemispheric Cerebral Oximetry Monitoring During Pediatric Seizure Activity Correlates to Seizure’s Complexity and Acute Anti-Convulsant Requirements in a Pediatric Emergency Department
Abramo T, Arkansas School of Medicine, Little Rock, AR

309 D-dimer in Children With a Radiographically Diagnosed Pulmonary Embolism
Sharaf N, Cleveland Clinic Emergency Services Institute, Cleveland Clinic Lerner College of Medicine, Cleveland, OH

310 Assessment of Smartphone Otoscope Use on Diagnosis and Management of Ear Complaints in a Pediatric Emergency Department
Chan K, Emory University, Atlanta, GA

311 Are Pediatric Senior Residents Ready To Perform As Team Leaders During Pediatric Codes?
Rizvi M, Downstate Medical Center, Brooklyn, NY

**Trauma**

312 Chronic Subdural Hemorrhage after Mild Traumatic Brain Injury Among Patients With Antiplatelet Therapy: A Population-Based Cohort Study
Su YC, Dalin Tzu Chi Hospital, Buddhist Tzu Chi Medical Foundation, Chiayi, Chiayi County, Taiwan

313 Evaluation of Phenylalanine and Tyrosine Concentrations in Traumatically Injured Patients
Johnston B, Duke University Medical Center, Durham, NC

314 Hypoxemia During Rapid Sequence Intubation of Trauma Patients in the Emergency Department Is Associated With Mortality
Ciurmeo E, Lincoln Medical and Mental Health Center, Bronx, NY

315 Emergency Department Management of Rib Fracture Patients Based on a Clinical Practice Guideline
Hamilton C, Rocky Vista University, Parker, CO

316 Chest Tubes for “Occult” Injury Drain Less Fluid, and Have Shorter Duration and Length of Stay
Patel B, University of California, Irvine, Orange, CA

317 Over-Imaging of Hanging Injuries
Gupta N, Icahn School of Medicine at Mount Sinai, New York, NY
Appropriateness of Trauma Alert Activation and Validation of a Two-Tiered System for Trauma Alert Activation at an Academic Medical Center
Saef S, Medical University of South Carolina, Charleston, SC

TUESDAY, OCTOBER 31, 2017

10:00 AM - 10:50 AM
ELECTRONIC PRESENTATIONS

Toxicology & Pharmacology

Hospital Observation Upon Reversal With Naloxone: An Interim Analysis of a Prospective Validation Study
Clemency B, University At Buffalo, Buffalo, NY

Trends in the Use of Hydroxocobalamin Omritizes as Antidotes, 2000-2016
Rege S, University of Virginia, Charlottesville, VA

Trends in the Reports of Naloxone as Reported to a Regional U.S. Poison Center
Rege S, University of Virginia, Charlottesville, VA

Epidemiology of Gastrointestinal Therapies Reported to the Poison Centers, 2011 - 2016
Rege S, University of Virginia, Charlottesville, VA

Naltrexone as an Antidote to Prevent Delayed Neuropsychological Disabilities from Acute Poisoning with the Sarin Analogue Disopropfluorophosphate
Nussbaum C, Vidant Medical Center/Brody School of Medicine, Greenville, NC

Hematologic Findings of Venom-Induced Consumption Coagulopathy following Korean Viper (Gloydius species) Bite
Yoon JC, Chonbuk National University Hospital, Jeonju-si, Korea, Republic of

Resuscitation

A Comparison of Flow Rates and Hematologic Safety Between Intravenous Blood Transfusion Strategies in a Swine (Sus scrofa) Model of Hemorrhagic Shock: A Pilot Study
Krepsela A, Naval Medical Center Portsmouth, Norfolk, VA

Elevation of the Head and Thorax During Cardiopulmonary Resuscitation Improves Cerebral Blood Flow in a Swine Model of Prolonged Cardiac Arrest
Dodd K, Hennepin County Medical Center, Minneapolis, MN

Biomechanical Aspect of Two-Finger versus Two-Thumb Chest Compression for Cardiopulmonary Resuscitation in Infant Manikin Model
Chi CH, National Cheng Kung University Hospital, Tainan, Taiwan

A Trial of Terlipressin Compared to Small Volume Resuscitation in a Swine (Sus scrofa) Model of Uncontrolled Hemorrhage and Severe Hemorrhagic Shock
Wootten B, Naval Medical Center Portsmouth, Portsmouth, VA

Coagulation Abnormalities Resulting from Cardiac Arrest
Kurz M, University of Alabama at Birmingham, Birmingham, AL

Lyophilizedplasma in Out-of-Hospital Resuscitation: Risk Benefit Balance
Sicard B, Allianz Global Assistance, Kitchener, ON

Quality and Patient Safety

Impact of a Pharmacist-Driven Four-Factor Prothrombin Complex Concentrate Protocol in the Emergency Department at a Large Urban Academic Medical Center
Corio J, Massachusetts General Hospital, Boston, MA

Assessment of Utilizing a Standardized Checklist on Length of Time for Resident Physician Sign Out and Attending Physician Grading Consistency
Milano A, St. Luke’s University Health Network, Bethlehem, PA

Specimen Collection and Labeling After Implementation of New Electronic Health Record: Work as Imagined versus Work as Performed
Gale J, Brigham and Women’s Hospital, Boston, MA

Patient Experience Scores are Affected by Timing of Survey Administration in an Urban Academic Emergency Department
Taylor R, University of South Carolina School of Medicine Greenville, Greenville, SC

Patient Perceptions of Shared Decisionmaking in the Emergency Department: A Multi-Center Survey Study
Schoenfeld E, University of Massachusetts Medical School - Baystate, Springfield, MA

Ultrasound

Point-of-Care Ultrasound for the Detection of Aortic Dissections in the Emergency Department
Gibbons R, Temple University Hospital, Philadelphia, PA

Detecting Pericardial Effusions: Is One View Enough?
Corcoran J, Mayo Clinic, Rochester, MN

Point-of-Care Ultrasound for Identifying Safe Tube Thoracostomy Insertion Sites
Gray E, University of Michigan Medical School, Ann Arbor, MI

Point-of-Care Ultrasound for Evaluation of Peritonsillar Abscess
Kelley K, UC Davis Medical Center, Sacramento, CA

Sonographic Measurements of the Inferior Vena Cava and Aorta Diameters in Healthy, Normovolemic Children Aged 4 months to 8 Years of Age Presenting to the Pediatric Emergency Department
Barua-Nath U, University of Florida Jacksonville, Jacksonville, FL

Success and Safety of Emergency Department Ultrasound-Guided Midline Program
Colpitts K, Allegheny General Hospital, Pittsburgh, PA

Trauma

The Relationship between Adult Body Mass Index and Anticipated Failure Rate of Needle Decompression Using a 5-cm Needle for Tension Pneumothorax
Lyng J, North Memorial Medical Center, Robbinsdale, MN

Prevalence of Intracranial Injury in Blunt Head Trauma Patients With or Without Anticoagulantand Antplatelet Use
Probst M, Mount Sinai School of Medicine, New York, NY

Derivation of a Clinical Decision Instrument to Identify Adults in a Community Setting With Mild Traumatic Intracranial Hemorrhage at Low Risk for Requiring Critical Care Intervention
Anderson T, University of California Davis Health System, Sacramento, CA

Concussions in the Emergency Department: A Retrospective Analysis of Clinical Decision Guidelines Utilization
Lasure B, West Virginia University, Morgantown, WV
TUESDAY, OCTOBER 31, 2017 —cont’d

374  Wide Variation in Whole Body CT Utilization Despite Lack of Mortality Benefit  
  Harrison N, Beaumont Health, Royal Oak, MI

375  Improving Interdepartmental Trauma Evaluation and Resuscitation Through Mock In Situ Trauma Review and Debriefing  
  Baer H, Northwell Staten Island University Hospital, Staten Island, NY

11:00 AM - 11:50 AM  
ELECTRONIC PRESENTATIONS

Teaching Fellowship Abstracts

376  Development of a Critical Thinking Curriculum for Emergency Medicine Residents  
  Schechter J, SUNY Downstate - Kings County Hospital Center, Brooklyn, NY

377  The Patient Experience: Increasing Medical Student Awareness of Patient-Centered Care  
  Callevo V, SUNY Upstate Medical University, Syracuse, NY

378  Interactive Curriculum for Learning Pediatric Emergency Medicine Radiology  
  Kuntz H, Loma Linda University Medical Center, Loma Linda, CA

379  Understanding Emotions: Combating Burnout With Empathy During Emergency Medicine Residency  
  Carney D, UCSF, San Francisco, CA

380  The Emergency Medicine Research Rotation  
  Fant A, Northwestern, Chicago, IL

Resuscitation

381  Predictors of Good Outcomes after Pediatric Cardiac Arrest  
  Banerjee P, University of Central Florida, Orlando, FL

382  Lifevac: A Novel Device for the Resuscitation of the Adolescent Choking Victim  
  Lih-Brody L, ProHealth Care Associates, Rockville Centre, NY

383  A Novel Technique for Improving Fluid Resuscitation in Septic Shock  
  Priez M, WakeMed Health & Hospitals, Raleigh, NC

384  Delineating the Value-Added Inclusion of the Impedance Threshold Device During Head-Up CPR  
  Pepe P, The University of Texas Southwestern Medical Center, Dallas, TX

385  Management Patterns and Outcomes of Patients With Severe Sepsis or Septic Shock Admitted from the Emergency Department With End Stage Renal Disease or Congestive Heart Failure  
  Thom S, DMC Sinai Grace Hospital, Detroit, MI

386  Withdrawn

Quality and Patient Safety

387  Increasing Compliance With Repeat Lactate Measurement Utilizing Automated Repeat Lactate Ordering  
  Santistevani J, University of Wisconsin, Madison, WI

388  Sepsis Fun Facts: A Simple Way to Increase Sepsis Bundle Compliance  
  Leon L, University of Central Florida/HCA GME Emergency Medicine Residency Program of Greater Orlando, Kissimmee, FL

389  My Visit Board: Improving Patient Understanding of Emergency Department Care  
  Funk E, Mayo Clinic, Rochester, MN

391  Same Physician, Different Location: Variation in Press Ganey Scores Between Freestanding and Hospital-Based Emergency Departments  
  Simon E, Cleveland Clinic Akron General, Akron, OH

392  Disposition Destination Does Not Affect Patient Experience Ratings in Real Time in an Urban Academic Emergency Department  
  Polk R, University of South Carolina School of Medicine, Greenville, Greenville, SC

Ultrasound

393  Evaluating Clinical Decisionmaking Using Inferior Vena Cava Ultrasound for IV vs PO Rehydration in Pediatric Emergency Department Patients With Suspected Dehydration  
  Vazquez M, Jean S. School of Medicine at Mount Sinai, Manhattan, NY

394  Brain Imaging Using a Novel Three-Dimensional Ultrasound System  
  Broder J, Duke University, Durham, NC

395  Pediatric Emergency Medicine-Performed Point-of-Care Ultrasound for the Diagnosis of Intussusception  
  Tripolidas T, Children’s Mercy Hospital, Kansas City, MO

396  Ultrasound-Guided Resuscitation of Critically Ill Patients Presenting to the Emergency Department in a Resource-Limited Setting  
  Tafaya C, University of Michigan, Ann Arbor, MI

397  Sonographic Measurement of Optic Nerve Sheath Diameter Compared With CT Scan for Detecting Elevated Intracranial Pressure of Head Injury Patients in Emergency Department  
  Manu Ayan S, Pariyaram Medical College, Kannur, India

398  Emergency Medical Services and Bilateral Lung Ultrasound in Emergency (EMS BLUE) Study  
  Becker T, University of Pittsburgh, Pittsburgh, PA

Public Health

399  Employing a Geospatial Analysis of Asthma-Related Emergency Department Visits to Target Community-Based Programs: An Example from an Academic-Community Organization Partnership  
  Carlson L, Massachusetts General Hospital, Boston, MA

400  Using the Single-Item Screening Question to Assess Alcohol-Use Severity in the Emergency Department  
  McCormack R, NYU School of Medicine, New York, NY

401  The Increasing Practice of Whole-Body CT Scanning in Blunt Trauma Patients  
  Harrison N, Beaumont Health, Royal Oak, MI

402  One-Year Mortality of Opioid Overdose Victims Who Received Naloxone by Emergency Medical Services  
  Weiner S, Brigham and Women’s Hospital, Boston, MA

403  Geriatric Visits to California Emergency Department from 2008 through 2014  
  Castillo E, University of California, San Diego, San Diego, CA

404  Withdrawn
TUESDAY, OCTOBER 31, 2017 —cont’d

12:00 PM - 1:00 PM
EMF/GE Point-of-Care Ultrasound Challenge: Innovation in Research With a Crowd-Sourcing Twist

2:00 PM - 2:50 PM
PLENARY SESSION 3 - PRACTICE-CHANGING EMERGENCY RESEARCH

11 High-Sensitivity Troponin T Identifies Patients at Very Low Risk of Adverse Events. 
Peacock WF, Baylor College of Medicine, Houston, TX

12 Highly Elevated Quantitative D-Dimer Assay Values Increase the Likelihood of Venous Thromboembolism. 
Francis S, Duke University, Durham, NC

13 Metabolomic Profiling for Outcome Prediction in Emergency Department Patients With Out-of-Hospital Cardiac Arrest. 
Tsai CL, National Taiwan University Hospital, Taipei, Taiwan

14 The Ability of Heparin-Binding Protein To Identify Delayed Shock In Emergency Department Sepsis Patients Is Impacted by Age and Source of Infection. 
Schochardt B, Christiana Care Health System, Newark, DE

Van Meter T, ImmunArray, Richmond, VA

3:00 PM - 3:50 PM
ELECTRONIC PRESENTATIONS

Teaching Fellowship Abstracts

405F Instructional Module for Reviewing Articles for Publication. 
Stehman C, Indiana University School of Medicine, Indianapolis, IN

406F A Curricular Intervention to Address Medical Student Procedural Entrustability. 
Michael S, Alpert Medical School of Brown University, Providence, RI

407F Teaching Left Ventricular Assist Device Using Team-Based Learning in Emergency Medicine. 
Narajeenron K, University of California Irvine, Irvine, CA

408F Effective Integration of Team-Based Learning into an Emergency Medicine Core Curriculum Conference. 
Estes M, Stanford University, Stanford, CA

409F The Mass Casualty Incident: A Simulation-Based Curriculum. 
Plitt J, University of Arizona, Tucson, AZ

Pulmonary

410 A Novel Protocol Increases the Proportion of Pulmonary Embolism Patients Safely Discharged from the Emergency Department Without Hospital Admission. 
Kabrhel C, Massachusetts General Hospital, Boston, MA

Glober N, University of California at San Diego, San Diego, CA

412 Geographic and Treatment Analysis of Emerging Adult Asthmatic Patients Utilizing the City Emergency Medical Services System in a Large Impoverished Urban Area. 
Olsen E, Wayne State University, Detroit, MI

413 Incorporation of a Novel Asthma Action Plan to Improve Knowledge and Symptom Management in the Low Acuity Asthmatics Presenting to the Emergency Department. 
Pidgeon H, Rush Medical College, Chicago, IL

414 Correlation Between Procalcitonin and Severity Scoring Systems in Hospitalized Patients With Diagnosis of Community-Acquired Pneumonia. 
Ekşıoğlu M, Okmeydani Training and Research Hospital, Istanbul, Turkey

415 Discrepancy Between Gestalt and Subjective Wells in Workup of Pulmonary Embolism. 
Akhter M, University of Arizona College of Medicine-Phoenix, Maricopa Integrated Health System, Phoenix, AZ

Quality and Patient Safety

Aaronson E, Massachusetts General Hospital, Boston, MA

417 Performance of an Automated Severe Sepsis Screening Tool in the Emergency Department. 
Sanstistevan J, University of Wisconsin, Madison, WI

McKay M, University of Nevada School of Medicine, Las Vegas, NV

419 Extended-Length Peripheral Catheters Placed Under Ultrasound Guidance Are Associated With Increased Risk of Computed Tomography Contrast Extravasation. 
Gordon R, Medical College of Georgia, Augusta, GA

420 Standard of Care for Cleaning Stethoscopes before Patient Evaluations. 
Kafra S, Baylor College of Medicine, Houston, TX

421 Patterns of Non-English Language Use for Patient Care in a Public Emergency Department. 
Taira B, Olive View-UCLA Medical Center, Sylmar, CA

Wellness/Wellbeing

422 Surveying Maternal Experiences and Perceptions in Female Emergency Physicians. 
McDonald L, Henry Ford Wyandotte Hospital, Wyandotte, MI

423 Association between Physician Empathy and Patient Real-time Satisfaction. 
Holmes M, John Peter Smith Health System, Fort Worth, TX

424 Night Shift Preparation, Recovery, and Perception: Are There Differences Between Faculty, Residents, and Nurses? 
Richards J, U.C. Davis Medical Center, Sacramento, CA

425 Emergency Medicine Resident Perceptions about Physician Wellness Education. 
Williamson K, Advocate Christ Medical Center, Oak Lawn, IL

426 A High-Impact Mindfulness in Emergency Medicine Curriculum for Medical Students. 
Chung A, Icahn School of Medicine at Mount Sinai, New York, NY

427 Music in Emergent Settings: A Randomized Controlled Trial. 
Tyndall J, University of Florida, Gainesville, FL

Public Health

428 Prevalence of Homelessness and Housing Insecurity in an Urban Emergency Department. 
Jackson T, Emory University, Atlanta, GA
TUESDAY, OCTOBER 31, 2017 —cont’d

Assessment of Access to Firearms in Suicidal Patients in the Emergency Department
Naganathan S, Washington University School of Medicine and Barnes-Jewish Hospital, Saint Louis, MO

Characterizing Community Naloxone Programs and Opioid Overdose Trends in the United States
Bode A, University of Miami Leonard M. Miller School of Medicine, Miami, FL

Facilitating an Emergency Department Take-Home Naloxone Program Through Involvement of Community-Based Harm Reductionists
Barbour K, UC Irvine School of Medicine, Irvine, CA

Characteristics and Predictors of Tramadol Misuse Results from the 2015 National Survey on Drug Use and Health
Rege S, University of Virginia, Charlottesville, VA

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1 Chest Pain Care Patterns Across the Carolinas: Determining the Readiness for Widespread HEART Pathway Dissemination

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Study Objectives: Greater than 50% of patients who present to the ED with chest pain are admitted but <10% are ultimately diagnosed with ACS. This pervasive over-triage costs $10-13 billion annually. The HEART Pathway uses a validated clinical decision aid and serial troponin measures to provide real-time decision support to providers. In prior studies, the HEART Pathway decreased hospitalizations, stress testing, and hospital length of stay, without increasing adverse events, demonstrating efficacy at a single site. However, it is unclear what its effectiveness would be in a multicenter study.

In preparation for possible widespread implementation of the HEART Pathway, we sought to determine health care utilization and ACS rates for ED patients with acute chest pain across the 4 Carolinas Collaborative health systems (Wake Forest Baptist Health, Duke University, University of North Carolina, and Medical University of South Carolina). We hypothesized that sites that had not implemented the HEART pathway would have higher hospitalization and stress testing rates compared to the one site that had done so.

Methods: This multi-center observational study uses the Carolina Collaborative infrastructure to pool data from a common electronic health record platform across 4 academic university-affiliated health care systems. We included adult patients (>21 years old) presenting to the ED from 1/1/2015-12/31/2015 with a chief complaint of "chest pain" or "heart problem," for whom the provider ordered troponins. We excluded those with a diagnosis code of ST-segment elevation myocardial infarction (STEMI). We anticipate a total of 20,000 patients being eligible based on prior work. The Carolinas Collaborative has an existing ontology of variables including demographics, diagnoses, medications, and selected laboratory values. We assessed rates of hospitalization, stress testing, angiography, recurrent ED visits, readmissions, death, myocardial infarction, revascularization, and length of stay to determine the potential impact of implementing the HEART Pathway at included sites. Further variables were extracted and definitions harmonized across sites. Rates of hospitalization and stress testing from the Heart Pathway site, Wake Forest Baptist Health (WFBH) will be compared to other sites in the Collaborative. We will calculate p values with alpha =0.05 for these two comparisons with and without propensity score adjustment for comorbid conditions.

Results: We will report basic demographics, including age, sex, and race. We will report unadjusted rates of hospitalization and stress testing for non-STEMI patients with chest pain at the Heart Pathway site versus non-HEART pathway sites. After controlling for patient severity and comorbidity, we will determine whether patients at non-HEART pathway sites are more/less likely (odds ratios) to be admitted or to have stress testing.

Conclusions: In this comprehensive multicenter EHR data analysis, we anticipate that rates of hospitalization and stress testing among eligible patients will vary across sites. We will be able to determine whether implementing the HEART Pathway is associated with more or less hospitalization and stress testing.

2 Effectiveness of Provider-Focused Interventions to Eliminate Care Disparities: Results from the Equity in Diagnostic Imaging Trial (EDIT)


Study Objectives: African Americans have almost twice the incidence of subarachnoid hemorrhage (SAH) compared to Whites, yet studies indicate they are less likely to receive neuroimaging when presenting to the emergency department (ED) with headache, even when adjusting for age, sex, co-morbidity and acuity. Regulatory efforts and quality initiatives to reduce CT imaging for ED patients with headache may exacerbate this disparity and increase the likelihood that Black patients, who are at higher risk for SAH, do not receive an appropriate ED workup for severe headache.

The Equity in Diagnostic Imaging Trial (EDIT) was designed to develop and test the effect of two provider-focused interventions on this racial disparity in diagnostic imaging rates for ED patients with headache.
Methods: The EDIT team designed two evidence-based, provider-focused interventions: 1) an audit-feedback (AU-FB) intervention that provided periodic information on the higher incidence of SAH among Blacks and their lower rates of neuroimaging; and 2) clinical decision support (CDS) embedded in the electronic health record with similar content. These interventions were tested in sequential blinded, randomized, controlled trials; providers were unaware of the study. Attending physicians, emergency medicine residents, and physician assistants working in the adult ED of a large urban academic medical center were randomized to either AU-FB or control. After a 12-month intervention period and a 9-month washout period, providers were re-randomized to either CDS or control for another 12-month period. All adult patient visits (age > 18), identified through an automated report of patients for whom an adult headache template was used by the ED clinician during the study period, were reviewed. Patients with history of trauma were excluded. Data elements, abstracted by automated reports and structured manual review by trained research staff, included: ED provider names; patient age, sex, race, ethnicity, insurance type, emergency severity index, chief complaint, vital signs, pain score, neuro imaging order, ED disposition, ED diagnosis, and elements of the prior medical history, history of present illness, and physical examination significantly associated with the decision to order diagnostic imaging in a previously reported observational study, which confirmed the presence of a Black-White imaging disparity at the study site. Comorbidities were categorized using the Elixhauser Comorbidity Index. Results: AU-FB intervention group received 130 (1.6%) of these visits. ED reviews within 2 days of a previous ED visit for headache. These were dropped resulting in a final sample of 8,055 visits. The primary outcome for both trials is likelihood of a neuroimaging order for Black vs White patients. Secondary analyses will examine neuroimaging for all racial/ethnic/sex patient groups; comparative effectiveness of the two interventions; provider subgroups (attending, resident, PA); and concordance vs discordance of provider-patient race/ethnicity.

Conclusions: The EDIT Trial tested the effectiveness of two provider-focused interventions addressing a racial disparity in diagnostic imaging rates for ED patients with headache. These interventions are particularly timely given current efforts to decrease CT utilization for ED patients with headache.

3 Out-of-Hospital to Emergency Department Data Exchange: A SAFR Transition of Care

Study Objective: Electronic health records and the digital revolution are dramatically changing the way health care is delivered. Because electronic patient data can be shared among providers, physicians and nurses, it has the potential to vastly improve care, reduce errors, and enhance patient safety across the continuum of care. One area that remains largely disconnected from this growing exchange of patient data are Emergency Medical Services (EMS). Paramedics often do not have access to electronic patient data creating gaps of care. Just as importantly, given the potential acuity of presentation, information from paramedics in the field may not be available in a timely manner for ED providers receiving these patients. A robust EMS-hospital health information exchange (HIE) relies on a bi-directional flow of data covering all aspects of the patient care continuum including dispatch to hospital bed. We proposed and developed the first-of-its-kind real-time patient data exchange based on existing data standards between EMS providers and hospitals EDs to improve care for patients in the field and the acute care setting.

Methods: We developed and evaluated a process for paramedics to search the HIE for patient information and then push the ED report with the added HIE data to the destination hospitals. This process involved multiple hospitals and a large urban EMS agency and allowed providers in the field to more accurately and completely access and securely share a patient’s vital medical information electronically to improve emergency care, quality, and reduce errors with the following features: Search the patient’s health record for problems, medications, allergies, and end of life decisions to enhance clinical decisionmaking in the field, Alert the receiving hospital about the patient’s status directly, create a dashboard in the emergency department to provide decision support, Edit the emergency medical services patient care report data directly into the patient’s electronic health record for a better longitudinal patient record, and Recompile the electronic health record information including diagnoses and disposition back into the EMS patient care report for use in improving the EMS system.

To create the flow of information, integration teams worked together to create translate and exchange: CAD 911 data, a standard NEMSIS 3.4 out-of-hospital report, vitals and EKG images into an HL7 MDM message. The team also created an HL7 message to be consumed by the arrival hospital containing elements of the 911 call, EMS run number and a temporary ID number. The receiving hospital consumed this message and return a registration message to the EMS agency.

Results: During April 2017, 220 patient care events by EMS triggered transaction messages from City EMS to the emergency departments. As this study was just initiated this past month we are still evaluating length-of-stay measures, morbidity and mortality outcomes for both trauma and emergency department patients, ancillary test ordering patterns and patterns of frequent utilizers of the 911. These data would be available and analyzed by the time of presentation if accepted.

Conclusions: A novel process was successfully established for identifying patients in the field leveraging the HIE and integrating patient data into the hospital EMR. In simple terms, our hospital staff now know when a patient is arriving from the field, their basic medical information, somewhat akin to the saying "the data are here, where’s the patient?"

4 Serum GFAP and UCHL1-L1 Predict Traumatic Injuries on Head CT Scan After Mild-Moderate Traumatic Brain Injury: Results of the ALERT-TBI Multicenter Study
Bazarian JJ/University of Rochester, Rochester, NY

Study Objectives: There is a critical unmet medical need to improve the assessment and management of traumatic brain injury (TBI), a leading cause of injury, death and disability in the United States. Despite growing recognition and research of the importance and potential of biomarkers for TBI, there are currently no FDA-cleared or approved objective blood tests for TBI or concussion. Ubiquitin C-terminal hydroxylase-L1 (UCH-L1) and glial fibrillary acidic protein (GFAP) are two novel biomarker candidates that are highly brain specific and are detectable in the serum shortly after TBI. In this study, the utility of the Banyan UCH-L1/GFAP Assay was evaluated in a population undergoing computed head tomography (CT) for the evaluation of mild and moderate TBI.

Methods: A total of 11 subjects over the age of 18 were enrolled in this prospective multi-center study conducted in the United States, Germany and Hungary. Subjects presenting to the emergency department (ED) with a Glasgow Coma Score (GCS) of 9-15 and suspected mild or moderate TBI underwent blood draw and head CT within 12 hours of injury. All head CT scans were performed as a part of standard medical management within 3 hours of presenting to the ED. Scans were acquired according to local protocols and then transmitted to the Core Imaging Laboratory. A Neuroimaging Review Committee consisting of three board-certified neuroradiologists conducted an independent, blinded review of each CT scan to determine whether it was CT-positive or CT-negative with respect to acute intracranial lesions. Serum samples collected for biomarker assessment were tested using the investigational Banyan UCHL1/GFAP assay at 3 independent qualified laboratories blinded to the subject’s diagnosis and clinical status.

Results: The primary endpoints of assay sensitivity (95% lower CI) and NPV (95% lower CI) were determined to be ≥XX% (XX%–XX%) and ≥XX% (XX%–XX%), which allowed acceptance of the study alternative hypothesis. Results for secondary endpoints of assay specificity (XX%–XX%), PPV (95% lower CI) (XX%–XX%), or LR (95% lower CI) (1.532 [1.466]), and LRN (95% lower CI) (0.066 [0.168]), supported the technical utility of the assay as a rule-out test. Assay performance demonstrated XX% sensitivity (N=X) in the surgically manageable lesion (SML) subgroup. Assay performance demonstrated XX% sensitivity (N=X) in the mild TBI (GCS 13-15) subgroup. Assay performance demonstrated XX% sensitivity (N=X) in the minimal (GCS 15) subgroup.

Conclusions: The results demonstrated that the Banyan UCH-L1/GFAP Assay is characterized by high sensitivity and high NPV, which supports clinical utility for ruling out the need for a CT scan in patients with GCS 9-15 and suspected mild or moderate TBI with a negative UCH-L1/GFAP Assay result.

5 Pilot of a Modified HEART Score and Serial High Sensitivity Troponin T Pathway to Reduce Chest Pain Observations
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Study Objectives: Recent innovations have led to markedly decreased admission rates and reductions in 30-day major adverse cardiac event (MACE) rates to 0.5% in late-breaker study in progress and not yet completed.
Europe, which is improved over previous U.S. national estimated rates of missed acute myocardial infarction (2.1%) and unstable angina (2.3%). High sensitivity troponin T (hs-TnT) has recently been approved by the FDA. Our objective is to decrease “nonproductive” chest pain observations by reducing variability in assessments of patients presenting to the emergency department (ED) with chest pain (or other potentially ischemic symptoms), through the use of a modified HEART score and serial hs-TnT measurements at 0 and 1 hour, while simultaneously maintaining or improving patient outcomes.

Methods: This is a quality improvement project approved under our enterprise Care Affordability Incentive. The ongoing pilot will occur at two hospital EDs, one urban academic and the other suburban community with 66,000 annual visits each, commencing on July 1st, 2017. Low risk chest pain patients with onset of symptoms at least two hours prior to blood draw underwent serial hs-TnT measurements at 0 and 1 hours for risk stratification. Patients with “no risk/minimal risk” per physician gestalt were excluded. Low risk was defined as non-high risk history, nonischemic ECG (no new Q-waves, ST-depression, ST-elevation, or T-wave inversion), and modified HEART score ≤ 3. Patients with initial hs-TnT < 12 ng/l and delta hs-TnT < 3ng/l were considered to be very low risk for MACE and could be discharged. Patients who were not low risk, had initial hs-TnT ≥ 12 and < 52 ng/l, or had delta hs-TnT ≥ 3 and < 5 ng/l were considered intermediate risk and admitted for extended serial markers at 0, 3, and 6 hours. Patients who had initial hs-TnT ≥ 52 ng/l, had delta hs-TnT ≥ 5 ng/l, or had either ischemic ECG or high risk history plus hs-TnT ≥14ng/l were considered high risk and admitted to/for Cardiology. Data for modified HEART score was entered into discrete fields in the clinical decision support tool (CDST) within the electronic health record (EHR) by the provider. Initial data regarding observation rate was abstracted electronically from Datamart by in-house analysts. Future detailed data to be abstracted by Business Intelligence unit from Clarity database of the EHR. Observation rate pre and post implementation will be compared by relative risk with 95% confidence intervals. 30-day MACE will be assessed via EHR review and patient call backs when necessary.

Results: [N] total patients were assessed for inclusion, as measured by data within the CDST. [M] patients had one hs-TnT drawn and [N] patients had two serial hs-TnT drawn. [O] patients were considered very low risk for MACE and [P] patients were actually discharged. Relative Risk for early discharge was [RR] (95% CI RR1 - RR2).

Conclusions: Chest pain observations [were / were not] reduced after implementation of a modified HEART score and 0 and 1 hour serial hs-TnT pathway.

Validation and Integration of a Stroke Algorithm (VISA Study): Out-of-Hospital Identification of Large Vessel Occlusion Stroke in a Suburban/Rural EMS Service

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Study Objectives: We sought to compare performance of the Southeast Texas Assessment and Transport Stroke Tool Severity Criteria (STATS) and Rapid Arterial Occlusion Evaluation (RACE) for diagnosing large vessel occlusion stroke in a suburban/rural EMS Population.

Methods: The study setting is a suburban EMS advanced life support (ALS) service covering eleven hundred square miles in Southeast Texas. Our service answers 60,000 annual requests using 220 ALS medics and 900 EMT-B first responders. We conducted a prospective study of consecutive patients identified as possible stroke by National Emergency Medical Services Information System (NEMSIS) criteria of primary or secondary impression as stroke between 6/1/16-11/1/16. Data collection sources included Zoll® emergency medical record database and hospital records. Data included patient characteristics, onset of symptoms, Southeast Texas Assessment and Transport Stroke tool (STATS), STATS severity criteria, RACE score, transport designation, imaging utilized, treatment times, and final diagnosis.

Results: During the study period we answered 286 runs on patients suspected of stroke. 240 patients (84%) were positive on the STATS stroke diagnostic tool. 161/240 (67%) met the severity criteria for suspected large vessel occlusion, with 1 positive STATS severity criteria or RACE score ≥ 5, 39/161(24%) were diagnosed with large vessel occlusion. Characteristics in the large vessel occlusion group include 24/39 (61%) Male, 55/39 (90%) white, average age 74 years (58-92). In the severe stroke group 52/39 (82%) were transported to comprehensive stroke centers, with 37/39 (94%) in this group having time of onset to first medical contact <4.5 hours. Performance of STATS severity criteria over 1 for predicting large vessel occlusion was 31/39 (77%) sensitive, 38% specific (95% CI 0.60-0.88 and 0.31-0.45 respectively). RACE of ≥ 5 was positive in 27/39 patients 69% sensitive, 69% specific (95% CI 0.52-0.82 and 0.62-0.75 respectively). In patients identified as high risk for large vessel occlusion by RACE/STATS severity criteria, 31/161 (19%) received CTA imaging with an average door to imaging time of 121 minutes. Average door- to-non-contrast CT in this same group was 17 minutes with an average door-to-needle time of 58 minutes in those treated with TPA. Patients receiving interventional therapy for large vessel occlusion had a mean door-to- groin puncture time of 218 minutes (158-300 minutes).

Conclusions: The Southeast Texas Regional Advisory Committee (SETRA) criteria and RACE ≥ 5 demonstrated similar performance in identifying large vessel occlusion stroke in this EMS patient population of suspected strokes. The RACE score demonstrated higher specificity for large vessel occlusion. A majority of large vessel occlusion’s had onset <4.5 hours at time of EMS contact yet there was inconsistent use of CTA imaging in the subset of EMS patients who met the severity criteria for large vessel occlusion stroke. The preliminary data suggest few eligible patients with suspected large vessel occlusion are being evaluated with vascular imaging. The wide gap in mean imaging times for CT/CTA, suggests endovascular therapy was considered only after the failure of primary TPA therapy. A regional plan to improve...
performance in diagnosis and expedited endovascular therapy for large vessel occlusion stroke is indicated given the evidence for benefit of this therapy.

8

Dissemination of a Protocol to Expedite Home Treatment of Low-Risk Patients With Venous Thromboembolism With Monotherapy Anticoagulation

Hall CL, Gerrett JS, Wang H, Johnson E, Thammiwong J, Kline JA
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Study Objectives: Monotherapy anticoagulation has been used in two emergency departments (EDs) in Indianapolis, IN to treat and discharge patients with venous thromboembolism (VTE) [PMID: 26113241, 27143861]. Here, we describe the process and outcomes of dissemination and implementation of this protocol, including emergency physician supervised follow-up clinics in two large hospitals in the Dallas-Ft. Worth metroplex of Texas. We hypothesized low rates of recurrent VTE and clinically significant bleeding at 30 days.

Methods: For implementation, we used a written protocol (“Outpatient VTE for dummies”), slide shows, patient examples and site visits. We sequentially initiated the protocol at Baylor University Medical Center (BUMC) in Dallas, then John Peter Smith (JPS) in Ft. Worth. The BUMC clinic was established to allow referral from five community hospitals. To facilitate follow-up, we recreated special “clot clinics” at BUMC and JPS, staffed by either PharmDs or advanced practitioners with emergency physician oversight. Sites obtained institutional review board approval prior to initiation. The ED protocol included patients with objectively diagnosed with a venous thromboembolism (VTE) who were deemed low risk by the modified Hestia and POMPE-C criteria. Patients were treated with and prescribed either apixaban or rivaroxaban and given follow-up at one of the specialized clot clinics created by this protocol within 3-4 weeks.

Results: Full implementation at BUMC main hospital, with the five referral community sites, required 2 site visits, 4 months and approximately 5% effort of four individuals for initiation. Full implementation at JPS required 3 site visits, 9 months and approximately 2% effort of four persons. Since January 2016, the clot clinic at BUMC Main has treated 198 patients (49 with PE) and since September 2016, the clot clinic at JPS has treated 16 patients (1 with PE) for a total of 214 VTE patients. On 30-day follow-up, one patient (1/214, 0.4%, 95% CI 0-2.6%) had a recurrent VTE that did not require admission, and 0/214 (0-1.8%) had bleeding requiring hospitalization. None have switched or stopped their medications for any reason.

Conclusion: Our protocol decreased VTE follow-up needs, hospitalizations, and bleeding complications while remaining adherent to low risk criteria. It helped facilitate outpatient treatment and expedited follow-up for these ED VTE patients.

9

EMF

An Evaluation of a Payment Reform Experiment: The Effects of Global Budgets on Emergency Department Admissions

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Study Objectives: Initiating and Improving Emergency Department-Based Processes for Acute Care at Home as an Alternative to Admission

Stuck A, Crowley C, Tolia VT, Kreshak AA, Killeen JP, Castillo EM, Agha Z, Morita T /West Health Institute, La Jolla, CA; University of California, San Diego, San Diego, CA

Methods: We conducted a retrospective cross-sectional analysis using encounter-level data from the Informart database, which collects inpatient and ED data from MedStar Health Hospitals. The dataset for this study includes adult ED encounters from January 1, 2011 through December 31, 2015, with five MD hospitals, experimental group, and two District of Columbia (DC) hospitals, control group. Hospitals include inpatient and observation stays. We performed difference-in-differences (DID) analysis and determined risk-adjusted ED hospitalization rates using hospital-fixed effect regression. Regressions accounted for factors associated with risk of admission, including patient (age, sex, race/ethnicity, insurance status), encounter (mode of arrival and primary Clinical Classification Software diagnosis), hospital (annual ED volume, trauma level, hospital size), and community level (per capita income, primary care provider to population ratio, and urbanicity) covariates. We also examined the distribution of acuity scores among ED hospitalizations using hospital-fixed effect regression, with acuity levels defined by the All Patient Refined Diagnosis Related Groups’ severity of illness (SOI) and risk of mortality (ROM) scores: mild, moderate, major, and extreme.

Results: The final study sample included 1,492,953 ED encounters with a mean ED hospitalization rate of 20.8%. All covariates had statistically significant correlations with ED hospitalization. The ED hospitalization rate difference pre (2011-2013) and post (2014-2015) GBR implementation was -3.03% (p < .0001) for MD hospitals and -1.98% (p < .0001) for DC hospitals. DID analysis estimates a statistically significant effect of the GBR program, -1.95% (p < .0001), on ED hospitalization. In MD, there was a post-GBR decline in the proportion of hospitalized ED encounters with mild SOI (-0.6%, p = .002) and ROM (-0.9%, p < .0001), reflecting encounters that may be amenable to outpatient management, and extreme SOI (3.0%, p < .0001) and ROM (-0.9%, p < .0001), which may reflect advancement with GBR’s population health goals.

Conclusions: Amid hospitals within the same health system, implementation of global budgeting is associated with a decline in ED hospitalization compared to hospitals remaining under a fee-for-service model. This decline in hospital resource utilization helps meet the health care spending goals of the GBR model. It will be important for future research to examine whether the ED hospitalization trend impacts quality of care.
possible. The purpose of this study was to develop processes to support an ED-based disposition option for innovative acute care at home (ACH) using a rapidly responding home health provider not directly affiliated with the referring hospital.

Methods: This was a prospective cohort study that was designed to evaluate a novel acute care at home clinical pathway. Clinical care order sets were established for a subset of patients with conditions that normally would require inpatient treatment (eg, cellulitis, urinary tract infection (UTI), pneumonia (PNA) and heart failure (CHF)). The order sets were collaboratively developed with an emphasis on rapid response for short term, acute episodes of home-based care. Supporting infrastructure (eg, communications, referrals and EHR data) were also developed for both the dispositioning ED as well as for the home health agency. Supportive personnel having specific roles and responsibilities (eg, social workers, nurse case managers) to coordinate the transitions were also identified and deployed. Where possible, an iterative QI process was followed based on preliminary experiences. Process improvement was the primary objective. Patient demographics, ED revisits, hospital admissions and costs were also tracked. Descriptive statistics are presented.

Results: Following establishment of clinical coordination, logistical infrastructure, order sets and personnel in a single academic ED and a partnering home health agency, 60 patients were identified and transitioned to the ACH option. Patients were 45.0% female and 75.0% were age 65 or older. Overall, 8 patients returned to the ED within 7 days with 2 requiring admission; and 3 additional patients returned between days 8-30 with 2 of these requiring admissions. The top three diagnoses were cellulitis, 33 (55.9%), PNA 10 (17.0%) and UTI 5 (8.5%). 56 (93.3%) of the patients enrolled avoided a hospital admission. The average cost of inpatient services with similar conditions was $15928.53 for cellulitis (DRG 602) staying 4.9 days, $15,261.67 for PNA (DRG 193) staying for 4.49 days, $12,193.84 for UTI (DRG 689) staying 3.95 days and $16,155.90 CHF (DRG 291) staying 4.45 days. Preliminary costs for ACH ranged from $741.51 to $5,089.38.

Conclusions: A novel process was successfully deployed for transitioning seniors from the ED to receive ACH. Establishment of necessary processes and personnel between both the ED and the home health agency required several iterations, consistent with established principles of QI studies. With further process refinement, acute care at home using a rapidly responding home health agency has the potential to reduce inpatient admissions and lower costs. Additionally, this model can be implemented at hospitals as it leverages existing personnel (home health) and infrastructure (eg, EHR) that is readily available in most EDs.

11 High-Sensitivity Tropinin T Identifies Patients at Very Low Risk of Adverse Events

Peacock W, Baumann B, Davis T, Handy B, Jones C, Hollander J, Limkakeng A, Mehotra A, Than M, Dinkel C, Ziegler A/Baylor College of Medicine, Houston, TX; Cooper Medical School of Rowan University, Camden, NJ; Indiana University, Indianapolis, IN; University of Texas MD Anderson Cancer Center, Houston, TX; Thomas Jefferson University, Philadelphia, PA; Duke University, Durham, NC; University of North Carolina School of Medicine, Chapel Hill, NC; Christchurch Hospital, Christchurch, New Zealand

Study Objectives: Approximately 7 million patients present to US emergency departments (EDs) with suspected acute coronary syndrome (ACS) each year. Many undergo expensive, inconvenient, and expensive evaluation, the majority of which are negative. Our purpose was to determine if a negative high sensitivity troponin (hsTnT) at 0- and 3-hour follow up could identify patients at a < 1% risk of 30-day adverse cardiac events (ACE). Methods: Eligible patients presented to 1 of 15 US EDs with ACS symptoms, and had 0- and 3-hour follow up. ACE was defined as myocardial infarction, urgent revascularization or death. The upper reference level (the 99th %ile, established in a separate volunteer cohort) for the hsTnT assay (5th generation Roche Elecsys® hsTnT) was 19 ng/L and the FDA reportable level of detection (rLOD) was 6.0 ng/L. Patients were considered “ruled out” if hsTnT at 0 and 3 hours was < 19 ng/L. In rule-out patients, one or both 0- and 3-hour hsTnT levels could be above or below the LOD and thus created 4 subcohorts, as in the figure. Gold standard diagnoses were determined by a clinical endpoint committee.

Results: In 1264 ED patients with suspected ACS, 30-day ACE occurred in 15 (1.2%). Of the 290 (22.9%) not “ruled out” (hsTnT > 19 ng/L at 0 or 3 hours), ACE occurred in 8 (2.8%, 95% CI: 0.8-5.14). Of 974 (77.1%) with both 0- and 3-hour hsTnT < 19 ng/L, negative predictive value for ACE was 99.3% (95% CI: 99.05 to 99.5%), with 30-day ACE occurring in 7 (0.7%, 95% CI: <5.5 to 6.9%).

Conclusions: Patients with a 0- and 3-hour hsTnT < 19ng/L have a very low rate of 30-day ACE.

12 Highly Elevated Quantitative D-Dimer Assay Values Increase the Likelihood of Venous Thromboembolism

Francis S, Limkakeng A, Jr., Zheng H, Parry BA, Ferrmann G, Hollander J, Lovecchio F, Werner N, Schelting S, Kabeth C/Duke University, Durham, NC; Massachusetts General Hospital/Harvard Medical School, Boston, MA; University of Cincinnati, Cincinnati, OH; Sidney Kimmel Medical College, Philadelphia, PA; University of Arizona, Phoenix, AZ; International Center for Cardiovascular Interventions (ICCI) Heart Center Bonn, Bonn, Germany; Städtisches Klinikum Dresden, Dresden, Germany

Study Objectives: In patients with low pretest probability, diagnostic algorithms support using a negative D-Dimer to rule out venous thromboembolism (VTE). The degree of D-Dimer elevation is generally not incorporated into risk assessment tools. Among patients suspected of deep venous thrombosis (DVT) and/or pulmonary embolus (PE), we hypothesized that increased D-Dimer values would be associated with increased likelihood of VTE.

Methods: We conducted a multinational, prospective observational study of adult patients presenting to emergency departments (ED) with suspected VTE. D-Dimer levels, demographics, and clinical data were collected. Advanced imaging was obtained at the discretion of the treating physician. Imaging studies were evaluated by radiologists who determined whether the patient had VTE. Patient follow-up was obtained via phone call at 90 days. We used multivariable logistic regression, controlling for potential confounders, to assess D-Dimer values for prediction of VTE.

Results: We enrolled 1,752 patients suspected of having proximal DVT with non-high pretest probability. Patients with recurrent and chronic DVT were included. 59.5% were female, 40.5% male. The most common ethnicities were Caucasian (66.9%), African American (27.1%), and Hispanic (4.5%). 43% were younger than 50 years old, 57% were 50 or older. Among patients with a D-Dimer < 500 ng/ml, 18/743 (2.4%) were DVT positive. Among patients with a D-Dimer 500-999 ng/ml, 28/429 (6.5%) were DVT positive (OR 2.81, CI 1.54-5.15). Among patients with a value >1,000-1,999 ng/ml, 34/262 (13%) were DVT positive (OR 6.00, CI 3.53-10.84). Among patients with a value >2,000-3,999 ng/ml, 40/176 (22.7%) were DVT positive (OR 11.85, CI 6.60-21.28). Among patients with a value >4,000 ng/ml, 71/142 (50%) were DVT positive (OR 40.28, CI 22.74-71.35). Using a logistic regression model, the adjusted OR for D-Dimer value in DVT was 1.34 (95% CI 1.26-1.42), p < 0.0001. There were 1,834 patients in this study who were suspected of having a PE with non-high pretest probability. 63.1% were female, 36.9% male. The most common ethnicities were Caucasian (58.9%), African American (30.2%), and Hispanic (7.9%). 55.9% were less than 50 years old, 44.1% were 50 or older. Among patients with a D-Dimer < 500 ng/ml, 3/962 (0.3%) were PE positive. Among
patients with a D-Dimer 500-999 ng/ml, 11/398 (2.8%) were PE positive (OR 9.09, CI 2.52-32.75). Among patients with a value 1,000-1,999 ng/ml, 18/235 (7.7%) were PE positive (OR 26.52, CI 7.74-90.82). Among patients with a value ≥ 4,000 ng/ml, 55/107 (51.4%) were PE positive (OR 338.11, CI 102.34-1117.05). Using a logistic regression model, the adjusted OR for D-Dimer value in PE was 1.31 (95% CI 1.23-1.40), p < 0.0001. These findings are demonstrated in figure 1.

Conclusions: Higher D-Dimer values are associated with a significantly higher likelihood of DVT and PE, with VTE diagnoses in >50% of subjects with the highest D-Dimer values. Highly elevated D-Dimer values may aid in VTE risk assessment.

Figure 1 - D-Dimer values and the percentage diagnosed with either DVT (Black) or PE (White).

13 Metabolomic Profiling for Outcome Prediction in Emergency Department Patients With Out-of-Hospital Cardiac Arrest
Tsai C-L, Tsai M-S, Kuo C-H, Chen W-J, Huang C-H/National Taiwan University Hospital, Taipei, Taiwan; School of Pharmacy, National Taiwan University, Taipei, Taiwan

Study Objectives: Little is known about the role of metabolomic profiling in emergency department (ED) patients with out-of-hospital cardiac arrest (OHCA). The objective of the study was to explore whether certain metabolomic pathways could predict clinical outcomes in this patient population.

Methods: This prospective cohort study was carried out in a tertiary medical center’s ED with approximately 100,000 ED visits per year. Adult non-traumatic patients presenting to the ED with OHCA were enrolled in this study from 2007 to 2011. Among those with sustained return of spontaneous circulation, blood samples were collected at 2 and 24 hours after cardiac arrest. Metabolomic profiling was performed by liquid chromatography time-of-flight mass spectrometry in serum samples, and 137 metabolites were identified. The primary outcome measure was survival to hospital discharge that was ascertained by medical record review. Principal component and metabolite set enrichment analyses were performed to postulate underlying pathways, followed by principal component regression to investigate the role of pathways in outcome prediction.

Results: A total of 144 patients were enrolled during the four-year study period. Of them, 54 (38%) survived to hospital discharge. A principal component analysis of metabolites identified two major components that explained 33% of the variance in the metabolomics model. Enrichment analysis suggested that protein biosynthesis and urea cycle were most enriched for the first component and beta-alanine for the second component. In the multivariable analyses adjusting for multiple confounders, a higher first component and metabolite set enrichment analyses were performed to postulate underlying pathways, followed by principal component regression to investigate the role of pathways in outcome prediction.

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Conclusions: These findings shed light on the cellular mechanisms by which some OHCA patients have a better chance of survival.

14 The Ability of Heparin-Binding Protein to Identify Delayed Shock in Emergency Department Sepsis Patients is Impacted by Age and Source of Infection
Schuchardt B, Capan M, Lindor A, Akesson P, Kowalski R, Miller K, Arnold R /Christiania Care Health System, Newark, DE; Skane University Hospital, Lund, Sweden

Study Objectives: Within emergency department (ED) sepsis patients, delayed deterioration resulting in shock is associated with increased risk of death. Heparin-binding protein (HBP), a neutrophil-released serum biomarker, has been shown to be elevated in patients developing delayed shock. The objective of this study was to assess the performance of HBP to predict delayed shock among sepsis sub-populations.

Methods: This was a secondary analysis of a pooled database of patients enrolled into one of two prospective, multi-center observational studies of adult patients from five Swedish and two United States EDs admitted with infection. HBP levels were drawn upon ED arrival. Patients were excluded if they were hypotensive (systolic blood pressure (sBP) < 90 mmHg) upon ED arrival. The primary outcomes were: 1) early shock (eShock) = any sBP < 90 within 12 hours and 2) delayed shock (dShock) = any sBP < 90 that occurred between 12 and 72 hours after arrival. Outcome groups were analyzed separately and compared to controls, defined as patients without shock within 72 hours of arrival. Sepsis subpopulations were defined a priori by age (< 40, 40-59, 60-79, > 80) and source of infection (pneumonia, skin, urinary, abdominal, other). Univariate logistic regression models were utilized to identify independent predictors associated with each outcome.

Results: Over 34 months, 1055 patients were enrolled, with 962 for this analysis after exclusion criteria applied. HBP levels were higher in eShock (95 vs 45, p<0.0001) and dShock (65 vs 45, p=0.016) patients compared to those with no shock within 72 hours of arrival. An elevated HBP (>30 ng/mL) was most associated with progression to eShock [OR=3.67; 95% CI [2.10, 6.27], p<0.0001], followed by dShock (OR=2.29; 95% CI [1.33, 4.02], p=0.0032). HBP levels in patients without shock increased with age (<40: 25; 40-59: 45; 60-79: 50, >80: 63). HBP was elevated across all age groups >80 for the development of eShock (<40: 87 vs 25, p<0.0001; 40-59: 73 vs 45, p=0.007; 60-79: 113 vs 50, p<0.0001) and dShock (<40: 84 vs 25, p=0.025; 40-59: 80 vs 45, p=0.012; 60-79: 63 vs 50, p=0.011). Relative to source of infection, mean HBP values were not different (pneumonia: 58, skin: 47, urinary:68; abdominal=46; other=59, p=NS). However, in identifying eShock relative to controls, HBP values were increased across all infection types except abdominal (pneumonia: 89 vs 50, p<0.0001; skin: 106 vs 37, p=0.0002; urinary: 129 vs 54, p=0.0007; other: 83 vs 45, p=0.024). In identifying dShock, HBP levels were increased relative to controls for urinary (79 vs 54, p=0.004) and abdominal (100 vs 28, p=0.004) sources of infection but unable to distinguish between pneumonia, skin, and other (p=NS).

Conclusions: An elevated HBP is associated with a high risk of progression to shock within 72 hours of ED arrival. Differences seen in HBP levels based on age and infection type support the need for further study into the impact of co-morbid and disease specific factors on predictive ability and clinical interpretation of all biomarkers in sepsis. Clinical interpretation of an HBP result for assessing risk of either early or delayed shock should be made with respect to the patient’s age and source of infection.

Van Meter T, Mirshahi N, Rao V, Roy D, Peters M, Diaz-Arnastia R, Peacock WF, Korley FK/ImmunArray, Richmond, VA; Johns Hopkins University, Baltimore, MD; University of Pennsylvania, Philadelphia, PA; Baylor College of Medicine, Houston, TX; University of Michigan, Ann Arbor, MI

Study Objectives: Previously, we have reported on the development of highly sensitive and specific immunoassays for brain-specific biomarkers. Panels of multiple biomarkers have been shown to outperform individual biomarkers in detection of TBI in CT negative patients, but the ability to risk stratify patients into predicted outcome groups remains to be demonstrated. In this study, serum biomarker panels and machine learning algorithms were used to predict patient recovery after TBI.

Methods: The HeadSMART prospective TBI study was conducted at Johns Hopkins University School of Medicine, enrolling 541 brain injured patients. CT-negative HeadSMART patients were evaluated in the acute setting and outcome assessments were performed on follow-up at 1, 3, and 6 months after injury, including several outcome metrics. Serum samples from patients (18-80 years) were tested in electroeluminescent ELISA assays for 5 proteins: Brain-derived Neurotrophic Factor (BDNF), Glial Fibrillary Acidic Protein (GFAP), Neurogranin (NRGN), Neuron Specific Enolase (NSE) and Synuclein Beta (SNCB). Blood collections were performed within the first 24 hours after injury (median 4.2 hours; average 5.25 hours post-injury). Several machine learning algorithms appropriate to the nature of the data were used to build predictive models of dichotomized patient recovery (GOS-E), and symptomatic disability (ICD10-based PCS). For GOS-E, threshold scores of 7 or 8 were tested for good recovery and ICD10-PCS greater than zero was considered irrecovery (ie, score of 1 for mild ICD10-PCS and ≥2 for moderate to severe ICD10-PCS). Analysis was performed in R by ROC analysis for assessing model performance in each algorithm and 5-fold cross validation was used, repeated 5 times.

Results: After clinical feature selection to identify important covariates, models were also built using biomarkers with patient age and sex included. Poor functional recovery was best predicted using random forest (Best AUC = 0.74; sensitivity = 0.81, spec = 0.43, with number of samples analyzed = 63) using a combined outcome measure where GOS-E and ICD10-PCS scores were both required to be optimal for recovery (GOS-E= 7, 8 or ICD10-PCS= 0). The best performance across several algorithms was obtained using the panel NRGN, BDNF, and SNCB. Outcome for 3 and 6 months required a different trio of biomarkers for the optimal performance. Combined outcome measures performed better than individual metrics (eg, GOS-E score alone).

Conclusions: Objective prediction of adverse outcomes can be achieved using 3 panel biomarker tests and machine learning in CT negative, mild TBI patients whose symptomology may be otherwise unclear. These tests could be important tools in hospital or non-hospital acute settings to determine which individuals will have delayed recovery and benefit from treatment plans involving interventions such as physical and occupational therapy. In addition, the combination of simple objective blood tests and software with a finely tuned algorithm can be administered in an ED test that can risk stratify TBI patients for clinical trial guidance and enrollment. ImmunArray is further developing additional biomarkers and algorithm performance metrics to provide even greater resolution of outcome predictions for TBI.

16 Serum vs Urine Pregnancy Test: The Effect on Emergency Department Disposition Times in Females With Abdominal Pain Requiring Radiographic Study

Fuentes R, Huda Naeem T, Lui H, McKeown T/Henry Ford Wyandotte Hospital, Wyandotte, MI

Study Objectives: Patient length of stay (LOS) is one of the important metrics of efficiency for any emergency department (ED). Previously, urine pregnancy test (UPT) was assumed to be less expensive and faster to perform. However, it involves sample collection time followed by processing time. On the contrary, serum qualitative pregnancy test (SQPT) is performed in lab along with other blood tests ordered without additional collection time making collection time a rate-limiting step. Although a literature review was performed, only two articles were found comparing time to result and test accuracy of urine point-of-care pregnancy test and serum point-of-care pregnancy test. Our study is the first of its kind to compare patient LOS in the ED based on UPT vs SQPT. The purpose of our study was to investigate differences in LOS of ED patients with a complaint of abdominal pain. We hypothesized that females aged 14-50 years old, with abdominal pain, requiring radiographic test had increased ED LOS compared to males with similar complaint and imaging due to pregnancy status determination. The objectives were to investigate any difference between LOS of female vs male patients presenting with abdominal pain requiring imaging study and to determine if SQPT alone would decrease overall LOS for females aged 14-50.

Methods: To test our hypothesis, we ran an IRB-approved study. Initially, we conducted a retrospective study of ED LOS for patients aged 14-50 with abdominal pain receiving radiographic study. 3 groups were studied:

Group 1: Males, ages 14-50 years, with abdominal pain, requiring radiographic imaging
Group 2: Females with UPT, ages 14-50 years, with abdominal pain, requiring radiographic imaging
Group 3: Females with SQPT, ages 14-50 years, with abdominal pain, requiring radiographic imaging

Later, we conducted a prospective study from 02/17/17 to 03/27/17 requesting all ED providers to order SQPT on all females 14-50 with abdominal pain likely requiring radiologic study. We compared these patients to male patients 14-50 with similar complaint and imaging.

Results: According to retrospective study data, males had a reduced LOS compared to the other 2 groups; UPT and SQPT.
Males 14-50 Average (Avg) LOS: 317.66m
Females 14-50 UPT Avg LOS: 331.60m
Females 14-50 SQPT Avg LOS: 357.00m

According to our prospective study data, there is a decrease of 73.6m compared to previous females with SQPT and 48.2m compared to previous females with UPT. In the prospective study, SQPT had a 40.6 m shorter LOS than UPT.

Males Avg LOS: 318.3m
Females SQPT Avg LOS: 283.4m

Conclusions: Our results demonstrate that SQPT conducted along with other blood samples in our ED decreased LOS by an average of 73.6m for females. Additionally, using SQPT decreased females LOS by 34.9m compared to males. A decrease in LOS in the ED led to increased patient satisfaction, increased bed utilization, and likely increased ED revenue.

17 Emergency Radiology Utilization and Optimization

Hemmert KC, Gravenor S, Ford WJ, Brissel E, Kienan H, Schmidt MJ, Maliss S/Department of Emergency Medicine, Northwestern Memorial Hospital, Chicago, IL; Northwestern Memorial Hospital, Chicago, IL

Study Objectives: Emergency radiology is essential for rapid diagnosis and treatment of ED patients; a delay in imaging delays assessment of patients and prolongs their ED length of stay (LOS). Long ED waits are associated with adverse outcomes and poor patient experience. Reducing imaging turnaround time (TAT) has been proven to decrease...
ED LOS. A large, urban, multi-story, Level I trauma, academic ED undertook a plan to reduce imaging TAT. We hypothesized that operational changes would achieve goals of 30 min median order-to-perform for both X-Ray & non-contrast CT TAT.

Methods: Using previously described traditional process improvement (PI) methods (root cause analysis and LEAN methodology), we identified patient preparation, transportation, and radiology staff scheduling as key drivers of inefficiency. Radiology assistant technologists were hired to support communication and transportation functions, and radiology staffing was aligned with peak demand. Despite gains from these process improvements, TATs nonetheless exceeded goal time. At peak times demand on our single CT scanner was found to exceed capacity by 2 orders/hour. A comprehensive resource use analysis was undertaken, which identified geographic proximity as a limiting factor. 2nd floor ED patients had TATs 40 min longer than patients in closer geographical proximity to a CT scanner. This favored the addition of a decentralized radiology suite, which was added to the 2nd floor.

Results: In FY16 Q4 compared to FY15 Q4 baseline, 30 min TAT goals were achieved for both X-Ray & non-contrast CT. Average X-Ray TAT improved by 20 min (95% CI 19-21) and non-contrast CT by 43 min (95% CI 41-46). Average ED LOS improved by 34 min (95% CI 29-39) and LWBS % by 1.7 points (95% CI 1.4-2.0).

Conclusions: PI methods can improve inefficient ED radiology processes, but to achieve further gains comprehensive analyses must identify and rectify unique limitations. The addition of decentralized radiology capacity was a necessary solution to the distinct challenges of a two-level ED. Seasonal confounding was controlled; however, the continuous operational improvement cycle limits observational studies in the ED. This study reveals some gains and limitations of PI methods and the utility of comprehensive resource use analysis in order to decrease radiology TAT. These methods have the potential to improve ED operational metrics valued by leadership, including ED LOS and LWBS.

Table 1. Reduction in Radiology TAT

<table>
<thead>
<tr>
<th>Method</th>
<th>Before (min)</th>
<th>After (min)</th>
<th>TAT Reduction</th>
</tr>
</thead>
<tbody>
<tr>
<td>Baseline</td>
<td>100</td>
<td>70</td>
<td>30</td>
</tr>
<tr>
<td>PI methods</td>
<td>80</td>
<td>50</td>
<td>30</td>
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Table 2. Reduction in ED LOS

<table>
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<th>Before (min)</th>
<th>After (min)</th>
<th>LOS Reduction</th>
</tr>
</thead>
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<tr>
<td>Baseline</td>
<td>52</td>
<td>48</td>
<td>4%</td>
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<tr>
<td>PI methods</td>
<td>46</td>
<td>40</td>
<td>15%</td>
</tr>
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</table>

Table 3. Reduction in LWBS Rate

<table>
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<tr>
<th>Method</th>
<th>Before (%)</th>
<th>After (%)</th>
<th>LWBS Reduction</th>
</tr>
</thead>
<tbody>
<tr>
<td>Baseline</td>
<td>10</td>
<td>8.5</td>
<td>15%</td>
</tr>
<tr>
<td>PI methods</td>
<td>8.5</td>
<td>7.5</td>
<td>12%</td>
</tr>
</tbody>
</table>

18 Scan, Admit, or Both? Is There a Correlation Between Admission Rate and Computed Tomography Utilization?

Shanin D, Ulrich A, Robinson C, Venkatesh A, Parwani V/Yale University School of Medicine, New Haven, CT

Study Objectives: Prior work has described substantial variation in both individual emergency physician computed tomography (CT) utilization rates as well as individual admission rates. A recent focus on opportunities in decreasing variation in practitioner care, through campaigns such as Choosing Wisely, represents an opportunity to both improve quality of care and provide substantial health care dollar savings. At the same time, there has been a well-described steady increase in CT utilization by emergency physicians for a variety of patient complaints. Outside of variability in admission rates, little has been described on characteristics or trends in individual emergency provider admission rates. It has been conjectured by some that an increased CT imaging rate may correlate with a decreased admission rate. This study explores whether a correlation exists between individual emergency physician utilization of CT imaging and his or her overall admission rate.

Methods: We preformed a retrospective observational study using admission and CT utilization data for 68 attending emergency physicians for the calendar year 2016. All 68 physicians are board certified or eligible. The sites were an academic medical center with 96,808 annual visits, a community emergency department with 57,971 annual visits and a freestanding emergency department with 24,566 visits. 62 of 68 attendings worked clinical hours at 2 or more of the sites. CT scan of the head, neck, chest abdomen and pelvis were included. CT scan rate was determined by dividing number of studies ordered by a given physician divided by the total number patients to they were assigned to at time of final disposition (admission or discharge). When calculating admission rate both observation and inpatient admissions were considered admission. Individual admission percentage was calculated by number of patients admitted while assigned to a emergency provider divided by the total number of patient’s dispositioned.

Results: The overall admission percentage was 33.2% with a standard deviation of 8.6%. The total CT utilization was 16.3% with a standard deviation of 5.5%. Increased CT utilization correlated with increased admission rates with a Pearson’s correlation of 0.831 producing an R² of 0.69. See Figure 1.

Conclusions: Increased provider CT utilization does not correlate with a decreased admission rate. The opposite is true; those physicians who order the most CTs also admit the most patients. This suggests that each physician has an inherent level of risk tolerance that is demonstrated across multiple clinical decisions. These findings suggest that a broader discussion of risk tolerance and utilization standards is needed.
Collaborative Application of Guidelines Changes Imaging Utilization and Impacts Length of Stay in Acute Renal Colic

Thom CD, Warlaumont M, Farhi J, Jackson J, Schenkman N/University of Virginia, Charlottesville, VA; University of Virginia, Charlottesville, VA

Study Objectives: Applying guidelines to the management of acute renal colic in the emergency department (ED) provides an opportunity to improve resource utilization and clinical care for this patient population. We engaged in a collaborative effort across specialties within our academic institution to influence practice patterns in the ED through the formation of diagnostic and treatment algorithms that incorporate guidelines from multiple specialty societies and Choosing Wisely statements. We sought to investigate the changes in imaging utilization and ED length of stay (LOS) before and after the employment of these efforts.

Methods: We conducted a before and after study following introduction of a renal colic order set and evaluation algorithm (Figure 1). A retrospective chart review was completed of patients diagnosed with nephrolithiasis in the ED at a single academic institution. Two reviewers were utilized to identify renal colic patients by searching final ED diagnosis. Individual patient encounters were subsequently analyzed for rates of imaging utilization and ED LOS.

Results: The pre-intervention and post-intervention cohorts included 456 and 174 patients respectively. The utilization of imaging and ED LOS are summarized in Table 1. There was a statistically significant decrease from 57% to 44% in CT utilization after the intervention. The average ED LOS for patients receiving bedside ultrasound was 199 minutes (95% CI 182 to 216 minutes), while average ED LOS for patients receiving CT imaging was 336 minutes (95% CI 316 to 356 minutes). Overall ED LOS for the pre-intervention cohort was 291 minutes (95% CI 277 to 305 minutes), while overall ED LOS for the post-intervention cohort was 269 minutes (95% CI 250 to 288 minutes).

Conclusions: Our collaborative educational initiative and employment of evidence-based algorithms impacted utilization in our ED patients with nephrolithiasis. The CT utilization rate was reduced in a statistically significant manner. Patients who had bedside US performed had a significantly decreased LOS, as compared with those receiving CT. The average overall ED LOS was lower in the post-protocol group, though this reduction did not reach statistical significance. Further study will involve the evaluation of impacts in clinical outcomes, as well as predictive factors for downstream urolological intervention.

Table 1: Pre-Protocol vs Post-Protocol Imaging Utilization

<table>
<thead>
<tr>
<th></th>
<th>Pre-Protocol</th>
<th>Post-Protocol</th>
<th>P-Value</th>
</tr>
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<tbody>
<tr>
<td>Total Patients</td>
<td>456</td>
<td>174</td>
<td></td>
</tr>
<tr>
<td>Emergency Department Imaging for Total Patients</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>None</td>
<td>4%</td>
<td>9%</td>
<td>0.06</td>
</tr>
<tr>
<td>KUB</td>
<td>14%</td>
<td>10%</td>
<td>0.15</td>
</tr>
<tr>
<td>ED Bedside US</td>
<td>38%</td>
<td>42%</td>
<td>0.43</td>
</tr>
<tr>
<td>Radiology Renal US</td>
<td>13%</td>
<td>11%</td>
<td>0.62</td>
</tr>
<tr>
<td>CT Abdomen Pelvis with or without Contrast</td>
<td>57%</td>
<td>44%</td>
<td>0.006</td>
</tr>
<tr>
<td>Emergency Department Length of Stay (minutes)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bedside Ultrasound</td>
<td>199 (95% CI 182 to 216)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CT Abdomen Pelvis with or without Contrast</td>
<td>336 (95% CI 316 to 356)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>All Patients Pre-Protocol</td>
<td>291 (95% CI 277 to 305)</td>
<td></td>
<td></td>
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<tr>
<td>All Patients Post-Protocol</td>
<td>269 (95% CI 250 to 288)</td>
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</table>

Optimizing Magnetic Resonance Imaging Utilization in the Emergency Department

Sipes A, McDowell C, Koda A, Brauer K, Durbin B, Davis J/Memorial Medical Center, Springfield, IL; Southern Illinois University School of Medicine, Springfield, IL

Study Objectives: Our objective was to evaluate the appropriateness of MRIs ordered and then improve MRI order optimization in the emergency department (ED).

Methods: Our institution formed a Lean Six Sigma Green Belt project and incorporated the Define-Measure-Analyze-Improve-Control process to investigate MRI utilization in the ED. According to the Emergency Department Benchmarking Alliance 2015 Data, the expected rate of MRI utilization was 1.9 MRIs ordered for every 100 patients. Our institution ordered MRIs at a rate of 4.1 MRIs for every 100 patients. We performed a systematic chart review of all MRIs ordered in the ED during August 2016. The American College of Radiology (ACR) Select Criteria were employed to determine MRI utilization appropriateness. The chart review was completed by a tandem of an emergency resident and emergency physician.

The chart review and data collection process led to educational interventions on three fronts: a) reduction of lumbar spine MRIs, b) attending physician approval for all MRI orders placed by an Advanced Practice Provider (APP), c) reduction in MRI utilization due to Medicare nonpayment and specialist preference for CTA images. An electronic order set was modified to force clinicians to choose a reason for utilizing MRA over CTA (contrast allergy, renal disease, or specialist preference).

Another chart review was completed by the same tandem after the intervention was initiated.

Results: The rate of MRI utilization in the initial chart review was 4.1 MRIs ordered/100 patients seen. After implementation of the education and process improvement, that rate fell to 3.45 MRIs ordered/100 patients seen. The p value was 0.007.

The Appropriateness of MRI order as determined by ACR Select Criteria improved from 90.81% to 97.9% post intervention with resultant p value of 0.018.

The rate of Medicare nonpayment for MRAs averaged $14,531 per month before the intervention was tested. After intervention, the average monthly nonpayment rate fell to $2,052.

Conclusions: MRI utilization can be impacted by both educational and operational interventions. Our data revealed both a clinically significant reduction in MRI usage and a clinically significant improvement in appropriateness.
21 Success of a Strategy to Reduce Unnecessary White Blood Cell Differentials in the Emergency Department
Eastin C, Baker C, Walter D, Hadden C, Seepaul R/University of Arkansas for Medical Sciences, Little Rock, AR

Study Objective: With rising costs of health care, many are looking for ways to decrease unnecessary test utilization. Previous data show changing default settings in computerized physician order entry (CPOE) can improve appropriate utilization of commonly ordered tests. One particular test that is frequently ordered, but is of unclear clinical utility in many patients, is the white blood cell (WBC) differential.

We investigate the effect of a change in the default blood count (CBC) order from CBC with differential to plain CBC on ordering behavior in the emergency department (ED) setting.

A retrospective analysis of a cohort of patient visits from a metropolitan ED was performed. Previously, CBC with differential was the default order. In December 2015 the CPOE was altered so that the default test would be the CBC without differential automatically included. The CBC with differential was still available to order at the physician’s discretion. Pre and post study periods were March through August 2015 and March through August 2016, respectively. The primary outcome was overall change in frequency of test orders. Predicted cost savings was also calculated.

Results: A total of 61573 patient visits were evaluated, accounting for 32197 total tests ordered. There were no differences in number of patients, tests ordered, admission rates, discharge rates, ESI triage levels, or length of stay between the two study periods. Following the intervention, there was a 47% reduction in the number of CBC with differential (15655 to 7388) with a corresponding 4150% increase in CBC without differential (215 to 8939). Given that the cost difference when using CBC rather than CBC with differential is $11 per test, we calculated over $90,000 in savings in patient charges over a 6 month period, or over $180,000 saved per year.

Conclusions: Changing the default CPOE order from CBC with differential to plain CBC successfully reduced CBC with differential orders by nearly half, resulting in a potential of over $180,000 in savings per year. Future studies will focus on ensuring this improved test utilization can maintain safe and appropriate quality of care.

22 Apneic Oxygenation Via Conventional Nasal Cannula to Prevent Oxygen Desaturation During Rapid Sequence Intubation in the Emergency Department and Intensive Care Unit: A Systematic Review and Meta-Analysis
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Study Objectives: To a systematic review and meta-analysis of the effect of apneic oxygenation (ApOxs) by conventional nasal cannula (cNC) to reduce the frequency of oxygen desaturation to <90% and <80% during RSI in the emergency department (ED) and critical care (ICU) settings.

Methods: We searched MEDLINE, Embase, CINAHL, Web of Science, and clinical trial registries using search terms aided by a librarian. We identified 63 studies, and 45 were excluded based on the abstract alone. 18 studies underwent full review for inclusion by the authors, and 12 were excluded because they used other methods of ApOx than cNC. Overall, 2 studies met our inclusion criteria. Data on our outcomes was not present in 4 studies excluded for lack of study outcomes, including one published in abstract form. We corresponded with these authors to obtain previously unpublished data. The author of one prospective study and an author of an ED abstract also registered as a completed RCT that is undergoing current manuscript review were able to provide data for our study outcomes and quality assessment included in our analysis. Ultimately, two prospective ED studies, one ED randomized controlled trial (RCT), and one ICU RCT were included in our analysis. We used GRADE methodology to assess the quality of the 4 included studies and used the Cochrane Risk of Bias Tool for the 2 included RCTs.

Results: 1,112 patients were included in this analysis, and 57% received ApOx by cNC. 24% (150/629) of patients receiving ApOx by cNC and 37% (180/483) of patients without ApOx by cNC experienced oxygen desaturation during intubation. The two prospective studies were classified as moderate quality evidence, and the two RCTs were classified as high quality evidence using GRADE methodology. The Cochrane Risk of Bias Tool of the 2 RCTs received a rating of low risk of bias. The prospective studies either excluded patients with low oxygen saturation prior to RSI or inconsistently applied pre-oxygenation. The RCTs included patients who underwent at least 3 minutes of pre-oxygenation. Composite odds ratios (OR) of the 4 included studies using a fixed effects model shows the use of ApOxs via cNC reduces the odds of hypoxemia during intubation to less than 90% (OR = 0.62; 95% CI 0.45 -0.83; I² = 68) and less than 80% (OR = 0.56; 95% CI 0.37 - 0.85; I² = 33) oxygen saturation during RSI. We performed a subgroup analysis of the two RCTs (350 patients), and the relative risk for ApOx by cNC using a fixed effects model to prevent hypoxemia to <90% was 1.00 (95% CI 0.73 - 1.37; I² = 0).

Conclusions: The use of ApOx via cNC reduces the frequency of hypoxemia to <90% and <80% during RSI among the included prospective and RCT studies. However, in the subgroup analysis of the two RCTs, the use of ApOx by cNC was found to have no difference between desaturation rates to <90% during RSI. Further research is needed for the application of ApOx via cNC to prevent hypoxemia in ED and ICU patients with low oxygen saturation rates prior to RSI and those who cannot undergo adequate preoxygenation prior to RSI.
statistics were conducted using STATA 13. Performance standards were set for beginning and mastery levels by summing the critical items that a trainee at each level must perform to pass.

Results: Experts were recruited and brought together for the standard setting meeting on November 8, 2016. Experts indicated that for a well-prepared beginning resident, 25/51 items (49%) were considered critical for patient safety. Experts focused on the need for beginning residents to be skilled enough to assure safe task performance. Concerning mastery learners, experts noted that 49/51 (96%) of the items identified in the scenario were critical for mastery level comprehensive airway management.

Conclusions: The modified Angoff standard setting procedure developed proficiency standards for comprehensive airway management for beginning and mastery level trainees. Future work will focus on evaluation of resident performance using these procedural proficiency standards to predict patient outcomes.

24 PRIER: Patient Recall in Emergency Rapid Sequence Intubation
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Study Objectives: Rapid sequence intubation (RSI) is the standard of care in emergency department (ED) intubation. However, there is minimal research on patient experience during RSI. Anesthesia literature contains reports of painful, terrifying experiences during paralysis without adequate sedation. To address this, we assessed the effectiveness of sedation during RSI based on patient recall of depth and rapidity of induction. Our objective was to determine the adequacy of standard RSI induction to ensure patient comfort prior to paralysis and intubation.

Methods: This was a prospective, cross-sectional, convenience sample of awake and alert adult patients who required emergency intubation between January 2014 and February 2016 in the ED at our Level II Trauma facility. All patients intubated in the ED were screened for enrollment. Patients presenting in cardiac arrest, status epilepticus, or coma were excluded along with those who died prior to extubation or had poor neurologic status post-extubation. Patients who met study criteria were consented after medical recovery and asked to rate their anxiety, distress, pain, and awareness of the procedure on a 5-point Likert scale. The survey was designed de novo as there was no prior validated instrument. Reliability was assessed by measuring similarity in two sets of responses to the same question. Internal consistency was measured to show trends in responses. Subgroup analysis consisted of comparing the amount of drug administered per kg bodyweight between those with and without adequate sedation based on a t-test (0.05 threshold for significance). Rates are presented with 95% confidence intervals (±). The hospital IRB approved the study.

Results: Of 275 patients who were screened for enrollment, 53 met inclusion criteria and agreed to participate. Most were female (55%) age 59 ± 17.5 years with a mean bodyweight of 85.4 ± 29.3 kg. Nearly all received etomidate for sedation (98%, 52/53). Most (87%, 46/53) received succinylcholine as their paralytic agent, with the remainder receiving rocuronium (6) or vecuronium (1). Regarding distress during RSI, most indicated minimal or tolerable levels (40/C6). First attempt laryngeal grade I view was 0.37 (29). Distress during RSI was assessed using these procedural pro...
hospital cardiac arrest, 2 had severe sepsis and died in hospital, and 1 had a gun shot wound to the head. One patient with terminal brain cancer who had sepsis had prolonged hypoxemia both out-of-hospital and during intubation (due to caked secretions obstructing the glottic opening) that was thought to contribute to her poor outcome. Her lowest oxygen saturation during intubation was 81% with duration of hypoxemia of 132 seconds.

Conclusions: Hypoxemia during intubation in the ED is common. Prolonged hypoxemia was observed in 8% of cases with a valid extremitiy waveform. No patient with prolonged hypoxemia was found to have hypoxic encephalopathy at hospital discharge. Patients at the extreme of transient hypoxemia (prolonged hypoxemia) were not observed to have adverse patient outcomes; this suggests that the more minor outcome of transient hypoxemia may not be an important patient-centered outcome.

27 Rapid Sequence Intubation: Should the Sedative or Paralytic Agent Be Administered First?
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Study Objectives: Rapid sequence intubation (RSI) is a critical ED procedure in which a sedative and paralytic are administered near simultaneously to facilitate orotracheal intubation. It is commonly recommended that the sedative agent be administered before the paralytic agent. However, administration of the paralytic agent first may allow for decreased apnea time and increased first-pass success by shortening the time between the start of RSI drug administration and paralysis. The objective of this study was to determine if RSI drug order is associated with first-pass success or hypoxemia.

Methods: We performed an observational study using video review as the method of data collection. In our ED resuscitation bays there are three ceiling-mounted video cameras. Software captures the output from the three cameras and combines them with the video output from the patient cardiac and vital sign monitor. Senior emergency medicine residents perform the majority of tracheal intubations under the supervision of the attending emergency physician. Using the electronic medical record to identify ED intubations, we reviewed videos for the year 2013. Data collection forms were used by trained reviewers to record the course of intubation for each patient. Data points included whether a sedative and paralytic were administered and in what order, vital signs, attempt duration, and first-attempt success. An attempt began when the laryngoscope blade entered the mouth and ended when it left the mouth. The first-pass success rates and attempt duration by drug order used are presented. The analysis is descriptive.

Results: During the study period 676 cases were identified, of which videos were available for 593 (88%). In 305 of the 593 cases (85%), the first method was RSI and orotracheal intubation; in 306 (61%) cases the sedative was administered first, in 69 (14%) cases the paralytic was administered first, and in 128 (26%) the order could not be determined. First-pass success (95% CI) in cases in which the sedative and paralytic were administered first was 92% (89%-95%) and 94% (89%-100%), respectively, with a difference of 2% (4%-6%) to 8%. Hypoxemia rates (18% vs 19%) and first-attempt duration (44 s vs 40 s) were similar for sedative and paralytic first groups, respectively.

Conclusions: First-pass success, hypoxemia, and attempt duration were similar whether the sedative or paralytic agent was administered first.

28 A Simple Algorithm Reduced Mortality in Near-Hanging Patients
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Study Objective: This study evaluates the goal-directed treatment algorithm that decreases mortality, improves neurological outcome in near-hanging patients.

Method: Prospective cohort study was done in near hanging patients presented to our ED during one year before and after implementation of treatment algorithm. The algorithm was implemented in August 2015. It included targeted temperature management, mechanical ventilation, fluid management and inotrope and vasopressor supports. Mortality and neurological deficit are the outcomes compared. Neurological deficit is measured by patient ability/disability to perform same level of physical and mental tasks as prior to hanging as evidenced by patient himself and his relatives.

Results: 27 patients were studied during 01-August 2014 to 01-August 2015 (pre-implementation period) out of which 15 patients were intubated in ED, 9 patients were intubated in ICU and 3 patients did not need any intervention. Targeted temperature management was not done in any patient. Outcomes were death in 10 patients, discharged 7 patients with neurological deficit and 10 were discharged with recovery.

38 patients were studied during 02-August 2015 to 02-August 2016 (post-implementation period) out of which 32 patients who had low GCS (<9) or hypotension (MAP <65mmHg) or SpO2 < 94% with 8 liters of oxygen were intubated and targeted temperature management was given and 6 patients did not need any intervention. Outcomes were death in 2 patients, discharged 1 patient with neurological deficit and 35 were discharged with recovery.

Conclusions: Early intubation, timely management of hypoperfusion and targeted temperature management reduces mortality and morbidity in partial hanging patients.
Study Objectives: Pneumonia (PNA) is the leading infectious cause of sepsis. quick Sepsis-related Organ Failure Assessment (qSOFA) is a new screening criteria proposed by the Third International Consensus Definitions for Sepsis (Sepsis-3) to identify patients at risk for poor outcomes. We sought to externally validate qSOFA in a cohort of emergency department (ED) patients with pneumonia by comparing its performance to CRB and CRB-65 in predicting clinically important outcomes.

Methods: We conducted a subgroup analysis of USCIITG-LIPS (NCT00889772) using generalized linear mixed-effects models to assess the performance of qSOFA, CRB and CRB-65. The qSOFA score was based on the presence of three factors: altered level of consciousness (Glasgow Coma Scale < 15), systolic blood pressure < 90 mmHg, or respiratory rate ≥ 22 breaths per minute. The CRB score was based on the presence of one point for the presence of one of the following: cancer, leukemia and lymphoma; diabetes; or a blood oxygen saturation (SpO2) ≤ 90%.

Results: Overall, 5584 patients were in the original study with 713 diagnosed with pneumonia. Mortality and ICU utilization for this PNA cohort were 5.1% and 30.2%, respectively. Distribution for qSOFA ≥ 2, CRB ≥ 2 and CRB-65 ≥ 2 was 22.2%, 13.3% and 29.7% respectively. OR and 95% CI for mortality for qSOFA ≥ 2, CRB ≥ 2 and CRB-65 ≥ 2 were 4.39 (2.19-8.79, p < 0.001), 3.19 (1.49-6.82, p = 0.003) and 2.92 (1.47-5.81, p = 0.002), respectively, compared to subjects with respective score < 2. OR and 95% CI for ICU utilization for qSOFA ≥ 2, CRB ≥ 2 and CRB-65 ≥ 2 were 3.54 (1.78-7.02, p = 0.003) and 3.73 (2.51-5.55, p < 0.001), respectively. AUC for qSOFA ≥ 2, CRB ≥ 2 and CRB-65 ≥ 2 for mortality was 0.75 (0.66-0.84), 0.71 (0.62-0.80) and 0.71 (0.63-0.80), respectively. AUC for qSOFA ≥ 2, CRB ≥ 2 and CRB-65 ≥ 2 for ICU utilization was 0.80 (0.76-0.84), 0.78 (0.74-0.82) and 0.78 (0.74-0.82), respectively. Of note, when CRB-65 was modified (CRB-65 plus) by adding of one point for the presence of ≥ 1 coexisting condition (chronic hemodialysis, eGFR < 60, cirrhosis, CHF NYHA Class IV, metastatic solid cancer, leukemia and lymphoma) and one point for SpO2 < 90%, OR and 95% CI for mortality and ICU utilization for CRB-65 plus ≥ 3 was 3.54 (1.78-7.02, p = 0.003) and 3.73 (2.51-5.55, p < 0.001), respectively. AUC for CRB-65 plus for mortality and ICU utilization for CRB-65 plus ≥ 3 was 0.73 (0.64-0.82) and 0.78 (0.74-0.82), respectively.

Conclusions: In this cohort of ED patients with pneumonia, qSOFA ≥ 2 was a stronger predictor of inpatient mortality and ICU utilization compared to CRB ≥ 2, CRB-65 ≥ 2, and CRB-65 plus ≥ 3. qSOFA may be used as a predicting tool for pneumonia patients at risk for poor outcomes.

31 Performance of a Novel Computer-Based Clinical Decision Support Alert and the Impact of Patient Partitioning and Optimization to Identify Septic Patients in an Urban Emergency Department

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Study Objectives: Sepsis is a common condition that requires expeditious recognition and management. Computer-based clinical decision support (CDS) alerts are important tools to achieve management goals; however, performance limitations and errors can create excessive noise and alert fatigue. We have an existing CDS in our electronic health record (EHR) to identify sepsis patients, but its utility is limited based on the excessive false positives, which impair its value. The objective of this study was to report the performance of a novel knowledge-based computer CDS to identify emergency department (ED) patients with sepsis.

Methods: We developed a novel computer-based tool utilizing fuzzy logic and machine learning techniques to optimize performance accuracy of our sepsis alert while minimizing false positives. Components of the model include vital signs, demographics, nursing assessments and specific laboratory variables. The model is a point-based system with variable components weighted individually. An alert was fired when the model’s logic exceeded the established threshold. One year of sepsis cases was selected based on ICD codes and was matched with a random one-year sample of non-sepsis cases admitted to the hospital from the ED of a large urban Level I tertiary care center. Each case was adjudicated individually to confirm accurate ICD coding and was categorized based on traditional sepsis definitions into sepsis, severe sepsis, septic shock or non-sepsis. Additionally, the model was then modified to partition patients into 12 separate groups based known risk factors for sepsis: age, nursing home residency (yes/no) and hemodialysis status (yes/no). The model’s accuracy was then optimized within each group individually.

Results: The performance analysis was based on one year of adult sepsis patients (n=912) and a random sample of adult non-sepsis patients all admitted to the hospital (n=975). The sensitivity (Sn), specificity (Sp) and positive predictive value (PPV) for overall performance of the model was 81.6%, 91.3% and 89.9% respectively. The Sn, Sp and PPV for identifying just [severe sepsis + septic shock] was 86.9%, 91.1% and 87.3% respectively. The Sn, Sp and PPV for identifying just [septic shock] was 97.2%, 91.1% and 82.0% respectively. After alert threshold was optimized targeting the best sensitivity based on the 12 separate patient groups, the resulting Sn, Sp and PPV was 94.4%, 73.4% and 76.8% respectively. For 9 of the 12 patient groups including 467 patients (24.7%), the sensitivity achieved 100%. The remaining three groups had sensitivities of 88.8% (n = 730; 58.7%), 97.1% (n = 189; 10%) 92.5% (n=501; 26.6%).

Conclusions: Our novel computer-based CDS alert resulted in acceptable sensitivity while minimizing resulting false positives. Partitioning patients into groups based on demographic features may improve performance characteristics. Further analysis on a larger prospective sample and with additional optimization in the live EMR environment is required.

32 Predictors of Mortality Among Head Trauma Patients Reaching ICU

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Study Objectives: Traumatic brain injury is a leading cause of morbidity and mortality worldwide. Ninety percent occurs in low and middle income countries. We construct a predictive model for mortality in head injury patients on the basis of easily available parameters.

Methods: Prospective randomized study that included 100 head trauma patients admitted to the ICU in a period of 15 months. Demographic data, diabetes, hypertension and cardiac history were recorded. Admission blood samples were obtained for CBC, coagulation profile, kidney and liver functions tests and lactate level and random blood glucose level. Receiver operating curve (ROC) analysis including the area under the ROC and multivariable logistic regression were used to identify independent mortality predictors of admission parameters to create a prognostic model.
Results: A total of 58 patients died (58%) out of 100 patients included in this study. Multivariate analysis revealed that age >75 years (HR = 25.49, 95% CI = 2.86 to 275.66); GCS < 9 (HR = 4.19, 95% CI = 1.58 to 11.08); serum creatinine higher than 1.5 mg/dL (HR = 8.75, 95% CI = 3.10 to 24.71); PaCO₂ > 45 mmHg (HR = 1.486; 95% CI = 4.85 to 45.49) and history of cardiac diseases (HR = 0.37; 95% CI = 0.15 to 0.91) were associated with high mortality rate.

Conclusions: Age >75 years, GCS < 9, PaCO₂ > 45 mmHg, serum creatinine exceeding 1.5 mg/dL and cardiac diseases are independent significant predictors of mortality in head trauma patients.

### 33 Procalcitonin Trend Predicts Discharge to Home in Severe Sepsis and Septic Shock Patients

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Study Objectives: To examine the relationship between procalcitonin and discharge status in patients with severe sepsis and septic shock.

Methods: We collected an observational cohort consisting of all patients diagnosed with sepsis in the emergency department who were coded as severe sepsis or septic shock during their hospital stay. Our study was conducted at an urban ED with seventy-five thousand visits per year, between July 2016 and March 2017. Initial procalcitonin, maximum procalcitonin, and discharge location (coded as home, SNF, hospice, LTAC, other) were abstracted onto pre-designed data collection sheets by abstractors blinded to outcome. A multivariate regression model was then performed to decipher whether procalcitonin was a predictor of discharge status. The inclusion criteria included adults over the age of eighteen, ED diagnosis of severe sepsis, or septic shock by two or more of the following, temperature of more than 38°C (100.4°F) or less than 36°C (96.8°F), heart rate of more than 90 beats per minute, respiratory rate of more than 20 breaths per minute, or abnormal white blood cell count (>12,000/µL or <4,000/µL or >10% immature [band] forms) and associated with organ dysfunction, hyperperfusion, or hypotension (systolic blood pressure of less than 90 mmHg or a rapid decrease from baseline) or persistent hypotension and perfusion abnormalities despite adequate fluid resuscitation. Exclusion criteria included anyone who developed sepsis after the ED visit (during hospitalization), patients transferred from another facility, anyone less than eighteen years of age and patients who had less than two procalcitonin measurements ordered during their hospital stay.

Results: 168 patients were found to have sepsis or septic shock, first noted in the emergency department. Median age was 72 years old, with an inter-quartile range (IQR) of 60.8-82. 107 of these patients had 2 or more procalcitonin measurements and thus were eligible for our cohort. The median initial procalcitonin was 0.58 with an IQR of 0.16-5.36. 67% of procalcitonin measurements increased on repeat measurements, while the remainder were either equal to or less than the initial value. 43% of our population were discharged home, 17% were discharged to SNF, 13% were discharged to hospice, 7% were discharged to LTAC and 20% were coded as "other" (left AMA, died in-hospital without discharge to hospice or went to a different non-coded type of facility). Multivariate regression model (see figure), demonstrated a statistically significant correlation between a repeat procalcitonin which was equal to or less than the initial procalcitonin and discharge to home (p=0.0294, R²=18.1%).

Conclusions: Repeat procalcitonin measurements which fail to increase from the initial level appear to be associated with better outcomes including discharge to home in severe sepsis and septic shock patients.

### 34 Does an In-Hospital START Protocol Predict Admission at the Time of Earthquakes?

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Study Objectives: The mass casualty triage system known as Simple Triage And Rapid Treatment (START) has been widely used. Although START is a tool used to determine emergency severity, it may also have some relevance for hospital admission. There are few studies investigating the association between triage levels and hospital admission, and the number of participants has been very small. To use medical resources effectively, it would be helpful to obtain an accurate estimate of the number of individuals who require admission.

Methods: The utility of the START protocol was evaluated for the earthquakes that occurred in Kumamoto (Japan) in 2016. This was a retrospective observational study conducted at a tertiary emergency medical center closest to the epicenter. From April 14 through April 16, 2016, START was performed at the entrance of the hospital by medical staff (doctors and nurses). Data were collected from triage tags and charts. Recorded parameters included triage categories and patient dispositions (discharge, transfer, admission [general wards, intensive care unit (ICU)], and deceased).

Results: A total of 1240 individuals were enrolled. According to the START protocol, patients were categorized into one of four groups: category 1 (immediate, n=58 [4.7%]); category 2 (urgent, n=256 [20.6%]); category 3 (delayed, n=923 [74.4%]); and category 4 (deceased, n=3 [0.2%]). In category 1, 15 (25.9%) patients were admitted to general wards, 14 (24.1%) were admitted to the ICU, 6 (10.3%) were transferred, 20 (34.5%) were discharged, and 3 (5.2%) were deceased. In category 2, 62 patients (24.2%) were admitted to general wards, 8 (3.1%) were admitted to the ICU, 9 (3.5%) were transferred, and 177 (69.1%) were discharged. In category 3, 8 (0.9%) patients were admitted to general wards, 1 (0.1%) was transferred, and 914 (99.0%) were discharged. In category 4, all patients were deceased. Regarding prediction for hospitalization among individuals in categories 1 and 2 together, START demonstrated a sensitivity of 92.9% (95% confidence interval [CI]: 88.4-97.4) and a specificity of 82.3% (95% CI: 80.0-84.5).

Conclusions: This study demonstrated poor association between triage levels and patient dispositions as determined by the START protocol for the Kumamoto earthquakes of 2016. Of the patients in category 1, 65.5% required admission. Although over-triage may occur, it should be considered acceptable. However, to more effectively utilize medical resources, it is important to recognize that 34.5% of patients in category 1 could have been discharged. In contrast, only 1.0% of patients in group 3 required admission, but may have been overlooked given the number of over-triaged admissions occurring in category 1. It is vital, therefore, that this 1.0% of patients be identified accurately.

### 35 Time is Money: The True Cost of Helicopter EMS

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Study Objectives: This study aimed to delineate the advantages of helicopter transport (HEMS) over ground transport (GEMS) of critically ill patients undergoing inter-facility transfers. Multiple studies exist regarding this topic, but are confounded by differences in training and experience of HEMS personnel as compared to ambulance staff. In our hospital system, when a physician from an outside hospital calls for an HEMS transport, the crew first determines if weather conditions permit flight without having any further knowledge about the patient. If flying is deemed unsafe, the helicopter personnel will retrieve the patient by ground ambulance. Comparison of these two transfer modalities eliminates the confounder of crew expertise. We hypothesize that morbidity, mortality, and length of hospitalization of critically ill patients who underwent inter-facility transfer are comparable regardless of mode of transport if accompanied by highly trained personnel.

Methods: We performed a retrospective chart review of 2,129 patients who were transferred from an outside hospital to our tertiary care center in central Massachusetts by a helicopter EMS (HEMS) crew between January of 2010 and April of 2017. These patients were either transferred by ground or helicopter ambulance. Transfers occurred by ground ambulance in the rare case that the helicopter service was grounded by poor weather. In these instances the helicopter crew, consisting of a paramedic and flight nurse, staffed a ground ambulance to the transfer. This allowed our study to control for the level of crew training and care provided en route. We identified 655 patients that were transferred directly from the scene of the emergency, but these patients were excluded due to inability to standardize for transport distance. After
categorizing 1,323 patients who were transferred by HEMS and 151 patients that were transferred by GEMS. These patients were matched to their respective All Patients Refined Diagnosis Related Group (APR-DRG) and in-hospital mortality data. Scalar and categorical outcomes were analyzed T-Test or Fishers exact test respectively.

Results: The use of Helicopter EMS significantly reduced the time to definitive care over Ground EMS by at least twenty-one minutes and by no more than one hour and seventeen minutes, depending on the location of the requesting hospital. There was no statistical difference in the age or sex of the population transferred by either HEMS or GEMS. However, the population transferred by GEMS had significantly increased APR-DRG Severity and Risk of Mortality scores over the population transferred by HEMS. Despite this finding, there was no difference in in-hospital mortality between the two transfer modalities.

Conclusions: Despite the significant reduction in the time to definitive care through the utilization of HEMS, there was no statistically significant survival benefit conferred to critically ill patients undergoing inter-facility transfers. This suggests that the transport methodology may be of secondary importance to the level of training of the providers who are delivering the care en route.

36 The Safety and Efficacy of Nitroglycerin Use by Paramedics for Treatment of ST Elevation Myocardial Infarction

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Study Objectives: Nitroglycerin (NTG) is widely used by emergency medical services (EMS) for treatment of cardiac chest pain. Concern for precipitating hypotension in patients with inferior ST elevation myocardial infarction (STEMI) involving the right ventricle and in those with non-cardiac conditions has led some EMS systems to discontinue its use. The objectives of this study were to quantify the risk of hypotension and the benefits of pain relief in patients treated with out-of-hospital NTG for suspected STEMI.

Methods: Consecutive adult patients with suspected STEMI transported by EMS to one of three participating PCI-capable hospitals were prospectively identified and maintained in a log during an 18-month study period. Investigators reviewed out-of-hospital and hospital records for initial field and emergency department (ED) vital signs, field NTG treatment, and hospital management and outcomes. A second investigator independently confirmed key data and inter-rater reliability, using the kappa statistic, was assessed on a random 10% sample of records. Patients with contraindications to NTG were excluded, including hypotension on EMS arrival and phosphodiesterase 5 inhibitor use within 48 hours. The frequency of ED hypotension, defined as a triage systolic blood pressure (SBP) less than 100 mmHg, and the change in pain score were calculated in patients who received field NTG and compared to those who did not. The minimum clinically important difference (MCID) in pain score was set a priori at 1.5. Planned subgroup analyses were patients with final diagnosis of STEMI and percutaneous coronary intervention (PCI) of a mid or proximal right coronary artery (RCA) lesion. The frequency of hypotension was compared with the Cochran-Mantel-Haenszel test and change in SBP and pain score with Hodges-Lehmann’s median difference.

Results: Of 940 EMS transports for suspected STEMI, 160 were excluded for initial hypotension; thus 780 comprised the study cohort. Median age was 67 with 61% male. NTG was given to 340 (44%) patients, of whom 32 (9%) had ED hypotension compared with 54 (12%) who did not receive NTG, with a relative risk (RR) of 0.97 (95% CI 0.92, 1.02). Inter-rater reliability was excellent, kappa 0.93 (95% CI 0.80, 1.0). The average decrease in SBP was 17±4±90 mmHg and 6±9±29 mmHg in patients treated with and without NTG respectively, median difference -6 mmHg (95% CI -3, -9). The average change in pain scores for patients treated with and without NTG was -2.2±3.4 and 0±2.0 respectively, median difference -1.5 (95% CI -1.0, -2.0). Of 193 patients with confirmed STEMI, 155 (80%) received NTG. In this subgroup, ED hypotension occurred in 14 (9%) treated with NTG compared to 4 (11%) without NTG and the average pain score was -2.0±3.7 with NTG versus no change without. Finally, among patients with mid or proximal RCA lesions, 60 (80%) received NTG; there was no difference in hypotension with or without field NTG, 4/60 (7%) and 1/15 (7%) respectively. Compared to patients treated with PCI in any other location, the frequency of hypotension after NTG among patients with RCA lesions was similar, RR 0.95 (95% CI 0.87, 1.06).

Conclusions: In this cohort of suspected or confirmed STEMI patients, field NTG resulted in pain reduction and was not associated with an increased frequency of ED hypotension, even among those with mid or proximal RCA lesions.

Supraglottic Airway Use vs Endotracheal Intubation Pre/Post Deployment of the i-gel Supraglottic Airway Device in a Large Ground and Air-based Emergency Medical Services Agency

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Study Objectives: Identify changes in invasive airway management practices using supraglottic airway devices (SGA) and endotracheal intubation (ETI) as primary and secondary interventions following transition from the King LTS-D to the i-gel LMA SGAs in an EMS setting.

Methods: This is a retrospective observational study of invasive airway management in a large urban/rural, ground/air-based EMS service performing approximately 86,000 transports annually in the United States. Charts for patients who received an attempt at placement of an invasive airway between 15 May 2015 and 15 May 2016 were abstracted for age, sex, invasive airway indication, type(s) of invasive airway device attempted, number of attempts at placement for each device, and whether placement was successful. Two cohorts were defined: cohort “K” representing 15 May to 14 October 2015 when the King LTD was the SGA in use, and cohort “I” representing 15 Oct 2015 to 15 May 2016 when the i-gel LMA was the SGA in use. Endotracheal intubation, including medication-assisted airway management (MAAM) was available in both cohorts. Primary endpoint was the number of airways ultimately successfully managed using an SGA, including capnography-confirmed placement and ability to ventilate. Secondary endpoints included the rate of use of invasive airway devices based on clinical indication and use of the devices as primary or secondary airway interventions. Descriptive statistics included age, sex, and injury/illness severity score using the Rapid Emergency Medicine Score (REMS).

Results: 660 charts were abstracted, including 259 in cohort K and 401 in cohort I. Patient age, 57.5 ± 21.9 years, and sex (63.5% male) were consistent across cohorts (p=0.07 and 0.81 respectively). Injury/illness severity were similar across the cohorts. SGAs were used as the primary device in 1.9% of cohort K and 37.9% of cohort I, and as a secondary device in 10.4% of cohort K and 10.2% of cohort I. Success for first device used was ETI 84.0% and SGA 40% in cohort K, and ETI 80.1% and SGA 92.7% in cohort I. Month-to-month variation in successful airway device utilization is illustrated in Figure 1. Final successful device in cohort K was ETI 87.3%, SGA 11.1%, and in cohort I was ETI 54.6% and SGA 44.7%. Successful airway management was achieved using any invasive device at 94.2% in cohort K and at 98% in cohort I (p=0.015).

Conclusions: Deployment of the i-gel LMA substantially improved overall invasive airway success in this EMS service, achieving a 4% increase in successful invasive airway management, and a final 98% overall success rate. Introduction of the i-gel resulted in a large increase in use of SGAs as a primary airway device, and neutral effect on use of SGAs as a secondary device following attempted ETI. Despite that successful invasive airway management by device improved following i-gel deployment, erosion of ETI skills is identified as a potential collateral effect that requires surveillance.
38 Does EMS Transport of Septic Patients Improve Downstream Processes of Care?
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Study Objectives: Current Surviving Sepsis Campaign (SSC) guidelines call for broad spectrum IV antibiotics, fluids and a measured lactate within three hours of declaration. Early in-hospital recognition and aggressive treatment of severe sepsis has been associated with a reduction in in-hospital mortality. Previous studies have demonstrated that septic patients who arrive by EMS experienced a decreased time to antibiotics and early goal-directed therapy (EGDT), while in-hospital mortality remains relatively higher when compared to ambulatory patients.

Objective: The goal of our study was to determine whether there was a difference in management and outcome between patients arriving by EMS and those presenting directly to the ED.

Methods: This was a multi-center, observational study that included 1066 patients who presented to one of three county facilities in Los Angeles from January 2012 to December 2014. All adult patients, who were non-comfort care, with a discharge ICD-9 code of sepsis, severe sepsis, or septic shock were reviewed. Those meeting severe sepsis or septic shock clinical criteria and declared in the ED were included in the data set. Bundle compliance metrics were adapted from the revised 2015 SSC 3-hour bundle set.

Results: A total of 587 (56.0%) patients presented by EMS and 679 (63.7%) patients arrived via non-EMS transport. Patients transported via EMS were older (60.5 vs. 51.8, p < 0.001), had a higher rate of ICU admission (86.1% vs. 76.6%, p < 0.001), a higher rate of in-patient mortality (26.1% vs 18.9%, p < 0.006) and a higher mean acuity score (Emergency Severity Index: 1.8 vs. 2.1, p < 0.001) than their non-EMS counterparts. Patients transported via EMS also had a shorter median triage to doctor time (10.0 minutes vs. 19.0 minutes; p < 0.001), shorter median triage to admission time (283.5 minutes vs. 479.9 minutes; p < 0.001), and a shorter median triage to bundle compliance time (34.6 minutes vs 86.0 minutes p < 0.001) in contrast to non-EMS transport. There was a delay in median declaration to bundle compliance time (61.2 minutes vs. 48.1 minutes; p < 0.004) for patients who were transported via EMS. Morality was similar for patients who were transported via EMS (p = 0.428, OR = 1.15, 95% CI = 0.81-1.64) compared to those who were not, and among EMS transports, bundle compliance was not associated with overall mortality (p = 0.515, OR = 0.88, 95% CI = 0.61-1.28).

Conclusions: This was the first large multi-center study in a public health system evaluating the effect of EMS transport on the management and outcome of patients who were diagnosed with severe sepsis or septic shock in the ED. As has been reported previously, patients who arrived by EMS had a higher rate of admission to the ICU, a higher rate of in-hospital mortality, and a higher acuity score. As expected, triage to emergency physician time, triage to admission time, triage to declaration time, and triage to bundle compliance time were all shorter for patients who arrived by EMS. However, there was a delay in declaration to bundle compliance time in addition to no significant difference in in-hospital mortality for bundle-compliant patients who were transported via EMS. This is significant given the demonstrated higher acuity of this patient cohort and importance of early resuscitation. This finding requires further study and will be the focus of a prospective study examining the use of a nearby box containing intranasal naloxone and provided instructions to administer the medication to the patient. Interval times were recorded. Subjects completed pre- and post-simulation questionnaires.

Results: 50 of 53 (94.3%) enrolled subjects completed the simulation. Mean age was 36.4 (range 19-72) years and 52% were female. 49% (n = 25) indicated that they had first aid training, 11.8% (n = 6) were physicians or nurses, and 39.2% (n = 20) had no prior training. 20.8% (n = 10) stated they or someone they knew had experienced an opioid overdose. 49 out of 50 subjects (98%) administered the medication successfully. Mean time from 911 call to ambulance dispatch was 51.7 seconds (95% CI 46.6-56.9 seconds). Mean time from dispatch to administration of naloxone was 191.5 seconds (95% CI 182.8-200.3 seconds). Mean time from arrival to the patient to naloxone administration was 64.5 seconds (95% CI 58.8-60.8 seconds). Previous training had no significant impact on time to administration. Subjects’ comfort with administration of intranasal naloxone increased significantly on a 7-point Likert scale (median 6 pre-trial [IQR 4.7-7], median 7 post-trial [IQR 6.7-7], p < 0.001), as did willingness to provide medical care to an unconscious patient (median 5 pre-trial [IQR 4.7-7], median 6 post-trial [IQR 6.7-7], p < 0.0005). Comfort in providing nasal naloxone varied significantly with level of previous training prior to study administration (p < 0.001). Student’s t-test and one-way analysis of variance was used for continuous variables. Ordinal variables were compared using the Kruskal-Wallis test and Wilcoxon rank-sign test for paired data.

Conclusion: Bystanders are willing and able to administer nasal naloxone to a simulated patient in a public space. Public access naloxone stations may be a useful tool to reduce time to naloxone administration particularly in areas where opioid overdoses are clustered or where EMS transport times are prolonged.

39 Feasibility of Bystander Administration of Public Access Naloxone for Opioid Overdose
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Study Objectives: Naloxone is a competitive antagonist that can reverse opioid overdose, but must be given rapidly, particularly for overdoses of heroin and synthetic opioids like fentanyl. Pre-stationing naloxone in public spaces may expedite antidote delivery. Our study aimed to determine the feasibility of bystanders to assist a simulated overdose patient, including calling 911, accessing naloxone from a remotely unlocked station and correctly administering the medication.

Methods: Convenience sample of bystanders passing a public space in Cambridge, MA in April, 2017. Subjects were asked to assist a simulated patient mannequin who was described as unconscious and had drug paraphernalia at its side suggesting injection drug use. Subjects were provided no further information. Subjects called a simulated 911 line and a simulated EMS dispatcher interacted with the subject using standard protocols. On identification of a potential overdose, the dispatcher aided the subject in locating a nearby box containing intranasal naloxone and provided instructions to administer the medication to the patient. Interval times were recorded. Subjects completed pre- and post-simulation questionnaires.

Results: 50 out of 53 (94.3%) enrolled subjects completed the simulation. Mean age was 36.4 (range 19-72) years and 52% were female. 49% (n = 25) indicated that they had first aid training, 11.8% (n = 6) were physicians or nurses, and 39.2% (n = 20) had no prior training. 20.8% (n = 10) stated they or someone they knew had experienced an opioid overdose. 49 out of 50 subjects (98%) administered the medication successfully. Mean time from 911 call to ambulance dispatch was 51.7 seconds (95% CI 46.6-56.9 seconds). Mean time from dispatch to administration of naloxone was 191.5 seconds (95% CI 182.8-200.3 seconds). Mean time from arrival to the patient to naloxone administration was 64.5 seconds (95% CI 58.8-60.8 seconds). Previous training had no significant impact on time to administration. Subjects’ comfort with administration of intranasal naloxone increased significantly on a 7-point Likert scale (median 6 pre-trial [IQR 4.7-7], median 7 post-trial [IQR 6.7-7], p < 0.001), as did willingness to provide medical care to an unconscious patient (median 5 pre-trial [IQR 4.7-7], median 6 post-trial [IQR 6.7-7], p < 0.0005). Comfort in providing nasal naloxone varied significantly with level of previous training prior to study administration (p < 0.001). Student’s t-test and one-way analysis of variance was used for continuous variables. Ordinal variables were compared using the Kruskal-Wallis test and Wilcoxon rank-sign test for paired data.

Conclusion: Bystanders are willing and able to administer naloxone to a simulated patient in a public space. Public access naloxone stations may be a useful tool to reduce time to naloxone administration particularly in areas where opioid overdoses are clustered or where EMS transport times are prolonged.

40 Development of a Health-Literate Decision Instrument for Low-Risk Chest Pain in the Emergency Department
Moore T, Seupaul R, McIemore H, Marks M, Hadden K/University of Arkansas for Medical Sciences, Little Rock, AR

Study Objectives: Shared decisionmaking (SDM) is critical to the delivery of high quality ED care. An important underpinning of successful SDM includes careful attention to health literacy/numeracy when communicating risk. Recent advancements in risk stratification of patients presenting to the ED with chest pain have led to the development of useful SDM tools. Although these tools were developed based on established international consensus-based standards for patient decision aids, some health literacy best practices for plain language were not followed such as appropriate reading level. Furthermore, despite the iterative development process and field-testing with users, previous tools did not target or purposely include patients with low health literacy.

We develop and test a SDM tool using health literacy/numeracy best practice recommendations for ED patients with low-risk chest pain.

Methods: Published SDM tools for low-risk chest pain were evaluated for readability and health literacy/numeracy standards to provide a framework for the development of a refined tool. Plain language best practices including the use of simple words rather than medical jargon, clear and concise messages, and simple formatting with ample white space were used for all written portions of the SDM tool. The icon array used gist representation to convey risk with a part-whole relationship to allow “n in x” frequency format and a denominator of 100. The tool was field tested using qualitative methods from a recent health literacy publication. Participants used stoplight coding to denote level of difficulty to understand, marking information red (hard), green (easy), and yellow (could be improved). An emergency physician demonstrated the SDM tool with participants and engaged three of the five in teach-back to confirm understanding. Qualitative data of color-coded materials and verbal comments were collected, and a knowledge question was asked to determine risk comprehension.

Results: The SDM tool has a 3rd-4th grade readability, much lower than previous tools with 9th-10th grade readability. The icon array with two distinct heart icons to reinforce the positive and negative risk frame avoids precise percentages or more complex graphing that can be difficult for low numeracy or low graph literacy individuals. The mean rating of the SDM tool by focus group participants on a scale of 1-10 was 9. The words “enzyme” and “troponin” were denoted as difficult to understand. Focus group participants correctly identified risk 80% of the time with 100% of those engaged in teach-back demonstrating risk comprehension.

Conclusions: Shared decisionmaking in the ED is enhanced by decision aids designed for individuals with low health literacy/numeracy. Our tool incorporates these elements, providing a useful alternative to currently published instruments. The SDM tool complements patient-physician dialogue and should be considered an adjunct to verbal, plain language communication along with teach-back to confirm understanding.
A Baseline and 30-Minute Algorithm for Rapid Rule-Out of Acute Myocardial Infarction: Does it Get Any Better Than This?

Nowak RM, Moyer M, Christenson RH, Jacobsen G, Hudson M, Hrabec D, McCord J/Henry Ford Health System, Detroit, MI; University of Maryland School of Medicine, Baltimore, MD

Study Objectives: Approximately 20 million individuals present to the emergency department (ED) with symptoms suggestive of acute myocardial infarction (AMI) in the United States (US) and Europe annually. A baseline and 1-hour rule-in/rule-out AMI algorithm using high sensitivity cardiac troponin T (hs-cTnT) measurements has been reported and validated in several non US studies and is recommended for use in the 2015 European Society of Cardiology (ESC) NSTEMI guidelines. Given the early release and rapid accumulation of hs-cTnT during AMI it may be possible that a shorter time period could be utilized for the rule-out zone of this algorithm. The purpose of this study was to determine if baseline and 30-minute hs-cTnT levels in patients presenting to a US ED population with suspected acute coronary syndrome (ACS) could accurately rule out AMI in a significant number of these individuals.

Methods: Patients presenting with symptoms suggestive of ACS as determined by the emergency physician at a single US tertiary care urban center were enrolled in this study. Study baseline (within 60 minutes of triage ECG) and 30 minute (±10 minutes) blood samples were obtained. AMI diagnosis was independently adjudicated by a cardiologist and emergency physician using the 3rd universal definition, the hospital troponin 1 assay (Siemens Ultra, 99th percentile 40 ng/L) and all data available 30 days post discharge. The hs-cTnT assay studied was the Roche Diagnostics Elecsys 2010 (99th percentile 14 ng/L) and measurements were independently done at the University of Maryland.

Results: Of the 569 studied subjects 44 (7.7%) had AMI. Using the baseline and 1-hour ESC algorithm in the 539 patients with these hs-cTnT values available at 0 hours and 30 minutes resulted in 313 assigned to the rule-out zone (0 hour < 12 and 1 hour delta < 3 ng/L), 163 to the observation group and 63 to the rule-in zone (0 hour > 52 or 1 hour or delta ≥ 5 ng/L). The negative predicted value (NPV) and sensitivity for AMI were 98.7% and 90.9% (4 AMIs missed, rate of 1.3%) while the positive predictive value (PPV) and specificity for AMI were 36.5% and 91.9%. The large multi center multinational TRAPID-AMI study (referenced in the ESC guidelines) using the 0- and 1-hour algorithm had a PPV of 99.1% (AMI missed in 7 patients or 0.5% rate) and had a PPV in the rule-in zone of 77.2%.

Conclusions: As clinicians and patients desire an AMI miss rate of any rapid AMI rule-out algorithm to be < 1.0% for patients presenting with suspected ACS the application of the hs-cTnT cut points for the 0- and 1-hour cannot be routinely used with blood draws obtained at baseline and 30 minutes. Additionally the baseline and 30-minute algorithm had a very poor PPV in the rule-in zone of 36.4%. These results emphasize that a 1-hour blood draw per the ESC guidelines should not be drawn earlier as this could result in an increased missed AMI rate in the rule-out zone. Further studies are needed to define what hs-cTnT cut points should be used at baseline and 30-minute blood draws.

Is the European Society of Cardiology 0- and 1-Hour Algorithm Guidelines for Rapid Evaluation of Acute Myocardial Infarction Effective at 0 Hour and 30 Minutes

McCord J, Moyer M, Christenson R, Hudson M, Noll S, Nowak RM/Henry Ford Health System, Grosse Pointe Park, MI; Henry Ford Health System, Detroit, MI; Mt. Sinai West, New York, NY; Mayo Clinic College of Medicine, Rochester, MN; University of Maryland School of Medicine, Baltimore, MD

Study Objectives: Approximately 20 million patients present to the emergency department (ED) with symptoms suggestive of acute myocardial infarction (AMI) in the US and Europe annually. A baseline and 1-hour rule-in/rule-out acute myocardial infarction (AMI) algorithm using high sensitivity cardiac troponin T (hs-cTnT) measurements has been reported and validated in several non US studies and is recommended for use in the 2015 European Society of Cardiology (ESC) NSTEMI guidelines. The purpose of this study was to apply the ESC baseline and 1-hour algorithm to 0 hour and 30 minute blood draws in patients presenting to a US ED population with suspected acute coronary syndrome (ACS) to determine if the rapid evaluation of AMI could be made quicker using these ESC hs-cTnT recommended values.

Methods: Patients presenting with symptoms suspicious of ACS as determined by the emergency physician at a single US tertiary care urban center were enrolled in this study. Study baseline (within 60 minutes of a triage ECG) and 30 minute (±10 minutes) blood samples were obtained. AMI diagnosis was independently adjudicated by a cardiologist and emergency physician using the 3rd universal definition, the hospital troponin 1 assay (Siemens Ultra, 99th percentile 40 ng/L) and all data available 30 days post discharge. The hs-cTnT assay studied was the Roche Diagnostics Elecsys 2010 (99th percentile 14 ng/L) and measurements were independently done at the University of Maryland.

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Etiology of Myocardial Ischemia in Emergency Department Chest Pain Patients With Two Negative Initial Troponins, Nonischemic ECG, and Nonconcerning Vital Signs

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Study Objectives: We seek to determine the etiology of myocardial ischemia (MI) in ED patients with 2 non-elevated initial cardiac troponin values and to determine if there are distinguishing demographics which can risk stratify these patients. To our knowledge, this is the first study to investigate the frequency of MI in a large group of patients with 2 non-elevated initial troponin values, a nonischemic ECG, and non-concerning vital signs.
Methods: A secondary analysis was performed of 7,266 patients examined in a prior study (Weinstock et al., JAMA Int Med. 2015). Patients were included if they were admitted to the hospital or an observation unit and had 2 non-elevated troponins, a nonspecific ECG, and non-concerning vital signs. Twenty-five of the 7,266 patients were diagnosed with an MI. These 25 MI patients were compared to 2 groups of randomly selected controls from the same cohort (group 1: patients with non-elevated troponins who had coronary angiography and group 2: patients from the entire cohort). To attempt to assess the etiology of MIs, the 25 MI patients and 25 group 1 control patients had their catheterizations re-read by a blinded interventional cardiologist. Demographic information was compared in all 3 groups on a variety of clinical factors, including the HEART Score.

Results: In patients ultimately diagnosed with an MI, all 25 were found on catheterization to have a potentially acute lesion (compared to 12 in group 1; p<0.001). Among the cases, 14 had regional wall motion abnormalities (5 in the controls), 7 had new loss of viable myocardium (2 in the controls) and 6 had an intracoronary thrombus (2 in the controls). There were minimal to moderate differences between the groups in demographic and clinical data, specifically in the HEART score (Table 1).

Conclusions: In this cohort, patients diagnosed with MI after two non-elevated troponins had a coronary lesion as the etiology. Differences in patient demographics were not clinically significant enough to make disposition decisions.

Table 1. HEART Scores and HEART Score subgroups across cases and controls.

<table>
<thead>
<tr>
<th>Elevated troponin</th>
<th>Negative troponins, catheterized</th>
<th>Negative troponins, all comers</th>
</tr>
</thead>
<tbody>
<tr>
<td>History ‡</td>
<td>N (%)</td>
<td>N (%)</td>
</tr>
<tr>
<td>Slightly suspicious</td>
<td>7 (28)</td>
<td>47 (29)</td>
</tr>
<tr>
<td>Moderately suspicious</td>
<td>15 (60)</td>
<td>112 (69.1)</td>
</tr>
<tr>
<td>Highly suspicious</td>
<td>3 (12)</td>
<td>3 (1.9)</td>
</tr>
<tr>
<td>EKG Normal</td>
<td>13 (52)</td>
<td>65 (40.1)</td>
</tr>
<tr>
<td>Non-specific changes</td>
<td>12 (48)</td>
<td>97 (59.9)</td>
</tr>
<tr>
<td>Age Group &lt;45</td>
<td>2 (8)</td>
<td>11 (6.8)</td>
</tr>
<tr>
<td>45-64</td>
<td>16 (64)</td>
<td>92 (56.8)</td>
</tr>
<tr>
<td>&gt;65</td>
<td>7 (28)</td>
<td>58 (35.8)</td>
</tr>
<tr>
<td>Risk Factors *</td>
<td>0</td>
<td>7 (4.3)</td>
</tr>
<tr>
<td>1-2</td>
<td>10 (40)</td>
<td>43 (26.5)</td>
</tr>
<tr>
<td>&gt;2</td>
<td>15 (60)</td>
<td>112 (69.1)</td>
</tr>
<tr>
<td>Heart Score 0-3</td>
<td>8 (32)</td>
<td>32 (19.8)</td>
</tr>
<tr>
<td>4-6</td>
<td>17 (68)</td>
<td>129 (79.6)</td>
</tr>
<tr>
<td>7-10</td>
<td>0 (0)</td>
<td>1 (0.6)</td>
</tr>
</tbody>
</table>

‡ Elevated troponin occurred after an initial two negative troponins.
‡ Two groups of controls were selected. The first included admitted/observation patients who did not have an nSTEMI and were taken to the catheterization lab. The other group, ‘all comers’, were selected from all admitted patients with negative troponins.
‡ Four historical features were assessed including vomiting, exertional pain, diaphoresis, and pain radiation. Subjects were slightly suspicious if they had none of these features, moderately suspicious if 1-2 features were present, and highly suspicious if 3-4 features present.
* Risk factors include DM, HLD, HTN, smoker, BMI >30, family history of CAD.

44 Modified HEART Score Using the Derived 12-Lead Electrocardiogram and Cardiac Electrical Biomarker

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Study Objectives: The HEART score is used to stratify risk for patients presenting with chest pain suggestive of acute coronary syndrome (ACS) and is comprised of elements including history (H), measured 12-lead ECG (mECG) changes (E), age (A), risk factors (R) and serum troponin (T) concentration (cTn). However, cTn may not become available until 1 hour after patient presentation. The measured 12-lead ECG (mECG) can be derived (dECG) from 3 measured leads with high correlation. A new cardiac electrical biomarker (CEB®) that has correlation with troponin can be

instantaneously constructed from the dECG on a cardiac monitor with reportedly high diagnostic accuracy for detection of acute myocardial ischemic injury (AMII).

We compare the HEART risk score to modified HEART risk scores that included substitution of dECG for mECG changes and CEB® for serum cTn.

Methods: This is a cross-sectional study of 137 consecutive patients presenting to an emergency facility with complaints of chest pain. The prevalence of AMII was 13.8% including 6 STEMI and 13 Non-STEMI. There was 1 case diagnosed as unstable angina yielding a prevalence of 14.6% for acute coronary syndrome (ACS). All patients had a 12-lead mECG and serum troponin I on presentation and final diagnosis was confirmed by review of the medical record. The dECG was constructed continuously from leads [I, II, V2] directly from a cardiac monitor/ECDG system (VectorplexES ECG System, VectorCor Inc, Totowa, NJ). The CEB® was constructed from the dECG in real-time and displayed on the cardiac monitor. The CEB was quantitatively stratified by cTn (non-AMII), 66-95 (indeterminate, caution zone), and >95 (AMII) from prior ROC analysis. The HEART risk score was calculated and compared to a HEART© score that utilized the dECG observed changes instead mECG changes, HEARTa, that used the CEB instead of cTn, and a HEARTl that used both the dECG and CEB® in their calculations. CEB® diagnostic accuracy parameters including sensitivity and specificity were calculated. Pearson correlation was used to compare the dECG and mECG. Spearman correlation and ROC curve C-statistics were used to compare the risk scores.

Results: The 12-lead mECG and dECG showed high Pearson correlation (r = 0.947). The CEB® showed high diagnostic accuracy for AMII with sensitivity 88.9%, specificity 95.2%, negative predictive value 98.02%, and positive predictive value 76.2%. HEART vs. HEARTa, HEARTl, and HEARTl showed high Spearman correlation of 0.9999, 0.928, and 0.9285 respectively. The ROC curves for all HEART, HEARTl, HEARTa, and HEARTl risk scores were constructed for detection of acute coronary syndrome showing area-under-curves (AUC) of 0.892, 0.897, 0.888 and 0.888 respectively. No statistically significant differences among the risk scores or AUC C-statistics were noted.

Conclusions: The modified HEART scores using HEARTa, HEARTl, and HEARTl based on substitution of the dECG for mECG and CEB® for cTn appear to perform well in risk stratification of patients presenting with chest pain and are comparable to the customary HEART score. The modified HEART risk scores are easy to calculate and are available immediately allowing a shorter time to decision for possible admission. Also, the modified HEART scores may be applicable in facilities where cTn is not immediately available such as in outpatient urgent care centers. Further studies are warranted to validate the findings of this exploratory study.

45 Effectiveness of Modified HEART Score Versus Emergency Department Assessment of Chest Pain Score Accelerated Diagnostic Protocol for Low Risk Chest Pain: A Prospective Observational Study

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Study Objective: The HEART score has gained wide popularity among emergency physicians across the world for risk stratification of patients presenting with acute chest pain. HEART score uses clinical gestalt as one of its parameters, which may change from one provider to another, as opposed to emergency department assessment of chest pain score accelerated diagnostic protocol (EDACS-ADP) which has well-defined symptoms with positive and negative scores. The Modified HEART score incorporates highly sensitive troponin I in place of conventional troponin I. We carry out this study to compare effectiveness of the modified HEART score with EDACS-ADP towards 30-day major adverse cardiac event (MACE) from the time of presentation, in patients presenting to the emergency department with suspected acute myocardial infarction.

Methodology: This was a prospective observational study, of adult patients who presented to the emergency department with hemodynamically stable chest pain and non-ST elevation acute coronary syndrome over a period of 8 months (August 2016- March 2017). Patients were followed for 30 days after initial presentation for any major adverse cardiac events including documented myocardial infarction, percutaneous coronary intervention, coronary artery bypass graft or death. The Modified HEART score and EDACS-ADP was calculated and compared with MACE.

Result: A total of 354 patients were included in the study. Of the total, 264 (73%) and 218 (65%) patients were identified as low risk by the Modified HEART score (score ≤ 3) and the EDACS-ADP (score <16 along with normal high sensitive troponin I and no ST-T changes on ECG), of which 1 and 0 had MACE in 30 days (P = 1), respectively. Fifty percent of patients with modified HEART score > 3 had MACE, while 24% had MACE in those with EDACS-ADP ≥16 (p=0.2).

Conclusions: EDACS-ADP and modified HEART score are comparable in safe dis-position of the patients.
Study Objectives: Crowding in the emergency department (ED) is a persistent problem that slows the movement of patients at all time points in an acute care setting. One solution involves introducing a Concierge Physician (CP) whose sole purpose is to provide a brief initial assessment (BIA) and aid patient navigation through the ED. The BIA provides faster physician contact and begins the initial evaluation and treatment. The CP is an emergency medicine trained physician who identifies patients waiting for formal evaluation and initiates testing including lab work and radiographic imaging.

The goal of this study was to quantify the impact of a concierge physician on patient flow dynamics in the ED setting.

Methods: We performed a retrospective observational cohort study in an urban academic ED. All available records during a 6-month period with a concierge physician evaluation were reviewed. Initially the CP was present in the treatment area during weekdays, during the last half of the observation period an additional CP was added to the waiting room on weekends. We identified major milestones in the ED visit with regards to patient throughput. Adult patients presenting to the ED with a triage level of Urgent (ESI 3), were analyzed for this study. Patients with a triage level of 1 or 2 were seen by an acute care team while triage level 4 and 5 were seen by mid-level providers. Data was stratified based on the patient’s ultimate disposition (admitted or discharged) and presented as means with 95% confidence intervals.

Results: Between August 2016 and January 2017, the ED evaluated 60,244 adult patients. Of those, 46,574 (67%) were triage level urgent (3), and 15,594 (39%) received a BIA from a concierge physician. Patients evaluated by a CP were seen 36 min faster (40% reduction in door-to-doctor time), but stayed 28 min longer in the ED on average, because the medical decisionmaking process took 63 min longer when initially evaluated by a CP. (Table 1). Of note, Press Ganey scores for the emergency department showed improvement over this time period of having a CP available.

Conclusions: Adapting a concierge medicine model to rapidly evaluate patients resulted in a dramatically reduced door-to-doctor time, but no change in overall time spent in the ED. This discrepancy was a direct result of delay in physician disposition. Addressing this discordance in medical decisionmaking would enhance this form of patient navigation.

### Table 1: Major Milestones in Patient Flow

<table>
<thead>
<tr>
<th>Time Period</th>
<th>Door to Doctor (hrs)</th>
<th>Door to Decision (hrs)</th>
<th>Doctor to Decision (hrs)</th>
<th>Door to Disposition (hrs)</th>
</tr>
</thead>
<tbody>
<tr>
<td>August-October, Concierge in Treatment Area</td>
<td>1.54 (1.50,1.59)</td>
<td>5.36 (5.16,5.36)</td>
<td>3.78 (3.69,3.86)</td>
<td>10.05 (9.89,10.21)</td>
</tr>
<tr>
<td>Discharged without BIA (n=8184)</td>
<td>1.64 (1.61,1.67)</td>
<td>4.70 (4.65,4.76)</td>
<td>3.10 (3.05,3.15)</td>
<td>4.24 (4.17,4.31)</td>
</tr>
<tr>
<td>Admitted with BIA (n=1841)</td>
<td>2.95 (2.91,3.00)</td>
<td>5.91 (5.79,6.33)</td>
<td>4.74 (4.63,4.86)</td>
<td>10.54 (10.31,10.77)</td>
</tr>
<tr>
<td>Discharged with BIA (n=4390)</td>
<td>0.89 (0.86,0.92)</td>
<td>5.32 (5.25,5.40)</td>
<td>4.64 (4.57,4.71)</td>
<td>4.75 (4.65,4.85)</td>
</tr>
<tr>
<td>November-January, Concierge in Treatment and Waiting Room</td>
<td>1.22 (1.19,1.25)</td>
<td>4.95 (4.88,5.03)</td>
<td>3.76 (3.69,3.83)</td>
<td>10.47 (10.29,10.64)</td>
</tr>
<tr>
<td>Discharged without BIA (n=3807)</td>
<td>1.31 (1.29,1.33)</td>
<td>4.47 (4.41,4.51)</td>
<td>3.18 (3.13,3.23)</td>
<td>4.54 (4.48,4.60)</td>
</tr>
<tr>
<td>Admitted with BIA (n=7766)</td>
<td>0.81 (0.78,0.84)</td>
<td>5.00 (4.93,5.05)</td>
<td>4.59 (4.50,4.68)</td>
<td>10.85 (10.64,11.07)</td>
</tr>
<tr>
<td>Discharged with BIA (n=6597)</td>
<td>0.72 (0.70,0.74)</td>
<td>4.88 (4.82,4.93)</td>
<td>4.56 (4.50,4.62)</td>
<td>4.90 (4.82,4.97)</td>
</tr>
</tbody>
</table>

**Note:** BIA = Brief Initial Assessment

48 A Novel Approach to Addressing an Unintended Consequence of Direct to Room: The Delay of Initial Vital Signs

Youssef E/Staten Island University Hospital, Northwell Health, Staten Island, NY

Study Objectives: The concept of “direct to room” (DTR) and “immediate bedding” has been described in the literature as a mechanism to improve front-end emergency department processing. The process allows for an expedited clinician-patient encounter. An unintended consequence of DTR was a time delay in obtaining the initial set of vital signs upon patient arrival.

Methods: This retrospective cohort study was conducted at a single, academic, tertiary care facility with an annual census of 94,000 patient visits. Inclusion criteria were all patients who entered the emergency department (ED) from 11/1/15 to 5/1/16 and between the hours of 7:00 am to 11:00 pm. During the implementation period, a vital signs station was created and a personal care assistant was assigned to the waiting area with the designated job of obtaining vital signs on all patients upon arrival to the ED and prior to leaving the waiting area. Time to first vital sign documented (TVVS) was defined as the time from quick registration to first vital sign documented.

Results: The pre-implementation period mean TVVS was 15.3 minutes (N= 37,900). The post-implementation period mean TVVS was 9.8 minutes (N= 39,392). The implementation yielded a 35% decrease and an absolute reduction in the average TVVS of 5.5 minutes (p<0.0001).
Conclusions: In conclusion, this study demonstrated that the coupling of registration and vital signs station was successful at overcoming delays in obtaining the time to initial vital signs.

<table>
<thead>
<tr>
<th>Table 1. Time to first vital sign recording in minutes</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Pre-implementation (N = 37,900)</td>
</tr>
<tr>
<td>Mean ± Std. Dev (p&lt;0.0001)</td>
</tr>
<tr>
<td>15.38 ± 23.72</td>
</tr>
<tr>
<td>9.00</td>
</tr>
</tbody>
</table>

Figure 1. Time to first vital sign (minutes). Time to vital signs first recorded demonstrated as box-and-whisker plot, modified with maximum values shown at tops of curtailed whiskers. Mean values demonstrated with trendline.

EMF

Designing Emergency Departments to Provide Efficient, Patient-Centered Care: An Analysis of Split Flow and Sub-Waiting Area Models

Easter B, Houshiarian N, Patti D, Lennon J, Wilner J/University of Colorado, Aurora, CO; Texas Tech University, Lubbock, TX; Lennon Associates, Del Mar, CA

Study Objectives: As emergency department (ED) crowding has worsened and its effects catalogued, ED leaders have sought process improvements to improve efficiency while architects have proposed design strategies to achieve the same. Unfortunately, these efforts have largely failed to cross professional boundaries. The present study explored the essential interaction between ED design and flow with a goal to optimize split-flow patient care systems.

Methods: The study is a 2 factor analysis, examining the interaction of 3 flow types and/or design types), and linear and non-linear regression.

Results: One-way ANOVA testing demonstrated the superiority of the ED flow split by a physician with 2 sub-waiting areas. This model resulted in the smallest LOS of 189.8 minutes (54 min shorter vs. control), and the highest bed utilization of 5.02 patients/bed/day (41.8% increase vs. control). In addition, physician-directed flow with 2 sub-waiting areas also showed superior performance in several patient-centered metrics, having the best D2P time of 9.6 minutes (vs. 26.3 min, control) and only a 1.17% LWBS rate. Not surprisingly, having 2 sub-waiting areas did result in an increase in the number of different treatment spaces a patient visited, 4.2 vs. 4. For any given flow type, adding 1 additional sub-waiting area resulted in a decreased LOS (range 20.9 - 37.3 min), increases in bed utilization (0.42 - 0.70 patients/bed/day), decreases in D2P (2.6 - 8.3 min), and decreases in LWBS (0.8% - 1.24%). For a given number of sub-waiting areas, flow split by a physician resulted in superior performance, followed by flow split by ESI, followed by no split flow.

Conclusions: Modifications to both ED flow and physical design have significant potential to improve both operational and patient-centered metrics. In general, addition of sub-waiting areas and use of a physician to split flow, as opposed to ESI score sorting, significantly improved operational and patient centered metrics. EDs should consider implementation of a physician-based intake model with multiple sub-waiting areas to improve performance.

Cost Benefit Analysis of Physician-in-Triage Model at Community Hospital Emergency Department

Sharma J, Bastani A, Jones S/William Beaumont Oakland University School of Medicine, Rochester Hills, MI; Troy Beaumont Hospital, Troy, MI

Study Objectives: Crowding and long throughput times during peak hours represent two problems that emergency departments (ED) increasingly face. Previous studies have shown that the physician-in-triage (PIT) model reduces wait times, decreases length of stay, and increases staff satisfaction. In the community hospital setting, we have previously described that incorporating the PIT model significantly reduced door-to-doc time and length of stay. An additional benefit of the PIT model is to directly increase gross revenue by decreasing the number of patients who leave without being seen (LWBS) and recapturing that revenue. Our study objective was to compare the number of patients who LWBS before and after implementation of the PIT model during peak hours and calculate the resultant costs/benefits.

Methods: From March 1st, 2016 to May 31st, 2016, we conducted a retrospective observational study of ED throughput data at a suburban community hospital with an annual ED census of > 95,000 visits per year. During the study period a PIT was added to the staffing model from 4-8PM, peak patient arrival times. LWBS data was collected during this time and compared with historical control data from March 1st, 2015 to May 31st, 2015. Our primary outcome measure was to calculate the number of ED patients who LWBS before and after PIT model implementation. Our secondary outcome was to conduct a cost-benefit analysis in conjunction with the hospital finance department to determine whether the PIT model was able to recaptured potential revenue by decreasing patients. Data was analyzed using descriptive statistics.

Results: During the historical cohort a total of 169 patients LWBS. After the PIT model was implemented the number of patients who LWBS decreased to 72, a 57.4% change. Utilizing a conservative estimate, that patients who leave prior to evaluation typically represent low level 1 or 2 acute cases, we estimated a potential revenue recapture of $130 per patient. Based on these numbers an estimated $12,610 was recaptured in revenue by the hospital as a result of implementing the PIT model. The cost of the additional staffing during the study period was $66,462.64 ($722.42 x 92 days). This results in a direct cost of $53,852.64 by the PIT model.

Conclusions: Implementation of a PIT model during peak hours significantly decreases patients who LWBS, resulting in a direct increase in recaptured revenue. In our study this revenue was not able to compensate for the cost of the additional staffing required.
Study Objectives: Emergency department (ED) wait times represent a well-recognized, national problem. As wait times increase, care of all emergency department patients is delayed, negatively impacting both patient outcomes and satisfaction.

The “Dr. Admit” process was designed to have providers identify candidate patients early upon presentation and reduce the time they spend in the emergency department by rallying nursing, clinician, laboratory, imaging and consulting service resources in a coordinated fashion to prioritize patient’s care needs. The goal is having results that will help facilitate admission to an inpatient service within one hour of activating the process.

Methods: We collected data over a 12-month period between the advent of Dr. Admit, on November 16, 2015 and November 15, 2016. During this period we had a total of 11,820 patients admitted to the hospital that were triaged as an Emergency Severity Index (ESI) of 1 or 2. 1,911 patient were Dr. Admit Patients and 9,909 were Non-Dr. Admit patients. The primary outcome for our analysis was the actual time to admission. Time to admission was defined as the time from arrival to the time the admission order was entered into the electronic medical record.

Results: Analyzing time to admission as the primary outcome for these groups, we found a reduction in the average admission time of approximately 137 minutes, from 329 minutes to 192 minutes, and also found a reduction in the median admission time of 106 minutes, from 271 to 165.

Conclusions: The effective partnering and coordinating of multiple service lines (ED, Lab, Radiology, Consulting services) has led to the Dr. Admit program being successful in reducing patient admission decision times and in expediting care to the most ill patient population.

Dr. Admit: Reducing admission decision time for clinically-ill patients

Study Objectives: Venous thromboembolism (VTE) in hospitalized acute medially ill patients is a leading preventable cause of in-hospital morbidity and mortality in the US. Advancing age (>70 y) is one of the risk factors for VTE, and guidelines for diagnosis of VTE in these patients incorporate D-dimer for risk stratification. The DAMI ACT study has previously described that the majority of acute medically ill patients without suspected VTE had elevated D-dimer levels, 74.4% of patients, with levels ≥2xULN in 48.8% of patients. Age adjusted elevations (≥age*10) were found in 62.2% of patients. The goal of this analysis was to evaluate D-dimer levels across the three common age ranges utilized for VTE risk assessment.

Methods: DAMI ACT was a prospective observational study of hospitalized acute medially ill patients admitted Feb 14-Nov 15, 2016, across 9 US hospitals. Eligibility criteria were ≥60 y and acute medical illness; exclusion criteria were suspected or diagnosed VTE, anticoagulation prior to enrollment, or surgery within 30 d of presentation. After consent, a single D-dimer sample was drawn within 24 h of admission and before receiving anticoagulation. Samples were analyzed in a single central laboratory. Results were stratiﬁed across three age groups: 60-64, 65-74, ≥75 y. Outcomes included assessments of D-dimer levels, presence of VTE, and anticoagulation therapy.

Results: Of 995 patients included (60-64 y, n =322; 65-74 y, n =415; ≥75 y, n =258), 49% were male; patients ≥75 vs. <75 y were mostly Caucasian (82% vs. 68%) while fewer were African-American (16% vs. 30%). D-dimer levels remained signiﬁcantly with age (Table). The increase in D-dimer levels with advancing age remained signiﬁcant between patients <75 and ≥75 y when using an age-adjusted D-dimer cutoff. There was no difference in the proportion of patients who had in-hospital VTE event across all age groups (Table). Preliminary analyses showed that there was no difference in the proportion of patients receiving any anticoagulant during hospitalization (Table). More patients ≥75 vs. <75 y received heparin, 59.3% vs. 49.4% (p =0.006; 95% CI, 1.12-1.99).

Table. D-dimer levels, VTE events, and anticoagulation therapy in hospitalized patients

<table>
<thead>
<tr>
<th>Age 60-64 (n =322)</th>
<th>Age 65-74 (n =415)</th>
<th>Age ≥75 (n =258)</th>
<th>P-value (95% CI) 60-64 vs. 65-74</th>
<th>P-value (95% CI) 65-74 vs. ≥75</th>
<th>P-value (95% CI) &lt;75 vs. ≥75</th>
</tr>
</thead>
<tbody>
<tr>
<td>Median D-dimer levels, ng/mL (25th, 75th percentile)</td>
<td>720 (370, 1680)</td>
<td>970 (490, 2000)</td>
<td>1280 (690, 2380)</td>
<td>0.0004</td>
<td>0.0008</td>
</tr>
<tr>
<td>D-dimer above normal (≥500 ng/mL), n (%)</td>
<td>206 (64.0)</td>
<td>310 (74.7)</td>
<td>224 (86.8)</td>
<td>0.002 (1.21-2.28)</td>
<td>0.0002 (1.46-3.41)</td>
</tr>
<tr>
<td>D-dimer above 2xULN (≥1000 ng/mL), n (%)</td>
<td>126 (39.1)</td>
<td>206 (49.6)</td>
<td>154 (59.7)</td>
<td>0.005 (1.14-2.06)</td>
<td>0.011 (1.10-2.06)</td>
</tr>
<tr>
<td>D-Dimer age adjusted (≥age*10), n (%)</td>
<td>180 (55.9)</td>
<td>262 (63.1)</td>
<td>177 (68.6)</td>
<td>0.047 (1.00-1.82)</td>
<td>0.15 (0.92-1.78)</td>
</tr>
<tr>
<td>In-hospital VTE events, n (%)</td>
<td>4 (1.2)</td>
<td>6 (1.5)</td>
<td>5 (1.9)</td>
<td>1.00 (0.33-3.47)</td>
<td>0.76 (0.41-4.46)</td>
</tr>
<tr>
<td>Post-admission anticoagulant, n (%)</td>
<td>209 (64.9)</td>
<td>276 (66.5)</td>
<td>182 (70.5)</td>
<td>0.65 (0.79-1.46)</td>
<td>0.27 (0.86-1.69)</td>
</tr>
<tr>
<td>Post-admission heparin, n (%)</td>
<td>154 (47.8)</td>
<td>211 (50.8)</td>
<td>153 (59.3)</td>
<td>0.42 (0.84-1.51)</td>
<td>0.032 (1.03-1.93)</td>
</tr>
</tbody>
</table>
Conclusions: In hospitalized acute medically ill patients without suspected VTE, D-dimer levels increased with advancing age, without an increase in in-hospital VTE events. Proportion of patients who received anticoagulation was similar across all age groups, but older patients (>75 y) were more likely to receive heparin. Further analyses may provide more insights into understanding the relationship between D-dimer levels, age, anticoagulation therapy, and VTE events.

## 53 Analyzing the Components of the Wells' Score for Pulmonary Embolism Can Strengthen Unstructured Physician Gestalt

Francis S, Limkaeng A Jr., Zheng H, Parry BA, Chang AM, Prochaska J, Kümpers P, Fernmann G, Cohen J, Kabriel C/Duke University, Durham, NC; Massachusetts General Hospital/Harvard Medical School, Boston, MA; Sidney Kimmel Medical College, Philadelphia, PA; University Medical Center of the Johannes Gutenberg-University, Mainz, Germany; University Hospital Münster, Albert-Schweitzer-Campus, Münster, Germany; University of Cincinnati, Cincinnati, OH; Albany Medical Center, Albany, NY

Study Objectives: In determining pretest probability for pulmonary embolus (PE in emergency department (ED) patients, recent studies have shown physician gestalt to be similar or superior to structured clinical decision instruments. Physician gestalt is unique to each practicing emergency physician, developed through clinical practice, knowledge, and experience. Physician trainees often lack that prior clinical experience to develop a gestalt. This study sought to find the predictive value of the individual components of the Wells' PE score to better delineate the findings that are more predictive of PE, aiding in development of individual gestalt.

Methods: We conducted a multinational, prospective observational study of adult patients presenting to EDs with suspected PE. Wells' PE scores were calculated by the treating physicians. D-Dimer assays were performed using a single assay (INNOVANCE D-Dimer, Siemens). Confirmation imaging (CT angiography of the chest or ventilation/perfusion scan) was obtained at the discretion of the treating physician. Patients were prospectively followed for clinical outcomes by record review and phone follow-up. We created a multivariable logistic regression model to assess associations between the individual elements of the Wells' PE score.

Results: We enrolled 1,834 patients with suspected PE and a non-high pretest probability, with a mean Wells' PE score of 1.8 (SD 1.8). 63.1% were female, 36.9% were male. 55.9% were younger than 50 years old, 44.1% were 50 or older. 58.9% were Caucasian, 30.2% were African American, 7.9% were Hispanic, 1% were Asian, and 2% were other ethnicities. 28.4% were tachycardic, 7.1% had active cancer, and 10% had recent immobilization or surgery in the past 4 weeks. 9.4% had a prior history of VTE. Overall 5.5% (101/1,834) were diagnosed with PE. An additional 7% had recent immobilization or surgery in the previous 4 weeks. 9.4% had a prior history of DVT, 5.14 (3.40-7.78) 0.0001.

Conclusions: In this large patient cohort evaluated for PE, PE being the #1 or #2 gestalt when deciding whether to pursue a DVT work-up for their individual patient.

### Table 1. Individual Components of the Wells' Score for PE with associated adjusted odds ratio and p-value

<table>
<thead>
<tr>
<th>Wells' Score Component</th>
<th>Adjusted OR (95% CI)</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>PE is the #1 diagnosis or equally likely</td>
<td>3.97 (2.52-6.25)</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>Previous DVT or PE</td>
<td>3.40 (1.97-5.88)</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>Immobilization or surgery in the previous 4 weeks</td>
<td>2.18 (1.23-3.84)</td>
<td>0.0074</td>
</tr>
<tr>
<td>Clinical signs and symptoms of DVT</td>
<td>1.71 (0.84-3.47)</td>
<td>0.14</td>
</tr>
<tr>
<td>Malignancy (on treatment, treatment in last 6 months, or palliative)</td>
<td>1.19 (0.59-2.41)</td>
<td>0.63</td>
</tr>
<tr>
<td>Heart rate greater than 100 bpm</td>
<td>1.18 (0.72-1.93)</td>
<td>0.50</td>
</tr>
<tr>
<td>Pitting edema</td>
<td>0.57 (0.10-3.24)</td>
<td>0.52</td>
</tr>
</tbody>
</table>

43% were older than 75 years, 57% were 50 or older. Overall 5.5% (101/1,752) were diagnosed with PE. Additional 7% had recent immobilization or surgery in the previous 4 weeks. 9.4% had a prior history of DVT, 5.14 (3.40-7.78) 0.0001. Only 10% had recent immobilization or surgery in the past 4 weeks. 9.4% had a prior history of DVT, 5.14 (3.40-7.78) 0.0001.

### Table 1. Individual Components of the Wells' score for DVT and their adjusted odds ratio

<table>
<thead>
<tr>
<th>Wells' DVT Score Component</th>
<th>Adjusted OR (95% CI)</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Previously documented DVT</td>
<td>5.14 (3.40-7.78)</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>calf swelling at least 3 cm larger than asymptomatic leg</td>
<td>2.13 (1.39-3.36)</td>
<td>0.001</td>
</tr>
<tr>
<td>Active cancer</td>
<td>2.04 (0.97-4.26)</td>
<td>0.06</td>
</tr>
<tr>
<td>Collateral superficial veins</td>
<td>1.77 (0.71-4.41)</td>
<td>0.22</td>
</tr>
<tr>
<td>Pitting edema confined to symptomatic leg</td>
<td>1.25 (0.79-2.00)</td>
<td>0.34</td>
</tr>
<tr>
<td>Localized tenderness along deep venous system</td>
<td>1.22 (0.85-1.75)</td>
<td>0.29</td>
</tr>
<tr>
<td>Paralysis, paresis, or recent plaster immobilization of lower extremities</td>
<td>1.12 (0.42-2.99)</td>
<td>0.83</td>
</tr>
<tr>
<td>Recently bedridden for ≥3 days or major surgery within previous 12 weeks</td>
<td>0.96 (0.53-1.73)</td>
<td>0.88</td>
</tr>
<tr>
<td>Entire leg swollen</td>
<td>0.71 (0.42-1.19)</td>
<td>0.2</td>
</tr>
<tr>
<td>Alternate diagnosis at least as likely as DVT</td>
<td>0.28 (0.19-0.41)</td>
<td>&lt;0.0001</td>
</tr>
</tbody>
</table>

## 54 Physician Gestalt is the Most Predictive Component of the Wells' Deep Venous Thrombosis Score in Diagnosing Subsequent Deep Venous Thrombosis

Francis S, Limkaeng A Jr., Zheng H, Parry BA, Chang AM, Singer A, Zeserson E, Giordano N, Gentle N, Kabriel C/Duke University, Durham, NC; Massachusetts General Hospital/Harvard Medical School, Boston, MA; Sidney Kimmel Medical College, Philadelphia, PA; Stony Brook University, Stony Brook, NY; Christiana Care, Wilmington, DE; Massachusetts General Hospital, Center for Vascular Emergencies, Boston, MA; Lewis Katz School of Medicine, Temple University, Philadelphia, PA

Objective: Leg swelling is one of the 20 most common chief complaints presenting to United States emergency departments. Physicians can use either the Wells' Deep Venous Thrombosis (DVT) score or gestalt in initiating work-up of this disease. This study sought to look at the individual components of the Wells' DVT score for their predictive value in diagnosing subsequent DVT.

Methods: We conducted a multinational, prospective observational study of adult patients presenting to emergency departments (ED) with suspected DVT. Wells' DVT scores were calculated by the treating physicians. D-Dimer assays were performed using a single assay (INNOVANCE D-Dimer, Siemens). Confirmation imaging, venous ultrasound, was obtained at the discretion of the treating physician. Patients were prospectively followed for clinical outcomes by record review and phone follow-up. We created a multivariable logistic regression model to assess associations between the individual elements of the Wells' DVT score and final diagnosis.

Results: We enrolled 1,752 patients with suspected proximal DVT with non-high pretest probability. Patients with recurrent and chronic DVT are included, with a mean Wells' DVT score of 0 (SD 1.3). 59.5% were female, 40.5% male. The most common ethnicities were Caucasian (66.9%), African American (27.1%), and Hispanic (6.5%). 43% were younger than 50 years old, 57% were 50 or older. Overall 6.4% (113/1,752) were diagnosed with DVT. An additional 78 were diagnosed with isolated calf DVT. Table 1 shows the adjusted odds ratios for the individual components of the Wells' DVT score.

Conclusions: Independently analyzing the individual components of the Wells' DVT score reveals markedly different predictive values. A prior history of DVT, asymmetric calf swelling of the symptomatic leg, and active cancer were most predictive of subsequent diagnosis of DVT. According to an alternate diagnosis was most predictive of a DVT negative work up. Knowledge of these factors can help strengthen individual physician's gestalt when deciding whether to pursue a DVT work-up for their individual patient.
History, Physical Exam, and Emergency Department Bedside Ultrasound for the Diagnosis of Acute Appendicitis in Pediatric Patients

Hanna M, Sinhart R, Benabassas R/SUNY Downstate New York, NY

Study Objectives: To determine the utility of history, physical exam findings, lab tests, Pediatric Appendicitis Score (PAS) and ED-POCUS in diagnosis of acute appendicitis (AA) in pediatric patients in the ED using systematic review and meta-analysis. Using a test-treatment threshold model we studied which findings can rule in/out AA in the ED and obviate the need for CT scan and MRI.

Methods: We searched PUBMED, EMBASE and SCOPUS and research meeting abstracts from January 1966 to August 2016 for studies on pediatric patients presenting to the ED with either undifferentiated abdominal pain or findings suggestive of AA. We used QUADAS2 to evaluate quality of included studies. The operating characteristics of the interventions in diagnosing AA were calculated. Sensitivity, Specificity and positive and negative Likelihood Ratios (LR+ and LR-). When appropriate data pooling was conducted using Meta-DiSc with a random-effects model. Using available literature on accuracy of CT scan and MRI and applying Pauker-Kassirer method we developed a test-treatment threshold model.

Results: 20 studies were reviewed with a total population of 6,628 patients and weighted AA prevalence of 37.75%. We divided studies into 2 groups based on inclusion criteria. Group 1: Studies on patients with undifferentiated abdominal pain (2 studies, N=1,095, Prevalence of AA=14%) and Group 2: Studies on patients suspected of AA (18 studies, N=5,433, Prevalence of AA=42.5%). Studies had variable quality using QUADAS-2 assessment with Group 2 studies being at high risk of partial verification bias. In Group 1 studies, history of “Pain migration to RLQ” (LR+ 4.81, 95% CI 3.59-6.44) and presence of “Cough/Hop pain” in physical exam (LR+ 7.64, 95% CI 5.94-9.83) were most strongly associated with AA. In this group PAS>2 was the PAS cutoff point most suggestive of AA (LR+ 4.56, 95% CI 3.04-6.84). Across Group 2 studies, none of the history findings were strongly associated with AA (LR+ 0.15-1.75) Rovsing’s sign in physical examination was most strongly associated with AA (LR+3.52, 95% CI 2.65-4.68). Among laboratory findings, CRP>3 was most suggestive of AA (LR+ 2.10, 95% CI 1.61-2.76) and WBC<10,000 was most associated with absence of AA (LR- 0.24, 95% CI 0.20-0.28). In this group PAS>8 (LR+ 4.08, 95% CI 3.16-5.27) PAS>9 (LR+ 5.26, 95% CI 3.84-8.29) and PAS>10 (LR+ 5.8, 95% CI 1.97-17.11) were most associated with AA. None of the history, physical exam or PAS could rule in or rule out AA in any of the two groups. All studies on ED-POCUS were in Group 2. ED-POCUS had Sensitivity 85.6% (95% CI 79-90) Specificity 91% (95% CI 87-94). Using our test-treatment threshold model, positive ED-POCUS could obviate the need for CT and MRI and rule in AA LR+ 9.33 (95% CI 6.48-13.42) but negative ED-POCUS could not rule out AA LR- 0.17 (95% CI 0.09-0.32).

Conclusions: In a patient presenting to the ED with undifferentiated abdominal pain, history of pain migration to RLQ or cough/hop pain on PE, physicians should suspect AA. No single HXP, lab finding can establish the diagnosis of AA and obviate the need for imaging studies. If operator of ED-POCUS has similar expertise and training as operators in our included studies, ED-POCUS can replace RUS in diagnosis of AA. In ED patients suspected of AA, a positive ED-POCUS obviates the need for CT scan or MRI while negative ED-POCUS is not enough to rule out AA. In presence of a negative ED-POCUS we suggest physicians to proceed based on their clinical judgment and practice setting.

Emergency Department Computed Tomography in Early Acute Pancreatitis

Ullah K, Lohse M, Seda J, Thode HC, Jr., Singer AJ, Morley E/Stony Brook University, Stony Brook, NY

Study Objectives: Acute pancreatitis (AP) is a relatively common condition in patients presenting to the emergency department. Computed tomography (CT) is an increasingly utilized imaging modality for evaluating abdominal pain, and often ordered for patients in whom the diagnosis of AP has already been made via elevated lipase levels and typical abdominal pain symptoms. Many of the complications of AP detectable on CT (pseudocyst, abscess, or necrosis) do not develop until 4 days to several weeks after symptom onset. Small studies have been published demonstrating the limited utility of early CT in the evaluation of patients with AP, suggesting that it alters management in fewer than 10% of cases. Radiology and gastroenterology society guidelines recommend against routine CT imaging in early acute pancreatitis, suggesting instead that abdominal ultrasound is preferable as an initial study to evaluate for biliary etiology and direct subsequent management. Our study aimed to investigate whether early CT imaging performed in the emergency department altered management and led to further interventions, and what, if any, patient characteristics might predict the need for early imaging.

Methods: A retrospective chart analysis was performed on a cohort of patients presenting to Stony Brook University Hospital emergency department between the years 2013-2015. Patients were selected who met criteria for the diagnosis of acute pancreatitis, a subset of whom received CT imaging during their ED or inpatient course. Relevant history, laboratory, and imaging data were abstracted from the medical record and analyzed by 3 independent reviewers. The medical record for each patient was reviewed for interventions that occurred during patients’ hospital course, such as surgery, drainage procedure or ERCP, and an assessment was made whether CT findings altered patient management or led to an intervention.

Results: The electronic medical record query yielded 458 patients with ICD-9 codes for acute pancreatitis during the 3-year period. Of those, 179 met the ACG criteria for acute pancreatitis and were included in the study. 149 patients (83%) had abdominal CT studies performed during their hospital course, 125 (84%) of which were in the ED prior to admission. Of these 125 patients, 85 (68%) had imaging evidence of pancreatitis, 12 (10%) had gallstones, 11 (9%) had cyst/pseudocyst, 9 (7%) had necrosis or abscess, 8 (6%) had a mass lesion. Early CT
in the ED led to change in management in 39 (31%) patients. Ten (8%) patients underwent surgery or drainage, and 16 (13%) patients underwent ERCP. Of patients who received an intervention, the mean age was 62 (SD 16) compared with those with no intervention, mean age 52 (SD 17). This difference was significant for both ERCP (p = 0.06) and surgery/drainage (p = 0.04). There was no significant difference found in the lab values, initial vital signs and sex between the two groups.

Conclusions: In clinical practice at this institution and others, CT is widely utilized as the first line imaging modality for assessment of many of the causes of abdominal pain, including acute pancreatitis, despite past data suggesting it does not alter management in most cases. Our study suggests that a larger proportion of patients went on to intervention (21%) based on CT findings than has previously been reported. Of the demographic, initial vital signs, and lab values analyzed, the only significant difference found was that the patients who went on to receive interventions were significantly older.

EMF
The Association of Plasma Syndecan-1 and Mortality in Patients With Septic Shock

Nandi U, Puskarich M, Jones A/University of Mississippi Medical Center, Jackson, MS

Study Objectives: Sepsis affects the endothelial glyocalyx (EG), and EG damage is associated with an increased risk of adverse clinical outcomes, perhaps due to increased fluid extravasation. Our prior work has demonstrated that sepsis patients with high syndecan-1, a plasma biomarker of EG damage, are at a greater risk of death and may have an increased risk of intubation after large volume fluid resuscitation. The goal of this study was to validate these findings in a separate cohort of patients with septic shock.

Methods: Plasma samples were collected from patients with septic shock at the time of enrollment into a large ongoing, multi-site, interventional double-blinded, placebo-controlled trial. Patients were enrolled between 4-24 hours of the onset of septic shock. Samples were stored at -80°C without freeze-thaw cycles until the time of syndecan-1 measurements. Demographic and clinical information were collected prospectively as part of the trial. The primary independent variable was syndecan-1 level at enrollment. The primary outcome was mortality, while the secondary outcomes were intubation and renal dysfunction (as measured by the renal component of the SOFA score). Student’s t-test and Kruskal-Wallis were used to compare the means between the groups. We also evaluated the risk of intubation after fluid administration comparing high versus low syndecan-1 groups using logistic regression. We evaluated the cutoff of 240 ng/ml from our previous data for delineating these two groups and also analyzed a different cutoff from the current cohort using an ROC curve.

Results: Syndecan-1 was measured in 117 patients to date, with additional analyses ongoing. 47 (40%) patients met the primary outcome of 28-day mortality. 89 (76%) patients were intubated. 20 (26%) patients had a renal SOFA score of 0 while 54 (35%), 31 (28%), 10 (9%), and 8 (7%) patients had scores of 1, 2, 3 and 4 respectively. Median syndecan-1 concentration was 134 (56, 265) ng/ml. Syndecan-1 was significantly elevated in non-survivors compared to survivors (218 vs 149, p = 0.02). Syndecan-1 levels did not differ significantly between intubated and non-intubated patients or amongst the various renal SOFA categories. AUCROC for prediction to mortality, intubation and renal dysfunction (renal SOFA score 0: normal, 1 - 4: abnormal) were 0.64, 0.56 and 0.64. The cutoff of 240 ng/ml from our previous data had a sensitivity and specificity of 38% and 76% for mortality. Syndecan-1 > 305 ng/ml was classified as high for this cohort (sensitivity and specificity of 30% and 87%). The cohort received a median of 4L of fluids in the 24 hours prior to enrollment and did not differ significantly between the high and low syndecan-1 groups. High syndecan-1 was associated with a significant probability of mortality (OR: 2.88, p = 0.027), which increased after adjusting for age and IV fluids (OR: 4.03, p = 0.01).

Conclusions: Syndecan-1 levels are elevated in septic shock non-survivors compared to survivors, and a high syndecan-1 level is associated with increased odds of mortality compared to low levels. Syndecan-1 levels were not significantly associated with intubation or renal dysfunction in this more critically ill cohort enrolled at a later time point compared to our previous work. Completion of ongoing sample analyses and prospective early enrollment studies remain indicated to determine utility in the ED population.

Research Forum Abstracts

Does Intravenous Lactated Ringer’s Solution Raise Serum Lactate?
Skaages ZD, Ziter T, Rahbar A, Patel J, Khan M/University of Nevada, Las Vegas, NV; University Medical Center, Las Vegas, NV

Study Objectives: Federally mandated sepsis care guidelines have led to an increasing reliance on using serum lactate as a screen for sepsis and as a marker for the success of resuscitative efforts, despite confounders. Previous investigations have shown lactate levels to increase not only secondary to sepsis and other shock states but also secondary to exogenous substances such as metformin, propofol, and albuterol.

Lactated Ringer’s solution (LR) is a crystalloid containing 28 mmol/L of sodium lactate that is widely used in the resuscitation of septic patients. This study sought to isolate the effect of the administration of LR on serum lactate. Normal saline (NS) was used as a comparator.

Methods: In this randomized, double-blind, placebo-controlled trial, thirty healthy adult volunteers were assigned to receive either 30 ml/kg of intravenous Lactated Ringer’s solution or normal saline solution. Serum lactate was measured prior to and after the administration of the fluid bolus. Measurements were made using i-STAT 1 analyzer. The primary outcome was comparing the degree of change in serum lactate levels between the Lactated Ringer’s and normal saline groups. The secondary outcome measure was assessing for the development of hyperchloremic metabolic acidosis in the normal saline group.

Results: After a 30 ml/kg bolus of intravenous LR, the mean serum lactate increased by 0.93 mmol/L (95% CI 0.42 mmol/L to 1.44 mmol/L). However, there was also a small increase in the mean serum lactate in the NS group of 0.37 mmol/L (95% CI 0.26 mmol/L to 1.00 mmol/L), such that there was not a statistically significant difference in the change in lactate when comparing the LR group to the NS group (p = 0.2). The NS group had larger drops in pH and bicarbonate compared to the LR group. The NS group had greater increases in Na and Cl compared to the LR group.

Conclusions: A bolus of 30 ml/kg of LR given to healthy individuals results in an increase in serum lactate levels. It is not certain if this finding is applicable to patients with sepsis. A bolus of 30ml/kg of NS results in a reduction in pH and an increase in Na and Cl, a significant secondary outcome consistent with trend toward hyperchloremic metabolic acidosis in the NS group.

Table 1. Mean values for primary and various secondary outcomes

<table>
<thead>
<tr>
<th></th>
<th>LR</th>
<th>NS</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Increase in serum lactate</td>
<td>0.93</td>
<td>0.37</td>
<td>0.2</td>
</tr>
<tr>
<td>Decrease in pH</td>
<td>0.033</td>
<td>0.067</td>
<td>0.005</td>
</tr>
<tr>
<td>Decrease in Cr</td>
<td>0.0334</td>
<td>0.1</td>
<td>0.11</td>
</tr>
<tr>
<td>Increase in Na</td>
<td>0.7</td>
<td>2.1</td>
<td>0.012</td>
</tr>
<tr>
<td>Increase in Cl</td>
<td>-0.4</td>
<td>3.7</td>
<td>0.0003</td>
</tr>
<tr>
<td>Decrease in HC03</td>
<td>-0.36</td>
<td>2.35</td>
<td>0.0048</td>
</tr>
</tbody>
</table>

Electrocardiogram Changes in Patients With Acute and Chronic Hyperkalemia
Rafique Z, Kibisonb M, Clark CL, Singer AJ, Miller J, Laguna A, Caterino JM, Singh B, Chair D, Peacock WF/Baylor College of Medicine, Ben Taub General Hospital, Houston, TX; Saint Luke’s Mid America Heart Institute and University of Missouri-Kansas City, Kansas City, MO; Oakland University William Beaumont School of Medicine, Royal Oak, MO; Stony Brook School of Medicine, University Medical Center, Stony Brook, NY; Henry Ford Hospital, Detroit, MI; Wayne State University, Detroit, MI; The Ohio State University, Columbus, OH; ZS Pharma Inc., a member of the Astrazeneca group, San Mateo, CA; Washington University, Saint Louis, MO

Study Objectives: Hyperkalemia (HK) is a common emergency department (ED) presentation. Although electrocardiogram (ECG) changes are generally believed to identify patients at high risk of adverse cardiovascular events, they may not reliably predict outcomes or correlate with degree of HK. In addition, it is commonly thought that patients who present to the ED with HK for the first
time would have a higher rate of ECG changes compared to those with chronic HK.

Our primary goal was to determine the frequency of ECG changes in patients with acute and chronic HK. Our secondary goal was to determine the differences in ECG manifestations between patients with chronic kidney disease (CKD) and those without CKD.

Methods: REVEAL-ED was a multicenter study conducted at 14 sites in the United States designed to define the clinical presentations, treatments, and outcomes associated with HK. Eligible patients were aged ≥18 years, presented to the ED with potassium (K+) ≥5.5 mEq/L, and signed an informed consent. Overall, 203 patients with a mean (standard deviation) age of 56.8 years were enrolled (61% male, 51% African American, and 48% Caucasian). A total of 34% (69) of patients had a prior ED visit or hospitalization within 6 months for HK and 73% (149) had a history of CKD.

ECGs were scored for the presence of depolarization (PR and QRS prolongation, heart blocks, and arrhythmia) and repolarization (peaked T wave) abnormalities by a cardiologist blinded to K+ values. Patients with HK-related ECG abnormalities were categorized based on the presence or absence of prior HK-related hospitalizations (no visit vs prior visit) in the last 6 months and CKD status (no CKD vs CKD).

Results: A total of 203 patients with K+ ≥5.5 mEq/L were enrolled. All patients had interpretable ECGs at ED presentation. Overall rates of ECG changes in patients with HK were low; 53% of patients had any ECG abnormality and 23% had HK-related ECG changes (peaked T wave or prolonged QRS interval). Median (IQR) K+ levels were 6.2 (5.7-6.8) and 6.4 (6.0-6.9) mEq/L in the no visit and prior visit groups, respectively, and 5.9 (5.6-6.6) and 6.4 (5.9-6.9) mEq/L in the no CKD and CKD groups, respectively. Peak T waves occurred in 14% and 23% of patients in the no visit and prior visit groups, respectively (P=0.11). Presence of a widened QRS interval was not different between the no visit and prior visit groups (11% and 10%, respectively; P=0.10). HK-related peaked T waves or widened QRS intervals were observed in 20% and 29% in the no visit and prior visit groups, respectively (P=0.16). Overall, ECG abnormalities were observed more frequently in the prior visit group than in the no visit group (44% and 26%, respectively; P=0.02). Similar results were noted in patients with and without history of CKD, with ECG abnormalities observed more frequently in patients with CKD (36%) versus those without CKD (22%) (P=0.09).

Conclusions: Overall rates of ECG changes in HK patients were low. HK-related ECG changes appeared more frequent in patients with chronic HK and in those with CKD than those without CKD or prior HK-related hospitalization; however, only one-quarter of patients without CKD or prior history of HK was observed to have ECG changes.

Conclusions: Hyperkalemia-related ECG changes were observed in less than a third of the patients, indicating that ECG changes do not necessarily occur in patients with hyperkalemia and may be an unreliable indicator of HK. Even when K+ exceeded 7 mEq/L, HK-related changes were observed in less than 60% of ECGs.

### 61 Electrocardiogram Changes Are Not Reliably Associated With Hyperkalemia or Its Severity

Rafique Z, Kosiborod M, Clark CL, Singer AJ, Miller J, Lagina A, Caterina JM, Sindh B, Char D, Peacock WF/Baylor College of Medicine, Ben Taub General Hospital, Houston, TX; Saint Luke’s Mid America Heart Institute and University of Missouri–Kansas City, Kansas City, MO; Oakland University William Beaumont School of Medicine, Roal Oak, MI; Stony Brook School of Medicine, University Medical Center, Stony Brook, NY; Henry Ford Hospital, Detroit, MI; Wayne State University, Detroit, MI; The Ohio State University, Columbus, OH; ZS Pharma, Inc., a member of the AstraZeneca group, San Mateo, CA: Washington University, Saint Louis, MO

Study Objectives: Hyperkalemia (HK) is a common emergency department (ED) presentation, with the electrocardiogram (ECG) generally as the standard to identify patients at high risk of adverse cardiovascular outcomes.

Our purpose was to determine ifHK is associated with clinically significant ECG changes and to evaluate if ECG changes are associated with HK severity.

Methods: This is a preplanned analysis of ECGs obtained during the REVEAL-ED study. REVEAL-ED was a multicenter observational study evaluating the management of HK in the ED. Patients aged ≥18 years who presented to the ED with potassium (K+) ≥5.5 mEq/L were enrolled across 14 sites in the United States. Baseline demographics, electrolytes, ECG results collected on arrival, and outcomes are used for the current analysis.

ECGs were scored for the presence or absence of depolarization (PR and QRS prolongation, heart blocks, and arrhythmia) and repolarization (peaked T wave) abnormalities by a cardiologist blinded to K+ values. Patients with HK and HK-related ECG abnormalities were categorized based on the presence or absence of prior HK-related hospitalizations (no visit vs prior visit) in the last 6 months and CKD status (no CKD vs CKD).
Hyperkalemia in the Emergency Department: Severity, Treatment, and Outcomes

Singer AJ, Thode HC, Jr., Peacock WF/Stony Brook University, Stony Brook, NY; Baylor College of Medicine, Houston, TX

Study Objectives: Hyperkalemia is relatively common and may be associated with significant morbidity and mortality; however, treatments vary. We determined incidence, treatment, and outcomes of hyperkalemia in ED patients.

Methods: Study Design: Structured, retrospective review of electronic medical records.

Subjects: Consecutive adult ED patients with potassium (K) levels measured while in the ED. Setting: academic suburban ED with 100,000 annual visits. Measures: demographic, clinical, and laboratory data. Outcomes: treatments, disposition, and complications. Data Analysis: univariate and multivariate analyses were used to compare outcomes by K levels and are presented as adjusted odds ratios.

Results: Of 100,386 visits in 2014, K was ordered in 48,827 (49%). Mean age (SD) was 49 (22); 46% were male. 1727 patients (3.5%) were excluded because their sample had hemolyzed. K was low (<3.5 meq/L) in 5%, normal (3.5-5.0 meq/L) in 91%, and elevated (>5.0 meq/L) in 4% of patients. Patients with hyperkalemia were older (64 vs. 49, P<0.001) and more likely male (58 vs. 40%, P<0.001). Treatment for hyperkalemia varied greatly (Table). After adjusting for confounders, hyperkalemia was associated with inpatient hospitalization and death. Hypokalemia was also associated with admission and death. Mortality and admission rates increased significantly as potassium increased or decreased outside of the normal levels (Figures).

At least one medication was used to manage hyperkalemia in 12% of patients with minimal elevation and 50% with marked elevation.

Conclusions: Hyperkalemia occurs in 1 of 100 ED patients and is associated with admission and mortality. Treatment of hyperkalemia varies greatly.

<table>
<thead>
<tr>
<th>Treatments</th>
<th>Low K &lt; 3.5</th>
<th>Normal K = 3.5 to &lt;5.1</th>
<th>Minimal elevation K = 5.1 to 5.4</th>
<th>Marked elevation K &gt; 5.4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kayexalate</td>
<td>-</td>
<td>1%</td>
<td>1.3%</td>
<td>25.1%</td>
</tr>
<tr>
<td>Salbutamol</td>
<td>1.7%</td>
<td>2.5%</td>
<td>3.8%</td>
<td>9.7%</td>
</tr>
<tr>
<td>Na bicarbonate</td>
<td>0.2%</td>
<td>0.2%</td>
<td>1.3%</td>
<td>14.6%</td>
</tr>
<tr>
<td>Insulin</td>
<td>2.2%</td>
<td>1.3%</td>
<td>5.8%</td>
<td>30.6%</td>
</tr>
<tr>
<td>Calcium</td>
<td>-</td>
<td>-</td>
<td>0.3%</td>
<td>10.4%</td>
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<tr>
<th>Outcomes</th>
<th>Inpatient admissions: aOR (95% CI)</th>
<th>Mortality: aOR (95% CI)</th>
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<tbody>
<tr>
<td></td>
<td>1.5 (1.4-1.6)</td>
<td>2.5 (1.7-3.5)</td>
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</table>
**Study Objectives:** Clinical literature suggests blood drawn from intraosseous (IO) catheters show blood count and some chemistry values closely mirror venous samples. Other IO values approximate venous values; some will not correlate. Certain point-of-care (POC) analyzers have yielded acceptable results. However, most reported data was based on IO specimens obtained prior to any infusions or flush. This pilot study had 2 objectives: determine how long infusion must be stopped before drawing an IO specimen for analysis; and to determine if there is a difference between IO specimen results when the first 2 mL of IO blood were wasted and not wasted.

Methods: IACUC approval was obtained. A CVC and multiple IO catheters were placed in the proximal humeri (PH), tibial and femoral bones of two swine. An i-STAT Handheld analyzer and Chem 8+ cartridges (Abbott Laboratories) were used to obtain lab results for the following analytes: sodium (Na), urea nitrogen (BUN)/urea, potassium (K), creatinine (Crea), chloride (Cl), hematocrit (Hct), calculated hemoglobin (Hgb), ionized calcium (iCa), TCO2, glucose (Glu), Anion Gap (AnGap). Specimens were injected into green top laboratory tubes (lithium heparin) then withdrawn for analysis. Time of specimen collection, analysis and results were noted. For the IO waste study, an initial 2 mL sample was aspirated by syringe; then a subsequent 2 mL sample was collected. Ten matched pairs were collected. In the post infusion wait time study, the initial IO 2 mL draw and the CVC catheter priming volume were discarded before specimen collection. After baseline, IO sites and the CVC were infused with 0.9% sodium chloride at 125 mL/hr. Infusion time was 5 minutes with start and stop times synchronized at all sites. The initial post infusion wait period was 5 minutes. Time intervals were reduced and results compared to baseline were noted to be similar with as little as 1 minute wait time post-infusion. A target wait of 2 minutes was chosen to stay similar to wait time recommendations in IV lab studies. Thirty-two (32) pairs of IO and CVC results were obtained.

Results: IO and CVC specimens collected 2 minutes after stopping the infusion were clinically similar for all analytes. The difference between IO and CVC results for Na, K, Hct and Hgb was statistically significant, but not considered clinically significant. The greatest difference between specimens was found with Glu 53.28 ± 4.99 (IO) vs 56.91 ± 3.29 (CVC). For the comparison of the initial IO sample vs. post 2 mL waste, results for most parameters were near identical. Two initial aspirates could not be analyzed for K, Glu, and AnGap. One result for K was 8% higher in the initial vs. subsequent sample (6.6 vs 5.3 mmol/L).

Conclusions: When IO vascular access is necessary and POC samples are requested, the initial specimen drawn from the IO catheter for Chem 8+ lab analysis may be considered for sampling. If Chem 8+ values are needed, and requested, the initial specimen drawn from the IO catheter for Chem 8+ lab is more accurate with a wait time of 2 minutes post-stopping the infusion. A wait time of 2 minutes was chosen to stay similar to wait time recommendations. A target wait of 2 minutes was found with a wait of 1 minute wait time post-infusion. A 2 minute wait time was chosen to stay similar to wait time recommendations in IV lab studies. Thirty-two (32) pairs of IO and CVC results were obtained.

Study Objectives: Patients with chronic alcoholism often burden emergency departments (ED) with repeated visits and long lengths of stay. Yet few require lifesaving interventions and most are eventually discharged from the ED. Several U.S. cities are developing alternatives to ED transport called sobering centers, where patients with apparent uncomplicated alcohol intoxication can sober and access outpatient resources without occupying an ED bed. These patients must first pass criteria composed of vital signs, physical exam, and provider gestalt, but no study has compared the various individual components to determine which are the most specific and sensitive. The purpose of this study is to conduct a sensitivity analysis of the component questions of three published screens designed to triage patients with uncomplicated alcohol intoxication to a sobering center.

<table>
<thead>
<tr>
<th>Table 1: Test characteristics of the best-performing components of three criteria used by out-of-hospital providers to triage patients with apparent uncomplicated alcohol intoxication to a sobering center</th>
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<tbody>
<tr>
<td><strong>Screen Component</strong></td>
</tr>
<tr>
<td>Physical Exam</td>
</tr>
<tr>
<td>Walk with support?</td>
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<tr>
<td>Can they stand?</td>
</tr>
<tr>
<td>Glasgow Coma Scale &gt; 10?</td>
</tr>
<tr>
<td>Clinician Gestalt</td>
</tr>
<tr>
<td>Do they appear ill?</td>
</tr>
<tr>
<td>Do they have findings of concern?</td>
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<tr>
<td>Vital Signs</td>
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</table>
Methods: Prospective observational cohort study of patients presenting to three EDs (one academic and two community sites) with acute alcohol intoxication between November 2016 and March 2017. We collected information using screens developed in San Francisco, CA; Providence, RI; and Baltimore, MD. The triaging provider was interviewed in real time to obtain their assessment of the patient ("When you first assessed the patient, did you think they needed treatment in ED?", "Do they appear to be ill?, "Do they have any findings of concern?" and the patient’s physical exam (Glasgow Coma Scale [GCS] on arrival, signs of trauma/head injury/environmental emergency). We followed up a day later in the electronic medical record to obtain vital signs, test results, and the patient’s final disposition (admission vs discharge and elopement, our “gold standard”). We calculated the sensitivity, specificity, area under the receiver operating curve (AUCOR), and positive (LR+) and negative likelihood ratios (LR-) for each component. We then re-calculated these test characteristics using the best combination of factors.

Results: 199 subjects were enrolled. 90.6% were male and had a mean age of 50.1 ± 11.4 years. The average blood alcohol concentration was 288.8 ± 159.2 mg/dL. The best-performing vital sign was “50<Heart rate [HR]<110,” which was specific (88.41%) but insensitive (29.17%) (Table 1). Clinician gestalt was insensitive (36.4%-63.6%) and specific (67.6%-89.0%). GCS <10 was sensitive (95.2%) but non-specific (10.3%). The best combination of features was “GCS<10,” “50<HR<110,” “Do they have any findings of concern?” and “Does the patient need to be treated in the ED?” (79.2% sensitive, 59.4% specific, AUCOR=0.69, LR+=2.0, LR-=0.4).

Conclusions: No single feature had sufficient sensitivity or specificity to guide the appropriate triage of patients with apparently uncomplicated alcohol intoxication. A combination of the best-performing features had an intermediate ability to predict patient disposition.

65 Repairing the Stroke Chain of Survival: Exploring Missed Opportunities for EMS Prenotification
Nüsbaum JD, Gupta N, Glucksman A, Redneer M, Munjal K/Mount Sinai Hospital, New York, NY; Touro College, New York, NY; Mount Sinai St. Lukes, New York, NY

Study Objectives: To determine rates of prenotification in a large urban hospital setting among patients suspected by EMS of having had an acute stroke (CVA) and to determine factors associated with appropriate prenotification in this same population.

Methods: This was a retrospective cohort study of all patients with a discharge diagnosis of CVA, TIA, or Intracranial hemorrhage who arrived by EMS between Jan 1 and Dec 31st, 2015 at three large urban hospitals. Patients transferred from another acute care facility were excluded. Get With The Guidelines (GWGT) hospital data was matched to extracted EMS data, including out-of-hospital provider impression and out-of-hospital notification from the out-of-hospital care reports. Appropriate out-of-hospital notification was defined by any reference in the EMS narrative or hospital nursing and physician notes to advanced hospital notification of the patient’s arrival. Logistic regressions were used to determine factors, which may have been important for EMS prenotification and whether EMS prenotification was associated with higher rates of tPA administration. Analysis was done using the R statistical computing software.

Results: 379 patients presented acutely via EMS during the selected period. 126 presented within 3.5 hours of their LKN. EMS suspected CVAs in 107 (85%) of these patients. Appropriate prenotification was given in only 52 of the 107 patients (49%). Shorter EMS LKN times were associated with increased rates of prenotification (p<0.01). Prenotification was also more likely for patients who were found to have higher NIHSS (p=0.01). For the individual elements of the Cincinnati Prehospital Stroke Scale (CPSS), prenotification was 24% higher in cases where EMS identified slurred speech (p=0.01), 24% higher when arm drift was identified (p=0.01), and 29% higher for facial droop (p=0.04). In a multivariate logistic regression including the three components of the Cincinnati Prehospital Stroke Scale, slurred speech was found to be the most influential factor for prenotification (p=0.09), followed by arm drift (p=0.14), and facial droop (p=0.56). If a patient arrived after appropriate prenotification, there was a 17% increase in likelihood of receiving tPA (p=0.06).

Conclusions: Despite identifying acute CVA within the eligibility window for tPA, out-of-hospital providers are not consistently providing prenotification to emergency departments prior to arrival. In our cohort, out-of-hospital personnel prenotified the emergency department in patients with more severe and more acute onset symptoms. Given the body of literature suggesting improved metrics with prenotification, in addition to our data which similarly suggest that prenotification was associated with higher rates of tPA administration, this analysis suggests that there may be a benefit to dedicating further resources towards EMS education on the role prenotification plays in the stroke chain of survival.

66 Out-of-Hospital Large Vessel Occlusions
Branzler ES, Perez K, Rhode H/SUNY Stony Brook Medicine, Stony Brook, NY

Study Objectives: Multiple new studies have shown that for many patients with larger strokes, endovascular therapy significantly improves patient outcomes and is now clinically indicated. Since not all primary stroke centers are capable of delivering endovascular care, emergency medical services are now tasked with routing such patients who have large vessel occlusions to facilities capable of delivering such therapies. There are clinical implications and emergency medical system level issues to a decision to bypass a local primary stroke center in favor of transport to an endovascular capable center. In response to these issues, a multitude of out-of-hospital scales have been postulated, but few have been prospectively validated by paramedics. We sought to describe the utility of the Los Angeles Motor Score (LAMS) and of other physical findings for predicting the presence of a large vessel occlusion in a population of stroke code patients examined by paramedics and EMTs.

Methods: We performed an interim analysis of a convenience sample of stroke code patients presenting to a tertiary care center ED. Paramedics examined patients using the LAMS in a structured fashion. Without any specific additional training, paramedics were also asked to assess for problems including leg weakness, visual disturbances, altered level of consciousness, and language abnormalities (dysarthria, dysphasia, aphasia). We then calculated sensitivity and specificity of a LAMS score of ≥ 4 and performed a stepwise logistical regression on the other potential physical exam elements that might predict large vessel occlusion.

Results: A total of 270 subjects mean age 70 (±SD 14) 52% female were examined by paramedics and enrolled. One hundred nineteen subjects (44%) had a stroke, and of these 60 (22%) were identified to have a large vessel occlusion by various angiographic methods. A LAMS ≥ 4 identified stroke and large vessel occlusions with a sensitivity of 29% and 38% and specificity of 95% and 90%, respectively. When a LAMS of 3 with aphasia was recorded, sensitivity improved to 37% and 48% for stroke and LVO, respectively. None of the patient under the age of forty had a stroke.

Conclusions: When performed by paramedics and EMTs in an enriched stroke code population, the LAMS score can be used to identify Large Vessel Occlusions with high specificity. The addition of aphasia identified cases missed by LAMS score alone while improving positive predictive value. More data are required to identify the utility of other findings in the prediction of large vessel occlusion. We plan to enroll 500 subjects in the ultimate analysis of this question and expect that language and gaze may add to the specificity of LAMS in determining large vessel occlusion. The overall poor sensitivity of all stroke scales for stroke in general is unlikely to change.

67 Variations in Cardiac Arrest Regionalization in California
Chang B, Mercer M, Boisson N, Speror K/UCSI, San Francisco, CA; Harbor-UCLA Medical Center, Los Angeles, CA

Study Objectives: The development of cardiac arrest centers and regionalization may improve survival of patients with out-of-hospital cardiac arrest (OHCA). This survey of the Local EMS Agencies (LEMSA) in California was intended to determine current practices regarding the treatment and routing of OHCA patients and the extent to which EMS systems have regionalized OHCA care across California.

Methods: We surveyed all of the 33 LEMSAs in California regarding the treatment and routing of OHCA patients according to the current recommendations for OHCA management.
Results: Two counties, representing 29% of the California population, have formally regionalized cardiac arrest care within their systems. Twenty of the remaining LEMSA have specific regionalization protocols to direct all OHCA patients to ROSC to designated PCI-capable hospitals, representing another 36% of the population. There is large variation in LEMSA ability to influence in-hospital care. Only 14 agencies (36%), representing 44% of the population, have access to hospital outcome data, including survival to hospital discharge and cerebral performance category (CPC) scores.

Conclusions: Regionalized care of OHCA is established in 2 of 33 California LEMSA, providing access to approximately one-third of California residents. Many other LEMSA direct OHCA patients to PCI-capable hospitals for primary PCI and targeted temperature management, but there is limited regional coordination and system quality improvement. Only one-third of LEMSA have access to hospital data for patient outcomes.

An Urban Fire Department’s Experience With Left Ventricular Assist Devices

Goebel M, Donofrio J, Serra J, Kahan C, Dunford J/UC San Diego, San Diego, CA

Methods: This is a retrospective chart review of a level 1 academic center’s LVAD patients transported by the city fire agency to the academic center’s emergency department (ED) from January 2012 to December 2015. We sought to describe the frequency, 911 chief complaint, and interventions provided by the city fire agency. Medical records were queried for LVAD patients presenting to the ED during the study period. We extracted patient demographics (date of birth, sex, race, gender) and the list was then queried against the fire agency’s database to collect the out-of-hospital visits. Chief complaint, vital signs, abnormal physical exam findings, and interventions provided were obtained from the out-of-hospital database.

Results: During the study period, 95 LVAD patients presented to the academic university ED. Of these visits, ten were brought in by the fire agency. Of the ten patients, the most common chief complaint was weakness (5/10) followed by chest pain (2/10). In the patients with weakness, one patient had a battery change, another had a stroke scale performed, and all five had their glucose measured. Only 3/5 patients with weakness were documented to have a known LVAD in place. Of note, there was one patient whom the out-of-hospital providers were unaware of the LVAD, who had shortness of breath and was found to be diaphoretic, had diminished lung sounds, and chest pain. This patient was given continuous positive airway pressure, nitroglycerin and aspirin per chest pain protocol. Another patient, with a known LVAD, received Lidocaine for a pacemaker firing issue. The crew was aware of the LVAD in 6/10 patients and the coordinator was contacted with all 6 patients.

Conclusions: Most LVAD patients presenting to the emergency department do not present by ambulance. Of patients that do interact with out-of-hospital providers, the most common presenting symptom is weakness followed by chest pain. Given the LVAD requires coordination and consideration, a focus on how to improve out-of-hospital awareness of LVADs is key. Further research in this area is needed.

Use of 911 for Rapid Re-Triage of Critical Trauma Patients

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Study Objectives: To describe results of a 911 trauma re-triage pilot protocol for rapid transfer of trauma patients from a community hospital to a Trauma Center.

Methods: In August 2015 a community hospital opened in an area with high trauma volume. In anticipation of walk-in trauma patients, the local EMS Agency established a protocol for 911 re-triage to the closest Trauma Center. Criteria for trauma re-triage, shown in the table, were adopted from results of a State EMS workgroup, with input from local experts in EMS and trauma. An educational module, along with the criteria and implementation steps, were distributed to the emergency department personnel. Data on trauma patients transferred from the community hospital for the first 10 months of the program were abstracted from the regional trauma database. Descriptive statistics were calculated with median and inter-quartile range (IQR) or frequencies as appropriate. In addition, two independent investigators reviewed the EMS data to determine if the 911 re-triage criteria were met and if the investigator agreed with the decision to utilize 911 for transport. In the case of disagreement, a third investigator reviewed the case.

Results: During the study period, 32 patients were transferred via 911 re-triage to the Trauma Center, of whom 25 (78%) were male, 39% Black, 45% Hispanic, 3% White, and 13% other or undocumented race/ethnicity. The median age was 31 years (IQR 24-45). Twenty-one (66%) had a penetrating mechanism of injury. Median ISS was 4 (IQR 1-10). The median 911 provider response time was 4 minutes (IQR 2-5) and transport time 7 minutes (IQR 6-9). Seventeen patients (53%) met 911 trauma re-triage criteria as reviewed by study investigators. The most common criteria met, in 14 patients, was ‘penetrating injury to the head, neck or torso.’ Two patients, by investigator judgment, met the criteria ‘high likelihood of requiring emergent life- or limb-saving intervention within two hours,’ both had a gunshot wound to the buttock. ‘Intubation required’ and ‘extremity injury with neurovascular compromise’ were present in 1 patient each. Twenty-seven patients (84%) would have met EMS trauma triage criteria for primary transport to a Trauma Center. Overall, 22 (69%) patients were admitted to the Trauma Center, including 7 to the operating room and 4 to the intensive care unit. Three patients required packed red blood cell transfusion. All patients survived to hospital discharge.

Conclusions: 911 trauma re-triage resulted in rapid transfer of patients from the community hospital to the Trauma Center. Fifty-three percent of patients transferred met the criteria.

Multicenter Trial of Rivaroxaban for Early Discharge of Pulmonary Embolism from the Emergency Department

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Study Objectives: Hospitalization after an ED diagnosis of a pulmonary embolism (PE) is common, expensive, and of questionable clinical benefit in low-risk patients. Our purpose was to determine if low-risk PE patients, discharged home from the ED on rivaroxaban, have a different total number of hospital days through day 30 vs standard of care (SOC).

Methods: This was a multicenter, prospective, open label, randomized clinical trial of patients ≥18 years of age with an ED diagnosis of low risk PE (defined by HESTIA criteria). After consent subjects were randomized by a central computer to SOC, which was determined by the ED attending, or ED discharge on rivaroxaban, and followed for 90 days. Our primary outcome was the total number of initial hospital days, plus days of hospitalization related to bleeding or VTE, during the 30 days after a low risk PE diagnosis in patients discharged on rivaroxaban vs SOC. A 90-day composite safety endpoint was defined as International Society of Thrombosis and Hemostasis (ISTH) major bleeding, clinically relevant non-major bleeding, and mortality. Cohorts were compared using descriptive statistics and 95% confidence intervals for mean differences.

Results: We randomized 114 subjects, 51 to rivaroxaban and 63 SOC. Most were white (67.5%), female (51.8%), with a median (IQR) age of 50 (36, 61) yrs.
Of 112 (98.2%) receiving at least 1 dose of study drug, 99 (86.8%) completed the study. There were 15 (13.2%) discontinuations; 7 (6.1%) lost to follow-up, 4 (3.5%) adverse events, and 2 (1.8%) consent withdrawal. Median (IQR) therapy duration was 91 (89, 94), and 89 (85, 93) days for rivaroxaban vs SOC. The intent to treat primary endpoint was 4.6 hours for rivaroxaban vs 33.4 hours for SOC (mean difference -1.20 days, 95% CI -1.77, -0.630). Mean total hospital days (for any reason) at 90 days after randomization were significantly shorter for rivaroxaban than SOC: 0.8 vs. 1.8 days (mean difference between groups was -0.8 days; 95% CI: -0.963, -0.605). At 90 days follow-up there were no ISTH bleeding events, recurrent VTE, or deaths. Unplanned VTE and bleeding related hospital or doctor visits within 90 days were numerically lower with rivaroxaban; 2 (3.9%) vs. 4 (6.3%); difference in proportions -0.02 (95% CI: -0.21 to 0.16). The composite safety endpoint was similar in both groups; difference in proportions 0.005 (95% CI: -0.181 to 0.191). There were numerically more adverse events (AEs) with rivaroxaban than SOC, 59.2% vs. 39.7%, however, the overall rate of serious AEs, AEs leading to hospitalization, and AEs leading to study drug discontinuation were similar between cohorts (p>0.05).

Conclusions: In this prospective, open label, randomized standard-therapy controlled trial, low risk ED PE patients discharged on rivaroxaban had similar outcomes as SOC but spent fewer total days in the hospital in the month following their ED discharge.

71 PERC Rule to Exclude the Diagnosis of Pulmonary Embolism in Low-Risk Emergency Patients: A Noninferiority Randomized Controlled Trial


Study Objectives: As physicians may fear missing a pulmonary embolism (PE), some reports suggest that this diagnosis may be over-investigated, if not over-diagnosed, in emergency departments (ED). The Pulmonary Embolism Rule-out Criteria (PERC), an 8-item block of clinical criteria, has been derived and validated to select patients that should not undergo any investigation for PE. However, this rule has never been prospectively validated in an interventional study, and controversies on its safety limit its application in Europe. We tested the hypothesis that among patients with a low clinical probability of PE and a PERC score of zero, PE can be safely ruled out.

Methods: This was a cluster cross-over noninferiority randomized controlled trial (N=14 centers) in France. Each center was randomized for the study period: six months control period (routine care) followed by six months intervention period (PERC-based strategy), or in reverse. The two periods were separated by a two month wash-out period. We included all adult patients with a suspicion of PE and low gestalt clinical probability. In the intervention period, if the PERC score was zero, PE was ruled out with no other test. During routine care, all included patients underwent D-dimer testing. The primary outcome was the percentage of failure resulting from each diagnostic strategy, defined as venous thromboembolic events diagnosed at three-month follow-up among patients for whom PE was initially ruled out. Secondary endpoints included computed tomography of pulmonary artery (CTPA) performed, time spent in the ED, and initiation of anticoagulation therapy.

The delta was fixed at 1.5%, power at 80%, one-sided alpha at 5% and a cluster design effect at 1.12; therefore, we needed to recruit 1920 patients.

Results: We screened 3,158 potentially eligible studies. We included 14 studies representing 71,234 patients. There were 50 candidate predictors of adverse outcomes reported in these studies. The Figure illustrates univariate odds ratios for the 30 candidate predictors that were reported by at least two papers. The top five risk factors included advanced age, abnormal ECG, a prior history of congestive heart failure, myocardial infarction, or arrhythmia.

Conclusions: We establish baseline effect estimates for a large number of potential risk predictors. We intend to use these estimates to inform "priori" in the development of a novel Bayesian risk prediction model.
Clinical Suspicion and D-Dimer Levels in Venous Thromboembolism Patients With Low and High Clot Burden

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Study Objectives: There is growing evidence that venous thromboembolism (VTE) patients with low clot burden (distal calf deep vein thrombosis [DVT] and subsegmental pulmonary embolism [PE]) may not routinely require anticoagulation. We compared the clinical suspicion and D-dimer levels in VTE patients with low and high clot burden.

Methods: We conducted a multinational, prospective observational study of adult patients presenting to the emergency department (ED) with suspected VTE. Structured collection of demographic and clinical data was performed and D-dimer levels were obtained. Use of advanced imaging (ultrasound or CT angiography) was at the discretion of the treating physicians. Patients were classified as low (calf DVT or subsegmental PE) or high (proximal DVT or non-subsegmental PE) clot burden and groups were compared with univariate and multivariate analyses.

Results: Of 1,752 patients with suspected DVT, 1,561 (94.2%) had no DVT, 78 (4.4%) had a calf DVT, and 113 (6.4%) had a proximal DVT. DVT patients with a high clot burden were more commonly male (62% vs. 49%: OR 1.85 [95% CI, 1.33-2.59]), were more likely to have a high clinical suspicion of DVT (81 vs. 67%; OR 1.82 [95% CI, 1.02-3.24]) and had higher D-dimer levels (3760 vs. 1670; OR 0.83 [95% CI, 0.75-0.92]) than patients with low clot burden. Of 1,834 patients with suspected PE, 1,726 (94.1%) had no PE, 7 (0.4%) had isolated subsegmental PE, and 101 (5.5%) had non-subsegmental PE. PE patients with high clot burden were younger (47 vs 67 years; OR 0.97 [95% CI, 0.96-0.99]), were more likely to have a likely Wells score ≥4 (47 vs. 14%, OR 4.82 [95% CI, 3.03-7.67]), and had higher D-dimer levels (4,170 vs. 2,520), OR 0.77 [95% CI, 0.72-0.82] than PE patients with low clot burden.

Conclusions: VTE patients with high clot burden were more likely to have a high clinical suspicion for VTE than patients with low clot burden. Overall incidence of isolated subsegmental PE is low.

Astaxanthin Pretreatment Attenuates Burn Induced Heart Injury in Rats

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Study Objectives: Major burn injury results in impairment of left ventricular contractile function. There is convincing evidence to support the acute oxidative stress is involved in the development of burn-related contractile dysfunction. Astaxanthin (ASX) is the strongest antioxidant in nature that shows preventive and therapeutic properties. The aim of present study was to determine whether ASX pretreatment provides protection against burn-induced heart contraction failure.

Methods: Male Wistar rats were randomly divided into four groups, including sham burn, sham burn + ASX, burn and burn + ASX groups. 30 mg/kg/day of ASX were administered for seven days. The burn and burn + ASX groups were given 40% of total body surface area thermal injury under general anesthesia. The animals were sacrificed to evaluate the left ventricular contractility at 24 hours post-burn. The heart was removed and cannulated to perfuse in a retrograde fashion via the aorta by Langendorff method. The myocardial contractility was measured with a latex balloon inserted into the left ventricle. The contractility index was calculated as the difference between the systolic and end-diastolic pressures as dP/dT.

Results: The dP/dT was measured 80 cm of perfusion pressure, and the heart rate was set at 300 beats per minute with an electronic stimulator. The left ventricle max dP/dT was significantly decreased in the burn group compared to those in the sham burn and sham burn + ASX groups (1684 ± 913 mmHg/s vs. 3580 ± 670, 3330 ± 735, respectively, p < 0.01). The dP/dT of the burn + ASX group (2727 ± 746 mmHg/s) was significantly higher than that of the burn group (p < 0.05).

Conclusions: The ASX pretreatment provided better cardiac protection against the burn injury, as evidenced by the improved myocardial contractility.
Patterns of Emergency Department High Utilizers at Grady Memorial Hospital
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Study Objectives: High utilizers of emergency care represent an area of unmet need and can be a financial burden on the health care system. We aimed to identify emergency department (ED) high utilizers at Grady and determine the relationship between high utilizer patients and total visits. Previous studies have identified predictive factors associated with ED high utilizers at a specific setting. The demographics and clinical features of Grady high utilizers are also described.

Methods: This retrospective study examined the electronic medical records of 216,522 patients with a total of 492,766 (ED) visits at Grady Hospital from November 2010 to March 2015. High utilizers were defined as patients with at least six ED visits in one year during the study period. Patient characteristics, diagnostic information, and ED operational measures were also examined. Data analysis was performed using descriptive statistics, chi-square tests, and independent samples t-tests.

Results: In this study, 2.6% of patients were high utilizers accounting for 25% of all visits. Of high utilizers, 69% were only high utilizers during one of the six calendar years included in the study period. High utilizers were more likely to be male (67% vs. 53%, p < 0.0001) and older than non-high utilizers (48.0 vs. 41.5, p<0.0001). Sickle cell disease, substance abuse, chronic disease and mental health conditions were more frequent diagnoses in high-utilizer ED visits. The rate of leaving without being seen was significantly higher in the high utilizer group (21.3% vs. 11.2%, p<0.0001).

Conclusions: A small percentage (2.6%) of high utilizers made up one quarter of ED visits at Grady during the study period. These patients have a higher frequency of certain diagnoses than their non-high utilizer counterparts and tend to have transient patterns of high utilization. Further study is warranted to better understand and meet the unique needs of these patients.
definition, these patients have a high number of potentially avoidable ED visits and hospitalizations. Increased visits are associated with increased cost, increased morbidity and mortality, and pose significant quality and safety concerns (ex: hospital acquired infections, increased ionizing radiation secondary to recurrent imaging, etc.). We sought to reduce variation in the care of this patient population across multiple EDs in our health system. Our objective was to determine whether implementation of individualized care plans for high utilizers reduced ED visits, admissions, and costs.

Methods: In our operational pilot, ED physicians at seven sites (six community, one academic with annual ED volumes ranging from 29,000 to 79,000) identified patients with frequent visits, many of whom had subsequent hospitalization, for entry into the Individualized Care Plan (ICP) project. Most patients had >6 ED visits in the prior year and many were opioid dependent secondary to chronic pain. All potential patients were reviewed by an interdisciplinary team at each site comprised of emergency physicians, hospitalists, subspecialist when necessary, and either a social worker or care coordinator that met twice per month. Generally, 2-3 ICPs were developed per session. Each ICP included the following components: Reason for ICP, Common Complaints & Prior Evaluations, ICP Committee Recommendations, and Community Social Support Plan (as needed). The final product was published in the electronic medical record (EMR). A Best Practice Advisory alerted the provider to the existence of an ICP on initial opening of the chart. Outcomes data for each patient included ED visits, inpatient hospital days, and costs for six months pre-ICP creation and six months post-ICP creation.

Results: ICPs were created for 145 patients. ED visits decreased from 1,713 to 965. Inpatient hospital days were reduced from 1,432 to 691. Admitted patients had a 43% reduction in both direct and indirect costs; discharged patients had a reduction of 45% direct and 50% indirect costs. The post-ICP, six month cost reduction totaled $1,628,875.

Conclusions: Creation of individualized care plans (ICPs) for high-utilizer patients reduced ED visits, inpatient hospital days, and costs for six months pre-ICP creation and six months post-ICP creation.

81 The Effect of Compulsory Provider HEART Score Calculation on Chest Pain Patients Sent to Observation Units
Osborne AD, Rutz D, Ross M, Bodie C, Johnson R, Wheeless M/Emory University, Atlanta, GA

Study Objectives: The HEART Score provides an objective way to risk stratify patients with suspected ACS. There is an abundance of data showing that low risk patients (scores 3 and under) are not only at very low risk for future events, but also, would not benefit from further testing in the emergency department and/or observation unit. Despite this information, many providers place patients in observation units for non-invasive testing, and there is sparse data describing interventions to bridge this knowledge gap or reform this practice.

The objective of this study is to describe patient populations with low-risk chest pain with and without compulsory computer assisted risk score stratification.

Methods: Our practice group staffs several EDs in metro Atlanta. In three academic hospitals with visits totaling approximately 132,000 visits annually, providers are shown a mandatory form for calculation of the HEART score in the electronic medical record prior to completing transfer to the observation unit for chest pain patients. In a fourth institution, the primary teaching academic site with approximately 125,000 visits, providers DO NOT have this question asked or suggested by the computer interface. Additionally, in the institutions with compulsory calculation, there were email communications explaining the data and reasoning behind this initiative. We performed a retrospective chart review of consecutive patients over the dates of 1/1/15 - 3/31/15 (usual care site) and 1/1/16 - 3/1/16 (compulsory testing sites) who were sent to the observation unit on a chest pain pathway following their emergency department evaluation. For the hospital without compulsory calculation, HEART score was obtained by individual chart review. Outcomes of discharge, revascularization, and diagnosis other than MI for all encounters were also obtained by chart review.

Results: Overall, there were 1269 cases. The overwhelming majority of patients were discharged (see Table 1) following a negative stress test. Only 4 patients over the entire study periods had revascularization of any type. HEART scores for the usual care site and compulsory calculation group were not statistically significant, 3.6 and 3.5 respectively. Also, at the sites where testing was compulsory, there were slightly more low risk patients placed in the observation unit for further testing.

Conclusions: As previous studies have shown, it is not beneficial in the emergency department to order additional testing for coronary artery disease in patients presenting with low risk chest pain. In nearly all cases, this testing did not change the plan of care. However, the compulsory objectification of the patient’s risk did not cause providers, as a group, to significantly alter who obtains this further testing. This suggests that additional measures may be necessary to address this knowledge gap or that providers use criteria outside of HEART score data points in determining who should obtain further testing.

Table 1. Patients in each group

<table>
<thead>
<tr>
<th></th>
<th>UC High Risk Outcomes</th>
<th>UC Low Risk Outcomes</th>
<th>CC High Risk Outcomes</th>
<th>CC Low Risk Outcomes</th>
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<td>Discharge</td>
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<td>3</td>
<td>0</td>
</tr>
<tr>
<td>Revascularization</td>
<td>0</td>
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UC = Usual Care; CC = Compulsory Care
The "Gold Card": A Novel Discharge Process to Guarantee Timely Specialist Follow-Up


Study Objectives: Within the current climate of ED crowding, hospitals are continually experimenting with new ways to streamline patient throughput. One option to prevent crowding is early discharge of patients whose specialist evaluation could safely be provided in the outpatient setting. However, reluctance on the part of the patient, the specialist, and emergency physician to discharge patients without confirmed follow-up leads to increased observation and admission of certain patient groups. At our institution, we noted that a significant number of patients were waiting on both the inpatient floor and the ED observation unit for specialty consultations, which could have been done in the outpatient setting were follow-up guaranteed. Our objective was to determine if initiating a novel 'gold card' program, where patients were guaranteed follow-up with a group of participating specialists within two business days would be feasible in the community hospital setting.

Methods: From August 2016 to March 2017, we conducted a prospective observational study of all discharged ED patients who participated in the 'gold card' program. This study was performed through a community hospital ED with 98,324 annual visits. All adult (age > 18) patients who were deemed by the treating emergency physician as candidates for a 'gold card' were screened by a care coordinator to confirm insurance eligibility and provided a 'gold card.' This 'gold card' guaranteed an appointment with the selected specialist within two business days. All patients who participated in the program were contacted to evaluate the feasibility of the process. Our primary outcome measure was the number of 'gold card' recipients who completed an appointment within two business days of discharge. Our secondary outcomes included: 1) patient satisfaction with the process; 2) reasons for not completing a gold card appointment, and 3) an analysis of utilized specialists. The data was analyzed using descriptive statistics.

Results: From August 2016 through March 2017, there were 65,912 visits to our ED. 42,886 (65%) of these patients were discharged home, 17,202 (26%) were admitted, and 5,824 (9%) were sent to ED observation. Of the total ED discharges during this period, 1,508 patients (3.5%) received a gold card. Within that cohort, 119 patients (7.8%) chose not to go to the appointment: 86 (72%) canceled and 33 (28%) no showed. Of the 1,389 remaining gold card patients, 1,009 patients (74%), demonstrating an average monthly patient satisfaction rate of 98.7% with the program, alongside increasing observational study of all discharged ED patients who participated in the 82 gold card use (See Figure 1).

Conclusions: The 'gold card' program represents a feasible option to provide urgent specialty appointments for select patients who otherwise would remain in the hospital to see their consultants.

Gender at the Head of the Bed: Does Gender Bias Exist in the Evaluation of Emergency Medicine Residents’ Leadership Skills During Medical Resuscitations?

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Study Objectives: One of the most challenging skill sets emergency medicine (EM) residents must develop during training is to become competent team leaders (TL) during critical medical resuscitations. Although medical knowledge and technical skills are required to be an effective TL, non-technical skills including leadership, communication, and teamwork behavior are also crucial. Research exists that suggests that implicit gender bias may impact the evaluation of female residents, especially in agentic specialties such as EM. The purpose of this is to see if gender bias exists in the way that EM residents are evaluated by EM nurses and faculty in their role as TL during medical resuscitations.

Methods: Two of the principle investigators (LW, DC) reviewed twenty videotaped medical resuscitations and from these chose four (two with female residents as TL and two with males) as well run resuscitations. They then individually rated these videos using a previously validated score sheet for leadership skills during resuscitations. When the two investigators ratings for the videos were compared, there was very good inter-rater agreement with a kappas > 0.72. These videos were then observed by groups of EM nurses and attending physicians. These observers were asked to the same scoring sheet and were also asked to circle adjectives that they felt described the TL. Observers were blinded to the purpose of the study. Data from the score sheets was entered into Excel by one investigator (LW). Both qualitative and quantitative analysis were performed on the data.

Results: The video resuscitations performed by female EM residents were seen by 83 EM nurses and faculty whereas the resuscitations performed by male EM residents were watched by 94. There was no significant difference in how the male and female residents were rated as TLs (2.25 versus 2.38, p=0.75). However, interesting trends appeared when analyzing the adjectives used to describe the residents. Male and female residents were equally likely to be called authoritative, self-confident, and assertive. Female residents, however, were more likely to be identified as active and collaborative. Only male residents were described as cold and only female residents were described as impatient.

Conclusions: Female and male EM residents were viewed as being equally effective as leaders in this study. They were both seen to have important behaviors of leaders including self-confidence and assertiveness but female residents were more likely to be described as active and collaborative.

Medical Student Response to Improvisation and Acting Training: Novel Curriculum Pilot Study

Del Vecchio A, Pfennig C, Moschella P/University of South Carolina School of Medicine Greenville, Greenville, SC; Greenville Health System, Greenville, SC

Study Objectives: An increasing number of the nation’s leading medical schools, such as Columbia, Cornell, and Stanford, are integrating humanities training into their curriculum. Based on studies that have demonstrated that engaging in artistic activities enhances physicians’ communication skills and empathy and decreases burnout, Harvard Medical School launched an Arts and Humanities program this past June. At the Johns Hopkins University School of Medicine, medical students trained in improvisation techniques stated they felt it improved their communication skills. Student often respond well to these additions feeling that these experiences could make them into better physicians. The purpose of this study was to conduct a pilot acting workshop for medical students and assess their interest in seeing this training integrated into the interprofessional and clinical skills curriculum at the University of South Carolina School of Medicine Greenville.

Methods: A 50-minute Interprofessional Practice of Medicine lecture including 2 interactive acting workshops was offered to all first-year medical students. The lecture and interactive active workshop focused on developing various skills including communication, trust, active listening, and comfort with ambiguity. At the conclusion of the session, time was set aside to seek both informal oral and formal written student feedback. An online survey was distributed consisting of 7 questions that sought to evaluate the success of the session and to seek student interest in additional acting training.
Results: Out of a class of 102 first-year medical students, 50 students voluntarily attended the lecture/workshop (49% participation rate). Of these 50, 12 responded to the post-session online survey (24% response rate). Using a standard Likert 1-5 scale ("Strongly disagree" to "Strongly agree"), the survey looked to assess the success of the workshops in increasing various skills. Overall, 33% strongly agreed that the workshop helped improve their ability to deal with ambiguous situations, 67% felt the workshop helped increase their self-awareness, and 75% affirmed they wanted to see more hands-on, active-learning, and team-based acting exercises in the interprofessional and clinical skills curriculum. Additionally, 58% expressed interest in continuing training to perhaps become standardized patients.

Conclusions: A majority of student respondents to the survey felt that the workshop increased several key skills and want to see more active-learning and team-based acting exercises integrated in the current curriculum. These sessions may provide a novel method to expand learning into a new venue for training in many key ACGME competencies necessary for successful practicing physicians. Our next steps involve integrating the informal and formal feedback into an expanded curriculum including more acting workshops. We plan to also expand training for a select few to included rigorous training as a standardized patient.

The frequency of either the best or second best responses to the confidentiality scenario was significantly greater in EM residents than in EM faculty physicians (p=0.01). There were higher rates of participants who received formal educational courses about medical professionalism in EM residents’ group versus in EM faculty physicians’ group (23.0% versus 5.4%, p=0.003).

Conclusions: EM faculty physicians were unable to provide acceptable response to challenges to professionalism in confidentiality and few had received an education in professionalism during school curricula. The greater teaching of professionalism is needed in medical education for both EM residents and EM faculty physicians in Japan.

The Difference of Professionalism Between Emergency Medicine Residents and Faculty Physicians: Multicenter Cross-Sectional Analysis

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Study Objectives: Professionalism is one of the critical emergency medicine (EM) physician competencies and professional behavior affects patient satisfaction. Forty-five percent of EM program directors reported that there were two or more residents with unprofessional behavior in their programs per year. Another study reported that role model was the most influential factor. However, there is no evidence to support that there is difference of professionalism between EM residents and EM faculty physicians. Therefore, to investigate difference of professionalism between EM residents and EM faculty physicians may facilitate medical professionalism education. Thus, by using a cross-sectional multicenter survey, we aimed to analyze the responses to common challenges to medical professionalism for EM physicians and to survey the extent of education related to professionalism and satisfaction with it during the time attending medical schools.

Methods: We conducted a survey of EM residents and EM faculty physicians at several teaching hospitals in Japan, using the Barry questionnaire. The Barry’s questionnaire is one of the assessment of professionalism tools widely used in the US and Japan. The questionnaire instrument contains 6 challenging cases to professionalism: acceptance of gifts; conflict of interest; confidentiality; physician impairment; sexual harassment; and honesty in the documentation. After completing all six scenarios, participants were asked, ‘Have you ever experienced formal educational courses about medical professionalism?’ on yes or no responses. We sent the Barry’s questionnaire to 6 hospitals. In addition, we collected data at the Japanese biannual emergency medicine academic meeting. We analyzed the frequency of providing either the best or the second best answers to each scenario as a main outcome measure and compared those frequencies between physicians in EM residents and EM faculty physicians. The Fisher exact test and proportion comparison test with normal distribution approximation were used to analyze data, where appropriate.

Results: We collected data from 135 participants (61 EM residents and 74 EM faculty physicians). Capture rate was 87%. The most challenging scenario was the sexual harassment scenario, in which 46.7% provided the best or second best answers, followed by the confidentiality scenario with 71.1%. Table 1 compares the frequencies that the participants provided the best or second best responses between EM resident and EM faculty physician.

Study Objectives: Evaluations are an integral part of medical student education, but faculty grading styles may lead to variations in grades. By applying sentiment analysis, a technique to determine the attitude conveyed by a body of text, we sought to examine how we grade our medical students during their emergency medicine rotation.

Methods: Our students are evaluated by a combination of numeric grades and free-form test, with numeric grades broken down by subcategories and an overall grade, and text broken down by strengths, areas for improvement, and any additional comments.

We used Microsoft Cognitive Services, a support vector machine (SVM) trained primarily on data from Twitter, to analyze the free-form text. SVMs, like all machine learning algorithms, depend upon the quantity of data points used for training. To our knowledge, there is no medical student evaluation database sufficiently large enough to reliably train an algorithm. Moreover, Twitter data resembles medical student evaluations in that brevity and jargon are quite common.

The algorithm assigns a score of 0 to 1 for a given body of text: 0.60 or higher signifies a positive sentiment, 0.45 or lower, a negative sentiment, and values in between are considered neutral.

We retrospectively analyzed 2943 entries from our medical student evaluation database that contained both numeric scores and free-form text. A sentiment score was calculated from the combined free-form text of each evaluation. We equated a negative sentiment score with an overall grade of 1 or 2, neutral with an overall grade of 3, and positive with an overall grade of 4 or 5, and investigated whether the algorithm could predict each student’s grade.

Results: The algorithm was correct for 1954 evaluations (66%) and incorrect for 989 (34%) (Table 1). The mean sentiment scores correlated well with the overall grade assigned (r = 0.88), but there was no direct relationship between the grades and the sentiment of the free-form text (r = 0.16). Subgroup analysis similarly did not yield any significant correlations.

Conclusions: Integral to sentiment analysis is the concept of human concordance, the degree to which individuals agree upon a given sentiment. Human concordance is typically between 70-80% when studied, and attempts to reach 100% are prone to inaccuracy via overestimation. Our algorithm in total approaches human concordance (86%) and is at or above human concordance for negative grades of 2 (71%) and positive grades of 4 (82%) and 5 (85%).
Even so, there are no significant correlations between the sentiment score of what is written about the students and the grade they receive, and the average sentiment of all evaluations is quite positive (0.78). Perhaps this is best illustrated by the algorithm’s inability to predict neutral grades, where the majority of the free-form text is still very positive despite the assigned grade.

Our results demonstrate variability in medical student grading. Still, additional machine learning approaches may help further investigate these findings, especially as our evaluation database continues to grow each year and algorithms can eventually be trained using our own data set.

### Assessing Compassion Fatigue Among Emergency Department Professionals

**Graham S, Martin E, Elie M-C/University of Florida, Gainesville, FL; University of Florida, Gainesville, FL**

Study Objectives: Research has shown that burnout is negatively associated with work performance. Due to the nature of emergency medicine, physicians and other emergency department (ED) health care professionals are often faced with challenges of assisting others. Compassion fatigue is the negative aspect of working as helpers. The concept of compassion fatigue stands on the premise that there is more than one area that contributes to job satisfaction. Compassion fatigue is measured using the Professional Quality of Life (ProQoL) scale. The ProQoL scale has three areas: Compassion Satisfaction, Burnout, and Secondary Trauma which are measured independent and should not be combined to create an overall score. The purpose of this pilot study was to (1) determine the degree of compassion fatigue among ED health care professionals (2) compare the frequency of compassion fatigue experienced among groups, and (3) identify factors associated with compassion fatigue.

Methods: This prospective observational cohort study conveniently sampled health care professionals from a single academic ED. All participants were currently employed as an attending, resident, nurse, or technician within the ED. Each person who did not meet the previous criteria were ineligible. The primary data collection tool was the validated ProQoL v. 5. Demographic data (age, sex, race/ethnicity, and marital status) and professional information (reason for working in emergency medicine, career satisfaction). Participants completed the survey using an online or paper-based survey. Statistical analysis were conducted using IBM’s SPSS. We performed a Cronbach alpha to test the reliability of scales. Descriptive statistics were used to report characteristics. Independent t-test and ANOVA were conducted to measure and compare compassion fatigue.

Results: 100 ED health care professionals participated in this study. Females accounted for 60% of the sample. The highest level of education for 46% of the sample was a medical degree. Approximately 55% of the sample reported that they are currently working in emergency medicine because it was their chosen career path. About 4% reported that compensation and emergency medicine being the only job they could find as the reason for their current employment status. Overall, ED health care professionals reported average compassion satisfaction (mean 39.4; SD 7.83) and burnout (mean 23.6; SD 6.30) and low secondary traumatic stress (mean 20.5; SD 6.15). There was a statistically significant difference among all groups and compassion satisfaction (p = 0.03). Emergency medicine career satisfaction and compassion satisfaction were significant (p < .001). Job satisfaction was significant with burnout (p < .001). Feeling hopeless at work was significant with all scales (burnout, p < .001; compassion satisfaction, p < .001; and secondary traumatic stress, p = 0.002). Pleasure from work was significant with burnout (p < .001) and compassion satisfaction (p < .001).

Conclusions: Preliminary results from this pilot study revealed that ED health care professionals experience compassion fatigue at different levels. Further research is needed to uncover specific factors that contribute to compassion fatigue. In-depth qualitative interviews could potentially inform researchers on ways to implement interventions and strategies to reduce burnout, secondary traumatic stress, and increase compassion satisfaction.
Methods: In February 2017, we performed a multi-center survey study at 9 emergency medicine residencies nationally, administering the MBI and four additional validated wellness instruments. Quality of Life (QOL) was assessed by a single-item linear analog scale assessment: “How would you rate your overall quality of life during the past week?” High QOL was defined as >80, moderate 60-80, and low <60. Work-Life Balance was assessed with the question “My work schedule leaves me enough time for my personal/family life.” Responses of strongly agree and agree were categorized as positive for work-life balance. Career satisfaction was assessed by a single-question: “If given the opportunity to revisit your career choice, would you choose to become a physician again?” Responses of “likely” and “very likely” were categorized as positive for career satisfaction. Provider depression was screened using the first two items of the Primary Care Evaluation of Mental Disorders (PRIME-MD) instrument. A “yes” response to either question was considered a positive screen for depression.

Results: A total of 261/334 residents responded, for a total response rate of 78%. Data were analyzed using Pearson’s correlation, chi-square, or t-test as appropriate for continuous or categorical variables. Residents’ impressions of their quality of life was significantly correlated to burnout indices with lower QOL being associated with higher emotional exhaustion (r = -0.437, p < 0.0001), higher depersonalization (r = -0.18, p = 0.005), and lower personal accomplishment (r = 0.347, p < 0.001). Scores on the work-life balance rating correlated with MBI emotional exhaustion (p = 0.001) and depersonalization (p = 0.009) though not personal accomplishment. The feeling of having made an appropriate career choice was significantly associated with lower emotional exhaustion (p = 0.001), lower depersonalization (p = 0.005), and higher personal accomplishment (p = 0.05). The prevalence of a positive depression screen in our survey sample was 40%. Screening positive for symptoms of depression was also significantly associated with higher emotional exhaustion, higher depersonalization, and lower personal achievement (all p < 0.0001).

Conclusions: In this multi-center survey study of emergency medicine residents we found that increasing levels of burnout were associated with perceived lower quality of life, poor work-life balance, lower satisfaction with the choice of medicine as a career, and a higher rate of screening positive for depression. Use of the Quality of Life Scale, Work Life Balance rating, assessment of career satisfaction, and Primary Care Evaluation of Mental Disorders instrument in addition to the MBI may provide a more global assessment of resident wellness and inform decisions about targeted wellness interventions. These findings also support the development of a formal wellness curriculum that can be incorporated into resident education.

90 Comparison of Emergency Department Antihypertensive Agents on Cerebral Blood Flow
Tabor A, Calo S, Nahab B, Thompson R, Levy P, Miller J/Henry Ford Hospital, Detroit, MI

Study Objectives: Data on the cerebral effects of commonly administered emergency department (ED) antihypertensive agents are limited. These effects are potentially important in patients requiring blood pressure reduction in neurological emergencies or those with known intracranial stenosis. The study objective was to measure the effect of common ED antihypertensive agents on cerebral blood flow in ED patients with severely elevated blood pressure.

Methods: We conducted a prospective, quasi-experimental study of patients with a SBP > 180 mmHg and planned antihypertensive treatment in the ED. Patients who were < 18 years, pregnant, unable to consent prior to treatment, or had a known acute stroke were excluded. Non-invasive hemodynamic and cerebral vascular measurements were obtained prior to and post treatment. Cerebral vascular measurements were obtained with a transcranial Doppler fixed to a head-frame to detect middle cerebral artery mean flow velocities (MFV). Antihypertensive therapy was at the discretion of the treating physician. Analysis included descriptive statistics and generalized linear modeling, adjusted for baseline BP, to test the effect of four categories of antihypertensive agents on MFV. Categories included oral clonidine, intravenous (IV) labetalol, IV hydralazine and combination therapy (agents from ≥ 2 classes given within a 50-minute period).

Results: We enrolled 35 patients (37% female) with a mean age of 49 ± 13 years. A total of 8 (23%) patients received clonidine, 6 (17%) IV labetalol, 5 (14%) IV hydralazine and 16 (46%) combined therapy. Combination therapy most frequently included IV hydralazine and IV labetalol. The mean baseline SBP was 214 ± 24 mmHg and MFV was 49 ± 13 cm/sec. The mean percentage fall in mean arterial pressure by medication was: clonidine -12 ±7%, labetalol -13 ±12%, hydralazine -23 ± 11%, and combination -25 ± 16%. The overall change in MFV was 9 ± 15%, and by medication was: clonidine -10% (95% CI -2 to -21%), labetalol -11% (95% CI -5 to -27%), hydralazine +1% (95% CI -18 to +21%), and combination -11% (95% CI -2 to -19%). Adjusting for baseline BP, patients receiving hydralazine had less change in MFV compared to other medications (difference between means ±12%, 95% CI 3-33% p = 0.1).

Conclusions: In this study with modest BP reductions, common rapid-acting ED antihypertensive medications have comparable effects on cerebral blood flow. These results hint that cerebral blood flow may be more stable with hydralazine administration, but further testing is required.

91 Impact of Intermittent Versus Continuous Infusion of Fentanyl After Rapid Sequence Intubation on Intensive Care Unit Delirium
Wolf L, Messana E, Wilson SS, Park L/Detroit Receiving Hospital, Detroit, MI; Sinai-Grace Hospital, Detroit, MI

Study Objectives: Emergency department (ED) providers frequently perform rapid sequence intubation (RSI) in critically ill patients who require mechanical ventilation. Post-intubation analgesodation is an essential component of controlling pain and agitation. However, there is no data on the best method of administration. Intermittent versus continuous drug administration is generally based on ED providers’ preference. Continuous infusions may result in over-sedation, prolonged duration of mechanical ventilation, intensive care unit (ICU) delirium, and increased health care costs. ED providers can have an impact on patient outcomes by optimizing post-intubation analgesodation. The aim of this study was to evaluate the impact of intermittent versus continuous infusion of fentanyl for analgesodation given post-RSI on the incidence of ICU delirium.

Methods: This is a retrospective study of patients who underwent RSI in two EDs within the Detroit Medical Center between October 2011 and December 2015 and received either intermittent or continuous fentanyl for analgesodation. Intubated patients admitted to the medical ICU were included if they were greater than 18 years of age and had an admission diagnosis of congestive heart failure, chronic obstructive pulmonary disorder, pneumonia, or sepsis. Patients were excluded if they were intubated for less than 48 hours. Patient demographics, severity of illness scores, Richmond Agitation Sedation Score (RASS) and Intensive Care Delirium Screening Checklist (ICDSC) scores, and cumulative opioid and benzodiazepine doses were collected. Adverse events (ie, self-extrusion) and neurological tests (CT scan, EEG, lumbar puncture, or MRI) were also collected. The primary outcome was the incidence of ICU delirium, defined as an ICDSC score ≥ 4. Additional outcomes included ICU and hospital LOS, and hospital mortality. Statistical analysis was performed using SPSS and a p-value less than 0.05 considered statistically significant.

Results: A total of 60 patients were included for analysis (n = 31 intermittent bolus, n = 29 continuous infusion). Baseline demographics were similar between groups; median age was 66 years and the majority of patients (77%) were African American males. Pneumonia was the most frequent admitting ICU diagnosis (50%), followed by sepsis (22%). Patients initiated on a continuous infusion received more fentanyl in the ED than those in the intermittent group (median 350 mcg [IQR 211-758] vs. 100 mcg [IQR 50-130], p = 0.003). The primary outcome of delirium occurred in more patients receiving continuous infusion fentanyl compared to intermittent fentanyl (72.4% vs. 41.9%, p = 0.017). Patients in the continuous infusion group also had a greater number of days with ICDSC scores ≥ 4 (median 1 day [IQR 0-2] vs. 0 days [IQR 0-1], p = 0.015). Secondary outcomes including duration of mechanical ventilation, ICU and hospital lengths of stay, neurologic events, and self-extrusions were similar between groups.

Conclusions: Patients initiated on a continuous infusion of fentanyl after RSI in the ED experienced more delirium compared to those who received intermittent boluses. Results of this study support the use of initiating intermittent bolus over continuous infusion analgesodation in the ED to prevent adverse outcomes.

92 Comparison of Early Versus Late Sedative Interventions After Rapid Sequence Intubation Using Rocuronium in the Emergency Department
Killer E, Jarrell D, Sakles JC, Edwards C, Patarneka AE/University of Arizona College of Pharmacy, Tucson, AZ; Banner University Medical Center-Tucson, Tucson, AZ

Study Objectives: The use of etomidate and rocuronium for rapid sequence intubation (RSI) results in duration of paralysis that exceeds the duration of sedation.
with this drug combination. The objective of this study was to compare the number of sedation interventions early versus late after RSI, when rocuronium is used in the emergency department (ED). The secondary objective was to descriptively assess post-RSI sedative and analgesic dosing.

Methods: This was a retrospective cohort study conducted in an academic ED in the United States. Consecutive adult patients who received the combination of etomidate and rocuronium for RSI between 1/1/2015 and 6/1/2016 were included. The primary outcome measure was the number of sedative interventions after RSI. An intervention was defined as initiation of an opioid or sedative, or a dose increase of an infusion rate. Interventions were categorized as early (<30 minutes post-RSI) or late (>30 minutes post-RSI). The Wilcoxon signed-rank test was used to compare the median number of interventions.

Results: There were 108 patients included in the study cohort. The mean rocuronium dose was 1.1 ± 0.3 mg/kg and median Glasgow Coma Scale prior to RSI was 11 (IQR 8-14). There was a median of 2 interventions (IQR 1-3) that occurred <30 minutes post-RSI compared to 1 intervention (IQR 0 to 2) >30 minutes post-RSI (p<0.001). There were 12 (11%) patients who did not receive any intervention in the first 30 minutes post-RSI. Most patients were started on both propofol and fentanyl infusions (n=70, 64%). Some patients received a fentanyl infusion only (n=20, 19%), propofol infusion only (n=11, 10%), or no infusion (n=7, 7%). The initial propofol infusion rate was 20 mcg/kg/min (IQR 10 to 20 mcg/kg/min). The initial propofol infusion rate was decreased or held in 15/18 (11%) patients (rate decrease 5 to 40 mcg/kg/min). The initial fentanyl infusion rate was increased in 25/81 (31%) patients (rate increase 5 to 30 mcg/kg/min). The initial fentanyl infusion rate was increased in 11/90 (12%) patients (rate increase 25 to 100 mcg/hour) and increased in 18/90 (20%) patients (rate increase 20 to 100 mcg/hour).

Conclusions: When rocuronium is used for RSI in the ED, there were more sedative interventions early rather than late after RSI. However, there is the potential that some patients are inadequately sedated after RSI with rocuronium.

93 Effect of Timing of Adrenaline on Out-of-Hospital Cardiac Arrest Patients
Al Muhtim MA, Jr., Al Shahrani M/University of Dammam, Dammam, Saudi Arabia; University of Dammam, Dammam, Saudi Arabia

Study Objectives: Despite advances in medical treatment, survival rates of OHCA remain low; the average survival rate to hospital discharge in OHCA ranges from 7 to 11%. Whether adrenaline is improving or adversely effect (OHCA) patients outcome still an area of discussion in recent literature.

The aim of this study is to compare the timing of adrenaline administered to patients presenting to the emergency department and hospital stay.

Methods: A retrospective observational study carried out at King Fahad Hospital of the University, Saudi Arabia. Records of all adult patients who presented to the emergency department after cardiac arrest the period between 2005 and 2015 were reviewed. Demographic data, timing of cardiac arrest and adrenaline administration (0-5, 5-10, 10-15, >15 minutes), total number of doses (less than 4 doses and more than 4 doses), type of rhythm and outcome in term of mortality and discharged from hospital were obtained. Multivariate regression analysis conducted to look for other factors might impact the outcome.

Results: 500 patients during that period were identified, 199 patients (66.4%) were males, mean age was 50.4±20.26. Shockable rhythm were found in 24 patients (8%). Over all survival rate to hospital discharge of OHCA patients was around 11%. Patients who received more than 4 doses of adrenaline had a worse outcome with a mortality of 66.9% versus 42.9% in those received less than 4 doses with a p value of 0.001. Patients who received early adrenaline within 5 minutes had worse outcome with a mortality of 89.4% compared to 49.2% in the 5-10 minutes group, 37.1% in 10-15 minutes group, and 14.8% when its given after 15 minutes (p value = 0.002). Multivariate regression analysis showed that duration of cardiac arrest to arrival, cardiac, pulmonary, kidney disease and malignancy, positive cardiac enzymes, and higher lactic acids are correlated with poor outcome.

Conclusions: Our results indicate that early use of adrenaline and increase number of adrenaline doses is associated with worse outcome in OHCA patients; long-term outcome is still to be investigated by larger prospective studies.

94 Cost Impact of Hydroxocobalamin as Treatment for Patients With Known or Suspected Cyanide Toxicity Due to Smoke Inhalation Injury
Sanders MK, Aggarwal J, Michalopoulos SN, Stephens J, Dalton D, Lewis DE/Pfizer, Inc., New York, NY; Pharminter International, Bethesda, MD; Iniventiv Health, Inc. on assignment to Pfizer, Inc., High Point, NC; Meridian Medical Technologies, a Pfizer Company, Columbia, MD

Study Objectives: Cyanide toxicity can occur in persons who are exposed to smoke in a closed-space fire. Hydroxocobalamin (HC) is a cyanide antidote indicated for treatment in persons with known or suspected cyanide poisoning including that due to smoke inhalation. The objective of the present analysis was to estimate the cost impact of outcomes with administration of HC compared to historical controls not receiving cyanide antidote.

Methods: A one-year economic model was developed to assess treatment cost differences for individuals who received or did not receive HC for known or suspected cyanide toxicity due to smoke inhalation. Nearly all surviving patients who were transported to the emergency department (ED) were intubated prior to admission to the intensive care unit (ICU). Clinical outcomes (ie, pre-ICU intubation, pneumonia or in-hospital mortality) and health care resource utilization (ie, ICU and hospital length of stay [LOS], and duration of mechanical ventilation [MV]) were estimated by Nguyen, et al. (2017) in a prospective cohort analysis that compares outcomes in HC-treated individuals [2008-2014] to a historical control [2002-2008]). Cost parameters were estimated using published literature and publicly-available hospital charges. All charges were adjusted to reflect costs applied a cost-to-charge ratio based on data from the Healthcare Cost and Utilization Project. Results are reported as per-patient cost of treatment as well as total days of care based on nearly 16,000 fire-related injuries in the US in 2014 (US Fire Administration 2014).

Results: The per-patient cost of treatment was estimated to decrease by $7,227 with the use of HC (H, $15,381; no HC, $22,608). The primary drivers of this cost difference were days spent in the ICU (HC, 6 days; no HC, 10 days; $8,203 vs $13,671) and non-ICU hospital days (HC, 7 days; no HC, 11 days; $5,997 vs $6,281). Cost-savings were also observed from a reduction in number of MV days (HC, 4 days; no HC, 7 days; $1,616 vs $1,892). Use of HC also contributed to a reduction in the number of pneumonia cases. Differences in costs and clinical outcomes are reported in the table below.

Conclusions: Use of HC in the out-of-hospital setting, as treatment of known or suspected cyanide poisoning, may provide cost-savings through decreases in ICU and hospital LOS; these provide the largest source of benefit, and are expected to offset the cost of HC. Further observational studies are needed to show the benefit of HC on both short- and long-term clinical outcomes (eg, neurological sequelae and cardiovascular outcomes) with cyanide exposure.

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<th>Outcome</th>
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Safety and Efficacy of Dantrolene Sodium (250 mg/5 mL) in Patients With Exertional Heat Stroke

Heppner A, Greenberg M/Eagle Pharmaceuticals, Woodcliff Lake, NJ

Study Objectives: Exertional heat stroke (EHS) is a rare, life-threatening condition that may affect anyone performing intense physical activity, especially in a hot environment. Morbidity and mortality persist despite aggressive cooling. EHS is a leading cause of death in young athletes and non-combat-related deaths in the military. EHS affects outdoor workers, firefighters, and people performing intense physical activities in hot weather. Severe hyperthermia and CNS dysfunction are hallmark features; rhabdomyolysis, renal failure, liver damage, and coagulation abnormalities are common and as many as 1/3 of survivors have long-term neurologic deficits despite the use of aggressive cooling. The study objectives were to evaluate the safety and efficacy of dantrolene sodium 250 mg/5 mL (DS) for injectable suspension for the treatment of EHS, administered as an adjunct to standard body cooling (SBC).

Methods: This was a randomized, 2-arm, parallel, open-label study evaluating DS plus SBC compared to SBC alone in patients with EHS. EHS was defined as a core body temperature ≥40.0°C, impaired level of consciousness (LOC) (Glasgow Coma Scale, GCS score ≤13), and tachycardia. SBC was defined as efficient body cooling plus supportive measures. Patients were randomized 1:1 (n=17 per group). The primary endpoint was the cumulative incidence of recovery of LOC defined as a GCS score ≥13 at ≤90 minutes postrandomization. Secondary efficacy endpoints included calculated cooling rates and rectal temperature values. Safety and tolerability were assessed. The modified intent-to-treat (mITT) population excluded patients with endotracheal intubation at baseline, which made full assessment of GCS unfeasible. The study was conducted in a real-world emergency medicine setting. Due to the rareness and unpredictable nature of EHS, the study was designed to evaluate clinically meaningful outcomes and not powered for statistical significance.

Results: Demographics and baseline characteristics were balanced between the treatment groups. A total of 61.8% of patients were male. Mean age was 40.7 years (range 18-45). Mean baseline rectal temperature was 41.4°C mean baseline GCS score was 6. Ten patients required rapid sequence intubation on presentation. More patients in the DS plus SBC group met the primary endpoint vs SBC alone (29.4% [CI: 10.31, 55.96] vs 11.8% [CI: 1.46, 36.44]). Patients in the DS plus SBC arm cooled faster. The median time to first rectal temperature ≤38°C was 75% of subjects in the mITT population was 125 min for the DS group vs 195 min for SBC alone. Safety and tolerability findings were similar in both groups. No treatment-emergent adverse events were reported as treatment related or led to discontinuation in either group. SAEs were reported for 11.8% of patients in each group. Seven patients (20.6%) experienced at least 1 SAE, with similar proportions across the 2 groups (DS plus SBC: 23.5%; SBC alone: 17.6%).

Conclusions: This well-conducted, randomized, controlled clinical trial demonstrated that DS is safe and well-tolerated in subjects with EHS and is consistent with the known, well-characterized safety profile in currently approved indications. DS in addition to SBC demonstrated greater clinically meaningful improvement in neurologic function vs SBC alone. Patients treated with DS in the ITT population were 3 times more likely to achieve recovery in their LOC; whereas, the mITT population were 6 times more likely to achieve recovery.

Use of Emergency Medical Services by Law Enforcement

Strote J, McCoy A, Wolpaw E/University of Washington, Seattle, WA

Study Objectives: Law enforcement and Emergency Medical Services (EMS) have a close working relationship with frequent requests by police for evaluation, treatment, and transport of patients. Law enforcement agencies also require some level of medical training and allow officers to do certain assessments and interventions on their own. We examined these calls to better identify how EMS was used by law enforcement.

Methods: All requests for medical assistance from the law enforcement agencies were included. The system is setup such that of the 11 emergency medical responders on-duty (10 are EMTs and 1 is a police officer). One officer was called to transport Basic Life Support (BLS) patients and a private company is called to transport Basic Life Support (BLS) patients. Cases were excluded if law enforcement and EMS were simultaneously dispatched from a 911 call. Variable data were extracted from EMS run sheets and included disposition, transportation from scene, type of injury or illness identified by EMS providers, and vital signs.

Results: During 2014 and 2015, 6,649 calls were made, which represents 3.1% of all police-citizen interactions during that period. Of these, 3,971 (59.7%) patients were transported to hospital, 2,373 (35.7%) were released, and 33 (0.5%) were declared dead at the scene. Of those transported to hospital, 219 (6.0%) were transported by ALS, 5283 (90.1%) were transported by BLS, and 133 (3.7%) were transported by non-medical personnel. The majority of calls received were for trauma (3,123; 47.9%), followed by general medical (1,482; 22.3%), complications from drug and alcohol (1086; 16.3%), and psychiatric (435; 6.5%). Significantly abnormal vitals were found in 2045 (30.8%) of calls. The most common were tachycardia (1580; 23.8%) and tachypnea (464; 7.0%); bradycardia (17; 0.3%) and hypotension (39; 0.6%) were rare.

Conclusions: Requests for EMS assistance from law enforcement are common. In this population, a very large percentage of calls involve patients who are evaluated on scene and released or stable enough to be transported by a private BLS agency or non-medical personnel. Further analysis may identify situations where increased officer training and a change in protocols could potentially reduce unnecessary fire department involvement via decreased calls overall and direct calls for private transport.

Safety of Out-of-Hospital Midazolam in Behavioral Emergencies

Hern HG, Jr., Dreyfuss A, Martinez C, Alter H/AHS - Highland Hospital, Berkeley, CA; AHS - Highland Hospital, Oakland, CA

Study Objectives: Based on its increasing use in emergency departments, one urban EMS agency in California began using midazolam for sedation (up to 5mg IM standard dose). To date, no studies evaluate midazolam safety in the out-of-hospital setting for sedation of patients in acute behavioral emergencies. This study attempts to quantify the incidence of adverse events associated with out-of-hospital patients receiving midazolam.

Methods: This was a retrospective cohort study of midazolam use in the out-of-hospital setting to sedate violent or severely agitated adult patients in one urban California county. The authors gathered information for patients who received midazolam between 2012-2015 and then selected those who had acute behavioral or psychiatric emergencies and who were treated at the facility receiving the highest proportion of those patients. We then linked the data of these out-of-hospital patients with the emergency department records for each patient. We noted outcomes of airway and respiratory adverse events. The chart reviewer was trained using a set of “practice” medical records and a data extraction form. Records with any of the outcome measures were secondarily reviewed by multiple physician authors to confirm data authenticity.

Results: Of the data encompassing Jan 1, 2012 to Dec 31, 2015, a total of 5750 patients received midazolam in the out-of-hospital setting. 1514 patients received midazolam for acute behavioral emergencies. 421 patient records were documented in the PCR as arriving at the receiving hospital. Case matching was done from the emergency department EHR. Of the 421 original records, 25 records were eliminated from the dataset (1 duplicate, 24 records with no matching patient in the ED) leaving 396 for analysis. Of the 396 cases, there were no cases of stridor, hypventilation, or apnea. There was one case of intubation in the case series. The patient was a polysubstance overdose who arrived to the ED agitated. The patient was intubated to facilitate workup but never hypoxic or hypoventilating at any time. There were 4 cases of desaturation in the case series (1.0% [95% CI = 0.3%-2.6%]). No desaturation was below 85%. Each resolved with supplemental oxygen. Three of the cases had additional sedation in the ED with zopisaloidone and the fourth had an obvious concomitant suicidal overdose with balofen. Each of the four desaturation cases were discharged from the ED to the psychiatric emergency department without further medical intervention.

Conclusions: Out-of-hospital midazolam for sedation in acute behavioral emergencies appears to not be associated with the respiratory events of stridor, hypventilation, apnea, or intubation. Transient episodes of desaturation resolved with supplemental oxygen alone.
Methods: We conducted a retrospective case series of consecutive traumatic cardiac arrest cases where simple thoracostomy was used during the resuscitation effort. Data was abstracted from our Zoll TM emergency medical record using a standardized method for consecutive patients who received the procedure for a 32-month period between June 1, 2013 and January 25 2016.

Our EMS service is a suburban/rural non-fire based 911 system with about 60,000 calls for service annually. We have 200 advanced life support medics supported by 900 EMT basics in an 1100 square mile response area. Prior to deployment of the procedure, our medics completed didactic and hands-on training using an anesthetized swine model with yearly medical director credentialing. We collected general descriptive characteristics, procedural success, presence of pneumothorax, return of spontaneous circulation, survival, and neurologic outcome on each patient.

Results: During the study period we conducted simple thoracostomy on 46 patients. Mean age was 41 years (15-81), 83% were male. The indications included 33/46 (72%) blunt trauma, 13/46 (28%) penetrating trauma. The presenting rhythms were pulseless electrical activity 66%, asystole 21%, ventricular tachycardia/fibrillation 6% and 7% others/non-recorded. 35/41 (76%) of procedures were bilateral. 12/46 (26%) had ROSC, with 5/46 (11%) surviving to 24 hours and 3/46 (6.5%) discharged from hospital with normal mental status. Of the three survivors, all were blunt trauma mechanism with initial rhythms of PEA. There were no reported medic injuries/adverse events.

Conclusions: Our data demonstrates that properly trained paramedics in a ground EMS service were able to safely and effectively perform simple thoracostomy in traumatic cardiac arrest. We found a significant 27% presence of tension pneumothorax in our sample, which supports previous reported high rates of tension in this patient population. Further studies are needed to evaluate other subsets of patients that may benefit from this procedure.

Study Objectives: Geopolitical changes and increases in manmade and natural mass casualty incidents (MCIs) make preparation for such events more critical. The objective of this study is to understand those preparedness activities that are most effective in securing a successful response to MCIs. To achieve this goal, RAND was commissioned by the Department of Health and Human Services/OFFICE of the Assistant Secretary for Preparedness and Response (HHS/ASPR) to develop a peer assessment tool that was pilot-tested in three communities across the United States that had recently experienced an incident.

Methods: An interview protocol was developed based on a literature review of past domestic and international MCIs, after action reports from previous domestic incidents, expert opinion, and previous RAND post-incident evaluation tools.

The protocol, designed for use by peer assessors, was piloted-tested in three communities that had recently experienced MCIs and sought to elicit successes, challenges, innovative adaptations, lessons for other communities, and related recommendations.

Results: Use of this tool identified key preparedness activities in the areas of: scene management, communication, patient transfer optimization; receiving hospital actions, receiving ED actions, emergency operation center actions, interfacing with law enforcement and state or federal agencies, patient identification and family reunification, interfacing with the media; incorporation of mental health needs, interorganizational relationship building; and preparedness investment. Based on peer-assessor and pilot-site feedback, use of this tool was deemed feasible with low burden on sites.

Conclusions: The results of these pilots, and the use of this tool following future incidents, can be used to create a de-identified database of best practices for disaster preparation, informed preparedness policy, improve response, and guide federal preparedness investments.

Given the current world geopolitical climate effective MCI preparedness is critical. Based on these pilots, critical lessons have been learned that can guide the MCI preparation of hospitals, health care systems, and the larger response community.
Assessment of Stress Markers in Restrained Individuals Following Physical Stress With and Without a Sham TASER Activation

Sloane CM, Marsh D, Chan TC, Kolkerhorst FW, Neuman T, Castillo E, Vitke G/UCSD Medical Center, San Diego, CA; University of Miami, Miami, FL; San Diego State University, San Diego, CA

Study Objectives: Law enforcement and out-of-hospital care personnel often confront violent and dangerous individuals who must be restrained for safety purposes as well as to allow for assessment and treatment. Many are under the influence of drugs and law enforcement officers may need to use an electronic control device like a TASER to gain control. However, these techniques have been reported to increase stress on an individual, potentially worsening their physiologic condition. The purpose of this study was to investigate the specific psychological effects of anticipating vs not anticipating a TASER activation on stress biomarkers in exercised and restrained human subjects.

Methods: We performed a randomized, crossover controlled trial to study stress associated with exercise, physical exhaustion, and restraint with and without an induced psychological stress simulating the field use of a TASER event in human volunteer subjects. Subjects were consented that they would be receiving a TASER activation. Each subject performed two trials each consisting of a brief period of intense exercise on a treadmill to physical exhaustion followed by placement into the hogtie restraint position with and without induced psychological stress. The psychological stress consisted of a TASER brandished and sparked in front of the subject. We collected blood samples for analysis pre and post exercise, as well as 10 minutes after completion of the exercise and sham TASER.

Hormones and stress markers measured included cortisol, copeptin, orexin A, dynorphin, oxytocin, neuropeptide Y, dopamine, norepinephrine, and cortisol-ACTH ratio. Means and standard deviations (SD) are presented compared between and within groups.

Results: In the table, numbers are mean values with standard deviations in parenthesis.

We identified differences within and between study groups for the biomarkers measured.

Conclusions: In this limited study, during a brief period of intense exercise and restraint followed by the psychological stress of a sham TASER application, there were some differences in the markers measured. These differences need to be studied further.

<table>
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<th>Compound measured</th>
<th>Post-EX</th>
<th>Post-Ex</th>
<th>Post-Res</th>
<th>Pre-EX</th>
<th>Taser</th>
<th>Post-Ex</th>
<th>Taser</th>
<th>Post-Res</th>
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<td>75.64</td>
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<td>104</td>
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<td>Dopamine (ng/ml)</td>
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<td>(36-111.9)</td>
<td>(52-99)</td>
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<td>Copeptin (ng/ml)</td>
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<td>1.32</td>
<td>0.91</td>
<td>1.36</td>
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<td>(1.40-2.15)</td>
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<td>CVD (ng/ml)</td>
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<td>(7.9-33.4)</td>
<td>(8.2-27.2)</td>
<td>(14.3-34.0)</td>
<td>(9.7-32.3)</td>
<td>(9.6-24.3)</td>
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<td>Cortisol/ACTH</td>
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<td>1.89</td>
<td>1.12</td>
<td>1.80</td>
<td>1.47</td>
<td>1.51</td>
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<td>(0.2-3.58)</td>
<td>(0.2-1.96)</td>
<td>(0.5-3.02)</td>
<td>(0.5-2.39)</td>
<td>(0.3-3.03)</td>
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Pacemaker and Defibrillator Interrogations in the Emergency Department and Hospital Rarely Lead to Device Reprogramming

Neuenschwander JF II, Peacock WF III, Le TS, Cordial P, Panian J, Hammill EF, Kojasoy T, Hiestand BC/Genesis Healthcare Systems, Zanesville, OH; Baylor School of Medicine, Houston, TX; University of Pittsburgh, Pittsburgh, PA; Johns Hopkins University, Baltimore, MD; Genesis Healthcare Systems, Zanesville, OH; Boston Scientific, St. Paul, MN; Wake Forest School of Medicine, Winston-Salem, NC

Study Objectives: There is increasing availability of read-only interrogation systems for use in patients presenting with complications related to cardiac implantable electric devices (CIED), a designation which includes defibrillators and pacemakers. One barrier to adoption of these systems is the belief the interrogation will typically require an industry representative or trained health care professional to adjust CIED programming, which cannot be accomplished via the remote interrogation systems currently approved. Our objective was to investigate the frequency that CIED interrogation identified a need for immediate device reprogramming.

Methods: We performed a retrospective chart review using data from a single hospital, 2 ED system, with a combined annual ED census of 70,000 visits. From April 29, 2015 to March 4, 2017, hospital and ED patients with known Boston Scientific CIEDs and potential device related complaints were evaluated by the Latitude Consult interrogation system (Boston Scientific, Inc., Marlboro, MA). The Latitude system provides data on CIED events, current device status, and need for programming. Interrogations were performed by ED and hospital staff. T-test was used for continuous variables, and Fisher’s exact test to compare categorical variables.

Results: During the study period, a total of 176 interrogations were performed. The mean age of the cohort was 72.5 years, SD 14.8, range 25-99 years. There were 103 (59%) males in the sample. Cardiac episodes (including dysrhythmia, shock events, overdrive pacing, etc) were discovered in 82/176 (47%, 95% CI 39-54%) interrogations of these CIED with reported episodes, 10/82 required further review or programming optimization (12%, 95% CI 6 - 21%). Overall, 25/176 interrogations were flagged for further review (14%, 95% CI 9.4% - 20%). There was no difference in age (72.2 years [no review] vs. 74.4 [review], p=0.5) or sex (59% [male [no review] vs. 68% [review], p=0.51) between groups. In the "review required" subgroup, 18/25 (72%) had normally functioning devices but with subacute relevant findings that did not require immediate attention (low battery, atrial fibrillation episodes, etc.). There were 7 (28% of the further review group, 4% of the total sample) devices that required immediate reprogramming intervention for device dysfunction.

Conclusions: Clinically relevant cardiac events were discovered in nearly half of interrogations performed by ED and hospital personnel, indicating that CIED interrogation is frequently value added to patient care. The need for immediate device programming changes was very infrequent, at 4% for this group.

Predictors of Hospital Admission in Emergency Department Patients With Atrial Fibrillation

Singer AJ, Singer DD, Thode HC, Jr., Peacock WF/Stony Brook University, Stony Brook, NY; Baylor College of Medicine, Houston, TX

Study Objectives: Atrial fibrillation is a common and potentially lethal disease. However, many patients can be treated in the ED and managed as outpatients. Our purpose was to determine the predictors and frequency of admission for ED patients presenting with atrial fibrillation.

Methods: Study Design—secondary analysis. Setting—National Hospital Ambulatory Medical Care Survey (NHAMCS) for the latest years available (2010-2013). Patients—all patients visiting an ED with a discharge diagnosis of atrial fibrillation. Measures—demographic and clinical characteristics including vital signs as well as treatment administered while in the ED. Outcomes—admission to hospital or ICU and mortality. Data analysis—univariate and multivariate analyses used to determine association between predictor variables and outcomes.

Results: Between 2010-2013 there were an estimated 517 million ED visits of whom 2.8 million (0.5%) had atrial fibrillation. Mean (SE) age was 73 (0.7) years; 50% were females, 68% had Medicare. Prior history included CHF (22%) and CVA (12%). 58% were admitted directly to the hospital of which 10% went to an ICU. Only 1% died in...
hospital. Mean (SE) ED length of stay was 296 (21) minutes. Mean (SE) heart rate and systolic blood pressure (SBP) at triage were 102 (2) beats per minute and 136 (1.4) mmHg respectively. 47% had a heart rate >100/min and 6% had a SBP <100mmHg. Common treatments included calcium channel blockers (29%), beta blockers (14%), digoxin (5%) and magnesium (4%). Anticoagulants administered in the ED included enoxaparin (7%), unfractionated heparin (5%), and warfarin (2%). Admitted patients were older (75 vs. 71 years, p = 0.003), more likely to have CHF (28% vs. 13%, p = 0.002), more likely to have a heart rate >100/min (52% vs. 39%, p = 0.02) and a respiratory rate >20/min (38% vs. 14%, p < 0.001) than non-admitted patients. Factors associated with admission on multivariate analysis included respiratory rate >20 (OR 2.8 [95% CI 1.7-4.8]), history of CHF (OR 2.0 [95% CI 1.1-3.6]), and age (1.02 per year [95% CI, 1.002-1.035]).

Conclusions: Atrial fibrillation is commonly seen in the ED and approximately 6 of 10 are admitted. Older age, history of CHF, and respiratory rate greater than 20 are associated with admission. Overall mortality is low.

EMF

Can Corrected Flow Time Detect Changes in Patients Undergoing Heart Failure Treatment?

Pare J, Pang P, Noble V, Moore C, Sam F/Boston University School of Medicine, Boston, MA; Indiana University, Indianapolis, IN; UH Cleveland Medical Center, Cleveland, OH; Yale University, New Haven, CT; Boston University School of Medicine, Boston, MA

Study Objectives: Acute decompensated heart failure (ADHF) is a leading cause for admission in persons ≥65 years of age. Treatment of ADHF is challenging due to a lack of a reliable measure to assess degree of congestion. Corrected flow time (FTc) measured by ultrasound, is an easy to perform vasoactive Doppler measure and correlates with cardiac filling pressures. FTc is calculated from a Doppler tracing and is based on Bazett’s formula for time spent in systole vs diastole. We seek to determine if FTc can detect physiologic changes in patients undergoing diuresis from ADHF as a possible target to direct ADHF therapy.

Methods: This is a prospective observational cohort study conducted at a large academic medical center. Patients (≥21 years of age) being admitted as inpatients for treatment of ADHF were eligible for enrollment. Patients unable to provide consent, including non-English speaking, and those patients with an EKG showing a non-sinus rhythm were excluded. Enrollment began Feb 2017 and is ongoing. Trained research assistants or physicians obtained FTc measures during ED visit, and then again within 24 hours of patient discharge or being transitioned back to oral diuretic. We conducted a paired t test analysis to detect significant changes in FTc.

Results: This pilot data includes 36 patients; mean age of 58 years (IQR 52-68). Heart failure with reduced ejection fraction (HFREF) (EF <50%) was present in 27/36 patients, mean EF 28% (IQR 20-40). The remainder had diastolic dysfunction. There was a significant decrease in FTc after treatment for ADHF: mean 297 (95% CI 285 - 309) vs 281 (95% CI 270 - 291), p = .0001 (Figure 1).

Conclusions: In patients undergoing treatment for ADHF, there was a significant reduction in FTc from admission to discharge. FTc may be an alternative noninvasive measure to assess volume status and direct therapy in patients with heart failure.

Table 1. Patient Characteristics (n=391).

| Age, median (IQR) | 59.0 (49.7, 69.4) |
| Sex | 56.0% Female |
| Race | 43.7% African-American 53.5% Caucasian 2.8% Other |
| History of Hypertension | 261 (66.8%) |
| History of CAD | 120 (30.7%) |
| History of MI | 79 (20.2%) |
| History of CABG | 27 (6.9%) |
| History of Diabetes Mellitus | 112 (28.6%) |
| History of Smoking | 119 (30.4%) |
Stroke Prophylaxis and 30-Day Clinical Outcomes After US Emergency Department Diagnosis and Discharge for Atrial Fibrillation

Kea B, Lin AL, Fu R, Olshansky B, Raat M, Lip GY, Sun B/Oregon Health & Sciences University, Portland, OR; University of Iowa, Iowa City, IA; VA Portland Health Care System, Portland, OR; University of Birmingham, Birmingham, United Kingdom

Study Objective: Atrial fibrillation (AF) is a potentially serious condition that can lead to thromboembolic complications. Current guidelines recommend oral anticoagulation (OAC) to reduce the risk of stroke in high-risk AF candidates but US emergency department (ED) OAC prescribing rates and 30-day clinical outcomes after an AF diagnosis are unknown. We determined OAC prescribing practices and 30-day clinical outcomes after ED diagnosis of new AF.

Methods: This was a population-based, retrospective cohort of Medicare fee-for-service beneficiaries from 2011 to 2012. The cohort included beneficiaries age ≥65, without prior OAC filled in 90 days, who were discharged from the ED with a new diagnosis of AF. We calculated proportions of patients filling an OAC prescription within 10 days of an ED AF diagnosis. Adverse events within 30 days of the ED visit were identified via ICD-9 codes from inpatient and outpatient ED claims data. We performed descriptive statistics and bivariate analyses to assess associations between filling an OAC and patient/hospital characteristics and clinical outcomes. We stratified analyses by risk for stroke (CHA2DS2-VASc) and bleeding (HAS-BLED).

Results: Of those discharged from the ED with a diagnosis of AF (n=9,147), 91.4% (n=8,363) were intermediate to high-risk (CHA2DS2-VASc ≥ 2 in males and CHA2DS2-VASc ≥ 1 in females) for stroke. Of those eligible for stroke prophylaxis [high-stroke risk with low-moderate bleeding risk (n=3,968)], 74.5% (n=2,958) did not fill an OAC prescription within 10 days. Of those prescribed, 71.4% were prescribed by an ED provider. Warfarin was the most common OAC ED prescription (64.6%), followed by dabigatran (21.0%), enoxaparin (8.0%), and rivaroxaban (6.4%). In high stroke risk patients, ischemic strokes occurred in 3.1% (40/1302) of those with OACs filled vs. 2.1% (132/6219) of those without OACs filled (p<0.01). Bleeding events occurred in less than 10 patients in this cohort of OAC filled, and in 1.4% (44/3247) of those without an OAC filled.

Conclusions: In ED patients with a new diagnosis of AF and at high stroke risk, only a minority are prescribed an OAC within 10 days. Among these patients, OAC prescribing could potentially avoid ischemic events in up to 2.1% of patients with AF. These data indicate a practice gap in appropriate OAC prescribing.

Table 1. 30-day clinical outcomes of patients discharged from the ED* stratified by CHA2DS2-VASc1, HAS-BLED2, OAC prescription fill within 10 days of AF ED visit

<table>
<thead>
<tr>
<th>Stroke Risk (CHA2DS2-VASc3)</th>
<th>Bleeding Risk (HAS-BLED2)</th>
<th>OACs4 filled, prescribed by EM provider, within 10 days</th>
<th>Overall N (n=9147)</th>
<th>Any Adverse Event4</th>
<th>Any Bleed-Related Adverse Event5</th>
<th>Ischemic Stroke6</th>
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<td>2972</td>
<td>83.6%</td>
<td>631</td>
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</table>

1CHA2DS2-VASc: congestive heart failure, hypertension, age ≥75, diabetes mellitus, prior stroke or transient ischemic attack, sex, age 65-74 years, and vascular disease. 0 in males, 1 in females = low risk for stroke, 1 in males = moderate risk, and ≥ 2 high risk.

2HAS-BLED: hypertension, abnormal renal function or liver function, stroke, bleeding, labile INR [excluded as all patients not on warfarin prior to inclusion], elderly >85yo, and drugs and alcohol7: 0 to 2 = low to moderate risk (anticoagulant could be considered), > 2 = high risk (alternative to anticoagulation should be considered).

3Includes: Warfarin, dabigatran, enoxaparin, rivaroxaban, and dalteparin. Excludes salicylic acid (aspirin).

4Any adverse event in 30 days of interest: Death, inpatient admission, any stroke, non-stroke brain bleed, GI bleed, CVA, occlusion of cerebral arteries, transient cerebral ischemia, AMI, mesenteric ischemia, thrombotic event, intracranial hemorrhage.

5Any bleeding-related AE includes: hemorrhagic stroke, CVA, non-stroke brain bleed, GI bleed.

6Ischemic stroke also includes occlusion of cerebral arteries and transient cerebral ischemia.

7Medicare allows the reporting of cell sizes > 10. Thus, certain fields were not reported.

*ED: Emergency Department.
Previously to connect with their physician. Overall, 74% of patients reported having access to a smartphone or computer, while 65% of patients reported using the internet daily.

Conclusions: Patients in observation units for heart failure identified concerns with self-care such as nutrition and exercise. Surprisingly, most patients did not report physician access or medication management as significant problems. Although patients report awareness and interest of telehealth, none had used mobile technology in their self-care. This study provides data to create a mobile technology-based intervention for patients after an observation stay for acute heart failure.

Advanced Analytics: Boarding Adjustment Factors for Key Emergency Department Operational Metrics

Taylor R, Ulrich A, Shaprio M, Oh A, Harriman D, Parwani V/Yale University School of Medicine, New Haven, CT

Study Objectives: Boarding in the emergency department (ED) is known to affect numerous operational throughput metrics (eg, length of stay, LWBS, door to doc), patient satisfaction, and patient outcomes. Quantifying and further understanding the effect of boarding on ED metrics may serve as valuable information for ED operations leaders in hospital negotiations. In this study, we aim to demonstrate the advantages of advanced analytics for daily use in ED operations, as a proof of concept, by quantifying the effect of boarding on operational metrics through time series analyses and developing local boarding adjustment factors for key ED operational metrics.

Methods: Retrospective analysis of the effect of boarding on ED operational metrics between January 2014 and July 2017 in a single site urban, academic, Level I trauma center with an annual census of approximately 90,000 patients with a single vendor EHR. For the purposes of this analysis, a boarded patient is defined as a patient who remains in the emergency department after the patient has been admitted to the facility for 4 hours. Data analysis included descriptive statistics on ED performance metrics and boarding. Continuous data are presented as means and 95% confidence intervals (CIs). Analyses were performed using the visit as the unit of analysis. To determine the effect of boarding on ED performance metrics and to develop adjustment factors, time series analysis was performed using univariate autoregression integrated moving averages (ARIMA) models with external regressors and multivariate vector auto-regression moving average models (VARMA). An autoregressive process or lag of 1 would indicate that the model takes into account the ED mean LOS of the previous shift. The adequacy of the model was analyzed using the autocorrelation function and periodogram. We used the Akaike information criteria (AIC) to select the appropriate ARIMA model. Stationarity of the ARIMA model was examined using the Dickey-Fuller and Phillips-Perron unit root tests. Portmanteau statistics were used to determine if any autocorrelation remained in the residuals of the model. Interaction terms between the shift and other covariates were examined for statistical significance to determine if key variables varied in their relationship with LOS at different times of the day. Unlike a simple structural regression model, where the relationship between dependent and independent variables is assumed static, the VAR modeling offers a more dynamic (behavioristic) approach to the nature of interaction between variables via a system of autoregressive equations.

Results: All performance metrics were significantly impacted (p < 0.05) by boarding count, except for overall Press Ganey scores (p = 0.65). For every additional increase in boarder count, overall LOS increased by 1.55 minutes (0.68, 1.50). Smaller effects were seen for waiting room LOS and treat and release LOS. The percentage LWBS and Walkouts changed by 0.07% for every additional increase in boarder count. Impulse responses indicated that the boarding shock is characterized by an increase in the performance metrics within the first day of that fades out after 4-5 days.

Conclusions: In this proof of concept study regarding the use of advanced analytics in daily ED operations, time series analysis provided multiple useful insights into boarding and its impact on performance metrics. These results strongly support the value and need for investment in advanced analytics by ED operations leaders.

Effect of Zero Diversion on Center for Medicare Patient Flow Metrics

Becker ML, Rudek T, Terrell J, Kovac H, Korman S, Hulin B, Jaber D/Aurora St. Luke’s Medical Center, Milwaukee, WI; Aurora St. Lukes Medical, Milwaukee, WI

Study Objective: Aurora St. Luke’s Medical Center (ASLMC) is the largest of four Aurora hospitals in Milwaukee County with an ED volume of 70,000 patients per year and a 30% admission rate. Prior to the initiation of zero diversion, yearly ambulance diversion was 12-15%. Milwaukee County made the decision to end ambulance diversion in April 2016. In preparation for this, the four Aurora metro hospitals decided to end diversion in November 2015. The objective of this study is to determine the effects of organizational and countywide diversion bans on Center for Medicare (CMS) patient flow metrics.

Methods: This was a retrospective observational study of all ED patients comparing five different seasonally paired time frames of pre and post diversion metrics. Institutional Review Board approved the study as a quality improvement initiative.

Results: CMS patient flow metrics were compared across 5 different seasonally paired time frames.
Conclusions: For a decade we have worked to eliminate diversion by implementing patient flow best practices. While we were successful in reducing length of stay and decreasing diversion, we were never able to fully eliminate ambulance diversion. This analysis shows improvement in CMS goals without adverse patient outcomes after introducing an ambulance diversion ban.

Table 1. Performance measures by diversion practice

<table>
<thead>
<tr>
<th></th>
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</thead>
<tbody>
<tr>
<td>Total Volume</td>
<td>28985</td>
<td>31431</td>
<td>34085</td>
</tr>
<tr>
<td>Daily Volume, Mean (SD)</td>
<td>1922 (22.6)</td>
<td>2068 (21.7)</td>
<td>2193 (24.1)</td>
</tr>
<tr>
<td>Admissions, N (%)</td>
<td>8514 (29.4%)</td>
<td>9066 (28.8%)</td>
<td>9461 (28.6%)</td>
</tr>
<tr>
<td>LWBS without AMAL, N (%)</td>
<td>913 (3.2%)</td>
<td>692 (2.3%)</td>
<td>431 (1.3%)</td>
</tr>
<tr>
<td>Mortality, N (%)</td>
<td>22 (0.08%)</td>
<td>36 (0.11%)</td>
<td>41 (0.16%)</td>
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<tr>
<td>ED OP D20 (Range)</td>
<td>10 (0-351)</td>
<td>9 (0-333)</td>
<td>5 (0-280)</td>
</tr>
<tr>
<td>ED OP D20 (Range)</td>
<td>34 (0-360)</td>
<td>21 (0-333)</td>
<td>8 (0-323)</td>
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<tr>
<td>ED OP LOS, Median (Range)</td>
<td>242 (5-1092)</td>
<td>216 (6-1019)</td>
<td>220 (6-1156)</td>
</tr>
</tbody>
</table>

Utilization of Business Intelligence Software for an Emergency Department Dashboard

Schwartz A, Silver M, Antoline M, Brodmann K/Kaiser Permanente, San Diego, CA

Study Objectives: Historically, emergency departments (ED) utilize a read-only dashboard for reporting metrics. Information retrieval and analysis from an electronic health record (EHR) database can be tedious. Previously, our ED used an SQL editor to obtain information from a clinical database. This information was placed into spreadsheet software for analysis and presentation. The spreadsheet program obtained a static copy of the information and produced a daily dashboard. ED metrics are increasingly scrutinized and predicting arrival patterns and dispositions can help with supply-demand matching and improve throughput. The static nature of traditional ED dashboards often creates the need for further inquiry into relevant data. The ability to quickly retrieve and visualize relevant information is vital to the management of a safe and efficient ED.

Methods: A novel method was utilized to obtain, analyze and display relevant information from the Kaiser Permanente EHR database. Business intelligence software was used to obtain, analyze and present information. A separate SQL editor software was no longer necessary for creation and further analysis of the dashboard and other relevant data. A master file was created using the business intelligence software which allows for a dynamic dataset from which to analyze and present relevant ED metrics. Various relevant parameters and filters were created for increased customizability. The dashboard included information from the previous 31 days and reported daily volume, admissions, left without treatment (LWOTs), door-to-room time, door-to-doc time, holding hours, arrival mode, emergency severity index, disposition, arrivals per hour and volume by week. This interactive dashboard was placed on a secure server, thereby allowing any authorized user access. Users did not need to have a license for the business intelligence software. Users had the ability to obtain more detailed data by selecting fields on the graphical interface. For example, if a mean value was reported, users had the ability to retrieve and export all discrete values utilized in the formula. Full interactive features were available on any browser or mobile device.

Results: This dashboard allowed our ED administrative team to retrieve, analyze and present relevant information in a highly customizable and interactive format. It has reduced the absolute number and time spent on SQL queries, and has facilitated our ability to visualize and process data. The accuracy of reports has improved while providing an enhanced level of detail. Outliers have been studied more easily with the ability to drill down to the source data.

Conclusions: The creation of an interactive daily ED dashboard using business intelligence software has revolutionized the way our ED and hospital administrative teams evaluate ED operations. Access to the dashboard and its source data is significantly improved by housing it on a secure server and ensuring access via any device with a browser and Internet capability. This process has provided visually appealing, accurate data that is accessible anywhere at any time. In the future, we hope to use this and similar processes to assist in internal benchmarking within our organization.
Study Objectives: In March 2016, the Aurora St. Luke’s Medical Center (ASLMC) Department of Emergency Medicine elected to begin a provider is triage (PIT) process in order to decrease the current door to provider time from 29 minutes to the Center for Medicare (CMS) top decile of 11 minutes. The objective of this study is to determine the effects of a PIT on door to provider and other patient flow metrics. The novelty in this cohort is the already low pre-implementation door-to-doctor metric compared to other studies.

Methods: Retrospective observational study comparing pre- and post-implementation metrics. Data included all emergency department patients three months before and after the initiation of PIT process. Our IRB approved the study as a quality improvement initiative.

Results: A provider in triage resulted in significant decrease in D2D time for admitted and discharged patients. Mean daily patient volumes were higher in the post-implementation period. Ambulance diversion was implemented institution wide on 11/4/2015 and county wide on 4/1/2016. The LOS metrics were not significantly different in the pre- and post-implementation periods. There was an increase in PA and RN staffing.

Conclusions: Our initial hypothesis was that the D2D and OP LOS metrics would decrease in a 1:1 ratio. The results did not bear this out. This could be due to the slight increase in volume as ambulance diversion was implemented institution wide on 11/4/2015 and county wide on 4/1/2016. We did also note some inefficiencies of provider in triage. The short initial D2D time frame did not always allow for orders to be started or the second provider would sometimes change the plan. As facilities attempt to meet the CMS flow metrics they should weigh the costs of increased staffing with metric improvement.

Study Objectives: To determine if the creation of a standard scribe script that delineates what information must be documented for every ED encounter can lead to an improvement in level of service (LOS) charges.

Methods: A community emergency department with annual volume of approximately 40,000 visits implemented 24-hour scribe coverage in October 2015. Average LOS charges remained flat in the months after this roll out. Therefore scribes, contracted from a national scribe company, were provided with a script that walked them through a typical provider note. This script delineated exactly what pieces of information were necessary for all notes, ie, past surgical history and review of systems, etc. The script provided wording that a scribe would verbalize to their provider to prompt collection of necessary detail and data. The script also contained prompts to make sure a proper differential diagnosis was documented as well as key imaging and lab values that were imperative to the providers’ medical decisionmaking. Providers were also educated, via staff meetings and emails, that the scribes would begin to ask them for information should they not obtain it during their initial patient interaction. Level of service charges were then retrospectively compared, using a two proportion z test, between the two quarters preceding implementation of the scribe script to two quarters after implementation.

Results: There was a statistically significant (p=0.001) decrease in mid-level charges (99283) and a statistically significant (p=<0.0001) increase in two of the highest reimbursing codes (99284 and 99285). Figure 1 demonstrates the change in LOS charges.

Conclusions: Development and deployment of a scribe script can lead to a significant increase in higher reimbursing evaluation and management charges in a community emergency department.
Methods: This study was an electronic survey of the 1249 emergency physicians identified through the Council of Emergency Medicine Residency Directors email listserve. The survey consisted of questions assessing the amount of education emergency medicine residents receive on treating pregnant and breastfeeding women, as well as their understanding of available references. Descriptive statistics were used to summarize demographic information. Frequencies were used for nominal variables, means and standard deviations were used for continuous variables, and confidence intervals were used to quantify the certainty concerning estimates.

Results: There were 91 respondents included in the analysis. 54.3% of respondents strongly agreed that a specific drug information resource for this patient population would be beneficial for EM residents. Those who treated pregnant and breastfeeding patients in the ED more frequently were more likely to strongly agree with a specific drug information resource in this population being beneficial (p = 0.0096). Availability of drug information resources was positively correlated with both training for EM medical residents as well as need for a specific reference. The majority of responders stated “no” or “unsure” when asked whether their residency program dedicated time to teaching residents about medication safety in this population. We note that availability of information was significantly positively associated with both training and need. As a result, the higher a respondent assessed the availability of information, the more attention was paid to addressing medications use in breastfeeding and pregnant patients. Likewise, the higher the availability of information, the higher the perceived need for an emergency department specific resource.

Conclusions: The majority of providers surveyed agreed or strongly agreed that a specific drug information resource for this patient population would be useful for their EM residents. This study suggests a need for further education for EM residents on medication safety in this population.

Human Cadaver vs Simulator Nerve Model for Ultrasound-Guided Regional Anesthesia Resident Education
Adan A, Gibbons R, Patterson J, Goett H, Dali T, Costantino T/Temple University Hospital, Philadelphia, PA; Temple University College of Public Health, Philadelphia, PA

Study Objectives: Ultrasound-guided regional nerve blocks have been shown to be a safe and effective modality for pain relief. It is a skill that is increasingly used by emergency physicians, but there is limited data on how to teach this skill set most effectively. Our goal was to assess the efficacy of cadaver-based teaching of ultrasound-guided nerve blocks versus a simulator gel-based nerve model.

Methods: Residents of all levels (PGY-1 through PGY-3) were given a presentation on ultrasound-guided regional anesthesia. They were then randomized to a cadaver or nerve block gel model to perform regional nerve blocks. Residents were surveyed to assess their comfort with performing ultrasound-guided nerve blocks as well as the educational effectiveness of the session. The survey used a Likert scale from 1 to 7. We performed independent-sample t tests to assess if there were significant differences between the two groups.

Results: 27 residents participated in the session, 13 randomized into the cadaver group (6 PGY-1, 4 PGY-2, and 3 PGY-3) and 14 into the gel model group (2 PGY-1, 5 PGY-2, 7 PGY-3). The average number of previous blocks was 2.07 in the cadaver group and 3.85 in the simulator group. There was no statistically significant difference in comfort level between the cadaver and simulator group (5.3 [SD = .48] vs. 5.9 [SD = .86]; t [25] = -2.019, p = .054) in performing ultrasound-guided nerve blocks after the session. Similarly, there was no significant difference in educational benefit (6.7 [SD = .63] vs. 6.9 [SD = .27]; t [15.9] = -1.251, p = .229).

Conclusions: There was no statistically significant difference in comfort level between the cadaver and simulator groups. This may be confounded by the fact that the simulator group contained more PGY-3 residents with a greater average number of blocks performed prior to the session. However, this data is reassuring given that nerve block gel models are more cost effective and easily accessible for educational purposes. Furthermore, residents found the activity to be extremely beneficial with a rating of 6.8, echoing the necessity of incorporating this into emergency medicine curricula.

Research Pioneers in Emergency Medicine: Advice to Education Researchers - A Qualitative Study
Coates WC, Jordan J, Clarke SG, Yarris LM, Runde D, Fowkes E, Kurth J/Harbor-UCLA Medical Center, Torrance, CA; University of California, Davis, Sacramento, CA; Oregon Health and Sciences University, Portland, OR; University of Iowa, Iowa City, IA; UCLA, Los Angeles, CA

Study Objectives: Research in basic science, translational, and clinical emergency medicine (EM) has made great strides since the establishment of the specialty. Individuals and organizations worked tirelessly to meet rigorous research standards. Research in medical education must meet appropriate methodologic standards to inform best practices and demonstrate measurable improvements in outcomes. Our objective was to identify and analyze strategies employed by EM research pioneers and seek their advice to education researchers to attain corresponding excellence.

Methods: This is a qualitative study with a grounded theory approach, using an interpretivist paradigm. Leading EM researchers in basic, translational, or clinical research who completed residency training prior to 1995 (identified by study authors and interviewees) were eligible. We used purposive sampling of sex, decade of age, and geographic distribution. Data collection ceased when thematic saturation occurred. After obtaining consent for participation and voice recording, one researcher conducted semi-structured telephone interviews that were de-identified, then transcribed by an associate. Thematic coding followed an iterative process until saturation was reached and a theoretical model was developed and analyzed. Agreement was calculated and disputes were resolved by discussion.

Results: We interviewed 10 research pioneers (all Professor rank; 7 males). Decade of residency completion: 1970s: 2; 80s: 5; 90s: 3. Five completed a fellowship. Peer reviewed publications: mean 160.5, range 40-350; All received federal funding: PI: mean 13.6, (6-50); As mentor: mean 16.4, (5-50). Thematic coding agreement: 91.5%. Pioneers valued fellowships for methodologic training and mentorship. Barriers to obtaining funding: lack of recognition of EM; no research track record; lack of training/resources. Deliberate interventions taken by the specialty to improve EM research: educational sessions at national meetings, pairing with mentors and existing networks, creation of targeted funding by EM organizations, and involvement with funding agencies. Individual success factors: availability and willingness of mentors (often outside EM); the ability to frame a research question properly as a result of advanced training or mentorship. For those currently seeking a standard research career, pioneers recommend mentorship, advanced training, and collaborative networks as keys to success. They personally facilitate research excellence by serving as or finding mentors and allocating funds or protected time to developing researchers. Their perception of research in medical education in EM is not favorable, citing a lack of rigorous methodology and failure to seek high level outcomes. Most would not read articles focused on education unless they are directly relevant to their practice. They agree that improvements can be made in education research in EM, suggesting advanced training in relevant research methods and forming research consortia to conduct generalizable outcomes-based studies.

Conclusions: Research pioneers in EM cite mentorship, advanced skills obtained through fellowship or graduate degrees, deliberate collaboration with experienced researchers, support of EM organizations, and forming networks as reasons they attained success. They advise EM education researchers to follow similar strategies, taking into account unique education research methodology.

A Survey of Best Practices for Residency Inservice and Board Examinations in Emergency Medicine
Nelson M, Calandrelli C, Sud P, Foster D/North Shore University Hospital, Manhasset, NY, LIJ Medical Center, New Hyde Park, NY

Study Objectives: Each year, leaders in residency administration question what is the best and most efficient way to prepare emergency medicine residents for both their annual Inservice Training Exam (ITE), as well as the ABEM Qualifying Exam for graduating residents. Despite the importance of these exams, there is no established best method amongst the group of residency educators. Debate continues to arise as to what is the best predictor of how our residents will perform, and what is the best strategies to allow them to succeed. The ABEM ITE score from the final year of residency’s correlation with the ABEM Qualifying examination performance is often viewed as a gold standard.
While we know from Gillen that a structured board review course may increase the knowledge base and test performance of EM-1 residents, the best strategy to ensure a residents’ success has had a wide variance amongst different programs.

**Methods:** We created an anonymous survey sent to all members on the Council of Emergency Medicine Residency Directors (CORD) listserv. The survey contained 7 questions regarding the best practices for both ITE and ABEM Qualifying Exam preparation. Questions included opinion on best predictor of scores, best adjunct tools used, as well as length of time and amount of financial support offered.

**Results:** We had 99 responses to our survey. There are a combined 222 programs, representing both allopathic and osteopathic emergency medicine programs on the CORD listserv. As predicted, 71% of the respondents felt that the annual inservice score was the best predictor of success on the ABEM Qualifying Exam. Over 70% of respondents felt that Rosh review provided the best adjunct for both ITE and board preparation. Peer Review Questions and Intra-departmental education were the next highest ranked adjuncts. Almost 80% of all programs responding offered dedicated exam preparation every year in various forms during conference. Surprisingly, two thirds of the respondents did not offer any financial support for the exam preparation. The greatest disparity came in questioning what the most appropriate amount of time needed to prepare for the Qualifying Exam. 31% of the respondents felt that residents needed over 8 weeks to adequately prepare.

Conclusions: While our survey only offers a snapshot of what EM residency directors believe, we feel it is an excellent starting point to identify best practices for our residents’ success on their training and board examinations. There seems to be a consensus within the group surveyed, that new adjuncts such as the Rosh Review may be just as effective, if not more helpful for exam preparation compared to time tested adjuments like PEER review.

While the great majority of educators feel adjuncts may be beneficial to success, two thirds do not offer financial support for board preparation. That being said, almost 80% offer their own exam preparation during didactic sessions. The survey seems to show that there actually may be consensus amongst residency educators as to what best practices for exam preparation in emergency medicine should be.

### 118 Knee Immobilizer Use in the Emergency Department

**Pendery L**/Mount Sinai, New York City, NY

**Study Objectives:** Assess the prescription of knee immobilizers by emergency department providers. Assess if educational interventions describing appropriate prescription of knee immobilizers changes the prescription patterns of emergency department providers.

Knee pain is one of the most common presenting complaints to emergency departments in the United States. Patients are frequently prescribed knee immobilizers despite not meeting adequate criteria (evidence of ligamentous instability, presence of a tibial plateau fracture, patellar fracture, patellar dislocation, acute traumatic joint effusion). Inappropriate use of knee immobilizers pose a risk of muscle atrophy, joint instability, increased risk of DVT, and prolonged patient recovery. Many providers are likely unaware of the risks posed by immobilizers and the appropriate indications for use.

**Methods:** A retrospective chart review was performed at four different urban academic hospitals in NYC using each institution’s respective electronic medical record system. Each system queried adult and pediatric patient visits in the emergency department in which a knee immobilizer was prescribed and the patient was discharged. Exclusion criteria included patients admitted to the hospital. 

Chart review was performed from January 1, 2011- December 31, 2012.

The intervention arm included lectures describing appropriate indications for knee immobilizer. The lectures were both in person and an online video format given to providers at each academic institution during March-June 2016.

There is ongoing chart review from July 1, 2016- June 30, 2017.

**Results:** Chart review from 2011 to 2012 is summarized in Table 1.

<table>
<thead>
<tr>
<th>Institution</th>
<th>Knee Immobilizers Prescribed</th>
<th>Correctly Prescribed</th>
<th>Inappropriately Prescribed</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>437</td>
<td>210</td>
<td>227</td>
</tr>
<tr>
<td>B</td>
<td>157</td>
<td>90</td>
<td>67</td>
</tr>
<tr>
<td>C</td>
<td>1055</td>
<td>535</td>
<td>520</td>
</tr>
<tr>
<td>D</td>
<td>856</td>
<td>442</td>
<td>414</td>
</tr>
</tbody>
</table>

Data collection is ongoing; however, there is preliminary data from July 1, 2016 to Dec 31, 2016, summarized in Table 2.

Conclusions: Knee immobilizer use in the ED was not indicated in almost 50% of the patients who received them. Data collection is still ongoing for part 2 of the study, but shows a trend toward a decreasing percentage of inappropriately prescribed knee immobilizers.

There are several limitations to our study including poor documentation of the physical exam or medical decisionmaking by providers may affect our results. We tried to correct for this by also reviewing radiology reports. Due to the nature of an academic institution, not all providers were the same during the two periods of chart review.

### 119 Development of a Clinical Performance Dashboard to Empower Resident Education

Sun J, Li KY, Peng P, Genes N, Chung A/Icahn School of Medicine at Mount Sinai, New York, NY

**Study Objectives:** To develop an emergency medicine (EM) resident clinical dashboard to address the need for more objective and formative feedback in medical education. This dashboard contains high-impact visual displays of select performance measures for EM residents based on data extracted from the electronic medical record (EMR).

**Methods:** This was a feasibility study conducted at a four-year EM residency program at an academic tertiary care center. Resident performance data from July-Nov 2016 were extracted from the EMR. Residents’ names were replaced with a random two-letter code (“AA,” “DE,” etc) to protect resident confidentiality. A business analytics software was used to calculate 4 performance measures, or key performance indicators (KPIs). KPIs were designed to 1) reflect state or nationally reported quality metrics; 2) represent metrics supported by the American College of Emergency Physicians (ACEP) Clinical Emergency Data Registry (CEDR); or 3) represent Accreditation Council for Graduate Medical Education (ACGME) EM Milestones. These KPIs were coded into an interactive interface to create the EM resident clinical dashboard.

Data filters were added to allow visualization based on resident training level, patient acuity, and ED location. Descriptive statistics were calculated for each KPI.

**Results:** We developed a prototype interactive clinical dashboard measuring the following KPIs: admission rate, time to disposition and time to discharge. Interactive graphs were generated for each KPI, and residents were ranked and color-coded by tertile for easy visual interpretation (see accompanying figure for example). Different colors were assigned to the top-performing tertile (lowest admission rates, shortest disposition and discharge times, and highest sepsis protocol compliance), the middle tertile, and the bottom tertile. For all patients, the average admission rate was 20% for PGY1s, 23% for PGY2s, 29% for PGY3s, and 23% for PGY4s. Average time to disposition in minutes was 358 for PGY1s, 218 for PGY2s, 226 for PGY3s, and 216 for PGY4s. Average Time to Discharge in minutes was 436 for PGY1s, 305 for PGY2s, 310 for PGY3s, and 272 for PGY4s.

**Conclusions:** In this feasibility study, we demonstrated that an EM Clinical resident dashboard can be generated from EMR data to display and manipulate resident performance measures across multiple KPIs. We hope that such a Dashboard can be further developed as an innovative tool to enhance and supplement usual feedback in order to improve resident learning and career preparedness. Future research plans include a pre-post analysis of resident behavior after incorporation of the**
Advance Directives: Applications to Clinical Scenarios

Marco C, Anderson A, Mann D, Mozalewski E, Post A, Holbrook M/Wright State University, Kettering, OH; Wright State University, Dayton, OH

Study Objective: To assess emergency department (ED) patients’ perspectives regarding advance directives and their application to various clinical scenarios.

Advance directives provide patients with a means to communicate end of life preferences if they are unable to communicate their own wishes. Examples of advance directives include do not resuscitate (DNR) orders, living will, durable power of attorney for health care and physician orders for life-sustaining treatment (POLST). These orders are commonly applied in the setting of severe disease or terminal conditions. However, the application of advance directives to unanticipated clinical scenarios is not well understood.

Methods: In this prospective survey study, eligible participants included any ED patient age 18 years or older. Participants received written education regarding advance directives and state law regarding advance directives. Participants were asked to assess their personal opinions regarding whether an advance directive would apply to 14 hypothetical clinical scenarios.

Results: The survey was completed by 271 patients (mean age 50.3 ± 18.5 years, age range 18-90+). Participants were 56% female (n=151), and 66% Caucasian (n=176). Only 21 patients (7.8%) currently had a DNR order in place for themselves. The clinical scenario for which the greatest proportion of patients thought a DNR should apply was a severe car accident with critical injuries (N =123/271; 45.6%), followed by surgery for aortic aneurysm rupture (N =121/271; 44.1%) and suicide attempt (N =111/271; 41.3%). Of note, only 36.5% of patients (N=99) believed that a pre-existing DNR order should apply in the case of cardiac arrest.

Conclusions: These results demonstrate wide variability in patient opinion and insight regarding the clinical application of advance directives. The majority of participants had little understanding of the advanced directive concept or end-of-life decisionmaking. These results underscore the importance of recognizing the complexity of end-of-life care decisions and individual communication with patients regarding personal preferences for end-of-life care.

Association Between Systemic Inflammatory Response Syndrome Criteria and Bloodstream Infections in Immunosuppressed Patients in the Emergency Department

Reichert E, Augustin D, Rozycki E, Atkins E/The Ohio State University Wexner Medical Center, Columbus, OH; Naval Medical Center, San Diego, CA

Study Objectives: The primary outcome of the study was the correlation between systemic inflammatory response syndrome (SIRS) criteria and bloodstream infections (BSI) in immunosuppressed patients who presented to the emergency department (ED).

Methods: A retrospective, cohort review of suspected septic ED patients was conducted. Patients were identified using a local sepsis alert database. Baseline vital, laboratory results, and BSI risk factors were reviewed for patients who presented to the ED. Patients were immunosuppressed if they were 18 years or older and had blood cultures drawn and antimicrobial therapy administered in the ED. Patients who were incarcerated, transferred from an outside hospital, or previously enrolled were excluded. Immunocompromise was defined as human immunodeficiency virus (HIV) with an acquired immunodeficiency syndrome (AIDS) defining illness, chronic (>14 days of active therapy) immunosuppressive or immunomodulatory agents such as glucocorticoids, calcineurin inhibitors, mannitol, or antifungal therapy with a total mTOR inhibitor or chemotherapy within 14 days of presentation to the ED.

Results: There were 245 patients included and 29 (11.8%) patients had positive blood cultures. Overall, the mean age of the patients was similar between immunosuppressed with BSI compared to immunosuppressed without BSI (54.6 ± 10.9 years vs. 55.1 ± 14 years p = 0.86), lactate ≥ 2 mmol/L (OR 3.21; 95% CI 1.42 - 7.27) and WBC <4,000 cells/mm³ (OR 0.24 95% CI 0.09 - 0.63) were significantly associated with a BSI in comparison to normal values. There was no difference in respiratory rate >20 breaths per minute (OR 1.46; 95% CI 0.67 - 3.20), heart rate >90 beats per minute (OR 0.86 95% CI 0.28 - 2.67) temperature >38°C (OR 0.25, 95% CI 0.25 - 1.25) or temperature <36°C (OR 0.31, 95% CI 0.01 - 8.04). An indwelling catheter was present in 47.2% of patients with BSI vs. 62% of patients without BSI (p = 0.17). All-cause mortality was increased in immunosuppressed patients with BSI compared to immunosuppressed patients without BSI (20.7% vs. 3.2%, p = 0.001).

Conclusions: Immunocompromised patients with BSI were less likely to meet systemic inflammatory response criteria. The presence of a lactate ≥ 2 mmol/L may be useful to identify immunosuppressed patients with bacteremia.
122 Analysis of a Multi-Center Survey to Assess Fluid Resuscitation Practice in Patients With Sepsis and Heart Failure

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Study Objectives: The recently introduced Sepsis CMS Core Measure (SEP-1) has introduced bundles for providers to the goal of improving patient-centered outcomes in severe sepsis and septic shock. Certain aspects of the bundle, however, have been met with some resistance by emergency physicians. One such requirement of the bundle requires a 30 cc/kg bolus of crystalloid fluid for all patients with hypotension or hyperlactatemia, which many providers feel may harm patients with systolic heart failure (SHF). Our objective is to evaluate emergency physicians’ knowledge, attitudes, and behaviors regarding the management of septic patients with SHF, deﬁned as an ejection fraction ≤ 40% without evidence of volume overload. The majority of questions used a ﬁve-level Likert scale, with exception of the final two questions that asked providers how much ﬂuid they would administer in hypothetical situations. Descriptive statistics were then used to analyze results and Fisher’s exact test was used to determine any statistical differences between attending physicians and trainees.

Results: 100 emergency physicians responded to the survey, of these 55 were attending physicians and 45 were trainees. Barriers and biases to ﬂuid administration in these patients included: comfort and education regarding ﬂuid resuscitation, lack of time to properly analyze responsiveness to ﬂuid administration, and low levels of nursing support. Specifical, 50% did not feel comfortable administering a 30 cc/kg ﬂuid bolus to septic patients with SHF, and 47% felt that their training discouraged this (either strongly agree or agree). 41% of emergency physicians either disagreed or strongly disagreed that nursing ratios were appropriate to properly monitor these patients and 70% did not feel they had enough time to properly reassess these patients to determine if more ﬂuid was needed. Of note, 58% of emergency physicians felt that patients with SHF should be exempt from the core measure (either agree or strongly agree). The median amount of ﬂuid emergency physicians report administering prior to the initiation of vasoactive medications is 1.3-2.0 L in patients with SHF compared to 2.1 to 4.0 L in patients without heart failure. There was no statistically different response between attending physicians and trainees to any of the questions, with the exception that trainees were more likely to agree or strongly agree that patients with heart failure and sepsis should have different mean arterial pressure goals during resuscitation (p = 0.042).

Conclusions: Numerous barriers exist to the administration of 30 cc/kg for septic patients with heart failure in the ED, particularly those related to attitudes and behaviors regarding ﬂuid administration. Future studies need to verify or refute these concerns.

123 Emergency Providers Adequately Manage Mechanical Ventilation in Critically Ill Patients With Spontaneous Intracranial Hemorrhage and Elevated Intracranial Pressure


Study Objectives: Managing mechanical ventilation (MV) is an important part of emergency providers’ skills in resuscitation, especially among patients with spontaneous intracranial hemorrhage (sICH) because of their hemodynamic parameters. The 2010 American Stroke Association suggested reduction of systolic blood pressure (SBP) to less than 160 mm Hg if presenting SBP > 160 mm Hg. A previous retrospective study of 102 patients with aneurysmal subarachnoid hemorrhage requiring MV showed that 92% had at least one episode of hypcapnia < 35 mm Hg and 58% of these patients sustained unfavorable neurological outcome at 3 months. However, no data exists about mechanical ventilation practice among emergency providers taking care of a critically ill group of emergency department (ED) patients with sICH and suspected high intracranial pressure. Therefore, our objectives were: a) to describe the general MV settings used by emergency providers in critically ill patients with sICH and suspected high ICP; b) to compare the hemodynamic proﬁles of these MV patients with those not requiring MV in the ED and their hospital mortality.

Methods: We performed a retrospective study of adult interhospital ED-transferred patients with diagnosis of sICH and receiving extra ventricular drain (EVD) during hospitalization at a quaternary academic referral hospital between 01/01/2011 and 09/30/2015. Patients were identiﬁed by International Classiﬁcation of Disease, version 9 (ICD-9 codes of 430.XX, 431.XX) and procedure code 02.21. Patients were excluded if a) not transferred directly from EDs; b) no ED records available. We used descriptive analysis for MV settings from EDs and data was expressed in median and interquartile range (IQR). Mann-Whitney U test was used to compare median values between unique groups.

Results: We electronically identiﬁed 430 sICH patients, who were interhospital transferred from 40 unique referring EDs, and received EVD during hospitalization. Three hundred twenty one (321) patients were analyzed. Fifty-six percent (181) of these patients required MV in ED but only 25% (45) of MV patients had arterial blood gas (ABG) tests after MV. Median values for tidal volume per ideal body weight (IBW), respiratory rate, peak end expiratory pressure (PEEP), peak airway pressure (Paw) were 7[6-8] ml/kg, 15[14-18] breaths per minute, 5 [5-5] and 20 [16-24] cm H2O, respectively. Median value for partial pressure of CO2 (pCO2) was 42 [35-49], MV patients had higher median tidal SBE (181[151-213]) compared to non-MV patients (163[145-193], p=0.005). MV patients had similar median SBE at departure (148 [126-170] vs 153[133-173] mm Hg, p=0.26), lower median ICP (20[15-29] vs 25[17-30], p=0.024), comparing to non-MV. However, patients with MV in the ED were associated with signiﬁcantly higher in-hospital mortality comparing to non-MV patients (30% vs 13%, OR 2.88, 95% CI 1.6-5.19, p<0.001).

Conclusions: Emergency providers adequately provide mechanical ventilation support to critically ill patients with spontaneous intracranial hemorrhage and elevated ICP requiring ventricular drainage. Although patients receiving mechanical ventilation in ED had lower intracranial pressure, they were associated with signiﬁcantly higher in-hospital mortality comparing to patients who did not receive mechanical ventilation in emergency departments. 24
Lactate as a Mortality Predictor in Emergency Department Patients With Gastrointestinal Hemorrhage

Grow KL, Nazir N, Cannon CM/University of Kansas Medical Center, Kansas City, KS

Study Objectives: The prognostic value of emergency department lactate levels has been well studied in conditions such as sepsis and trauma; however, limited data exists for its use in gastrointestinal hemorrhage (GIH). Additionally, the presence of hypotension has also been cited as predictive of mortality in GIH but the role of lactate is not defined. The primary objective of this study was to compare mortality in emergency department GIH patients using lactate as the prognostic indicator.

Methods: This was a retrospective cohort study in an urban, tertiary care teaching hospital. A total of 269 patients with GIH had lactate levels obtained between October 1st, 2008 and May 31st, 2013. Inclusion criteria were all individuals presenting to the ED with early septic shock is high. Compared to early septic shock patients without ARDS, those who developed ARDS have a significantly higher mortality rate.

Results: Of 179 subjects, 47 received invasive mechanical ventilation with P/F < 300 (26.3%). Of these 47 subjects, 17 had discordant radiology adjudications requiring panel adjudication (36.1%). Upon final adjudication, the incidence of ARDS was 12.3% (22/179). The median P/F ratio of ARDS patients was 122.14 mmHg (SD 51.2). The majority of ARDS cases were categorized as “moderate” (55%, P/F 100 - 200), followed by “severe” (41%, P/F <100) and “mild” (5%, P/F 201-300), with corresponding mortality rates of 33.3%, 77.8%, and 0%, respectively. Of note, ARDS was associated with a 3.8-fold higher 60-day in-hospital mortality rate (50.0% vs. 13.3%, p < 0.01).

Conclusions: The rate of disagreement between radiographic determinations of ARDS is higher than previously reported. The incidence of ARDS in patients presenting to the ED with early septic shock is high. Compared to early septic shock patients without ARDS, those who developed ARDS have a significantly higher mortality rate.

Figure 1 shows that hypotension in GIH is associated with increased mortality regardless of lactate level. However, in normotensive patients, increasing lactate levels can identify those at increased risk of mortality.

Table. Outcomes

<table>
<thead>
<tr>
<th>Goal</th>
<th>90 Days Before MIH</th>
<th>90 Days After MIH</th>
<th>Relative % Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>ED Visits</td>
<td>18</td>
<td>19</td>
<td>+5.6%</td>
</tr>
<tr>
<td>Observation Stay</td>
<td>95</td>
<td>106</td>
<td>+11.6%</td>
</tr>
<tr>
<td>Inpatient Stay</td>
<td>140</td>
<td>26</td>
<td>-81.4%</td>
</tr>
<tr>
<td>Length of Hospital Stay (days)</td>
<td>451</td>
<td>115</td>
<td>-74.5%</td>
</tr>
<tr>
<td>ICU Length of Stay</td>
<td>79</td>
<td>18</td>
<td>-77.2%</td>
</tr>
<tr>
<td>Primary Care Visits</td>
<td>297</td>
<td>340</td>
<td>+14.5%</td>
</tr>
<tr>
<td>Total Charges (ED, Obs, inpatient)</td>
<td>$4,538,271</td>
<td>$1,313,940</td>
<td>-71.0%</td>
</tr>
</tbody>
</table>

Study Objectives: Mobile integrated health (MIH) is a novel method of health care delivery leveraging highly trained paramedics outside of emergency response. One proposed value of MIH is to reduce repeat acute care utilization.

To determine whether a MIH transitional care strategy reduces readmissions and repeat ED visits for specific high-risk diagnoses.

Methods: This is a pilot before-after cohort study with a single intervention arm. Indianapolis EMS MIH team, together with Eskenazi Health (a county health system), targeted chronic obstructive pulmonary disease (COPD), Pneumonia (PNA), and Heart Failure (HF) patients prior to hospital discharge. In addition to the financial penalties associated with 30-day readmissions, these conditions often involve a complex interplay of medical and psychosocial issues that makes restoring health and independence difficult over time. Patients were identified by ICD-9 codes generated by case managers. Patients were approached by the MIH team, consisting of a paramedic/social worker dyad. If patients agreed to participate, the intervention consisted of: 1) Post-discharge visit (usually within 48 hours) comprised of a focused medical and social work assessment 2) Additional visits and telephone follow-up as determined by the MIH team. Initial assessments included: A) brief exam, vitals, and assessment for home safety; B) financial assessment (with follow-up financial counseling) and insurance status; C) follow up and access to primary care; D) medication reconciliation; and E) education for their medical problems. The ‘Before’ period started 90 days prior to MIH visit and ‘After’ as follow up through 90 days. Goals and outcomes for this pilot study: promote more cost-effective care, reduce ED visits and hospitalization, reduce hospital length of stay, and increase primary care visits. Analyses are primarily descriptive. Categorization of visits as ED, observation, or inpatient were based on discharge location. If a patient presented to the ED, went to observation status, then inpatient, the final category was inpatient. Charges were based on hospital charge master and do not reflect true costs.

Results: From January 2015 to March 2016, a total of 212 patients were seen by the MIH team. Of these, 51% were female, average age of 58.7 years (SD 10.3), and 50% Black or African American. The Table below shows before and after data resulting from the MIH intervention. When compared 90 days before to 90 days after MIH intervention, overall health care visits decreased 40% (253 to 151) in the first 90 days after CORE intervention, driven by a decrease in inpatient stays. This also led to a decrease in total costs. Finally, primary care visits increased after MIH intervention.

Conclusions: In this before and after study, MIH intervention was associated with reduced inpatient and ICU admissions and length of stay. As a result, total charges also decreased. MIH participants had an increase in outpatient primary care visits, as well as ED and observation visits. This pilot study supports further work regarding the potential value of the MIH care delivery model.
Study Objectives: California has 40 million inhabitants and the local EMS agencies set policy regarding DV reporting for the paramedics and EMTs within each county. It is unclear how many EMS agencies have written policies for DV reporting or even if there is unifying agreement about paramedics and EMTs being mandated reporters under California law. Methods: This was an IRB-approved survey sent by electronic methods to each of 31 local EMS agency medical directors in California to assess their policies and knowledge of California state law regarding mandated reporting by EMS personnel. Results: 26 of 31 California EMS agencies responded (83.9% response rate). Of the 26 respondents, only 7 (26.9% [95% CI 11.6%-47.8%]) stated they have written policies/protocols for reporting suspected victims of domestic violence, 18 (69.2% [95% CI 48.2%-85.7%]) stated they had no protocols in place. One agency was ‘unsure.’ If a victim is not seen by law enforcement or transported, only 9 agencies stated those victims are reported to a law enforcement agency. Eight agencies stated they weren’t and 9 were ‘unsure.’ Of the medical directors, 19 (76% [95% CI 52.2%-88.4%]) stated paramedics were mandated reporters of DV in California, 5 (20% [95% CI 6.6%-39.4%]) were unsure and 1 (4% [95% CI 0.1%-9.6%]) said no. Fifteen respondents (60%) (26.9% [95% CI 11.6%-47.8%]) stated EMTs were mandated reporters, 7 (26.9% [95% CI 36.9%-76.6%]) were unsure and 3 (12% [95% CI 2.4%-30.2%]) said no.

Conclusions: There is wide variation in practice among EMS agencies in California regarding mandated reporting requirements. While most Medical Directors state there is a legislative requirement for Paramedics and EMTs to report Domestic Violence victims, only 7 agencies state they have protocols and policies in place for reporting. Only 9 agencies state the victims are reported to law enforcement if they are not transported (ie. sign out against medical advice).

The Prevalence of Domestic Violence Reporting Among EMS Agencies in California
Hern HG, Jr, Larkin H, Mekonnen K, Sporer K/AHS - Highland Hospital, Berkeley, CA; AHS - Highland Hospital, Oakland, CA; Alameda County EMS Agency, San Leandro, CA

The Quick Organ Failure Assessment Identifies Septic Patients in the Out-of-Hospital Setting
Barbara P, Graziano C, Caputo W, Litvak I, Battinelli D/Staten Island University Hospital Northwell Health, Staten Island, NY

Study Objectives: The primary objective is to determine whether a-out-of-hospital quick Organ Failure Assessment (qSOFA) screening obtained by emergency medical services (EMS) providers correlates with emergency department (ED) sepsis diagnosis.

Secondary objectives were to evaluate characteristics of the out-of-hospital qSOFA cohort as related to sepsis. This included EMS call information, patient demographics (age and sex), measured systemic inflammatory response syndrome (SIRS) criteria, lactate, placement of central venous access, and ED mortality.

Methods: An initial qSOFA score was calculated when the respiratory rate was greater than 22, systolic blood pressure (SBP) is less than 90 mmHg, and there is an altered mental status (AMS). A retrospective hospital-based 911 EMS chart review was conducted for patients received at the hospital campus sites. The study period was 1/1/2014 to 6/30/2014. Out-of-hospital charts were filtered for the 2 vital sign criteria for qSOFA and matched with their respective ED charts by identifiers. The EMS charts were reviewed for out-of-hospital documentation of SIRS by any of the following criteria: Glasgow Coma Scale under 15, APV score of V P or U, Chief Complaint of AMS, AMS documented by provider, Individual EMS chart review. EMS charts were excluded for patients less than 18 years, inqSOFA documentation, or patients in cardiac arrest who did not achieve return of spontaneous circulation. Additionally, duplicate or non-911 charts were removed.

Researchers blinded to ED outcome performed EMS chart review.

ED charts were reviewed to clarify which out-of-hospital qSOFA patients were septic vs. non-septic. Septic patients were defined as an admit diagnosis of: sepsis, severe sepsis, septic shock or if the patient met more than 2 SIRS criteria and a documented infection.

Researchers blinded to EMS chart performed ED outcome review.

Results: Within the study period, 271 EMS charts met the filter criteria for 2-value qSOFA. Of these, 28 were excluded as inter-facility transfer calls, leaving 243 true 911 responses remaining. AMS was not documented in 162 of the 243 leaving 81 remaining as screening positive for 3-value out-of-hospital qSOFA.

Nine of 81 charts were removed due to insufficient ED documentation, leaving 72 for analysis. Forty-eight of the 72 patients were identified as ED Septic and 24 ED Non Septic. The positive predictive value of the out-of-hospital qSOFA in our study was 66.67% (95% CI 55.8%-77.6%).

The ED septic cohort had a higher average number of SIRS criteria vs. non-septic: 2.67 vs. 1.41 respectively. Lactate values were equivalent at 4.10 vs. 4.06. Of the 53 patients that met > 2 SIRS criteria in the ED, 81.1% were Septic.

Sensitivity, specificity, receiver operating curve (AUC), positive and negative likelihood ratio (LR+ and LR-) were calculated for the qSOFA scores.

The ED septic cohort had a higher average number of SIRS criteria vs. non-septic: 2.67 vs. 1.41 respectively. Lactate values were equivalent at 4.10 vs. 4.06. Of the 53 patients that met > 2 SIRS criteria in the ED, 81.1% were Septic.

Conclusions: The qSOFA is a useful screening tool that requires no formal testing or equipment and can be used to identify patients who require prompt intervention and resuscitation. Sepsis remains a diagnostic difficulty for EMS providers due to absence of obvious findings. Vital signs and mental status are ubiquitously recorded by EMS. Close attention to derangements of these assist in the identification of critically ill patients. A positive qSOFA should prompt rapid ED evaluation. Additionally, the qSOFA likely has high inter-rater reliability, requires no special devices or equipment and can be repeated as needed during a call.

Table 1. Test Characteristics of Three Sobering Center Screens.

<table>
<thead>
<tr>
<th>Criterion</th>
<th>Sensitivity % (95% CI)</th>
<th>Specificity % (95% CI)</th>
<th>AUROC</th>
<th>PPV % (95% CI)</th>
<th>NPV % (95% CI)</th>
<th>LR+ (95% CI)</th>
<th>LR- (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Baltimore</td>
<td>59.1 (36.4-79.3)</td>
<td>52.6 (42.1-63.0)</td>
<td>0.56 (0.46-0.65)</td>
<td>22.4 (12.5-35.3)</td>
<td>84.8 (73.0-92.8)</td>
<td>1.25 (0.8-1.9)</td>
<td>0.78 (0.5-1.3)</td>
</tr>
<tr>
<td>Brown</td>
<td>59.1 (36.4-79.3)</td>
<td>64.2 (53.7-73.8)</td>
<td>0.62 (0.52-0.70)</td>
<td>27.7 (15.6-42.6)</td>
<td>87.2 (70.9-94.0)</td>
<td>1.65 (1.1-2.6)</td>
<td>0.64 (0.4-1.1)</td>
</tr>
<tr>
<td>San</td>
<td>50.1 (17.9-91.8)</td>
<td>11.6 (5.9-19.8)</td>
<td>0.51 (0.42-0.61)</td>
<td>19.2 (12.2-28.1)</td>
<td>84.6 (54.9-98.1)</td>
<td>1.03 (0.86-1.20)</td>
<td>0.79 (0.39-3.29)</td>
</tr>
<tr>
<td>Francisco</td>
<td>63.6 (40.7-82.8)</td>
<td>64.2 (53.7-73.8)</td>
<td>0.64 (0.55-0.73)</td>
<td>29.2 (17.0-44.1)</td>
<td>88.4 (78.4-94.9)</td>
<td>1.78 (1.2-2.7)</td>
<td>0.57 (0.3-1.0)</td>
</tr>
</tbody>
</table>

Area under the receiver operating curve = AUROC, PPV = positive predictive value, NPV = negative predictive value, LR+ = positive likelihood ratio, LR- = Negative likelihood ratio.
receiver operating curve (AUROC). The AUROCs of the three screens and the triaging provider’s gestalt were compared using Delong’s method with Bonferroni’s correction.

Results: 117 of 198 subjects enrolled during the study period had records, allowing for comparisons among the screens. There were no significant differences in demographics or vital signs between those included in the analysis and those who were not. Subjects had a mean age of 50.1 ± 11.7 years, were predominantly male (90.6%), and stayed an average of 10.6 ± 6.1 hours. 24.7% had abnormal vitals and providers thought 40.2% needed treatment in the ED. 34.5% had their blood alcohol concentration measured, with an average result of 288.8 ± 159.2 mg/dL. 81.2% of patients were discharged or elapsed. The San Francisco screen had the highest sensitivity (90.1%) and provider gestalt performed had the highest AUROC (0.64) (Table 1). The AUROC of the screens were not significantly different from each other (p-value>0.05 for all comparisons).

Conclusions: Provider gestalt was as accurate as any published screen at identifying which patients could be safely triaged to a sobering center instead of an ED.

130 A Better Way to Monitor Intravenous Infusions Away From an Outlet?
Coupenerus K, Krniecik K, Kang C/Madigan Army Medical Center, Tacoma, WA; Madigan, Tacoma, WA

Study Objectives: Intravenous (IV) administration of fluids and medications are a significant part of patient treatment. They are classically set through gravity with roller clamps and drip counts, or smart pump technology. In the austere environment both of these have respective limitations such as accuracy, weight, and need for power. The DripAssist™ device we investigated monitors drip rates by counting drops in the IV tubing drip chamber. It securely attaches to IV tubing, is small, weighs 3.0 oz., lasts 290 hours on a single AA battery, and will alarm for a +/- 13% change in rate from the set rate. We theorized this may provide a useful patient safety bridge in the austere, out-of-hospital, or battlefield patient care environments.

To compared perceived ease of use in comparison to traditional roller clamp methods. We also explored perceived functionality for use in austere, out-of-hospital, battlefield or power outage environments.

Methods: The protocol was IRB approved, prospective, and designed as a pilot study. It involved 28 Madigan Army Medical Center Emergency Department personnel. Each participant was timed while setting three normal saline infusions at specific rates. Participants were then asked to fill out a survey.

Results: Most participants thought the DripAssist was easy to set up, understand and were confident in their ability to use it after limited training (4.8/5, 4.7/5, 4.7/5). Compared to IV infusion pumps participants thought it was slightly easier to use (3.7/5). In comparison to traditional roller clamps EMTs/paramedics and Army medics in the study found the device neither easier nor harder to use (3.1/5, 3.6/5) whereas nurses and physician assistants found it much easier to use (4.6/5, 4.8/5). Nurses and physician assistants were more likely to see potential for the device in out-of-hospital/austere environments (4.6/5, 4.8/5) than EMTs/paramedics and Army medics (3/5, 3.6/5). Average time to completion of the 83ml/hr, 125ml/hr and 250ml/hr drips were 68, 120, and 114 seconds respectively.

Conclusions: Our pilot study demonstrated that various levels of health care personnel thought that the DripAssist device was easy to use. Increased perceived accuracy, safety and applicability to austere/out-of-hospital/battlefield care was highest among nurses and physician assistants whereas EMTs, paramedics and Army medics had less positive perceived benefits. The DripAssist device may offer a safe, low-weight, functional tool through which to improve care in a variety of resource-limited environments.

131 Ultrasonographic B Lines are a Common Result of SCUBA Diving Exposures
Ray K, Williams S, Sanders R/Nova Southeastern University, Ft. Lauderdale, FL; Baylor College of Medicine, Houston, TX; University of Texas Medical Branch, Galveston, TX

Study Objectives: Immersion pulmonary edema (IPE) is a rare but life-threatening complication of diving, where fluid shifts to the lung become pathologic. In this study, we aim to better classify the normal physiology of diving by determining the occurrence of B lines in the lungs resulting from commercial diving work at NASA’s Neutral Buoyancy Laboratory (NBL) using ultrasound (US). These findings help to broaden the understanding of the occurrence of IPE.

Methods: In this controlled, prospective study, a chest ultrasound (US) was used to evaluate for the baseline presence and resultant occurrence of B lines in divers working at the NBL. Each US study was performed by one of two board certified emergency physicians with ultrasound fellowship training, serving as co-investigators. The US evaluated 12 intercostal points on the anterior, lateral and posterior aspects of the chest wall. Each subject had an US examination prior to entering the pool, followed by a second US examination by the same investigator within 30 minutes of leaving the pool. The number of B lines (B line score) in each of the 12 predetermined points was recorded in real time, and any increase in the number of B lines was considered a positive study. Each US clip obtained was later reviewed by the other co-investigator.

Results: A total of 50 pre- and post-US studies were completed during the study period. The B line score was 0.02 ± 0.14 pre-dive and 0.66 ± 0.77 post dive (p<0.001). One pre dive US was positive with one B line in one intercostal space; all other US scans were negative. Of the 50 post dive US scans, 24 were positive with 1-2 B lines in at least one intercostal space. Seven of the positive studies had B lines in 2 intercostal spaces and the remaining 17 only in one intercostal space. None of the divers had complaints of shortness of breath or coughing at any time during the study.

Conclusions: Immersion pulmonary edema has been described in less than 2% of swimmers and divers and is characterized by rapid onset of shortness of breath and cough. From our results the presence of two B lines or less in one intercostal space (likely resulting from pulmonary fluid shifts from immersion) could be viewed as a normal, transient, physiologic process in commercial divers and was not associated with symptomatic IPE. Further study of US in symptomatic divers may yield the usefulness of field US in the diagnosis and treatment of IPE.

132 Tracking the Opioid Epidemic Through the OHDSI Collaborative
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Study Objectives: Emergency departments in the United States (US) are in the midst of an opioid epidemic (OE), with more than half of overdose deaths in 2014 attributable to opioids. The US consumes 80% of the world’s supply, and contributes to growing concern of an international crisis. A lack of standardization and inadequate drug monitoring complicate the comparison of opioid overdose (OO) rates between countries. This study serves as a proof of concept on single site data, that in the future could compare the rate of OO through sites connected by the Observational Health Data Sciences and Informatics (OHDSI) collaboration. OHDSI is a network of sites sharing patient data standardized to the OMOP Common Data Model from over 600 million patients in 11 countries. This allows for the comparison of OO rates from various sites that participate with OHDSI, potential characterization of the true nature of the OE, and may elucidate whether concerns of a global opioid crisis are founded. By demonstrating the feasibility of these methods, we hope to then characterize the OE through international results.

Methods: The OHDSI collaborative at a single urban US hospital was queried to establish the ratio of OO compared to annual census. Poisson regression was used to determine significance of a positive trend. A study cohort was generated for patients who had clinical documentation for the 90 days before and after their OO event. Similar criteria were used to create a control cohort for patients with any new condition, excluding OO. Demographics and frequencies of conditions associated with OO and controls were calculated. To maintain patient privacy, only counts were included in results and limited to counts greater than 10. A disproportionality analysis (DA) was performed between OO’s and controls to determine odds ratios (OR) of OO associated with each condition.

Results: From 2006 to 2015 there are a total 502 OO visits compared to 9,498,646 total patient visits. Poisson Regression indicates that the increase in the annual rate of OO is statistically significant (p<0.001) with an average rate ratio of 1.09 per year. There are 379 (75.5%) OO patients and 281,474 (2.96%) control patients. Demographics and frequencies of conditions associated with patients diagnosed with OO are founded. By demonstrating the feasibility of these methods, we hope to then characterize the OE through international results.

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gastroparesis (OR 65, 95% CI 38-109) and bipolar disorder (OR 30.77, 95% CI 23-41). Conclusions: Rates of OO and characterization of overdose can be investigated through ODHSI. Single US site data shows overdose is increasing approximately 10% annually. DA has demonstrated prior overdose increases odds of OO; however, additional conditions including gastroparesis and bipolar disorder also demonstrate increased odds of OO. In the future, we will generate similar DA’s for medications and procedures, all of which could be compared internationally. Further studies through ODHSI will aid in the understanding of the US OE, generate potential indicators for OO, and allow for the comparison between the US and international sites to better understand the risk of a global crisis.


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Study Objectives: Radio-frequency identification (RFID) technology is a wireless system that allows for automatic collection of location data for tagged entities such as people or equipment. Health care is beginning to utilize RFID in several ways, including real-time location services (RTLS). In order to meaningfully interpret RFID data in real time within a clinical setting, a reliable measure of sensitivity and precision must first be established. No standardized manner currently exists. The purpose of this study is to develop a novel method for measuring the sensitivity and precision of real-time location RFID data in a clinically relevant manner.

Methods: The study was conducted at a 76-bed quaternary, academic emergency department (ED) with 75,000 annual patient visits. The RFID system includes 194 in-ceiling, passive RFID readers with 734 antennas covering 212 locations in the 54,450 square foot ED and adjacent emergency radiology space. ED personnel, ED patients and certain ED equipment are tagged through ID badges, wristbands, and adhesive tags, respectively. RFID location and time data are collected and aggregated, and then programming logic and filters reduce the various readings into discrete locations within the department and are reported. To determine sensitivity and precision of RTLS, two methods were designed: a “depth and duration model” and a “serpentine model,” i.e., standardized sequence of entering and exiting multiple exam rooms. These models were designed to replicate how staff and patients flow within our ED. To test these models, several tags were worn while repeatable movements were performed.

Results: Depth and Duration Model.

Using the depth and duration model to assess different locations within the patient room for different intervals of time, it was found that standing at the foot of the patient bed for a duration of 20 seconds satisfied clinical relevance while having an accuracy of ≥98%.

Serpentine Model

Modeling staff movement within the ED using serpentine testing, tags in patient rooms had a sensitivity 91% and a precision of 96%. Tags in hallways had a sensitivity of 75% and precision of 94%. Tags in staff pod work areas had a sensitivity of 97% and precision of 97%. In the remaining areas of the ED such as storage alcoves, tags had a sensitivity of 91% and precision of 80%. Together, all areas assessed using the described framework showed an overall precision of 93%.

Conclusions: We describe a novel, systematic framework for the practical assessment of RFID sensitivity and precision in the clinical setting. Using this depth- and duration and serpentine testing design, we can assess our current RFID location system, allowing us to report the precision when using RFID for clinical research and to test how future physical or programming changes affect our system’s function.

134 Characterization of Emergency Department Abandonment Using Real-Time Location System


Study Objectives: Left without being seen, also known as abandonment in emergency departments (EDs), is a major problem. In some cases, patient needing care for critical conditions may find themselves in emergency departments with long waits and end up abandoning before being seen. Traditionally, EDs are unable to capture exact departure/abandonment times, thereby unable to best understand patient tolerance levels to delays. This raises the following questions: 1) What are actual abandonment times? 2) How much is the discrepancy of capturing abandonment using traditional methods? Knowing such information can aid better triaging and inform modifications to the existing triage processes. Hence, the overall objectives of this study were to use location services technology to quantify actual abandonment times and discrepancies with existing methods.

Methods: Site and technology: The institution, a large academic medical center in the Midwestern United States instrumented the ED clinical space with Radio-frequency Identification (RFID) readers in the ceilings. Patients arriving at the ED are registered with RFID wristbands. The team developed in-house real time location system (RTLS) software, that takes the timestamps and presents it, both for real-time search/locate functionality as well as, retrospective analytics. Data on all patients who abandoned the ED after registration in 2016 were collected. Timestamps of the EMR was compared against RTLS timestamps. Measures: Pre-RTLS abandonment was computed as the duration between the patient registration and the earliest time when the nurse notices the patient as being absent. Post-RTLS abandonment was computed as the duration between patient registration and the timestamp of patient physically leaving the ED waiting area (last known timestamp recorded) from RTLS system.

Results: A total of 1,181 patients abandoned the ED during the timeframe of the study. Actual abandonment times had a mean of 58 minutes (median 68 and SD 194). Among those patients abandoning the ED, the 17:00 hour had the maximum rate at 12 percent, followed by the 18:00 hour at 11 percent. Hours 3:00 and 5:00 had the least rates at 0.3 percent. Five hours spanning 16:00 through 21:00 accounted for almost 50 percent of the abandonments. As for day of week, Tuesday had the most abandonments, and weekends had the least. Among months of the year, August had most abandonments, followed by July and September, and January had the least rate. The number of patients waiting in the waiting area varied, and based on the retrospective analytics, on the average there were 13 (median 13 and SD 7) patients in the waiting area when patients abandoned. As expected, traditional methods overestimated the time before abandonment for every patient in the entire cohort, causing a discrepancy. The discrepancy had an average of 92 minutes (median 70 and SD 111).

Conclusions: ED abandonment is a major issue in various hospitals having detrimental effects on patient care, safety and patient experience. While this is of significant importance, lack of objective data has inhibited studies and design of interventions. This study leveraged real-time location system to characterize accurate abandonment rates and discrepancy with traditional methods. Future, studies will plan to focus on identifying key predictive factors affecting abandonment (such as number of patients waiting, etc) to design interventions.

135 Interface Design Dividing Physical Findings Into Medical and Trauma Findings Facilitates Clinical Document Entry in the Emergency Department: A Prospective Observational Study

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Study Objectives: The interface design and its effect on workflow are key determinants of the usability of electronic medical records (EMRs) in the emergency department (ED). However, whether the overall clinical care is improved by dividing the interface design of physical findings into medical and trauma findings is unknown. We previously developed an EMR system in which the checkpoints were separated into different sections according to the body part. Herein, we modified this EMR system by remaking the interface design specifically for trauma patients, and evaluated its performance.

Methods: This study was undertaken in a single-center ED between October 2014 and September 2015. In the modified EMR system, all trauma findings are displayed together on the screen, according to the Japan Advanced Trauma Evaluation and Care. We compared the time to finish documentation entry and the length of ED stay between the previous (used in the first 6 months) and current systems (used in the latter 6 months). Furthermore, we stratified the patients by triage levels.

Results: The study involved 2141 patients (934 and 1207 assessed using the previous and modified EMR systems, respectively). The modified EMR in trauma patients significantly decreased the time to final documentation entry from 135 [interquartile range, 85-203] to 112 [73-167] min (p=0.006). When stratifying...
trauma patients by triage level, significantly shorter clinical documentation times were observed with the modified EMR system in levels 2 (emergency) and 3 (urgent).

Conclusions: Using different interfaces for trauma findings shortened the time for clinical documentation for trauma patients.

**136 Can Conventional Discharge Instructions Engage Patients in a Post-Emergency Department Visit Telemedicine Follow-Up Program?**

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Study Objectives: Given widespread difficulty obtaining timely access to primary care following emergency department (ED) use, we explore patient follow-up characteristics and preferences after information regarding a telemedicine follow-up program was added to standard discharge instructions.

Methods: We conducted a prospective cohort study of adult patients referred to telemedicine follow-up at a single, urban academic center between September 2015 and November 2015. Referral was made at the discretion of the ED providers, who received basic education and information about the telemedicine program, called ConnectER (secure live audio-video consultation with an emergency physician for a flat fee of $35). A referral took place when information about the program was included with the patient’s printed discharge instructions. The usual discharge process remained in place, including the provision of printed instructions after brief verbal instruction from both the treating physician and the discharge nurse. All patients referred to the ConnectER program were contacted by phone between 2 and 4 months after their visit to assess follow-up characteristics, as well as knowledge and impression of the telemedicine program. Follow-up visit location was confirmed by review of both the ambulatory electronic medical record and regional health information exchange.

Results: A total of 122 patients were referred to the ConnectER program. 73 completed the phone survey, a completion rate of approximately 60%. Of all patients referred to the ConnectER program, 35 (29%) had no follow-up visits, 3 (2.5%) used telemedicine/ConnectER, and 35 (29%) followed up at other locations, including 15 (11%) individuals who returned to an ED or urgent care center; 90% of patients who had no follow-up and 48% of patients with other follow-up reported they were unaware of the ConnectER program. Of those who had other follow-up, 73% reported they would have chosen telemedicine if they had been aware of this option. However, among those with no follow-up, the number was significantly less, only 20% of these patients said they would have chosen telemedicine if they had been aware of this option (p=0.0046).

Conclusions: Many patients who sought follow-up care and received printed discharge instructions on telemedicine reported they were unaware of the telemedicine program. This may reflect limited review of discharge materials by the patients themselves, limited education by ED staff or impaired recall. Since many patients expressed a willingness to consider telemedicine once aware of this option, novel approaches to improve patient education and engagement should be studied.

**137 Optimal Scheduling: Using Technology to Drive a Workload-Based Scheduling Model for Emergency Department Pharmacists**

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Study Objectives: Since inception of emergency department (ED) clinical pharmacy services in our facility in 2007, ED pharmacist (EDP) staffing has remained unchanged, despite significant increases in patient volumes and acuity. Over the course of this time, the EDP role has expanded, leading to EDP burn-out. There are no published data regarding methods to quantify EDP workload and optimize scheduling. We hypothesized that due to current wholesale pricing, optimizing opiate supply to match prescribing demand in the ED would increase costs. The objective of this study was to utilize scenario-based analyses to examine the relationship between wholesale opioid pricing and opioid waste in the emergency department.

Methods: We conducted a cross-sectional analysis of ED medication orders between December 2014 and December 2015 in three EDs, one a tertiary ED, one a urban, community ED and one a suburban, free-standing ED. We included all medication orders for intravenous hydromorphone, and morphine. We then collected average wholesale pricing (AWP) data for various dosages of hydromorphone, and morphine via Red Book®, produced by Micromedex®. The primary outcomes were total waste defined as the sum of differences between the dose ordered and the stocked vial of the medication used and the total annual cost of medication used. We utilized a scenario analysis algorithm in which vials were selected and allocated for each provider order. In the price optimization scenario vials were selected to minimize the cost of the order, selecting the most inexpensive option without concern for waste. In the waste optimization scenario, vials were selected to minimize the amount of unused medication after the provider order was delivered.

Results: Of 40,258 total intravenous opioid medication orders, morphine was more commonly ordered than hydromorphone (56% vs 29%). Among all orders, 10,015 hydromorphone orders (85%) resulted in waste while 7,866 morphine orders (35%) resulted in waste. In the base case scenario (current state), the total waste was 43,774.99mg (53%), in 21,288 instances and the total cost for opioid medications used was $175,221.00. In the price optimizing scenario the total waste was $56,171mg (57%) of medication waste in 23,131 instances with total cost of $139,563.10. In the waste optimization scenario, the total waste was 15,612.99mg (23%) of waste in 9,232 instances and the total cost was $161,798.80.
Conclusions: Current average wholesale pricing of intravenous opioids may contribute to the magnitude of controlled substance waste. Supply optimization could reduce waste by 60% and save approximately $13,422.20 across 3 EDs in one health system in one year. In addition, hospitals should consider indirect cost savings achieved by utilizing supply optimization, including the nursing time saved with the reduction in the number of instances of drug waste. With the continuing rise in opioid abuse and related overdose deaths it is important that health care systems recognize supply driven concerns and consider risk mitigation strategies in the broader opioid epidemic.

139 Successful Initiation of an Emergency Department-Based HIV and HCV Screening Program
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Study Objectives: In May 2016, we initiated an ED-based age-cohort screening program for HIV/HCV based on 2006 revised CDC guidelines at Tampa General Hospital, then expanded our age-cohort for HIV screening to include young IVDU with a goal of maintaining seropositivity rate >= 6%. To accommodate this high volume testing, our process focused on taking the burden off providers by utilizing existing tools within our EMR (Epic).

Methods: Initial involvement of risk management, IT, ED registration, laboratory, hospital executives, ED nursing staff, and providers at frequent periodic development retreats to discuss and refine our process led to buy-in across disparate groups of service lines and leaders. Our commitment to minimal workflow impact in our design led us to develop best practice alerts and automated testing, creating a cultural shift towards support of the large-scale new initiative. We track daily testing as a percentage of total ED volume with test cancellations and patient opt-outs to monitor variation within the system.

Results: One year from our program’s inception in May 2016, we now consistently test approximately 1,400 patients/month for HIV & HCV (using our expanded age range) – or about 100 ED patients/day. About 85,000 patients visit our ED and the prevalence of unknown disease may be as high as 0.3% for HIV (1.35% seropositivity in screened group, 230 HIV+/2016-17) & 1.8% of all ED patients with HCV (8% seropositivity in screened population, 642 HCV Ab+ 2016-17). In 2017-2018, approximately 34,000 patients will be screened for HIV &/or HCV at TGH. In 2016-2017, we initially estimated we would conduct approximately 24,500 screening tests (17,000 HIV and 7,500 HCV). We met 86% of our total screening goals and completed over 21,000 screening tests (10,556 HIV and 10,500 HCV).

Conclusions: We recommend frequent process review and early engagement of disparate hospital groups to ensure buy-in as well as open communication with frontline workers to minimize workflow impact and increase testing success. Harnessing existing EMR processes and integrating new electronic alerts into workflow also ensures maintenance of ED patient volume and quality of care. The creation of quality and operational reports to track BPA success and compliance assists in appreciating existing EMR processes and integrating new electronic alerts into workflow line workers to minimize work

140 Patient Understanding of Peak Emergency Department Hours and Busiest Days of the Week
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Study Objectives: Patient visits for non-emergent conditions contribute to emergency department (ED) crowding. While it is intuitive for consumers to predict peak visits for non-medical businesses (eg, lunchtime/fast food restaurant), high volume ED periods may be less obvious to patients. We conducted a cross-sectional study to determine the proportion of patients who could identify peak day/periods for our ED volume.

Methods: Prospective, cross-sectional study design. Stable patients enrolled at an inner-city ED (convenience sample) completed a written survey/provided acuity self-assessment. Patients asked to identify week’s busiest days and 6-hour time periods. Volume statistics provided by electronic tracker. Categorical data analyzed by Chi-Square; 95% CIs provided. Multivariate logistic regression performed. Primary outcome parameter was proportion of patients reporting that they would have changed presentation time if aware of less busy times.

Results: 379 patients enrolled; 54% female, age 41.1±13 years, 71% Hispanic race, 64% income <$20,000, 15% private insurance, 56% had primary care MD (PCP). 41% (95% CI: 37-47%) of patients would come at a different time if they knew the ED was less busy. Many patients rated complaints relatively minor (CCRM): 25% (95% CI: 21-30%) wanted check up, 26% (95% CI:22-31%) rated problem as needing to be seen <7 days. 60% (95% CI: 54-66%) of CCRM patients willing to take PCP appointment within 24 hours.14% (95% CI: 11-18%) of study group correctly identified Monday as ED’s busiest. 5% (95% CI: 3-7%) of study group correctly identified Sunday least busy. Multivariate logistic regression revealed increasing age (p=0.02) associated with correctly identifying busiest day; other study variables (SV) were: sex, income, insurance, Hispanic race, acuity, and willingness to take a PCP visit <24 hours. 14% (95% CI:11-18%) of study group correctly identified the 9A-3P as busiest ED period of the day. Multivariate logistic regression revealed that SV including age were not associated with correctly identifying the busiest time of the day (p=0.47).

Conclusions: Only 5% of the study group identified the least busy ED day and 14% the busiest ED periods. Future research should examine the ED flow impact of providing local patients/public with more information about peak volume periods.

141 Frequency and Effect of Interruptions on Resident Workload in the Emergency Department
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Study Objectives: Quantify the frequency of interruptions and effect on resident cognitive workload in an academic emergency department (ED).

Methods: Emergency medicine (EM) residents of varying post-graduate year (PGY) were directly observed during 8-hour clinical ED shifts by experienced health systems researchers. Interruptions were classified by type (face-to-face, phone call, page, environmental, patient care demand, technology); priority (high, medium, low), and location (eg, staff work station, patient room) using a validated tablet PC-based tool. Residents completed subjective assessments of mental demand task complexity, temporal demand, distractions, situational stress, and physical demand using the NASA-Task Load Index (TLX) and reaction time tests at the mid- and end of shifts.

Results: Twenty-three resident shifts (PGY1=8, PGY2=8, PGY3=7) were observed in the ED. There were 2132 interruptions (M=11.6 interruptions/hour, SD=3.29). The average duration of an interruption was 37.5 seconds. More than 12% of clinical time per shift was spent on interruptions (3.5% high priority, 7.8% medium priority, 1.3% low priority). Face-to-face nurse communication (24.7%), face-to-face physician communication (21.4%), and face-to-face other communication (12.9%) interruptions were the most prevalent interruption types experienced by residents. Approximately three-quarters (77.9%) of interruptions were of medium priority, followed by low priority (15.6%) and high priority (8.5%). The
majority (83.7%) of interruptions occurred in the staff work station and 10.7% in the patient room. There was a significant difference in the number of interruptions experienced by PGY level ($F(2,20)=5.4, p<0.01$). EM PGY3s faced more interruptions ($M=14.4$ interruptions per hour, $SD=2.9$) than PGY2s ($M=11.0, SD=2.59$) or PGY1s ($M=9.8, SD=2.83$).

NASA-TLX scores were universally higher at the end of the shift across all 6 dimensions (Figure 1); however, significant increases were only observed for mental demand ($p=0.02$) and physical demand ($p=0.01$). Reaction times were not significantly higher at the end of the shift compared to the beginning of the shift ($p=0.34$). No significant differences were observed in performance scores or reaction times with different interruption loads per shift.

Conclusions: Residents experienced more interruptions than reported in the literature. Nearly one hour of residents’ clinical time was spent dealing with interruptions. The majority of interruptions were face-to-face communication with other health care team members, of medium priority, and occurred at the staff work station. PGY3 EM residents faced significantly more interruptions than their counterparts, which could be reflective of increased responsibility as residents gain seniority. Overall, residents revealed increasing cognitive demand and slower reaction times over the course of the shift. Higher powered studies may be needed to detect differences in performance scores and reaction times with different interruption loads. Further work is needed to assess the positive and negative implications of interruptions on resident workload and what interventions will be most effective to minimize interruptions that occur in the ED workspace.

Figure 1. Average EM resident NASA-TLX scores at mid-point and the end of shift. **p<0.05

142 Septic Shock Patients More Likely to Be Transferred to ICU from Floor

Study Objectives: To determine whether the type of shock (severe vs. septic) influences whether patients are transferred to the ICU after initial admission to a non-intensive care unit.

Methods: This was an observation cohort study from July 2016 to March 2017 with severe sepsis and septic shock. Severe sepsis was defined as organ dysfunction, hypoperfusion or hypotension (systolic blood pressure of less than 90 mmHg or a rapid decrease from baseline). Septic shock was defined as persistent hypotension and hypoperfusion despite adequate fluid resuscitation (30cc/kg bolus). The dataset was developed using a data collection sheet and included demographic, laboratory, and hospital outcome variables. Statistical analyses were conducted in JMP 12.0 for the Mac.

Results: 74 patients (45%) met the criteria for severe sepsis while 90 (55%) were classified as septic shock. Of these, 64% of septic shock patients were transferred to the ICU after being admitted to the floor, while this occurred only in 28% of severe sepsis patients ($P<0.0001, z$-test for proportions).

The severe sepsis cohort was 47% female, with a median age of 73 (IQR 62-83), with 12% from a nursing home (NH) and 59% via EMS while the septic shock cohort was 41% female, with a median age of 72 (IQR 52-82), with 19% from a NH, and 71% via EMS. The two groups were not significantly different in terms of age, sex, or arrival from a nursing home or via EMS.

In a multivariate model including age, sex, arrival from nursing home or via EMS, whether sepsis bundle was ordered, initial and 3-hr lactate, WBC, procalcitonin values, the type of sepsis (severe sepsis vs. septic shock) was significantly associated with being transferred to the ICU after initial floor admission, with those in septic shock being more likely to do so ($p=0.0046, R^2=21.1\%$, logistic regression).

Conclusions: Meeting the criteria for septic shock is significantly more likely with being transferred to the ICU after initial floor admission. These data may be helpful to guide initial bed type to alleviate the additional burden of having to transfer.

143 Experts in Education Research: Advice to Emergency Medicine Education Researchers: A Qualitative Study
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Study Objectives: As EM develops as a specialty, there has been significant growth in the scope and rigor of research in both the basic science and clinical domains. This growth has been the result of dedicated efforts by individuals and organizations within EM. Education research within EM is developing along a similar trajectory. To inform the development of appropriate research methodologies and best practices, we sought structured input from experts in education research in order analyze their advice and perspective.

Methods: This is a qualitative study completed using grounded theory methodology with an interpretivist paradigm. Experts in education research from a variety of specialties and backgrounds were eligible. Subjects were identified through a review of medical education literature, specifically looking for multiple first or senior author publications in high impact medical education journals within the previous 6 years. Purposive sampling was used with regard to geographic distribution, sex, and age. Data collection ceased when thematic saturation occurred. After obtaining consent for participation and voice recording, one researcher conducted semi-structured telephone interviews that were de-identified, then transcribed by an associate. Thematic coding followed an iterative process until saturation was reached and a theoretical model was developed and analyzed. Agreement was calculated and disputes were resolved by discussion.

Results: We identified 9 experts in education research (6 males; 6 Full, 2 Associate and 1 Assistant Professor rank). Age distribution: 3 subjects aged 35-50, 4 aged 51-65, 2 aged >65 years. Education: 6 subjects with MD, 3 with PhD; 3 completed master’s degrees, 2 completed a fellowship. Peer reviewed publications: mean 73.6, range 22-171. Thematic coding agreement was 92.3%. Education experts valued fellowship or master’s degree programs for training in research methodology, mentorship and developing collaborative relationships. Barriers to education scholarship: lack of funding, protected time and resources; differential recognition and departmental support for education research; lack of rigorous methodology in planning and execution; challenges in measuring education outcomes; failure to identify venues for publication. Specific recommendations for success in education research: deliberate practice in formulating relevant and generalizable questions prior to implementing an educational intervention or research study; collaboration with individuals with different backgrounds and skill sets; working with a network/community of education researchers to increase expertise and research generalizability; using rigorous methodology for qualitative studies; identifying appropriate venues for publication. Experts stressed the value of securing mentorship with specific expertise in education scholarship. Their perception is that education research within EM is still developing and would benefit from formal support by national EM groups, application of increased methodological rigor, especially during the study design phase, and increased collaboration across institutions.

Conclusions: Experts in education research cite formal training, collaboration, application of rigorous methodology and identification of proper venues for publication as keys to success. They advise EM education researchers to adopt these strategies on an individual level and national groups to provide support and facilitation.
Study Objectives: Telemedicine is a rapidly expanding and novel way for medical providers to interact with patients. Emergency physicians are well positioned to be leaders in telemedicine; however there is limited literature on formal resident training in this area. The American Medical Association has recommended incorporating telemedicine into resident education yet to date there are no ACGME guidelines. Our goal was to develop an elective for EM residents to provide a foundation and establish competency in telemedicine.

Methods: The elective was developed using a three-stage process: (1) a comprehensive literature review of telemedicine and EM, (2) structured 30-60 minute interviews with key stakeholders and (3) iterative implementation. We searched PubMed with MeSH terms “Telemedicine” and “emergency medicine” for articles published between 2011 and 2017. Interviewees included stakeholders in management at private direct to consumer companies, directors of university-based telemedicine programs, members of information technology and innovation teams, EM faculty and advanced practice providers practicing telemedicine, as well as EM residents. Iterative changes in the elective were made contemporaneously based on participating resident feedback.

Results: We found general consensus in the need for training of residents in telemedicine, although no consistent recommendations on the best method to achieve fluency in practice emerged. Managerial stakeholders and providers suggested that several years of general EM (non-telemedicine) experience was required for a provider to be effective in telemedicine. There was stakeholder consensus that technology was less of a barrier than training in communication and etiquette over video. Respondents recommended several strategies to overcome telemedicine challenges including difficulties with remote examination, fragility of technical platforms, and limitations based on the reimbursement environment. Stakeholders recommend an EM elective incorporate clinical experience, didactics, administrative/logistics teaching, and public policy learning and that experience be tailored to individual resident’s strengths, interests, and needs. All agreed that almost all emergency physicians would have telemedicine practice be a part of their clinical environment in the next decade. The iterative experience reinforced several elements identified in the structured interviews: shadowing providers was less useful than actually providing care and trialing different techniques to facilitate video examination; accompanying patients during their telemedicine evaluation provided insight into the patient’s telemedicine experience and underscored the importance of video training.

Conclusions: An EM telehealth elective was developed that incorporates clinical experience and didactics training, including administrative and public health policy teaching. Such electives should incorporate best practices for video etiquette and telemedicine skills into EM clinical training. Formal training in telemedicine is still in its early stages but EM programs should be at the forefront as this curriculum is developed. Resident training in telemedicine should be developed further, and education in video presence and remote examination will be an essential part of this curriculum.

Study Objectives: Robust assessment is a crucial component in Advanced Life Support (ALS) training to determine whether participants have achieved learning objectives with little or no variation in their overall outcomes. We aimed to analyze the consistency of current checklist evaluation with minimum passing score (MPS) approach to the pass/fail judgments by comparison with the adherence of several important parameters for guideline recommendations.

Methods: Video records and formal checklist-based test results of cardiac arrest test scenarios for ACLS certification exam at several hospitals in Taipei, Taiwan during July, 2015 to Sep, 2016 were examined. Cases were excluded if any of the above data was missing. For the study interest, three objective parameters were measured via video review and were used for evaluation: percentage of compression free no-flow fraction (NFF), time to initiating chest compression and time to initiating defibrillation if applicable. All analyses were performed using Statistical Analysis Software for Windows, version V.9.4 (SAS Institute Inc, Cary, NC).

Results: A total of 185 scenarios were eligible for final analysis. While time to initiating chest compression was no difference between “checklist fail (Fail) group” and “checklist pass (Pass) group,” time to first shock delivery, if applicable, was significantly longer in the Fail group than that in the Pass group, 84 ± 29 (Mean ± SD) seconds and 63 ± 21 seconds respectively. In addition, NFF was also significantly higher in Fail group (30 ± 8 %) than that in Pass group (37 ± 8 %). Although the statistical significance “between” groups were observed in both time to first shock and NFF, notice in the graph that “within” groups variation of these key parameters was widely spread.

Conclusions: Rater observation using checklist-based tool could capture important tasks in assessing cardiac arrest scenarios; however, it can overlook many important survival-related parameters with the potential of influencing evaluation accuracy. Continues rater training and standardization and the development of valid tools for real-time assessment adjunct are essential toward more consistent outcome measures.
applications for the same limited residency positions. Many in residency administration have used applicants’ standardized scores as a screening process to choose which applicants they will interview. The belief is that if an applicant is successful on these standardized exams they should be successful on exams during their residency (Inservice Training Exam), as well as their post-graduate exams (ABEM Qualifying exam). Literature has suggested only mild to moderate correlation. Our goal was to see if this preconceived notion was based in any truth. We attempted to do this by looking at USMLE scores, ITE scores and success on ABEM Qualifying Exam in an emergency medicine residency over a 20-year span of time. The qualifying examination is a criterion-referenced examination. Therefore, anyone scoring 75 or higher passes the examination. This score was determined by ABEM by looking at the relationship between the ABEM ITE scores from the final year of residency and the ABEM Qualifying examination performance.

Methods: We collected scores of USMLE Step 1 & 2, ITE score from the PGY -3 yr and whether or not the resident successfully passed the ABEM Certification Exam on the 1st attempt from our archives of all residents who have graduated from our three year EM residency over the last 20 years. We compared the mean scores of each of the groups based on whether or not they passed the ABEM Qualifying exam, as well as whether or not they scored above a 75 on their graduating year ITE. We compared the two groups using the t-test to assess for significance.

Results: There is a significant difference between mean USMLE step 1 and step 2 scores, respectively for residents who passed the qualifying exam (220.4) and residents who failed the qualifying exam (step 1 - 220.4/207.9, p<0.05 and step 2 - 228.8/208.9, p<0.05). There is also significant difference between mean USMLE step 1 scores for residents who scored greater than or equal to 75 on ITE (220.0) and residents who scored below 75 on the ITE (209.0), p<0.05. However, there is not a significant difference between mean USMLE step 2 scores for residents who scored greater than or equal to 75 on the ITE (227.2) and residents who scored below 75 on the ITE (218.7), p>0.05.

Conclusions: Our results seem to validate that higher scores on USMLE step 1 and 2 both seem to correlate with a higher rate of success in passing the ABEM Qualifying Exam. It also supports that higher Step 1 scores seem to correlate with success on the ITE. Surprisingly, we did not see a significant difference in USMLE step 2 scores with relation to ITE. These results represent the information from the entire breadth of a residency program over 20 years. With an increase in the competitiveness of the Emergency Medicine Residency Match, there continues to be an increase in the overall USMLE scores, and thus the statistical significance may need to be reexamined.

147 Heads Up! An Innovative Use of Smart Phone Technology to Facilitate Residency Education

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Introduction: The evolving educational needs of emergency medicine residents are no longer being met exclusively by traditional lecture-based didactic models. Even with the best of lecturers, retention of material and resident engagement is limited. This has led to a growing need for alternative teaching strategies that emphasize interactive learning. With the advent of smart phones over 10 years ago, technology has had exponential increases in use for both clinical as well as educational applications. Although many smart phone applications exist for emergency medicine education, most target a resource of information instead of integrating a simple playful platform for learning. At the Hofstra Northwell Emergency Medicine Residency, we have used a game approach to learning. We created topic specific cards thru an app called Heads Up to teach the key symptoms and management of common diagnoses in the emergency medicine. In this model, residents work in groups taking turns giving and guessing common emergency medicine content. The approach - embracing elements of repetition, word and pattern recognition - allows for an entertaining and innovative educational model that moves away from a traditional classroom setting.

To implement a unique strategy for teaching residents didactic conference through using a game-based approach, encouraging retention through repetition and pattern recognition. We believe that this technique is an ideal strategy for in service training preparation as well as clinical pearls.

Methods: We utilized an application Heads Up available commercially thru the Apple App store for Iphones and Google play for android devices. The application was purchased for $9.99 with an additional cost of $9.99 to create a customized set of flash cards. Then a set of 125 cards was constructed individually, each with a term relating to a diagnosis or test applicable to that month’s emergency medicine topic. The cards were standardized across all faculty participating in the exercise. The application uses both camera and microphone to allow a timer and tally of individual resident performance during the exercise.

Results: Survey analysis of resident feedback was entirely positive. Residents of all levels felt that this was a fun and efficient way to review content in didactic conference. Residents felt that this type of educational endeavor led to increased retention of the material.

Conclusions: Although this innovation is in its early stages, we have discovered that residents find this session both enjoyable and helpful. We believe that the percentage of retained information using this technique is far superior to that of the standard lecture. Residents have reported using the same strategy when studying on their own. As we move together into the future of education, it is imperative to use the smart phone technology that everyone already has to our advantage during didactic conferences.

148 Comparison of Active Learning Techniques: Audience Response Questions vs. Small Group Discussion on Immediate and Long Term Knowledge Gain in Emergency Medicine Sub-Interns and Residents

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Study Objectives: Didactic sessions are a common component of medical education. Active learning techniques have been shown to help with motivation, involvement and retention during didactic sessions but there are limited data comparing different active learning methods on immediate and long term knowledge gain. The objective of this study was to compare two active learning methods, small group discussion vs. audience response questions, on immediate and long term knowledge gain in emergency medicine (EM) sub-interns and residents.

Methods: This was a prospective observational quasi-experimental study of EM sub-interns and residents. Participants were randomized into two groups and baseline knowledge was assessed with a multiple choice pre-test. Basic demographic data was also collected. Didactic sessions on salicylate toxicity and ocular trauma were given to both groups utilizing either small group discussion or audience response questions. A cross over design was utilized so that both groups received instruction by each method, ie, group A received didactic sessions on salicylate toxicity incorporating small group discussion and ocular trauma incorporating audience response questions, group B received didactic sessions on salicylate toxicity with audience response questions and ocular trauma with small group discussion. A multiple choice post-test was administered immediately following the didactics to assess immediate knowledge gain and again 2 months later to assess long term knowledge gain. Pre-and post-tests were identical. All test items were written by an academic faculty member, with advanced training in medical education, based on the goals and objectives of the session. Test items were piloted with a reference group of learners. Didactic instructors were blinded to test items. Descriptive statistics are reported. Data were further analyzed using a linear mixed effects model.

Results: 38 sub-interns and residents participated in the study (19 in group A and 19 in group B), including 11 PGY-4s, 8 PGY-3s, 8 PGY-2s, 3 PGY-1s, and 8 sub-interns. Both instructional methods showed similar immediate knowledge gain (mean gain score of 2.97±1.86 for audience response questions; 3.11±1.82 for small group discussion). This knowledge gain was attenuated at 2 months (mean gain score of 1.89±1.70 for audience response questions; 1.48±2.23 for small group discussion). The mixed linear mixed effects model did not demonstrate any significant difference between
Instructional method on immediate knowledge gain, p= 0.62, or long term knowledge gain, p= 0.36.

Conclusions: In this study there was no difference between instructional methods (audience response questions compared small group discussion) on immediate and long term knowledge gain in EM sub-interns and residents.

### 149 Interplay Between Diabetes and Outcomes of Sepsis: A Nationwide Cohort Study With Laboratory Data

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Study Objectives: The association between diabetes mellitus (DM) and sepsis hospitalization outcome was inconclusive. Also, studies using nationwide database with linked hospital information including laboratory data were rare. Understanding the trajectory of diabetic patients in sepsis course was important to improve medical care.

Objective: To determine the effect of DM on the outcome of hospitalized sepsis patients. In nationwide database, diabetic severity score, socioeconomic status, and antidiabetic drugs were evaluated. Important clinical information, such as HbA1c, initial glucose level, APACHII score, and blood cultures were collected from hospital-based database to make further understanding.

Methods: This is an observational cohort study of hospitalized sepsis patients using the nationwide database and linked hospital-based clinical information of a medical center. We collected the information using the national insurance claims database in a period of one year before the index hospitalization for sepsis and further included the hospitalization outcomes such as acute organ failure and complications. Propensity score matching was used to constitute the study (DM) and comparison (non-DM) cohorts. The major outcome was the association between DM complication severity and hospital mortality. Laboratory data including blood cultures of diabetic sepsis patients who were enrolled in the nationwide epidemiologic study were retrieved after link back to a medical center.

Measurements and Main Results: We initially included 120,439 hospitalized sepsis patients. After propensity score matching, there was 19,719 diabetic and 17,000 non-diabetic patients. In the study, respectively. Diabetic patients had an increased odds ratio (OR) of 1.14 (95% CI, 1.1-1.19) of mortality in the multivariate analysis. Furthermore, diabetic patients with adjusted diabetes complication severity index score (aDCSI score) of 0, 1, 2, 3, and 4 and ≥5 had an OR of 0.91 (95% CI, 0.85-0.97), 0.87 (95% CI, 0.8-0.96), 1.14 (95% CI, 1.07-1.22), 1.25 (95% CI, 1.13-1.38), 1.56 (95% CI, 1.43-1.7), and 1.77 (95% CI, 1.61-1.96) in mortality, respectively. DPP-4 inhibitors and TZD use were associated with decreased OR of mortality of 0.82 (95% CI, 0.7-0.96) and 0.86 (95% CI, 0.76-0.98), respectively. A linked 1143 diabetic sepsis patients were retrieved after link to the hospital database. Initial blood glucose level in survived and dead diabetic septic patients did not have obvious difference: 217.5 (mg/dL).

### 150 Sepsis Recidivism: Return Visits and Recurrence (S3R Analysis)


Study Objectives: Recently, CMS has placed a larger emphasis on reducing hospital readmissions. Given the morbidity associated with sepsis hospitalizations, there has been increased attention on its impact on chronic health. Specifically, sepsis may represent a key modifier of ongoing health. The long-term risk for repeat sepsis following an initial sepsis admission remains unclear. Our objective was to (1) characterize the frequency of admissions experienced by patients following a sepsis admission and to (2) compare characteristics of the patients with one admission (non-recidivists) versus multiple admissions for sepsis (recidivists).

Methods: We performed a retrospective chart review of patients ≥18 years admitted to a university hospital with sepsis from the ED during Aug. 2013 to Dec. 2015. We then analyzed the difference between the recidivists and non-recidivists using univariate and bivariate (chi-Square) analysis to determine if differences existed between patient characteristics and clinical measures during the first hospitalization in this period. All patients who died during the first hospitalization for sepsis were excluded.

Results: A total of 5,349 (male-2,374, 49.6%; female-2,337, 50.4%) patients were identified with sepsis present on admission during the study period; 638 were excluded for death during index hospitalization or based on the SSDE, making the final working sample of 4,711 patients. Of these, 1,618 (34.4%) were recidivists compared to 3,093 (65.7%) non-recidivists. Among recidivists, 1,242 (76.8%) had 2-3 visits and 37% (23.2%) had 4-12 visits. Average age of recidivists was 57.65 years (95% CI: 56.83-58.47) compared to 58.43 years (CI: 57.43-59.07) in non-recidivists. Average Charlson Comorbidity Index for recidivists was 3.47 (CI: 3.33-3.61); for non-recidivists the average was 2.63 (CI: 2.54-2.73). We found statistically significant differences between recidivists and non-recidivists by age (p=0.008) and race (p=0.001); there was no significant difference in sex (p=0.147). The underlying comorbidities COPD (p=0.043), renal disease (p<0.001), CHF (p=0.012), and hemiplegia/paraplegia (p=0.001) were statistically significant between the groups, whereas moderate/severe liver disease, previous MI, dementia, AIDS, metastatic cancer, and diabetes were not found to be significant (p<0.05). Analysis of clinical measures found that spending any period in the intermediate level of care during hospitalization (p<0.001), use of norepinephrine (p=0.001) or dopamine (p=0.002), and the Ranstow Index (mean = 47.36, CI: 46.47-48.25, p<0.001) initially taken were found to be statistically significant. Use of other vasopressors was not statistically significant (p>0.05). Additionally, mean values of initial WBC, lactate, creatinine, pH, and arterial bicarbonate lab results collected were not found to be significant (p=0.05). Over 30% of patients had a history of chronic disease. There is 80% mortality following 2 visits (see figure).

Conclusions: Over 1/3 of sepsis admissions to an academic hospital in a 29-month period represented readmissions for sepsis. Sepsis should be considered a key determinant of chronic disease.
151 Methicillin-Sensitive S. Aureus Contamination of Ultrasound Probes Using Several Conduction Media

Study Objectives: Point-of-care ultrasound (POCUS) is integral to the care of patients in the emergency department. Unfortunately, ultrasound probes can act as fomites for pathogen transmission from patient to patient despite various cleaning methods and barrier precautions. It is pertinent to understand what factors contribute to this and how we can best reduce this risk. The objective of this study was to detect growth of methicillin-sensitive Staphylococcus aureus (MSSA) from POCUS probes after scanning an inoculated pork model with several types of conduction media to investigate the difference in pathogen transmission.

Methods: A portion of store-bought pork shoulder was disinfected with chlorhexidine and allowed to dry. One mL of a cultured sample of abscess concentration MSSA was used to inoculate the specimen. A linear transducer was cleansed with a sterilizing cloth and the end of the probe was then covered with a Tegaderm (3M, Maplewood, MN). One of three conduction media was applied to the pork shoulder: sterile saline, chlorhexidine, or sterile gel. The probe was then used to perform a soft tissue scan of the pork shoulder for one minute. After this, the probe was swabbed and cultured to detect transmission of MSSA. This was done four times for each of the three media types.

Results: None of the four saline or four chlorhexidine probe swabs grew MSSA when cultured. Three of the four sterile gel probe swabs grew MSSA.

Conclusions: These results suggest that sterile ultrasound gel may be more likely to transmit skin pathogens to the probe during POCUS in a simulated environment. However, larger studies and further exploration into this topic are necessary to draw clinical conclusions.

152 Point-of-Care Influenza Testing Does Not Significantly Shorten Time to Disposition Among Emergency Department Patients With an Influenza-Like Illness
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Study Objectives: Symptoms attributable to influenza-like illness are common presenting complaints to the emergency department (ED) during the winter months. The availability of anti-viral agents and the need to cohort patients with infectious diseases has increased the need to confirm the diagnosis of influenza (flu) prior to determining a disposition for patients. The objectives were to determine if time-to-disposition (TTD) was shorter among patients who were tested for influenza using a point-of-care (POC) test in a hospital ED compared to those who were tested in the hospital core laboratory (lab) and to determine if there was a difference in antibiotic use between groups.

Methods: This study was conducted at an urban, safety net, academic level 1 trauma center. We conducted a prospective study that enrolled a convenience sample of ED patients for whom influenza testing was physician-ordered per usual ED clinical protocols during peak influenza season 2017. After consenting, subjects were randomized to either core lab testing (Xpert Flu, Cepheid) or POC testing (cobas Liat influenza). Run times for the core lab assays and POC were 55-75 minutes and 20 minutes respectively. Data collected included demographics, chief complaint, results of influenza test, time to test results (TTTTR, defined as time from when order was entered until results were available in the Electronic Medical Record), whether antibiotics were given, and TTD (defined as the time from when a patient was placed in the ED treatment room until the disposition (either admit, observe, or discharge) was ordered in the medical record. Descriptive statistics were calculated and group comparisons were made using a two sample t-test.

Results: Two hundred fifty-seven patients were approached of which 6 refused, and 51 were excluded (21 had comprehensive respiratory panels performed rather than exclusive influenza tests, 21 non-English speaking, 9 for other reasons). Two hundred subjects were enrolled, and 3 were dropped from the core laboratory arm due to incorrect test orders. Final study population included 97 in the core lab group and 100 in POC group. Demographic characteristics between core lab subjects and POC subjects were the same with respect to mean age, sex, and race. There were fewer flu positive results in the core lab group compared to the POC group (33.0% vs. 51.0%, p=0.01) but a similar percentage of influenza type A (84.4% vs. 86.3%), and discharged patients (83.5% vs. 78.0%). The mean TTTTR was 140.0min (SD 318.1min) for the core lab and 35.2min (SD 19.9min) for POC (p=0.001). The mean TTD was 185.9min (SD 110.0) for the core lab group and 168.9min (SD 91.7) for POC (p=0.26). Antibiotics were given to 14.4% of core lab subjects, and 14.0% of POC subjects (p=0.93).

Conclusions: Although use of a POC influenza test provided a more rapid time to test result than use of a core lab test, there was no statistically significant difference in time to disposition or antibiotic use between the groups. This is in contrast to other studies on POC testing in the ED setting. In this small study this finding may be due to the influence of other factors on disposition decisions in addition to diagnosis of influenza. Test implementation strategies for POC testing benefit from site-specific outcome studies in addition to reliance on published data from other institutions.

153 Pharmacist-Initiated Culture Follow-Up in the Emergency Department Reduces Time to Treatment Optimization
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Study Objectives: Urinary tract infections (UTI) and sexually transmitted infections (STI) are frequently encountered medical conditions in the emergency department (ED). Antimicrobial therapy prescribed for treatment is empiric due to the delay between obtaining a culture and growth of an organism to direct definitive therapy. A culture review and call-back process is paramount to ensuring appropriate therapy and preventing complications of inadequately treated infections for patients not requiring hospital admission. This project investigates if pharmacist-driven culture follow-up in the ED results in a reduction in time from final culture results to patient contact, when compared to the previous nurse driven process.

Methods: This is a retrospective pre- and post-intervention analysis in a 40-bed Level 1 trauma center ED that has 72,000 annual visits. All patients with UTI or STI cultures drawn in the ED in whom a change in therapy was indicated after final cultures resulted were included. Pre-intervention, all cultures were reviewed by the third-shift charge nurse and forwarded to the designated advanced practice provider (APP). Pharmacists were consulted at the discretion of the APP. Post-intervention, all cultures were first reviewed by an ED pharmacist who then forwarded results and treatment recommendations to the designated APP. Data was collected via electronic health record from September 2015 to February 2016 and April 2016 to September 2016 for the pre- and post-intervention groups, respectively. The primary outcome measured was time from final culture result to patient contact by the APP. Secondary objectives included: prevalence of treatment failure defined as patient return to the ED within 72 hours (h) for the same medical problem, hospital admission within 30 days of ED visit for related conditions (UTI, pyelonephritis, urosepsis), and percentage of pharmacist recommendations. Statistical analysis was completed with Mann-Whitney U test for continuous data.

Results: A total of 240 patients were included. Pre-intervention group consisted of 143 patients; 103 UTI patients and 40 STI patients. Post-intervention group consisted of 97 patients; 79 UTI and 18 STI patients. Post-intervention, patients were contacted a median of 19.83 hours earlier than in the pre-intervention group (CI 95%, 17.15-22.5; p<0.001). Post-intervention, median contact time for UTI patients was 15.06 hours earlier (CI 95%, 8.35-19.03; p<0.001) and the median contact time for STI patients was 47.31 hours earlier (CI 95%, 29.1-67.41; p<0.001) than the pre-intervention group.

Conclusions: Pharmacist-initiated culture review in the ED culture follow-up process reduces time from final culture results to initiation of optimal antibiotic treatment. Routine pharmacist involvement in the culture review process appears to have great value.

154 Fluid Resuscitation of Septic Patients at Risk for Fluid Overload
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Study Objectives: Guidelines recommend rapid fluid resuscitation of at least 30 ml/kg in septic patients in order to improve outcomes. However, since fluid overload...
increases the risk of intubation, providers are wary to aggressively fluid-resuscitate septic patients who are at risk of fluid overload - namely, patients with congestive heart failure (CHF) or end-stage renal disease (ESRD). We sought to assess whether an initial fluid dose of 30 mEq/kg in septic CHF or septic ESRD patients, compared to a fluid-restrictive strategy, leads to increased intubations. We also analyzed mortality rates and hospital length of stay (LOS).

Methods: At our ED, data on septic patients > 17 years of age are prospectively tracked for quality metrics. Patients who trigger the sepsis flag are up-triaged for quicker provider evaluation to assess whether to implement a sepsis bundle, including whether or not to administer 30 mEq/kg of fluids. All patients who are ultimately deemed to have had an infectious source that triggered the flag have multiple metrics logged and tracked. This prospectively collected set of data was retrospectively analyzed. Inclusion criteria were septic patients with past medical history of CHF or ESRD who were given fluids. Patients were excluded if they were under do-not-resuscitate (DNR) or comfort-measures-only (CMO) status, as well as if amount of administered fluid was unknown. Primary outcome was intubation frequency.

Secondary outcomes were hospital LOS and mortality. Student t-test and chi-square tests was used for analyses.

Results: Table 1 demonstrates the outcomes in patients who were given at least 30 mEq/kg compared to those who were not. In particular, there were no differences between groups in intubation rates. There were also no differences in hospital LOS or in mortality (although the sample was not sufficiently powered for mortality).

Overall, 13.8% (95% CI 9.5%-19.2%) of septic patients with CHF and/or ESRD who were given fluids. Patients were excluded if they were under do-not-resuscitate (DNR) or comfort-measures-only (CMO) status, as well as if amount of administered fluid was unknown. Primary outcome was intubation frequency.

Conclusions: Offering the ongoing professional practice evaluation in a simulated environment using procedure trainers is one way to increase experience with rare procedures and to improve confidence, while simultaneously demonstrating ongoing proficiency. The use of ultrasound for CL placement and the relative ease of IO line placement may contribute to lack of statistical significance on those procedures. This method was positively received by physicians as a means for refreshing procedural skill and assessing performance.

Table 1. Outcomes of patients with past history of CHF and/or ESRD who receive 30 mEq/kg fluids in the ED vs. those who did not. However, our results are in line with some previously presented data. Therefore, an initial bolus of 30 mEq/kg of fluids in the ED whereas 21.0% (95% CI 18.7%-23.4%) of septic patients without either CHF or ESRD received 30 mEq/kg of fluids in the ED (p<0.02).

Conclusions: Our analysis suggests that patients with a history of CHF and/or ESRD who become septic and receive at least 30 mEq/kg of fluids in the ED are not any more likely to be intubated than the patients who receive fluid-restrictive regimen of < 30 mEq/kg. This analysis has limitations, including that there may be baseline differences between the patients who did receive 30 mEq/kg of fluids in the ED vs. those who did not. However, our results are in line with some previously presented data. Therefore, an initial bolus of 30 mEq/kg fluids in septic CHF/ESRD patients appears to be safe - possibly even beneficial - and can potentially be included in a triage bundle set for sepsis care in the ED. At our site, CHF/ESRD patients were significantly less likely to receive 30 mEq/kg of fluids in the ED than non-CHF/ESRD patients, but adherence to the 30 mEq/kg target was low for all patients. Implementing a 30 mEq/kg fluid order from triage could enhance compliance with the Surviving Sepsis guidelines - and still leave providers the option of holding fluids when they clinically deem it appropriate.

155 Impact of a Simulation-Based Ongoing Professional Practice Evaluation on Provider Procedural Confidence in Five Rare Procedures

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Study Objectives: Evaluation of procedural skills of practicing Emergency Physicians is a Joint Commission requirement known as the Ongoing Professional Practice Evaluation (OPPE). The authors have implemented a simulation-based OPPE now in its second year. This study sought to determine the frequency of five rare procedures performed by each emergency physician, determine if the simulation-based OPPE increases confidence, and assess how the simulation format of OPPE is perceived by physicians.

Methods: Study participants were board eligible/board certified practicing EPs from one academic institution. Twenty-five physicians consented to the study and completed the pre-survey, and fifteen physicians to date have completed both the pre and post surveys. The pre-simulation survey measured the number of procedures performed in the past year and confidence in performing five procedures: ultrasound-guided central line (CL) catheter placement, cricothyrotomy (Crich), precipitous vaginal delivery (PVD), intraosseous line (IO) placement, and thoracostomy tube (CT) placement. During the OPPE session, participants were guided through simulation-based performance of each procedure. A follow-up survey sent 2-8 weeks after the experience to each physician asked their confidence and their opinion of simulation for refreshing procedural skills, assessment, and likelihood of future participation. We analyzed the difference in procedural confidence between pre and post OPPE session using descriptive analysis and paired sample t-test.

Results: The median number of yearly procedures performed per provider were: CL - 4, Crich - 1, PVD - 0, IO - 2, CT - 1. Pre- and post-simulation confidence is displayed in Figure 1, and showed a statistically significant improvement in procedural confidence in the post session for Crich, PVD, and CT, with an average post-session procedural confidence increase of 0.8, 0.73, and 0.53, respectively. Though there was no statistical difference in the procedural confidence between pre and post session for Cl and IO, there was still a slight post-session increase of 0.4 and 0.14. Average agreement on a 5-point scale for acceptance of simulation as a way to refresh procedural skill and assess performance was 4.2 and 4.0 respectively. Average likelihood to participate in future simulation sessions was 4.7.

Conclusions: Offering the ongoing professional practice evaluation in a simulated environment using procedure trainers is one way to increase experience with rare procedures and to improve confidence, while simultaneously demonstrating ongoing proficiency. The use of ultrasound for CL placement and the relative ease of IO line placement may contribute to lack of statistical significance on those procedures. This method was positively received by physicians as a means for refreshing procedural skill and assessing performance.
Result: Performance was compared between six PGY-3s and seven PGY-1s. Outcomes included mean time to decision (1.36 mins vs 1.75 mins), mean length of intubation (1.23 vs 1.42 mins) and modality (6 DL: 0 VL v 0 DL: 7VL).

Conclusions: The use of a high-fidelity cadaveric simulation including real-time vital monitoring allowed for a more realistic clinical scenario and intubation experience. While PGY-3s outperformed PGY-1s in time to decision and duration of intubation the gap was narrower than expected. This may be due to different cadavers being used for each group or the preference for video over direct laryngoscopy amongst the PGY-1s.

157 How to Effectively Integrate Telestroke by Utilizing Mock In Situ Telestroke Training in the Emergency Department

Baer H, El-Sherif Y, Peariman L, Peana A, Kuvelaeva N, Folan B, Dixon C, Capitario J/Northwell Staten Island University Hospital, Staten Island, NY; Northwell Staten Island University, Staten Island, NY

Study Objectives: Telestroke is a service that connects physicians with patients requiring emergent consultation at anytime from any location. Prior to implementing “live” telestroke, the neurology department collaborated with the SimLab and the ED and created mock in situ telestroke (MIST) scenarios. Our goal was to ensure that ED team was comfortable using the telestroke cart and performing a telestroke code. Our ultimate goal was to avoid any delays by adding this technology.

Methods: We created an interdepartmental, interdisciplinary team from the emergency department, neurology and the Patient Safety Institute (our simulation center). Our team is composed of physicians, physician assistants and nurses. Before going “live” with Telestroke, our team met to review our goals and objectives and to create a plan for education. We decided to focus our training on ED nurses. ED nurses were required to an online component. All other portions were taught live in the ED. Nursing education was done in 4 steps: 1) All nurses working in the ED were required to 4 and 8 continuing education units on ED nurses and our neurology team trained our ED nurses during different shifts for five days on how and when to operate the telestroke cart. 3) Live training during the MIST codes. a) Four content experts observed each case from patient presentation through disposition and debriefed his/her topic of expertise. b) Following MIST codes, nurses were offered additional help in focusing on performing the NIHSS exam and any questions they had After each MIST code with debriefing, the debriefers met to review areas for improvement and unanticipated issues.

Results: Our results are broken down into the following categories: When informally surveyed at the end of the first three MISTs, nurses indicated they were not comfortable with 1. the telecart and 2. How to perform a NIHSS assessment. Because of nursing feedback, we offered all nurses an opportunity to be trained again on how to utilize the telestroke cart and how to perform a NIHSS exam. Some of the variables captured included door-to-stroke Team, door-to-tPA decision, Door-to-tPA Actual. During the first 7 weeks of telestroke, there were a total of 119 stroke codes, 21 of which were telestroke cases. A total of 5 cases were offered tPA via telestroke and the decision to give tPA was documented (average 44 minutes). Door to tPA decision is the time that the neurologist gave approval to give tPA. In one case the family and patient refused and in another case there was a delay due to patient’s hemodynamic stability. This metric is meant to show how long it takes from arrival to making the decision to treat.

Table 1. Telestroke vs. Stroke cases (2/1/17 - 3/27/17)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Average Time (min; n=119)</th>
<th>Average Time (min; n=119) All Stroke Codes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arrival to Stroke Team Assessment</td>
<td>09:29 (n=21)</td>
<td>09:20 (n=119)</td>
</tr>
<tr>
<td>Door to TPA Decision</td>
<td>44:00 (n=5)</td>
<td></td>
</tr>
<tr>
<td>Door to TPA Actual</td>
<td>01:05:45 (n=4)</td>
<td>56:00 (n=13)</td>
</tr>
</tbody>
</table>

Conclusions: Our goal was to optimize operational flow and patient assessment during our stroke codes when introducing telestroke by creating a curriculum for nursing staff with a built-in process for implementing improvement after each code. While our number of MIST codes is small, we were able to demonstrate that our average door to tPA was not overall different.

158 Caring for a Critically Ill Simulated Left Ventricular Assist Device Patient With or Without a Cognitive Aid Improves Physician Comfort

Einstein N, Okubanjo O, Alexander A, Putman M, Watts H/Advocate Christ Medical Center, Chicago, IL

Study Objectives: The number of left ventricular assist devices (LVADs) implanted is increasing yearly. Despite this growing number, physician education on this patient population remains inconsistent. High fidelity simulation is a useful tool for education and assessment in the health care setting. Using high fidelity simulation, we sought to assess the comfort level of our emergency department (ED) providers caring for critically ill LVAD patients, with and without the use of an adjunctive cognitive aid (Figure 1).

Methods: We modified our Laerdal 3G SimMan to reflect an LVAD patient by decreasing the volume of his heart tones, turning off peripheral pulses and by placing a personal simulation device in the chest cavity. In collaboration with our LVAD team, we developed a cognitive aid to assist in the care of critically ill LVAD patients. Twenty physician teams cared for a simulated LVAD patient who was suffering from a gastrointestinal bleed and a suction event. Groups were composed of one attending and 1-2 emergency medicine resident physicians at various stages of training (PGY 1-3). The first 10 scenarios were managed without access to our cognitive aid; the second 10 groups had access to our cognitive aid. Participants were evaluated based on 11 predetermined critical actions for the case and completed a pre and post-simulation survey to evaluate their baseline experience with LVAD patients and their comfort levels pre and post simulation.

Results: The majority of caregivers (96%) care for < 5 LVAD patients per month. 74% of participants had cared for less than 30 LVAD patients in their career. We found no significant differences in a team’s delivery of appropriate care whether a cognitive aid was utilized or not (p<0.05). 92% of participants who were given the aid felt it was useful and 100% would use it during patient care. After participating in the simulation, all participants felt significantly more comfortable taking care of hypotensive (p<0.05) and crashing (p<0.05) LVAD patients.

Conclusions: Although participants felt the cognitive aid would be useful, our data supports that participation in the simulation increased physician comfort level regardless of the cognitive aid. LVAD placements are increasing nationally. Simulation may increase an ED provider’s comfort level in caring for unstable LVAD patients. For those providers who cannot participate in simulation, a cognitive aid that outlines common LVAD emergencies may also be useful.
Methods: Study participants were practicing emergency medicine attending physicians. Twenty-three of thirty eligible physicians consented to take part in the study. A simulated scenario was developed to assess skill in placing triple lumen central line catheters. An emergency physician simulation expert rater utilized a checklist previously developed using the Delphi method and validated in emergency medicine resident physicians. The rater also completed an adapted global rating score (ranging 1-5) comprised of six items regarding procedural proficiency and an overall procedural score. Pearson correlation and linear regression were used to compare checklist completion to overall global rating score for each participant.

Results: Participants correctly completed an average of 26 (87%) out of 30 (SD 2.65) items on the checklist. The average global rating score for all participants was 4.33, SD 0.90. The correlation between these items and global rating scores was 0.71 (p<0.01) (figure 1). Based on regression analysis, for every 1 additional item completed on the central line checklist there was 0.24 increase in the overall global rating scores.

Conclusions: When applied in the evaluation of attending physicians, the checklist and global rating scale are highly correlated. This suggests that the checklist may be a reasonable measure of ongoing physician procedural skill that objectively correlates with the subjective impression of the expert rater. Such evaluations are useful in an environment where the ability for objective continuing assessment is increasingly valued.

![Figure 1: Central line checklist scores are correlated with Global Rating Scores (n=23).](image)

**160 Validation of a Procedural Checklist for Ultrasound-Guided Internal Jugular Central Lines for Ongoing Evaluation of Attending Emergency Physicians**

**Hock SM**, Lee EM, Petty K, Shah SC, Sergei M/Rush University Medical Center, Chicago, IL; Northshore University HealthSystem, Evanston, IL; Rush University Medical College, Chicago, IL; John H Stroger Cook County Hospital, Chicago, IL

Study Objectives: Practicing physicians have been required by the Joint Commission to demonstrate procedural competence on an ongoing basis as part of the Ongoing Professional Practice Evaluation (OPPE) since 2009. Checklist tools have been developed for procedural training and initial demonstration of competence or mastery in emergency medicine, but these have been developed for and studied in resident physicians. Selecting a single tool for ongoing assessment of attending emergency physician competence presents unique challenges in that physicians may develop variations in practice patterns or changes in procedural technique that while still safe for patients may deviate from the selected evaluation tool. The authors sought to determine the reliability of a central line checklist in assessing attending physician skill.

Methods: Study participants were practicing emergency medicine attending physicians. Twenty-three of thirty eligible physicians consented to take part in the study. A simulated scenario was developed to assess skill in placing triple lumen central line catheters. An emergency physician simulation expert rater utilized a checklist previously developed using the Delphi method and validated in emergency medicine resident physicians. The rater also completed an adapted global rating score (ranging 1-5) comprised of six items regarding procedural proficiency and an overall procedural score. Pearson correlation and linear regression were used to compare checklist completion to overall global rating score for each participant.

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Conclusions: When applied in the evaluation of attending physicians, the checklist and global rating scale are highly correlated. This suggests that the checklist may be a reasonable measure of ongoing physician procedural skill that objectively correlates with the subjective impression of the expert rater. Such evaluations are useful in an environment where the ability for objective continuing assessment is increasingly valued.

![Figure 1: Central line checklist scores are correlated with Global Rating Scores (n=23).](image)
Dehydration was determined using percent weight change with rehydration. Malnutrition was calculated using mid-upper arm circumference. The effects of malnutrition and diarrhea type on the accuracy of nine clinical signs of dehydration were assessed using the Cochran–Mantel–Haenszel test. The accuracy of three clinical diagnostic models of dehydration was compared in children by nutritional status and diarrhea type using the area under their receiver-operator characteristic curve (AUC).

Results: Of the 1,282 were included in the final analysis, 685 (53%) had dehydration, 240 (19%) had malnutrition, and 446 (35%) had rice-water (cholera) diarrhea. There were no significant effects of malnutrition on the accuracy of any of the clinical signs, but seven signs were significantly less predictive of dehydration status among those with rice-water diarrhea. The AUC for the DHAKA Dehydration Score, the Clinical Dehydration Scale and the WHO algorithm were similar in children with and without malnutrition. The CDS was significantly less predictive for dehydration in children with rice-water diarrhea.

Conclusions: This study provides evidence that clinical signs of dehydration and dehydration scales predict dehydration similarly in children with malnutrition, but may be less predictive in children with rice-water diarrhea.

Access to a Health Care Facility Impacts Mortality in Brazilian Snake Envenomation: A Geospatial Information Systems Analysis

Ye JJ, Vissoci JRN, Hernandez TR, Toomey NM, Staton CA, Gerardo CJ/Duke University Medical Center, Durham, NC; Federal University of Minas Gerais, Belo Horizonte, Minas Gerais, Brazil; Duke Global Health Institute, Durham, NC

Study Objectives: Annually, snake envenomation causes 95,000 deaths and 400,000 permanent disabilities worldwide with low- and middle-income countries suffering the greatest burden. People with the greatest risk of envenomation and resultant morbidity and mortality lack access to adequate health care, including treatment with antivenom. In Brazil between 2001 and 2012, 28% of the 1,192,667 injuries and 54% of 2,664 deaths from terrestrial venomous animals were attributed to snake envenomation. While the majority of envenomations across the country are from the genus Crotalinae, time to treatment varies within and between Brazil’s five geographical regions. Southern Brazil reports the shortest time to treatment and the North with the longest. Our objectives were: 1) determine the incidence and prevalence of snakebites in Brazil using geographic information systems to determine hotspots by overall incidence; and 2) evaluate the geospatial association between mortality and time to reach a health care facility.

Methods: We conducted a secondary analysis of Brazil’s open health data (DATASUS) and worldwide open access databases (World Bank, IBGE, SINAN). Data were analyzed using geostatistics to evaluate geographical association patterns and prediction of snakebite occurrences and mortality. Spatial correlations (Moran’s I and Geary’s c) and regressions were used to evaluate the spatial-temporal distribution of envenomation cases across Brazil, and associated with access to health care facility, time to reach care and income level per municipality as defined by the World Bank.

Results: Between 2008 and 2015, there were a total of 247,086 reported cases of snake envenomation, resulting in 129,602 hospitalizations and an overall annual rate of 18.8 cases per 100,000 inhabitants. In same time period, there were 1,559 deaths from envenomation, of which 75% did not reach a health care facility and 59% had delayed treatment over 3 hours. Of those hospitalized, 38% took over 3 hours to reach a health care center. The prevalence and mortality of cases are higher in lower middle (17.9 and 0.9/100,000) and upper middle income (21.3 and 0.7/100,000) areas compared to high income areas (12.9 and 0.1/100,000). The mean age was 20.5 years. Compared to male controls, assault-injured males were more likely to report carrying a knife in the past 30 days (OR 2.6), and fighting requiring medical care in the past 6 months (OR 5.08), and threatening/injuring someone else with a weapon in the past 6 months (OR 3.4). Compared to female controls, assault-injured females were more likely to report homelessness in the past 30 days (OR 2.6). Assault-injured patients of both sexes were more likely than controls to give a 30-day history of drinking any alcohol (OR 6.3), binge drinking (OR 6.7) and smoking cigarettes (OR 4.0). They were also significantly more likely to report any physical fight (OR 4.4) or any physical fight requiring medical care in the past 6 months (OR 5.08), and lifetime history of arrest (OR 5.1) or conviction (OR 6.7).

Assault-injured patients were significantly less likely to endorse enrollment in an educational institution (OR 0.5) and membership in a religious group (OR 0.1). Significant differences were NOT found for: current employment; household poverty; or 6-month history of depression or suicide attempt.

Assailants were frequently known to the victim - 20% family/friend, 15% acquaintance, 6% romantic partner. Gang members comprised 11% of assailants. One quarter of patients anticipate violent retaliation as a consequence of their injury. Drugs and/or alcohol were used by victims prior to 78% of the assaults. Significant differences were not detected between females (76%) and males (79%). Assault-injured females were significantly more likely than males to report assaults at home, with a "struck
by/against" mechanism, and without weapons used. They were also more likely to list "romantic partner" as the assailant.

Overall, 47% of assault-injured youth and 15% of controls reported a history of a fight requiring medical treatment in the past 6 months.

Assault-injured males (259) greatly outnumbered non-assault-injured males (108) presenting for care, so it was not possible to enroll male controls on a 1:1 basis. The third installment of CECs focused on trauma. After a needs assessment by local Indian trainers after directly observed teaching and feedback by SEMI faculty, we had a high number of ICU admissions and a high death rate. More research is needed for evaluation of the exact burden of traumatic injuries for implementation of effective community-based preventive programs.

Conclusions: Initial results from this training-of-trainers model are promising; however, more data is needed. A formal, rigorous efficacy evaluation is under development with an expected rollout in January 2018.

165 A Retrospective Observational Study on Epidemiology of Traumatic Injuries Presenting to a Tertiary Care Hospital in Madurai, India
Soundararajan A, Jena NN, Smith J, Douglass K/Meenakshi Mission Hospital & Research Centre, Madurai, India; Ronald Reagan Institute of Emergency Medicine, George Washington University, Washington, DC; Ronald Reagan Institute of Emergency Medicine, George Washington University, Washington, DC

Study Objectives: Trauma is one of the leading causes of morbidity and mortality worldwide. In India alone, more than one million people die yearly due to trauma. Despite an understanding of the epidemiology of trauma in India, less is known about regional rates of trauma in different states. The objective of this study was to understand the epidemiology of traumatic injuries presenting to a tertiary care hospital in Madurai, India, located in the Southern state of Tamil Nadu.

Methods: This was a retrospective observational study of patients presenting to the emergency department (ED) between between January 2016 and December 2016. We included those patients with a chief complaint of injury as defined by International Classification of Disease 9th revision (ICD-9) Diagnosis Codes 958-959. Using a standardized abstraction form using a chart review, we collected information about patient demographics, mechanism of injury, type, Injury Severity Score (ISS), need for surgical intervention and disposition.

Results: During our study period, a total of 13,603 patients were evaluated and treated in the emergency department. Of this total, 1908 had a trauma-related ICD-9 diagnosis and comprised our final sample. Road traffic accidents were the most mechanism of injury (75.73 % of injuries). Head injuries (33.79%) and extremity injuries (34.2%) were the most common type of injury. The majority of patients (89.8%) had an ISS < 50. Just under half (46.9%) of patients had some type of surgical intervention. The majority of patients (67.6%) were admitted to the intensive care. However, 3% died in the ED and 7% died during the hospital course.

Conclusions: Our study showed that the epidemiology of trauma in Madurai is similar to other states in India, with road traffic accidents representing the most common type of trauma. Although the majority of our patients had an ISS score < 50, we had a high number of ICU admissions and a high death rate. More research is needed for evaluation of the exact burden of traumatic injuries for implementation of effective community-based preventive programs.

166 Access to Emergency Care Services in Brazil: A National Ecologic Study of a 6600-Hospital Health Care Network
Vissoci JRN, Rocha TAH, da Silva NC, Queiroz Barbosa AC, Appenteng R, Thurne E, Thomaz EBAF, de Sousa Queiroz RC, Facchinli LA, Staton C/Duke Global Health Institute, Duke University, Durham, NC; Federal University of Minas Gerais, Belo Horizonte, Brazil; Federal Center of Technological Education, Belo Horizonte, Brazil; Federal University of Minas Gerais, Belo Horizonte, Brazil; Duke University School of Medicine, Durham, NC; Federal University of Pelotas, Pelotas, Brazil; Federal University of Maranhao, Sao Luis, Brazil; Federal University of Pelotas, Pelotas, Brazil; Duke University Health System; Duke Global Health Institute, Durham, NC

Study Objectives: This study sought to describe access to adequate emergency care services in Brazil. As some of the most time and resource intensive patients in the emergency department present as a result of traumatic injury, we aimed to describe emergency services in Brazil by evaluating the population’s current access to surgical care as defined by the Lancet Commission of Global Surgery.

Methods: This study was an ecological survey of Brazil’s 6600 hospitals and 5570 municipalities. We evaluated the access of each Brazilian municipality by considering the regional and district level hospitals offering emergency and surgical care. Employing a two-step floating catchment area (2SFCA) method

Table 1. Stanford Continuing Education Courses for GVK EMRI EMTs

<table>
<thead>
<tr>
<th>Course</th>
<th>Start Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. General Approach to Medical Patient</td>
<td>May 2014</td>
</tr>
<tr>
<td>2. Obstetric and Neonatal Care</td>
<td>May 2015</td>
</tr>
<tr>
<td>3. Trauma</td>
<td>June 2016</td>
</tr>
<tr>
<td>5. Communication and Leadership</td>
<td>April 2017</td>
</tr>
</tbody>
</table>

Table 2. Trauma Multiple Choice Questions June 2016

<table>
<thead>
<tr>
<th>Location of Students</th>
<th>Pre-Test Mean (%)</th>
<th>Pre-Test StdDev</th>
<th>Post-Test Mean (%)</th>
<th>Post-Test StdDev</th>
<th>Knowledge Gain %</th>
<th>Two-tailed P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hyderabad (57)</td>
<td>16</td>
<td>53</td>
<td>24</td>
<td>81</td>
<td>10</td>
<td>8</td>
</tr>
<tr>
<td>Ahmedabad (61)</td>
<td>17</td>
<td>55</td>
<td>25</td>
<td>82</td>
<td>8</td>
<td>8</td>
</tr>
<tr>
<td>All (118)</td>
<td>16</td>
<td>54</td>
<td>24</td>
<td>81</td>
<td>9</td>
<td>8</td>
</tr>
</tbody>
</table>

Maximum score for pre and post-test = 30 questions
we calculated the accessibility index by determining (a) access to timely essential surgery in two hours or less, (b) number of specialist surgical workforce, (c) surgical volume and (d) perioperative mortality rate. The accessibility index is a measure of the availability of care to the exposed population within a catchment area.

Results: 5452 (97.9%) Brazilian municipalities had access to surgical care in less than two hours. Specifically, 1775 (31.9%) cities had access to surgical care in less than two hours travel time when the recommended workforce of 20 or more surgical specialist per 100,000 inhabitants was considered. Only 529 (9.5%) municipalities were served by a facility which met the minimum recommended surgical volume of 5000 procedures per 100,000 inhabitants. Finally, only 4532 (81.4%) cities had hospitals with a mortality rate of less than 5% of patients who underwent a surgical procedure. In total, 5312 (95.4%) cities were missing at least one of the four criteria defining access to quality surgical care.

Conclusions: Evaluating the strength of the emergency and surgical care services within a health system is an important measure to align with the World Bank’s Universal Health coverage paradigm. The set of indicators evaluated in this study highlights the need to improve the distribution of care throughout the Brazilian hospital network; the most important areas for improvement are in increase in the available health care workforce and an increase in the volume of procedures accessible across the health system.

167 Evaluating Patient-Centered Interventions to Reduce Pediatric Asthma-Related Acute Care Utilization
Abir M, Truchil A, Lam V, Forman J, Koegel P, Lozon M, Levites-Agababa E, Bright A, Brenner J/University of Michigan, Ann Arbor, MI; Camden Coalition of Healthcare Providers, Camden, NJ; University of Michigan, Ann Arbor, MI; VA Ann Arbor Healthcare System, Ann Arbor, MI; RAND Corporation, Santa Monica, CA; Camcare Health Corporation, Camden, NJ; Cooper Health, Camden, NJ; United Healthcare, Camden, NJ

Study Objectives: To evaluate patterns of pediatric asthma-related acute care utilization to inform interventions aimed at reducing potentially avoidable ED visits and hospitalizations.

Methods: A 3-phase mixed methods study was performed: (1) cluster analysis of hospital claims data from three Camden city facilities for the years 2010-2014 to classify patients aged 0-17 according to their asthma-related ED visits and hospitalizations; (2) qualitative thematic content analysis of four focus groups of asthmatic children and caregivers recruited using the clusters determined in phase 1; and (3) the development of an expert panel using the RAND-UCLA appropriate methods to vote on interventions to reduce pediatric asthma acute care use in Camden, NJ, based on phase 1 and 2 findings.

Cluster analysis based on total number of ED visits and hospitalizations was performed using the Ward’s Method with Squared Euclidian Distance hierarchical clustering procedure. The number of ED visits and hospitalizations are treated as coordinates in a scree plot that was used along with substantive clinical judgment to settle on 5 clusters.

Using clusters found in phase 1, four semi-structured focus groups of 5-9 participants identified through the local health information exchange were conducted: (1) clusters 4 and 5 and ages 14-17; (2) clusters 4 and 5 with caregivers of those ages 0-13; (3) clusters 1 and 2 and ages 14-17; (4) clusters 1 and 2 with caregivers of those ages 0-13. Questions included experiences with asthma, health care utilization, and potential interventions. Participants also ranked illustrated electronic prescribing of controlled substances mandate (NYM EPCS).

Cluster analysis revealed five distinct clusters of asthmatic children in Camden, New Jersey; this is summarized in Table 1. Qualitative themes from phase 2 are outlined in Table 2.

Conclusions: Differences in acute care utilization observed between groups across multiple socio-behavioral factors suggest these clusters may represent children who differ along multiple dimensions. The patterns of service use defined by these clusters as well as care preferences identified through focus groups can inform tailored interventions.

168 Effect of New York State Electronic Prescribing Mandate on Opioid Prescribing Patterns
Danovich D, Chacko J, Greenstein J, Ardolic B, Berwald N/Staten Island University Hospital, Staten Island, NY

Study Objectives: To describe our emergency department’s (ED) prescribing patterns of opioid analgesics prior to and in the months following the New York State electronic prescribing of controlled substances mandate (NYM EPCS).

Methods: This study is a retrospective, descriptive analysis of the ED prescribing patterns of opioid analgesics prior to and in the months following NYM EPCS. Approval was granted by the institutional review board for Northwell Health. Data were obtained from the Emergency Department Information Systems (EDIS, Allscripts EDIS V.7.2.1, Raleigh, North Carolina USA), the electronic health record for Staten Island University Hospital North ED (SIUH-N). Prescription drug name, age, sex, and primary diagnosis treated were extracted from EDIS from April 1, 2015
through July 31, 2015 and April 1, 2016 through July 31, 2016. These time periods were used to serve as a seasonally comparative group. Inclusion criteria were any opioid analgesics written for all patients during the study period. There were no exclusion criteria. Reasons for opioid prescriptions were inferred from the primary diagnosis in the chart. Demographic and baseline clinical characteristics were calculated as means with standard deviations (SD) for continuous variables and numbers with percentages for categorical variables. Differences in the primary outcome variable of the number of opioid analgesics prescriptions between the time periods of Pre-NYM EPSCs and Post-NYM EPSCs were compared with two-sample z-test for the difference between proportions. The analyses were performed for each primary diagnosis separately as well as for the overall prescriptions. All statistical tests are two-sided and a P-value of <0.05 was considered to indicate statistical significance. All data analyses were performed using the SAS software, Version 9.3 (SAS Inc., Cary, NC, USA).

Results: In the four months studied prior to NYM EPSCs our ED saw 31,335 patients, and 1,370 prescriptions were written for opioid analgesics. In the same four-month period following the NYM EPSCs our ED saw 31,300 patients, and 642 opioid prescriptions were written. This was a statistically significant difference of 53% of prescribed opiates (P < 0.001). Prescriptions were separated into 15 different categories based on the primary diagnoses (Figure 1). When compared, the number of prescriptions written for each diagnosis post NYM EPSCs was fewer in each category. There was a notable statistically significant (P < 0.001) decrease in prescriptions post-NYM EPSCs for the following diagnoses arthralgia/myalgia, back pain, dental pain, soft tissue injury, abdominal pain, neuropathic pain and genital pain.

Conclusions: There was a significant decline of prescribed opioids from our ED after the NYM EPSCs went into effect. Many diagnoses such as back pain, dental pain and abdominal pain showed a statistically significant drop in patients receiving prescriptions for opioid analgesics post-NYM EPSCs.

Methods: This project used a three-phase, convergent mixed-methods approach: (1) a systematic environmental scan of 4 databases for peer-reviewed literature and 10 Web sites of governmental and professional organizations for grey-literature; (2) a qualitative analysis of four focus groups of 5-13 participants and ten one-on-one interviews with EMS stakeholders representing diversity in performance, community-setting, geographic region, and professional roles; and (3) a quantitative descriptive data analysis of the Michigan EMS Information System (MI-EMSI). These three sources of data were triangulated to develop a comprehensive understanding of best practices in EMS oversight and quality measurement.

Results: Pre-existing literature and qualitative findings suggest that most quality measurement occurs at the EMS personnel level. The descriptive analysis of reported variables in MI-EMSI showed patterns of missingness by software platforms used, oversight agencies, and other characteristics. Triangulated findings showed best practices in EMS oversight in the following categories: structure, leadership, relationships, resources, collaboration, and community specific needs.

Conclusions: State EMS oversight entities can be deliberate in their structures and processes related to the five areas found. Doing so can support the standardization and coordination of care, develop quality improvement collaborations between hospitals and EMS agencies, and promote more high quality EMS delivery. Furthermore, the convergent mixed methods used in this project can support the development of more policy-relevant, actionable evidence in emergency and acute care research.

169 Informing the Policy, Practice, and Research Agenda for Emergency Medical Services

Oversight

Abir M, Taymour R, Lowell M, Wahl K, Scott J/University of Michigan, Ann Arbor, MI; Michigan Department of Health and Human Services, Lansing, MI

Study Objectives: In a 2015 report the Institute of Medicine (IOM) noted a fragmented EMS system in the United States, an absence of system-wide coordination and planning, and a lack of federal, state, and local accountability regarding EMS care. The IOM recommended understanding what roles the federal government, states, and local communities play in the oversight and evaluation of EMS system performance and how they may work together to improve care. This project, funded by the Michigan Department of Health and Human Services (MDHHS), aims to understand these relationships between oversight and EMS stakeholders in the state of Michigan, and to begin filling the knowledge gap noted by the IOM.

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Figure 1. Prescriptions by diagnosis category Pre- and Post-NYM EPSCs.
pattern is most appropriate remains somewhat open. However, given research highlighting the risks of subsequent misuse and long term use following opioid prescribing, providers in general EDs should consider whether more conservative prescribing is indicated.

171 Implementation of a Screening and Referral Process for Patients With Sickle Cell Disease in the Emergency Department
Freirencuth C, Murray D, Johnston J, Earls M, Tanabe P/Duke University, Durham, NC; Community Care of North Carolina, Raleigh, NC

Study Objectives: Some patients with sickle cell disease (SCD) have frequent emergency department (ED) visits. Many of these are driven by social behavioral health needs, challenges obtaining follow-up, transportation, filling prescriptions and difficulties with insurance. The objective of this project was to 1) develop and implement a screening tool and referral process within EDs to identify unmet needs for individuals with SCD, 2) measure the type and number of referrals made, and 3) measure the changes in out-patient care management service level.

Methods: A brief screening and referral form was developed using data from prior work and validated by experts and stakeholders in North Carolina, representing emergency medicine (NCCEP) and nursing (NCENA), social work and care management. Our group, led by Community Care of North Carolina (CCNC- a Medicaid managed care organization), developed a process and trained ED providers to and fax the referral form to the CCNC Call Center. ED providers were encouraged to fill out the form for any adult patient with sickle cell disease who was seen in the ED. Once received, staff determines where the patient is referred. All persons with Medicaid in NC have a care manager assigned to them through CCNC. SCD-specific educator counselors, funded by the North Carolina State Sickle Cell Syndrome program are available to assist with needs and referrals were sent to them for non-Medicaid patients. The process was implemented November 2014 at two large EDs, and a 3rd available to assist with needs as well and referrals were sent to them for non-Medicaid counselors, funded by the North Carolina State Sickle Cell Syndrome program are available to assist with needs and referrals were sent to them for non-Medicaid patients. The number of social, behavioral health, and health services needs. The referral program implementation status (deferred, inactive, pending, light, medium and heavy). Deferred status indicates patient refusal or inability to contact patient, and a heavier care management use indicates patients are utilizing services.

Results: 683 referrals were made between November 2014 and January 2017; 436 were sent to CCNC and 247 to the state SCD program. One health system accounted for 57% of the referrals, with 23% and 16% from the other two. Reasons for referral included: emotional (120), financial (95), medical (150), pain (329), prescriptions (92), relational issues/family support systems (60), and transportation (98). Care management status, indicating intensity of patient engagement changes, were observed: deferred status dropped from 48% to 14%, patients in inactive status dropped from 6% to 2%, patients in pending (attempting to contact) status increased 19% to 31%, patients in light status increased from 6% to 12% and patients in heavy status increased from 10% to 26%.

Conclusions: We successfully developed and implemented a screening and referral process for individuals with SCD in three large EDs in NC. Patients identified a large number of social, behavioral health, and health services needs. The referral program identified many patients who were not currently utilizing available services and resulted in increased contact with these patients. Future work is required to determine the effect of these services on ED visits and hospitalizations.

Poon SJ, Schuur JD, Mehrotra A/Brigham and Women’s Hospital, Boston, MA; Harvard Medical School, Boston, MA

Study Objectives: Over the last two decades, new acute health care venues in the United States have emerged and grown. Urgent care centers, retail clinics and telemedicine have expanded as alternative convenient care options. Despite the rapid growth of these alternatives, the relative use of these venues and their impact on the volume of emergency department (ED) use is not well described. We aimed to describe trends in utilization of EDs, urgent care centers, retail clinics and telemedicine, with a focus on low-acuity conditions.

Methods: Using claims data from a large national commercial health insurer from 2008-2015, we tracked utilization of different care venues. ED visits were identified by an ED-specific place of service code. Other care sites were identified using a combination of place of service codes, national provider identifiers and tax identification numbers. Our focus was on visits for a set of low-acuity conditions such as bronchitis, urinary tract infections, and rashes that are managed at all of these settings. These previously derived conditions each comprise 2% or more of all visits to retail clinics and urgent care centers, and excluded diagnostic codes that would require treatment in an ED. Patient burden of illness was captured using the diagnostic-cost-group (DCxCG) risk score.

Results: From 2008 to 2015, an average of 21 million insured members per study year made 52 million visits to acute care venues, with 23 million visits for low-acuity conditions. The number of visits for low-acuity conditions increased from 127 to 154 visits/1,000 members. There were substantial increases in the utilization of urgent care (93% increase, 41 to 79 visits/1,000), retail clinics (183% increase, 6 to 17 visits/1,000) and telemedicine (0 to 4 visits/1,000) (Figure 1). In contrast, there was a 31% decrease in visits to EDs for these conditions (80 to 55 visits/1,000). From 2008 to 2015 the fraction of low-acuity visits that occurred in the ED decreased from 63% to 35%. The pediatric population accounted for most of the decline in low-acuity ED visits (0-17 years: 44 to 22 visits/1,000 vs. 18-64 years: 29 to 27 visits/1,000). In contrast, the growth in urgent care utilization was more evenly distributed (0-17 years: 13 to 22 visits/1,000, 18-44 years: 18 to 35 visits/1,000, 45-64 years: 8 to 18 visits/1,000). Patients visiting non-ED settings for low-acuity conditions were healthier (mean risk score: ED 3.31, urgent care 1.25, retail clinic 0.94, telemedicine 0.94), and a greater proportion were female (ED 54%, urgent care 58%, retail clinic 64%, telemedicine 68%).

Conclusions: Over the eight-year period from 2008-2015, there were dramatic shifts in where patients in a national commercial insurance plan received care for low-acuity conditions. While use of retail clinics and telemedicine is rising, these settings represent a low proportion of visits. There has been an almost doubling of urgent care use with a corresponding drop in ED utilization. EDs now provide a minority of on-demand care visits for low-acuity conditions.

173 Validity of Code-Based Recording of Alcohol Intoxication Among College Students Presenting to a University Hospital Emergency Department
NgD DA, Holstege C, Ding C, Miley L, Rege S/University of Virginia, Charlottesville, VA; University of Virginia School of Medicine, Charlottesville, VA

Study Objectives: Previous studies indicated that the use of diagnostic codes in patient medical records to identify alcohol-related hospital admissions does not adequately account for the true burden of alcohol misuse among patients admitted to hospitals. Furthermore, to date no studies have specifically examined the validity of code-based recording of emergency department (ED) visits due to alcohol intoxication. This study aims to evaluate the accuracy and completeness of diagnostic codes in recording ED visits due to alcohol intoxication among college students in an ED associated with a major public university.
Methods: Six hundred clinical records of student visits to the ED in 6 academic years from 2009-10 to 2014-15 were randomly selected for chart review by 2 independent reviewers to identify visits with alcohol intoxication. Results were then compared with ICD-9 diagnostic codes indicating alcohol intoxication (30500, 30502, and 3030) in the hospital discharge database. Sensitivity, specificity, positive predictive and negative predictive values were calculated to evaluate the validity of diagnostic codes using the chart review as the “gold standard.”

Results: Over the study period, there were 9616 student visits to ED. Overall prevalence of alcohol intoxication was 10.4% based on ICD-9 diagnostic codes. Of the review sample of 600 records, the use of ICD-9 diagnostic codes in patient medical records identified 64 visits (10.6%) with alcohol intoxication, while the chart review identified 96 visits (16%) with alcohol intoxication. Sensitivity was 65%, indicating that ICD-9 diagnostic codes only captured 65% of the total ED visits with alcohol intoxication in the review sample. The specificity, positive predictive value, negative predictive value, and accuracy were 99%, 94%, 94%, and 94%, respectively (Table 1). There were 41 visits which involved both alcohol intoxication and injury or trauma, of which alcohol intoxication diagnostic codes were provided in only 18 visits (44%).

Conclusions: Although code-based recording of student ED visits due to alcohol intoxication had a high level of accuracy, over one third of ED visits due to alcohol intoxication were not captured by diagnostic codes. In particular, when the visit also involved injury or trauma, only less than half of visits with alcohol intoxication were given a diagnostic code for this condition. Code-based measurement appears to severely underestimate the true burden of alcohol intoxication in the ED associated with student visits. There is a strong need to improve emergency physician coding of alcohol intoxication so that ED electronic medical records can serve as a reliable data source to evaluate the burden of alcohol intoxication in the hospital emergency setting.

Table 1. Agreement in the number of ED visits with alcohol intoxication identified by the chart review and diagnostic codes

<table>
<thead>
<tr>
<th>Chart Review</th>
<th>Yes</th>
<th>No</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diagnostic codes</td>
<td>62</td>
<td>4</td>
<td>66</td>
</tr>
<tr>
<td>No</td>
<td>34</td>
<td>500</td>
<td>534</td>
</tr>
<tr>
<td>Total</td>
<td>96</td>
<td>504</td>
<td>600</td>
</tr>
</tbody>
</table>

174 Resident Clinical Experience in the Emergency Department: Patient Encounters by Post Graduate Year

Douglas A, Yip K, Tanen D, Fleischman R, Lumanauw D, Jordan J/Harbor-UCLA Medical Center, Torrance, CA

Study Objectives: The aim of our study was to evaluate the clinical experiences of residents in the emergency department based on their level of training. We sought to determine whether patients that residents of different training levels saw varied in their acuity levels, chief complaints, and dispositions.

Methods: This was a retrospective chart review of patients seen at a safety-net, academic hospital in Los Angeles from July 1, 2015 to June 30, 2016. Medical records for all patients seen by a resident in the emergency department (ED) were reviewed. A pre-determined data collection form was completed including: resident PGY level and specialty, patient acuity, chief complaint, and disposition. Acuity was classified based on the Emergency Severity Index. The chief complaint recorded by the triage nurse was categorized into one of 30 previously published categories of the most common chief complaints. As many patients seen by PGY1s are supervised by an upper-level EM resident, both the intern and upper-level resident were given credit for patients they saw together. Residents were only credited with patients for whom they initiated the workup. Descriptive statistics were reported.

Results: 48,073 visits were included. 32,816 (68.3%) of these visits were in the adult ED (AED) and 15,257 (31.7%) were in the pediatric ED (PED). Approximately half of the patients were male. Median acuity levels in both the AED and PED were 3. 27.3% of AED patients and 8.3% of PED patients were admitted. 130 residents were included in the study, consisting of 98 PGY1 residents (16 EM and 82 off-service), 16 PGY2 EM residents, and 16 PGY3 EM residents. We found that residents of different training levels saw different types of patients. EM residents further in their training were more likely to see higher acuity patients and patients who were admitted or died. PGY3s saw much higher percentages of acuity level 1 and 2 patients (2.3% and 35.6%, respectively) than their teaching residents (0.0% and 21.8%, respectively). PGY2s were in between the 2 groups but were more similar to PGY3s (2.1% and 34.3%, respectively). Conversely, EM PGY1s saw higher percentages of acuity level 4 and 5 patients (27.8% and 1.6%, respectively) compared to EM PGY3s (10.8% and 0.7%, respectively). We found that the five most over-represented chief complaints seen by EM PGY1s (ie, complaints seen disproportionately more by EM PGY1s than the overall prevalence of the complaint) were: ear symptoms, fever, skin symptoms, upper respiratory infections/throat symptoms, and toxic ingestions. The most over-represented chief complaints seen by PGY2s were: fainting/syncope, substance/alcohol-related symptoms, convulsions, palpitations, and altered mental status and by PGY3s were: focal neurological symptoms, general weakness, pregnancy complaints, dizziness/vertigo, and swelling. PGY3s were more likely to see patients who were admitted or expired (23.5% and 0.3%, respectively) as compared to EM PGY1s (11.7% and 0% respectively). Interestingly, off-service PGY1s saw more acute patients than EM PGY1s, including patients with higher acuity levels and higher admission rates.

Conclusions: Our study shows that the clinical experience of EM residents varies based on their level of training. EM residents were more likely to see higher acuity patients as they progressed in their training. Off-service interns tended to see higher acuity patients than EM interns. Future studies over longer time periods with more residents at additional sites would help verify this trend.

175 A Pilot Study of 360-Degree Perceptions of Emergency Physicians’ Professionalism

Narajeenron K, Velarde I, Dukovic J, Anderson CL, Chakravarthy B, Hoongpimsarnont W/University of California Irvine, Irvine, CA

Study Objectives: Physicians’ professionalism impacts patient satisfaction. The Accreditation Council for Graduate Medical Education requires professionalism competency as one of six core competencies for residency training. Many emergency physicians’ professionalism frameworks are derived from expert opinions. We aim to understand how EM professionalism is perceived by different cohorts including by attending physicians (AP), EM residents, first-year medical students (MS), fourth-year MS, emergency department (ED) nurses and ED patients.

Methods: We have been conducting a prospective cohort study by using a card-sorting technique at a university-based ED and its associated medical school from November 2016. We reviewed literatures globally, and identified 13 elements that...
potentially affects EM professionalism. For each element, we created three cards, each of which describes a quality or behavior that is associated with such element. We ensured a correct and uniformity of wording interpretation of each card by testing it with ED patients, MS, EM residents and AP. After several iterations, we achieved a deck of 39 cards, each describe a quality or behavior that is associated with professionalism. Then, we asked our consented subjects to sort the deck from most to least important quality that affects professionalism of emergency physician. We also collected demographic information from each subject. Finally, we used descriptive analysis to compare rankings between each cohort.

Results: Our preliminary data from 115 subjects (25 ED patients, 16 AP, 18 EM residents, 29 first year MS, 8 fourth year MS and 19 ED nurses) shows a consensus that wearing a white coat was the least important behavior for being professional. However, the opinion on the most important element diverges. ED patients ranked humanism, whereas health care providers ranked medical competency, honor and integrity, humanism and communication as the most important quality that affects professionalism (Table 1).

Conclusions: Our preliminary findings demonstrated a discrepancy in perception of EM professionalism among patients, physicians and nurses. Additional research to enhance our understanding on perception and definition of EM professionalism is warranted.

176 How Common are Cognitive Errors in Cases Presented at Emergency Medicine Resident Morbidity and Mortality Conference?
Xiao J, Chu D, Shah P, Todd B/Beaumont Health, Royal Oak, MI; William Beaumont School of Medicine, Rochester, MI

Study Objectives: Cognitive errors are increasingly recognized as a major contributor to medical error. Traditionally, medical errors at teaching hospitals are analyzed in morbidity and mortality (M&M) conference. We aim to describe the frequency of cognitive errors relative to other error types, in cases presented at an emergency medicine resident M&M conference.

Methods: We conducted a retrospective study of all cases presented at the Beaumont Emergency Medicine residency monthly M&M conference from September 2011 to August 2016. Each case was reviewed using the electronic medical record and peer review committee notes by two emergency physicians. Each case was categorized by type of primary medical error that occurred as described by Okafor et al. When a diagnostic error occurred, the case was reviewed for cognitive and non-cognitive factors that contributed. Finally, when a cognitive error occurred, the case was reviewed and classified into faulty knowledge, faulty data gathering, or faulty synthesis, as described by Graber et al. Disagreements in error type were mediated by a third emergency physician.

Results: 87 M&M cases were reviewed; the two reviewers were in agreement on 73 cases, and 14 cases required mediation by a third reviewer. No medical error was identified in 22 cases. 48 cases involved diagnostic errors, 2 cases involved procedural errors, 5 cases involved inappropriate disposition errors, 6 cases involved inappropriate or delayed therapy errors, 1 case was due to inappropriate delayed testing error, and 3 cases due to other. Of the 48 cases with primary diagnostic error, 47 were due to cognitive errors. Of these 47 cases, 39 cases were due to faulty synthesis, 22 cases were due to faulty data gathering, and 11 cases were due to faulty knowledge. 20 cases contained more than one type of cognitive error.

Conclusions: Resident emergency physicians are presented with an important opportunity to learn from errors at M&M conferences. Although a core competency of residency training is mastering a fundamental body of knowledge, our review of 87 M&M cases shows that diagnostic errors are less likely due to deficient knowledge, and more likely due to cognitive errors. In order to reduce future medical errors and improve patient care, residency training should include education on identification of cognitive errors and how to avoid them.

177 Development of a Sustainable Curriculum on Substance Use Disorders for Emergency Medicine Residents at Cooper University Hospital
Gruber E, Zapp Z, Pescatore R, Salzman M, Haroz R, Nyce A/Cooper University Hospital, Camden, NJ

Study Objectives: Substance use disorders (SUD) are estimated to affect nearly 1 in 5 emergency department (ED) patients, while the incidence of overdose, particularly opiate-related, continues to rise. Emergency physicians are on the front line of this epidemic. Through a grant co-sponsored by EMF (Emergency Medicine Foundation) and NIDA (National Institute on Drug Abuse), we designed a curriculum for EM residents relating to the comprehensive management of SUD in the ED. To the best of our knowledge, through literature searches and discussion with national SUD leaders, such a curriculum specific to EM providers is a first. In doing so, we align with the CDC and NIDA goals of reducing exposure to opioids, expanding access to medication-assisted treatment, and promoting the use of prescription drug monitoring programs.

Methods: The curriculum was designed through the help of two medical toxicologists with addiction medicine training, social workers with invaluable insight into community SUD resources, and input from ED program leadership. Funding for the project began in April 2016; the formal curriculum started in July 2016 and is ongoing for all EM residents at Cooper University Hospital. To assess the impact on residents thus far, we utilized pre and mid-curriculum assessments for all residents (excluding authors) completed at the onset of the curriculum and 8 months later.

Results: The SUD curriculum will be a requirement for all EM residents to prior to graduation. It consists of formal didactic lectures during structured EM resident weekly conferences, clinical exposure in multiple settings including the ED, outreach clinic, and inpatient detoxification consultation, and synthesis of all material through personalized care plans for SUD ED super-utilizer patients. Lectures are generated from evidence-based literature relating to a variety of SUD topics from management of the acutely intoxicated/withdrawing patient to referral to appropriate outpatient resources; addiction medicine specialists are in attendance for lectures and available to further discussion. Table 1 summarizes a checklist of clinical exposures and tasks required for residents to successfully the curriculum.

Data from resident assessment scores (initial assessment at onset of curriculum, second assessment at 8-month point) showed improvement in resident comfort level treating patients with SUD and overall SUD knowledge base. Furthermore, residents demonstrated better understanding of appropriate outpatient resources and referrals while improving upon opioid prescribing practices and augmenting use of alternatives to opioids for treatment of acute pain.

Conclusions: EM residents at Cooper University Hospital must our designed SUD curriculum to graduate. We have received positive feedback and data thus far; however, the curriculum continues to be a work in progress. There are multiple areas for improvement including focus on sustainability and better patient education. We are confident Cooper residents will emerge well equipped to tackle the challenges of the current SUD epidemic in their future practice.

Table 1: Curriculum Checklist

- Attend 50% of formal SUD lectures during weekly resident conferences
- Complete buprenorphine “X” waver training course
- Create and adhere to patient care plan for one SUD patient with frequent ED utilization
- Complete consult for 2 patients on addiction medicine inpatient service
- Outreach clinic for medication-assisted treatment of SUD; participate in initial intake visit, follow up visit, total of 2 sessions (4 hours each)
- Complete curriculum reflection piece
- Pre, mid and post-curriculum assessment

178 A Comparative Analysis of Online vs In-Person Opioid Overdose Prevention Training for First Year Medical Students as an Adjunct to First Responder Training Using Cardiopulmonary Resuscitation
Berland N, Lugassy D, Fox AD, Toffghi B, Hanley K/SUNY Downstate Kings County, Brooklyn, NY; New York University School of Medicine, New York, NY; Montefiore Medical Center, Bronx, NY

Study Objectives: To help address the growing opioid overdose epidemic and help teach a core toxicological emergency, the authors taught the use of naloxone as an antidote to an opioid overdose, for all first-year medical students as a part of first responder training using cardiopulmonary resuscitation, as an online and in-person training over three years. Previously we demonstrated that in-person opioid
Methods: Opioid overdose prevention trainings were conducted in person in 2014 and 2015, and online in 2016. First year students completed pre- and post-training surveys covering three measures: knowledge (11-point scale), attitudes (66-point scale) towards patients with opioid use disorders, and self-reported preparedness (60-point scale) to respond to an opioid overdose. Online and in-person scores across all three measures were compared using analysis of covariance (ANCOVA) methods across two years of trainings.

Results: After controlling for pre-test scores, there were very small and not meaningful differences in attitude and knowledge scores between in-person training and online training. The estimated difference for knowledge was -0.06 (95% CI -0.48 - 0.35) and for attitudes was 0.64 (95% CI -0.22 - 1.50). The average scores related to preparedness were higher for the students who took the course online, estimated at 2.10 points (95% CI 0.97 - 3.22). Feedback was generally positive, with 96% of the in-person group saying future classes should receive the training and 95% of the online group saying all medical schools should provide the training.

Conclusions: Online training has become a more common method of medical education due to its many advantages including standardization, scalability and flexibility to accommodate asynchronous learning. However, few studies have performed analyses of online training vs in-person training for relative effectiveness. The authors have demonstrated that for training medical students to administer naloxone as an antidote to an opioid overdose, online training is comparable to in-person training. These results support the use of online training for adding training on administering naloxone.

179 Institution of a Palliative Care Curriculum and the Effect on Resident Comfort and Knowledge Regarding End-of-Life Care
Riley J, Stuntz R, Stahlman B/Wellspan York Hospital, York, PA

Study Objectives: The objective of this study was to evaluate the effect of a 4-hour palliative care curriculum (PCC) on emergency medicine (EM) resident comfort with key palliative care skills and knowledge of the subject material. The primary outcome was the change in self-reported comfort with key palliative care skills. The secondary outcome was resident knowledge of best practices related to end-of-life care. It was hypothesized that participation in the curriculum would increase comfort level and knowledge of subject material in the immediate follow-up, but that some of this would be lost at 6 months.

Methods: This was a prospective, survey-based study. A 4-hour PCC, based on the EPEC-EM course, was designed and taught by a certified EPEC-EM trainer as part of the departmental conference series at an EM residency program. Residents were asked to a survey before, immediately after, and 6 months after completion of the curriculum. This survey assessed resident comfort with relevant palliative care skills on a five-point Likert scale. Resident knowledge of best practices to guide end-of-life conversations was assessed by nine multiple choice questions.

Results: Of 99 surveys issued, 66 were completed for a 67% response rate; 31 of 33 eligible residents completed at least one survey. At the immediate follow up, survey results showed a significant increase in resident comfort for all skills except informing a family member of a loved one’s death, breaking bad news to a patient, and managing the pain of a terminal cancer patient. At 6-month follow-up, resident comfort ratings continued to trend upward with all skills showing significant improvement over the pre-curriculum assessment except for completion of a POLST (Figure). The average resident comfort rating for all palliative care skills prior to the PCC was 3.04 (“neutral” sentiment). At immediate and 6-month follow-up, the average score was 3.84 and 4.05 (“somewhat comfortable”), respectively. There was no significant increase seen in the scores on the knowledge-based multiple choice questions immediately or at 6 months following the PCC.

Conclusions: Implementing a brief PCC as part of resident conference series improves resident comfort with key palliative care skills in the ED that not only persists at 6 months, but demonstrates further increase. This may be due to subsequent opportunities for residents to apply their palliative care skills in a clinical environment. Further opportunities for research would include application of a similar intervention across multiple residency training sites or institution of a follow-up training session to reinforce the skill set even further.

180 Effect of SEP-1 Core Measure Compliance on Mortality and Hospital Length of Stay
Gross EA, McGlynn G/University of California, Davis, Sacramento, CA

Study Objectives: In October 2015, the Centers for Medicare and Medicaid Services required U.S. hospitals to report compliance with the SEP-1 core measure, intended to standardize treatment of severe sepsis and septic shock in accordance with evidence-based guidelines. Core measure components include blood cultures, initial and repeat lactic acid, broad-spectrum antibiotics, 30 mL/kg of fluid for initial hypotension or lactic acid >4, and vasopressors for persistent hypotension. The aim of this study is to measure the effect of compliance with the SEP-1 core measure on mortality and hospital length of stay (LOS) for adult patients with severe sepsis and septic shock.

Methods: Data was collected from 2,007 individual hospital encounters for severe sepsis and septic shock qualifying for the SEP-1 core measure between October 2015 and November 2016. Compliance was calculated with the SEP-1 bundle overall as well as with the individual bundle components. Encounter-level data included in-hospital mortality, LOS, admission severity of illness (SOI), and diagnoses of heart failure (HF) and end-stage renal disease (ESRD). Logistic and linear regression analyses were performed to predict the effect of SEP-1 compliance, SOI, HF, and ESRD on mortality and LOS.

Results: Logistic regression analysis was performed including compliance and admission SOI as predictors of mortality in patients with severe sepsis (n = 1560) and septic shock (n = 447). Admission SOI significantly predicted mortality for patients with severe sepsis and septic shock (p < .001) and improved the fit of the model. HF and ESRD were not included because they did not significantly predict mortality.

Overall compliance was not significantly associated with mortality for patients with septic shock. For severe sepsis patients, the model was statistically significant (p < .001). It predicted 10.3% of the variance in mortality and correctly predicted 90.1% of these encounters. Overall SEP-1 compliance was associated with survival for patients with severe sepsis, p = .014.

Initial lactic acid (p < .000) and repeat lactic acid measurements (p = .013) were the only individual bundle components for which compliance significantly predicted mortality for severe sepsis patients. Broad-spectrum antibiotics, 30 mL/kg fluid for initial hypotension, and blood cultures did not significantly predict mortality.

Linear regression analysis was performed to predict hospital LOS based on SEP-1 compliance and admission SOI. Overall compliance was associated with a significant decrease in LOS for patients with both severe sepsis and septic shock (p < .000 for both).

Conclusions: With admit SOI included in the model, compliance with the SEP-1 bundle overall and specifically with lactic acid screening is
significantly associated with decreased mortality for patients with severe sepsis, but not septic shock. Overall compliance with the SEP-1 bundle is associated with decreased hospital LOS for patients with both severe sepsis and septic shock.

Table 1. Summary of Logistic Regression Analysis for Variables Predicting Mortality in Patients with Severe Sepsis and Septic Shock

<table>
<thead>
<tr>
<th>Predictor</th>
<th>Severe Sepsis</th>
<th>Septic Shock</th>
</tr>
</thead>
<tbody>
<tr>
<td>Admit Severity of Illness</td>
<td>2.233**</td>
<td>4.559</td>
</tr>
<tr>
<td>Overall Compliance</td>
<td>4.43**</td>
<td>0.028</td>
</tr>
<tr>
<td>Initial Lactic Acid</td>
<td>1.099**</td>
<td>0.249</td>
</tr>
<tr>
<td>Blood Culture Collection</td>
<td>-1.35</td>
<td>0.355</td>
</tr>
<tr>
<td>Antibiotic Administration</td>
<td>0.560</td>
<td>0.367</td>
</tr>
<tr>
<td>30 mL/kg fluids</td>
<td>-0.449</td>
<td>0.278</td>
</tr>
<tr>
<td>Repeat Lactic Acid</td>
<td>0.369*</td>
<td>0.279</td>
</tr>
<tr>
<td>Vasopressors</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

* Significance level < 0.05
** Significance level < 0.001

Methods: This was an international prospective cohort study conducted by 17 adult EDs between October 2016 and April 2017 in France, Spain and Belgium. Consecutive patients with a clinical suspicion of infection and qSOFA score ≥ 2 were included. The qSOFA was measured at 0, 1 and 3 hours (H0, H1 and H3 respectively), and patients were followed up until death or hospital discharge. The primary objective was to assess the prognostic accuracy of ΔqSOFAH0H3 (qSOFAH0 minus qSOFAH3). The primary end point was in-hospital mortality, truncated at 28 days. Secondary end points include a composite severity endpoint of death or ICU stay of more than 72 hours.

Results: On the 533 recruited patients, 7 were excluded for missing values and 14 because they had a qSOFA=1 at inclusion, leaving 512 for analysis. Mean age was 71 (standard deviation 18) and 56% were men. Infection was confirmed in 454 patients (88%), with a respiratory or urinary source in most cases (50% and 20% respectively). During the first three hours, patients received a median of 1500 ml of fluids (interquartile range 1000 - 2000). A total of 140 patients (27%) met the primary endpoint of in-hospital mortality, and 257 (50%) the composite severity endpoint. Two hundred eighty seven patients (55%) had an improved qSOFA score at H3. The value of ΔqSOFAH0H3 was inversely associated with the risk of death (Figure 1). Overall, the improvement of at least one point in qSOFA within 3 hours was associated with a reduced risk of in-hospital death (18% vs 37%, 19% difference [95% confidence interval [CI] 12% - 27%]) and of the composite endpoint (41.3% vs 61.1%, 20% difference [95% CI 11% - 12%]). The area under the ROC curve of ΔqSOFA was 0.65 [95% CI 0.59 - 0.69] for the prediction of in-hospital death, and 0.63 [95% CI 0.57 - 0.66] for the composite endpoint. Similar trends with smaller effect size were found with the variation of qSOFA between H0 and H1, and H1 and H3.

Conclusions: Among ED patients with infection and an initial qSOFA score of at least two, an improvement of this score during the first 3 hours is associated with a reduction in in-hospital mortality. However, the variation of qSOFA in the early hours has only mediocre prognostic value.

Study Objectives: In 2016, the SEPSIS-3 consensus redefined the concept of sepsis and suggested that the use of quick sequential organ failure assessment (qSOFA) could early identify patients at risk of poor outcomes. The score is based on the early assessment of three items: respiratory rate ≥22/min, altered mentation, and systolic blood pressure ≤100 mm Hg. Several studies have since validated this score in emergency department (ED) patients. However, the potential variability of qSOFA in ED patients has not been considered in prior publications. The purpose of this study was to evaluate whether serial evaluation of the qSOFA score (ΔqSOFA) during the first three hours could increase the prognostic accuracy of qSOFA in patients presenting to the ED with suspicion of infection.

Figure 1: Association between qSOFA variation and in-hospital death
qSOFA: quick sequential organ failure assessment. *p<0.05 for comparison with all groups.

Study Objectives: There are over 3.4 million annual visits to US emergency departments (EDs) for skin infections. Traditionally, 90% of abscesses are treated with incision and drainage with packing (I&D). A minimally invasive technique called loop drainage (LD) is gaining popularity in the ED through blog Web sites and podcasts but there are few prospective randomized trials in ED patients confirming efficacy of this technique. The objective is to compare efficacy, complications, and number of follow-up visits between LD and I&D of cutaneous abscesses in discharged ED patients.

Methods: This was a prospective, randomized, noninferiority clinical trial comparing LD to I&D in the ED and urgent care center of an urban, academic medical center. We aimed to enroll 216 patients (assuming 60% loss-to-follow-up) to obtain 65 subjects in each group to achieve 81% power for assessing noninferiority of LD to I&D. Inclusion criteria were: English speaking, >18 years of age, presenting for initial treatment of a cutaneous abscess and able to follow up in 14 days. Exclusion criteria were: post-operative abscesses, previous treatment for same abscess, abscess too small to drain, and admission to the hospital. Subjects returned at 14 days for evaluation of abscess resolution and complications. Number of follow-up visits was determined by chart review. The primary outcome was abscess resolution at 14 days, defined by absence of fluctuance, drainage, induration, erythema, warmth, tenderness. Secondary outcomes were complications (new/extended incision, new/
change antibiotics, hospital admission) and number of wound-related return visits. Descriptive statistics were performed and noninferiority was determined using a margin of equivalence of 10% (0.10). A two-sided t-test and chi-square tests were used to compare follow-up visits and complications between the two treatment groups.

Results: There were 2,889 subjects considered for enrollment and 2,522 subjects were excluded. Top exclusion reasons: abscess had been previously treated (n = 588), abscess did not require packing/loop (n = 499), patient admitted to hospital (n = 298), patient unable to provide informed consent (n = 257), and abscess required specialist for drainage (n = 113). 367 subjects were approached and 238 subjects consented to randomization. 117 subjects were randomized to LD and 119 to I&D treatments. Five subjects were dropped from each group (admitted to the hospital after the procedure). Final study participants included the 75 LD and 65 I&D subjects that attended study follow-up visit at 14 days. For the primary study hypothesis of noninferiority, in LD group, 66 (88%) had abscess resolution versus 53 (81.5%) I&D subjects, for a difference of 6.5% (95% CI < 18.4%), which is within the margin of noninferiority. There were 28 (37.3%) LD subjects and 41 (63.1%) I&D subjects who returned for a wound-related follow-up visit (p = 0.002) with a mean of 0.5 (SD = 0.8) visits per LD subject versus 1.2 (SD = 1.4) visits per I&D subject (p = 0.001). Complications were reported in 7 (11.6%) of the subjects in the LD group compared to 26 (24.6%) in the I&D group (p = 0.01). There was not a significant difference in complications requiring hospital admission between the two treatment groups (5.9% vs 6.1% p = 1.00).

Conclusions: Loop drainage is noninferior to traditional I&D as it is performed at our institution. There are fewer follow-up visits required and fewer complications for those undergoing LD.

183 Spatiotemporal Patterns and Social Determinants of Community-Associated Methicillin Resistant Staphylococcus aureus Skin and Soft Tissue Infections Among Emergency Department Patients in North Central Florida

Study Objectives: To investigate spatial and social demographic patterns of community-associated methicillin resistant Staphylococcus aureus (CA-MRSA) skin or soft tissue infection (SSTI) in patients presenting to the emergency department in North Central Florida.

Methods: From August 2015-January 2017, pediatric and adult patients presenting to UF Health Shands Emergency Department in Gainesville, FL, with an acute SSTI were prospectively enrolled in cross-sectional study. Both nasal and SSTI site specimens were collected and cultured for spa-typing, Geographic, social, medical, and other patient-level epidemiological data was collected. Department of Defense rural-urban classification system and 2010 Census data was used for spatial and geographic analysis. Multivariate analyses were conducted to test associations of determinants and microbiological result.

Results: 171 subjects were included, spanning 24 counties and 69 zip codes based on self-reported home residence. 121 (75.4%) of subjects enrolled reported living in rural zip codes. 50 (29.2%) subjects had MRSA positive wound cultures and 24 (14%) had MSSA positive nasal cultures. MRSA positive wound culture was associated with recent exposure to livestock (p = 0.006) while nasal colonization of MRSA was associated with current alcohol consumption (p = 0.04), current history of smoking (p = 0.003), and antimicrobial soap use (p = 0.024). Nasal colonization of MRSA or MSSA was a significant predictor of positive MRSA wound cultures (p < 0.001) and positive MSSA wound cultures (p = 0.004), respectively. Subjects residing in rural zip codes were 2.6 (CI: 1.07-6.33, p = 0.033) times more likely to have MRSA positive wound cultures. There was no association between zip code classification and nasal MRSA colonization.

Conclusions: The geographic distribution of CA-MRSA is not uniform and has a higher prevalence in less populated rural areas, potentially highlighting a zoonotic association in CA-MRSA transmission. Although previous studies have also shown the association of nasal MRSA colonization and MRSA positive wound culture, this study suggests an association of nasal MSSA colonization and MSSA positive wound cultures which has not been previously well recognized. Associations with nasal MRSA colonization and social demographics provide insight to possible preventative therapies to reduce CA-MRSA infections. While the effectiveness of antimicrobial soaps are disputed and regulated, the possible promotion of nasal MRSA colonization due to use requires investigation. Genetic spa-typing analysis will provide further insight regarding spatiotemporal transmission across communities.

184 Can Adjunct Use of Topical Provodine® Improve Healing Rates in Patients With Skin Abscesses?
Olson AS, Rosenblatt L, Salerno N, Odette J, Ren R, Emanuel T, Du L, Jahangir K, Schmitz G, University of Texas Health San Antonio, San Antonio, TX; University Health System, San Antonio, TX

Study Objectives: Community-associated methicillin-resistant Staphylococcus aureus (CA-MRSA) is an important cause of skin abscesses in patients seen in emergency departments. Provodine® is a topical povidone-iodine broad-spectrum antiseptic. The potential benefit of Provodine® for patients with a drained abscess is unclear. Our objectives were to determine if the addition of Provodine® would be superior to standard treatment in patients who had an abscess that was treated with incision and drainage (I&D). The primary outcome was clinical cure 7-10 days after I&D. The secondary outcomes were rate of development of new skin lesions and spread in household contacts (HC) within 30 days.

Methods: This is a randomized controlled pilot study of a convenience sample of 100 adult patients presenting with an abscess requiring I&D. Patients were excluded if they were unable to provide informed consent, were homeless or incarcerated, had active IV drug use or iodine allergy, had an abscess on the face or breast, or required admission or surgical drainage. Patients were randomized to Provodine® or standard care.

All patients had I&D and packing of the abscess and wound cultures sent. Patients randomized to Provodine® had the agent applied with a Q-tip to the abscess cavity and surrounding skin after I&D. Patients were instructed to leave packing in place and change the dressing daily until the first wound check.

Subjects returned at 48-72 hours. All patients were instructed on daily dressing changes with gauze. Patients randomized to Provodine® were instructed to wash hands with Provodine® and apply the agent to the cavity and skin daily. Patients randomized to standard care were instructed to wash hands daily with soap and water. All patients were advised to continue daily wound care until the second wound check or until cavity had closed.

Subjects returned at 7-10 days. They were also contacted by telephone for data collection at 30 days.

Compliance with intervention and side effects were recorded. Additional interventions for patients not clinically improving or worsening were considered treatment failures. Data was collected including clinical cure, new lesion development, and spread to HC at each visit and at 30 days.

Results: The mean age of patients was 41.73 years (range, 19 to 74). Thirty-seven percent of cultures were positive for MRSA. Clinical cure at 7-10 days occurred in 42 of 46 patients (91.3%) in the standard group versus 45 of 51 patients (88.2%) in the Provodine® group (difference, 3.1 percentage points; 95% confidence interval [CI], 0.39 to 2.71; p = 0.764). Spread to HC within 30 days occurred in 4 of 39 patients (10.26%) in the standard group versus 2 of 39 patients (5.13%) in the Provodine® group (difference, 5.13 percentage points; 95% confidence interval [CI], 0.36 to 12.28; p = 0.675).

Development of a new lesion within 30 days occurred in 8 of 41 patients (19.51%) in the standard group versus 8 of 39 patients (20.51%) in the Provodine® group (difference, 1.0 percentage points; 95% confidence interval [CI], 0.31 to 2.81; p = 1.00).

Conclusions: The addition of Provodine® to standard treatment did not improve clinical cure, rate of new lesion development, or spread to HC in patients with cutaneous abscesses requiring incision and drainage.

S74 Annals of Emergency Medicine Volume 70, No. 48 : October 2017
Study Objectives: To determine the availability of a pediatric emergency care coordinator (PECC) in US emergency departments (EDs).

Methods: We conducted a national survey of EDs to characterize emergency care, including pediatric care, in 2015. We used the National Emergency Department Inventory (NEDI)-USA database to obtain a comprehensive list of all non-federal and nonspecialty EDs open 24/7. We identified 5,278 EDs open in 2015 and mailed each a one-page survey up to three times until a response was received. For non-responding EDs, we contacted ED staff by phone for completion of the survey by interview. Data collected included ED location, visit volumes, and basic pediatric characteristics. PECC availability was assessed in one survey question: "Do you have identified coordinators for pediatric emergency medicine in your ED?" Respondents were given three response options: "yes, physician coordinator(s);" "yes, nurse coordinator(s);" and "no." Overall, 4,481 (85%) EDs from 50 states and the District of Columbia responded to the survey. For the present PECC analysis, we excluded 4 EDs which were later found to not meet our inclusion criteria (ie, were open less than 24/7) and excluded another 42 EDs which did not respond to the survey question about PECCs. Additionally, for the most up-to-date PECC estimate, we used the database which underlies the smartphone application, EMNet findERnow (www.findERnow.org). This free application for iPhone and Android phones locates the closest EDs using chi-square and Wilcoxon rank-sum tests as appropriate, and a multivariable logistic regression model to identify independent predictors of having a PECC in the ED.

Results: Among the 4,435 EDs with 2015 PECC data, 759 (17%) EDs reported the presence of at least one PECC; 538 (12%) EDs had a physician PECC, 546 (12%) had a nurse PECC, and 325 (7%) EDs had both physician and nurse PECCs. The states with the largest proportion of EDs with a PECC were Delaware (78%, 7/9 EDs) and Maryland (50%, 21/42 EDs), while the lowest PECC proportions were found in Mississippi (1%, 1/74 EDs) and Wyoming (4%, 1/25 EDs). In unadjusted analyses, presence of a PECC was associated with several ED characteristics: larger annual total and pediatric ED visit volumes, larger percentages of pediatric ED visits in relation to the total, a separate pediatric ED (ie, a dedicated ED area for children only), and EDs located in the Northeast and West (all P<0.001). Similar associations persisted in the adjusted multivariable model (Table), with separate pediatric EDs being the strongest independent predictor of having a PECC (OR 14.01, 95% CI 10.85-18.09). Presently, based on 4,551 EDs for which current data are available (as of 5/20/2017), 885 (19%) EDs reported having a PECC. Compared to 2015, this represents a 2% absolute increase in the proportion of EDs with a PECC (P=0.004). Conclusions: The number of EDs with a designated PECC is rising, but there is much room for improvement. We will continue to monitor changes in pediatric emergency care and promote enhancement of ED capabilities through continued survey research and maintenance of the EMNet findERnow app.

Table: Multivariable logistic regression model predicting presence of a PECC in US emergency departments, 2015

<table>
<thead>
<tr>
<th>ED characteristics</th>
<th>Odds ratio</th>
<th>95% CI</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Annual total ED visits</td>
<td>1.00</td>
<td>reference</td>
<td></td>
</tr>
<tr>
<td>10,000-19,909</td>
<td>2.05</td>
<td>1.42-2.95</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>20,000-29,999</td>
<td>3.18</td>
<td>2.29-4.41</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>30,000-</td>
<td>4.67</td>
<td>3.45-6.77</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>unknown</td>
<td>2.58</td>
<td>1.65-4.05</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Percentage of annual ED visits by children</td>
<td>15-24.9%</td>
<td>1.10</td>
<td>0.85-1.42</td>
</tr>
<tr>
<td>25-49.9%</td>
<td>1.34</td>
<td>0.99-1.81</td>
<td>0.06</td>
</tr>
<tr>
<td>≥50%</td>
<td>2.98</td>
<td>1.00-5.19</td>
<td>0.048</td>
</tr>
<tr>
<td>unknown</td>
<td>0.58</td>
<td>0.41-0.82</td>
<td>0.002</td>
</tr>
<tr>
<td>Separate pediatric ED</td>
<td>14.01</td>
<td>10.85-18.09</td>
<td>&lt;0.001</td>
</tr>
</tbody>
</table>

Abbreviations: ED, emergency department; 95% CI, 95% confidence interval.

Study Objectives: Firearm purchases account for the second leading cause of pediatric death in the United States. There is significant variation in firearm legislation at the state level. Recently, three state laws were found to be strongly associated with a reduction in overall deaths from firearms: universal background checks for firearm purchase, ammunition background checks, and identification requirement for purchasing firearms. We performed this study to determine if stricter firearms legislation at the state level and, specifically, the presence of these laws, is associated with decreased pediatric mortality from firearm-related injury.

Methods: We performed a cross-sectional analysis of 2015 state-level, firearm-related mortality data of children 0-21 years old from the Centers for Disease Control and Prevention’s Web-based Injury Statistics Query and Reporting System. We performed linear regression with log-transformation of non-normal data to measure the association of state gun laws scores with firearm-related pediatric mortality rates. The Brady Campaign Gun Law Scores for 2015 were used to generate state-specific scores. Scores ranged from -39 to +76, with higher scores indicating stricter laws. Additionally, the Mann-Whitney U tests were used to determine if there was a difference between median firearm-related pediatric mortality rates and presence of the 3 aforementioned specific state gun laws. Multiple imputation was used to calculate mortality rates for 6 states that were missing mortality data.

Results: 4,528 children died from firearm-related injuries in 2015. Mean age was 18 years (SD 3.5), 87% were male, and 44% were of non-Hispanic black race. State-specific mortality rates ranged from 0 to 18 per 100,000 children. Increased pediatric mortality rates were associated with lower state-specific gun law scores (β=−0.3; p-value < 0.001; Figure 1). Median mortality rates were lower among the 12 states requiring universal background checks for firearm purchase (3.8 vs. 5.7 per 100,000 children, p=0.002). Median mortality rates were also lower in the 5 states that required ammunition background checks (2.3 vs. 5.6 per 100,000 children, p=0.02). Only 2 states required firearm identification and no significant difference was found between median mortality rates when comparing these states with those that did not have this requirement (4.6 vs. 5.4 per 100,000 children, p=0.4).

Conclusions: Stricter gun laws, specifically those requiring universal background checks for firearm and ammunition purchase, are associated with lower state-level firearm-related pediatric mortality rates. These findings support the need for further investigation to understand the impact of firearm legislation on pediatric injury.
188 Lower Pediatric Patient Volume is Associated With Higher Mortality in US Emergency Departments

McCormick T, Haukoos J, Needleman J/Denver Health Medical Center, University of Colorado School of Medicine, Denver, CO; UCLA Fielding School of Public Health, Los Angeles, CA

Study Objectives: Children account for over 25% of emergency department (ED) visits in the United States. Almost ninety percent of pediatric ED visits occur in general community EDs, many of which have low pediatric volumes and sporadic exposure to critically ill children. The goal of this study was to assess the association between ED pediatric volume and mortality with the hypothesis that EDs with lower annual pediatric volumes will have higher mortality for similar life-threatening conditions.

Methods: We performed a secondary analysis of the 2012 Nationwide Emergency Department Sample (NEDS) dataset, the largest all-payer ED database in the United States. We included all patients ages 0-17 years. Using ICD-9 codes, the dataset was restricted to all patients with respiratory failure or cardiac arrest to identify critically ill children at high risk for mortality. Annual pediatric ED volume was divided into quartiles: low (<6373), medium (6374-12117), medium-high (12118-25376), and high (>25376). Descriptive statistics were performed and hierarchical multivariable logistic regression used to estimate associations between pediatric ED volume and mortality, adjusting for patient-level (comorbidity count, age, insurance, household income, sex) and hospital-level factors (urban-rural classification, teaching status, hospital designation, patient capacity, children’s hospital designation) that may offer competing explanations for this association.

Results: Of the 6.4 million pediatric patient visits in the 2012 NEDS dataset, 2,629 had a primary ICD-9 diagnosis of respiratory failure or cardiac arrest and were included in the cohort. The mean age was 4.1 years (SD 5.4). 40% were female, and the mean comorbidity count was 1.6 (SD 1.77), with 83% having at least one comorbidity. Thirty-nine percent of the cohort died in the ED. The majority of patients had Medicaid insurance (60%), 26% were privately insured, 10% were self-pay, and 49% lived in an urban area. Eleven percent were seen at major pediatric hospitals, 42% at trauma centers, and 56% at teaching hospitals. Almost 19% of patients were treated at a low-volume (1st quartile) ED, 24% at a medium-volume ED, 27% at a medium-high volume ED, and 31% at a high-volume ED. High-volume EDs were associated with decreased mortality (OR 0.40 95% CI 0.17-0.94) when compared to low-volume EDs. There was a trend toward incrementally lower odds of mortality in low-volume, medium-volume, medium-high, and high-volume EDs when compared to low-volume EDs, but only high-volume ED mortality reached significance. Using predicted probabilities to convert odds ratios to risk difference, children who present in cardiac arrest or with respiratory failure are 17% less likely to die in a high-volume ED than a low-volume ED, adjusting for patient- and hospital-level covariates available in the NEDS dataset.

Conclusions: In a population-based pediatric ED sample of respiratory failure or cardiac arrest, higher volume EDs were significantly associated with decreased mortality after adjusting for patient- and hospital-level confounders.

189 Practice Patterns and Attitudes Towards Universal Sexually Transmitted Infection Screening in a Pediatric Emergency Department

Baddourato G, Kreiling B, Chamberlain J, Goyal M/Children’s National Medical Center, Washington, DC

Study Objectives: Adolescents have the highest rates of sexually transmitted infections (STIs) and often use the emergency department (ED) for care, thus rendering the ED a strategic setting for STI screening. Unfortunately, STI testing is not routinely conducted in the ED. The objective of this study was to explore clinician attitudes towards STI screening in an urban pediatric ED.

Methods: This was a mixed methods study using electronic surveys, focus groups, and semi-structured interviews with clinicians from an urban pediatric ED. We examined STI screening practices, attitudes, and perceived barriers and facilitators towards screening.

Results: 78 of 86 (90.7%) clinicians participated in the survey and 23 participated in either focus groups or semi-structured interviews. Approximately half (56.4%) of clinicians reported always/most of the time screening all adolescents for STIs during an ED visit, regardless of complaint. The majority of clinicians (84.6%) agreed that STI screening is beneficial, and that the ED is an appropriate venue for screening (75.6%). Qualitative analysis revealed the following themes with regards to barriers towards ED-based STI screening: limited resources, disruption to workflow, and follow-up concerns. Almost all (95%) agreed that use of electronic clinical decision support to guide STI screening would facilitate STI testing.

Conclusions: ED clinicians believe that ED-based STI screening is important, but resources in the ED are limited. Almost all clinicians believe that electronic clinical decision support would facilitate STI screening.

190 Pediatric Observation Medicine in the United States

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Study Objectives: Observation units (OUs) improve patient outcomes, decrease cost, and increase ED efficiency. Unlike adults, characteristics of OUs have not been well delineated for the pediatric population. This study characterizes pediatric OUs (POUs).

Methods: Telephone/email survey sent July-December 2016 to 194 US pediatric residency programs. Sub-analysis of AHA database information also done.

Results: Survey response rate 60% (116/194). Results: median (range): ED census 53,500 (7,300-207,377), ED admissions 12% (4%-25%). 56% diverted ambulances, 77% rarely, 15% sometimes, 8% daily. 75% used midlevel providers (MLPs), 17% nurse practitioners (NPs), 12% physician assistants (PAs), 71% both.

24% (28/116) of hospitals placed pediatric patients in an OU or plan to open OU; pediatric patients only (POU) 12%, combined pediatric/adult patients OU (COU) 6%, planned POU 6%.

If no POU, pediatric observation status patients were placed in ED (7%), scattered throughout inpatient floors (93%). Reasons for not having POU: lack administrative support (34%), space (32%), staff (7%), finances (3%), combination (24%).

Of hospitals with POUs, median 7% (1%-10%) of ED patients placed in POU. Location: within/next to ED (71%), inpatient floor (29%). POU beds median 12 (4-27), patient to nurse ratio 4:1 (3:1-6:1), 50% used MLPs (66% NPs, 33% both).

POU existed median 5 years (range 0-26 years): <1 year (8%), 1-5 years (38%), 5-10 years (31%), 10-15 years (8%) >24 years (15%). 46% of POUs have existed <5 years.

Patients cared for: ED (29%), pediatrics (21%), ED/pediatrics (43%), pediatric medical/surgical (7%), 80% used residents. Administration: ED (71%), pediatrics...
inpatient/outpatient census, total personnel) is a predictor for whether or not a hospital having a POU. Many plan to open a POU within 2-5 years, correlating with services (CGH): 25% (5/20) POU. CGH with POU vs no POU: outpatient census by domain of pediatric readiness were: policies and procedures + 4.4 (95% CI 1.4, +7.7 points (95% CI -1.3, 16.7). Mean changes in WPRS was an accurate reflection of their ED’s pediatric readiness. Common themes from the interviews included: (1) the national survey in 2012 brought attention and administrative buy-in to the issue of pediatric readiness; (2) many pediatric readiness improvement activities were initiated by ED nursing; and (3) both an ED pediatric champion and collaboration with inpatient pediatrics were key to improvement. Examples of activities that physician leaders reported improved the care of children between the 2012 and 2015 assessments included: pediatric simulation, use of critical care telemedicine, formatting transfer agreements, equipment checks, disaster drills, and the use of a weight-based medication dosing system. Conclusions: Weighted pediatric readiness scores improved in the majority of KPNC EDs between 2012 and 2015. The attention brought to pediatric readiness by the 2012 assessment, administrative buy-in, a pediatric champion in the ED, and collaboration with inpatient pediatrics were identified by emergency physician leaders as keys to improvement.

### 192 Strengthening Emergency Care Operations in East Africa: Implementation of the South African Triage Scale at Kenyatta National Hospital in Nairobi, Kenya

Wangiaa AA, Leeper S, Mweu J, Harty S, Martin IB, Hunold KM, Ekernas K, Dunlop SJ, Twomey M, Maingi A, Myers JG/Kenyatta National Hospital, Nairobi, Kenya; University of North Carolina at Chapel Hill, Chapel Hill, NC; University of Cincinnatti, Cincinnatti, OH; West Virginia University, Morgantown, WV; The Ohio State University, Columbus, OH; Saint Joseph Hospital, Denver, CO; Hennepin County Medical Center, Minneapolis, MN; Insel University Hospital, Bern, Switzerland

Study Objectives: Implementation of triage systems standardizes and improves patient care in emergency departments (ED). Kenyatta National Hospital (KNH), the largest public tertiary hospital in Kenya, is both resource limited and without ED-specific triage protocols.

To standardize the approach to triage through implementation of the South African Triage Scale (SATS). We aimed to 1) assess the reliability of triage decisions among nurses and doctors following an educational intervention, 2) analyze validity of the SATS at KNH’s ED, comparing prior triage practice with the newly implemented triage protocol.

Methods: We conducted a two-part prospective observational study to assess the reliability and validity of the SATS as implemented in the ED at KNH. In part one, we assessed the percent agreement with an expert standard (a consensus-derived correct triage category) using previously validated vignettes via paper test administered to health care workers before and after an educational intervention. In part two, we assessed the validity of the SATS in predicting patient disposition outcomes through a retrospective, systematic sampling of triage charts, one month pre- and post-implementation.

Results: 104 paper tests were included for reliability analysis. Percent agreement with the expert standard increased after the educational intervention, from 47% to 64% exact agreement (p<0.0001), and from 89% to 97% agreement allowing for a one-level discrepancy in triage ratings (p<0.0001). 2420 total charts were analyzed for validity before and after SATS implementation. There was no significant change in percent of patients under-triaged or over-triaged before and after the implementation. However, neither the proportion of over-triage (12.8%) nor the proportion of under-triage (2.7%) exceeded the American College of Surgeons-Committee on Trauma thresholds (25-35%) and 5%, respectively.

Conclusions: Health care workers who received the educational intervention achieved high levels of agreement with expert, demonstrating that the intervention is contextually appropriate and represents an ongoing medical education opportunity. SATS scores performed well in predicting outcomes with low levels of both under and over-triage, confirming SATS as a locally appropriate triage system for standardizing care at a major East Africa emergency department.
Aluiski AR, Mbanjumwyo G, Barry MA, Karim N, Levine AE/Brown University Alpert Medical School, Providence, RI; University of Rwanda, Kigali, Rwanda

Study Objectives: Although emergency medicine (EM) training programs have recently been introduced in low- and middle-income countries (LMICs), no data exists on their effects on patient-centered outcomes in resource-limited settings. This study evaluated the impact of EM training on emergency department (ED) mortality among patients treated at the University Teaching Hospital of Kigali (UTH-K) ED.

Methods: The study was conducted at UTH-K, the primary public referral hospital in Rwanda. An EM post-graduate diploma program was begun at UTH-K in October 2013 and full EM residency training program was begun in September 2015. Prior to initiation of these training programs, care was provided exclusively by general practice physicians (GPs); since initiation, ED care has been provided through mutually exclusive shifts allocated between GPs and EM resident (EMR) trainees who have oversight by board certified emergency physicians. All patients presenting to the ED during the nine-month period prior to initiation of the EM training (Jan.-Sept., 2013) and nine-months following the start of the EM residency program (Sept. 2015-June 2016) were eligible for inclusion. Study personnel abstracted data from a random sample of hospital records using a structured collection instrument. Prevalence and risk differences (RD) of all cause ED mortality were compared for cases treated before and after EM training initiation and based on provider type (GPs or EMRs). Secular trends were assessed and magnitudes of effects were quantified using odds ratios (OR) with 95% confidence intervals (CI). Multivariate models were adjusted a priori for age, type and severity of illness.

Results: From the 35,491 encounters during the study period, 2,580 cases were randomly sampled. There were 1,480 cases prior to training initiation and 1,100 after. The median age was 32 years (inter-quartile range (IQR): 22, 49) with a male predominance (53.9%). Medical patients comprised 54.0% of cases and injuries account for 46.0%. Median ED length of stay (LOS) was 1 day (IQR: 0, 3). The majority of cases were admitted (55.4%). Compared to the pre-implementation period, post implementation cases were more likely to be admitted (p<0.001). Pre-implementation prevalence was 6.8% (95% CI: 5.4, 8.2%); post-implementation prevalence was 1.2% (95% CI: 0.5, 1.9%). In multivariate regression, as compared to ED cases treated prior to the initiation of the EM training program, those treated after were less likely to suffer ED mortality (aOR=0.14, 95% CI: 0.07, 0.30; p<0.001). In assessment by provider type, ED mortality among cases treated by GPs was 6.6% (95% CI: 5.5, 7.6%) and 1.3% (95% CI: 1.6, 2.4%) for those treated by EMRs. In regression analysis, compared to cases treated by GPs those treated by EM trainees were significantly less likely to experience ED mortality (aOR=0.08, 95% CI: 0.01, 0.55; p=0.011). No differences in secular trends in mortality were identified based on shift type either prior to (RD: 0.5%, 95% CI: -0.4, 4.6%; p=0.79) or after training initiation (RD: 0.9%, 95% CI: -0.8, 2.6%; p=0.35).

Conclusions: ED mortality was significantly reduced with implementation of EM training in the studied population in Rwanda. Although limited by design aspects, these results demonstrate the benefit on an objective patient-centered outcome of EM training in a LMIC, and supports further research and investment in EM training in resource-limited settings.

194 Forging a Locally Driven Public Sector Emergency Care Research Network in Ethiopia
Silvestri D, Abebe Y, Dida T/Harvard Affiliated Emergency Medicine Residency, Boston, MA; St. Paul’s Hospital Millennium Medical College, Addis Ababa, Ethiopia

Study Objectives: Ethiopia faces increasing demand for coordinated emergency care services, but lack of systematic data regarding emergency disease burden and care limits system planning and resource allocation. We aimed to establish Ethiopia’s first comprehensive emergency care research network in Addis Ababa, and show feasibility through collation of a six-month citywide emergency care patient database.

Methods: Following local ethical approval from the network coordinating center, St. Paul’s Hospital Millennium Medical College, Chief Executive Officers or Medical Directors from each of all ten government general hospitals in Addis Ababa, Ethiopia, were invited to participate. At participating hospitals, we located all emergency department, admissions office, and inpatient ward logbooks corresponding to patient visits from 8/1/2014 to 2/1/2015 (six months). Relevant logbook data were photographed, and are being entered electronically by trained professional health care transcriptionists, audited to ensure a low rate of data entry error, and standardized through data cleaning to facilitate aggregation for system-wide analysis.

Results: All hospital executives expressed strong enthusiasm in sharing institutional emergency care and inpatient data for the purpose of local system-wide research and health sector planning. In total, 188 logbooks were obtained from all ten institutions, corresponding to 6838 pages photographed for the study period. Data transcription, auditing, and cleaning are underway. Several unanticipated delays were encountered in the coordination and execution of database assembly. Study efforts have garnered gratifying interest from leadership in the Ethiopian Federal Ministry of Health (FMOH).

Conclusions: Among local health care executives in Ethiopia, we found strong and unanimous openness to collaboration for system-wide research. Local project leadership and early backing from the FMOH were both essential in establishing institutional trust and network support. Compared to individual patient records, which can be prohibitively difficult to identify and abstract, hospital logbooks may provide a more accessible source of patient data for institutions in lower-income settings lacking electronic health record systems. Routine logbook data abstraction initially appears feasible across a health system, though is not without significant operational challenges. Further research is needed to determine long-term cost-effectiveness of analysis using paper-based hospital logbooks versus an electronic health record system.

195 The Use of Non-Physician Prescribed Medication in Cambodia
Venezia DR, Cabble AR, Lums DJ, Lim K, Singer AJ/Stony Brook University, Stony Brook, NY

Study Objectives: Because of a lack of resources, many people in developing countries such as Cambodia receive prescription medications from non-physicians, including pharmacists or medication sellers. Studies have shown that non-physician prescribed medications may result in inappropriate dosing/indication, adverse events, and drug/drug interactions. The objectives of this study are to better describe the usage of non-physician prescribed medications in a patient population presenting to two acute care facilities in Phnom Penh, Cambodia and to assess the number of patients who can provide the names of their non-physician-prescribed medications used over the past two weeks.

Methods: This study is a prospective survey in two Cambodian medical facilities. Research assistants were given training to obtain informed consent and data collection to patients regarding the use of non-physician prescribed medications in the past two weeks prior to presentation. A data collection form was used to collect demographics, medications, including drug names, dose, duration, and where medications were obtained, and if any questions were asked prior to receiving medications, including allergies, medical illnesses, medications, or pregnancy. Patients were asked if they had received any instructions concerning usage and/or adverse effects. This study was approved by the Cambodian and relevant American institutional review boards. Data was summarized using descriptive statistics.

Results: Of the 477 patients surveyed, 248 used medications that were not prescribed by a physician prior to the visit. Of these patients, 120 patients could not name their medications nor could staff identify medications they brought. Of the remaining 128 patients, 73 patients brought in all identifiable medications of which at least one was a medication that would require a prescription in the United States, whereas 22 had all identifiable over-the-counter medications. The remaining 33 patients brought in a combination of identifiable and unknown medications. Of the patients using non-doctor prescribed prescription
medications, the most common categories were: cardiovascular (70), steroids (54), antibiotics (54), and anti-diabetic (27) medications. Narcotics and sedatives (4/15) were infrequently dispensed.

Conclusions: A significant proportion of patients in Cambodia use prescription medications that were not prescribed by a licensed physician. Patients lacked awareness of the names of their medications and medications causing adverse reactions. Efforts to regulate the sale of prescription medications should be considered.

**EMF**

**Evaluation of the Utilization and Impact of Point-of-Care Ultrasound in Acute Obstetrical Care in the North East Region of Haiti**

Bloom C, Gomes D, Kendall S, Kaufman B, Thomas V, Aluisio AR/SUNY Downstate Medical Center, Brooklyn, NY; Brown University Albert Medical School, Providence, RI

Study Objectives: Point-of-care ultrasound (POCUS) implemented through task shifting to non-physician users has potential as a diagnostic adjunct to enhance acute obstetrical care in low- and-middle income countries (LMICs) where there is often limited access to physician providers. This study evaluates utilization and impacts of obstetrical POCUS implementation at the Fort Liberté Hospital in the North East Department of Haiti.

Methods: Data was prospectively collected on women presenting for acute obstetrical evaluation at the Fort Liberté Hospital, the largest public health facility in the North East region of Haiti. All women presenting for care were eligible for inclusion. Sonography was performed by non-physician practitioners trained in basic obstetrical POCUS prior to the beginning of the study. Interim data on demographics, obstetrical history, ultrasound findings, treatments and outcomes using a standardized tool by clinical personnel was accrued from 9 March through 27 April of 2017.

Results: Preliminary results show that 88 cases received POCUS assessments at the study site (2.1 studies per day). The median age was 30 years (interquartile range [IQR]: 25, 32). The majority of women (92.0%) were known to be pregnant and were presenting for standard prenatal care. A new diagnosis of pregnancy was made via POCUS in 6.8% of cases. Among pregnant women POCUS facilitated successful assessment, in the majority of cases, of number of gestations (98.7%), fetal position (74.1%) and placental position (70.4%). One case of inabortion requiring hospitalization for further care was identified via POCUS.

Conclusions: Interim data demonstrates uptake and usage of POCUS by non-physician providers for acute obstetrical evaluations in the study setting with associated potential impacts on clinical decisionmaking and patient care. Lack of consistent use of ultrasound in patient evaluations suggests that implementation barriers, likely associated autocorrelation was calculated by Moran’s test.

**Impact of a Communication Process Improvement Program on Ambulance Use by Patients With Known Mental Health Diagnoses**

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Study Objectives: To safely reduce overutilization of Indianapolis emergency medical services calls by known mental health patients.

Methods: This is a prospective, quality improvement program, comprised of a cohort of patients with known mental health diagnoses. The study took place within a large Community Mental Health Center network (Midtown CMHC), comprised of 7 clinic sites geographically spread throughout a large urban area. Midtown predominantly serves socioeconomically disadvantaged patients. IEMS partnered with Midtown to decrease overutilization of 911. The pilot ran from February 2016 to December 2016 for adult (> 18 years) patients. Only patients with known active mental health treatment were included. Patients were identified by a licensed mental health counselor, embedded within IEMS, who reviewed a computer generated 911 overutilizer list every month. Once identified, a secure, electronic message comprised of the following “IEMS has provided the (identified month) overutilizer list. They consider anyone an overutilizer who uses the ambulance service more than 3 times within a month for any reason. You may already be aware of this but the following client(s) were on the list. Please let me know if you have any questions at (telephone number). (Name of client) had (number of runs) ambulance runs from (identified month) to (one day prior to notification)” was sent to the client’s treatment team. Midtown teams addressed 911 usage during therapy and activity of daily living skill sessions in any manner they felt most appropriate. A central theme, however, was development of a care plan for when the patient felt the need to call 911. Patients were then followed for 911 utilization at 30, 60, and 90 days, with 30-day utilization as the primary outcome. McNemar’s test was used to compare before and after group proportions of 911 utilization by call volume. As only patients who were overutilizers were included, no odds ratios and subsequent confidence intervals can be reported: (odds ratio goes to infinity when one of the discordant values is zero).

Results: Over the study time period, a mean of 9761 (SD: 466.1) IEMS dispatches were made per month. A total of 167 people with known MH diagnosis were overutilizers, making a total of 1489 calls to 911. Of these, 63% were male, 41% Black, 5% married, 28% homeless, 4% with a 4 year college degree, 96% unemployed, and over 75% Medicaid recipients. High levels of tobacco (49%), alcohol (44%), cocaine/crack (20%) were reported. Of the 167 overutilizers, 29% (n = 49) made the list more than one month. Figure 1 shows utilization by calls per month and their subsequent use through 90 days. McNemar’s test comparing initial runs to 30-day runs was statistically significant for every month. (p < .001). On average, the number of ambulance runs decreased by 76% across all months at the end of 90 days.

Conclusions: In this pilot quality improvement program, a simple, secure communication process decreases 911 calls by mental health patients identified as overutilizers of 911.
Study Objectives: The proportion of patients discharged from emergency departments (EDs) with short-term return visits has been scrutinized as both an internal and external quality metric, as well as a target for interventions. The ability to accurately predict which patients are more likely to revisit the ED could allow emergency departments and health systems to develop more focused interventions, but efforts to reduce revisits have not yet found success. A separate but related thread of literature has focused on patients with a high number of ED visits (frequent visitors) but the relationship between these two phenomena remains unexplored. Using a unique dataset with encounter-level data spanning several states we set out to identify the predictors of short-term return visits, with a particular focus on an often-overlooked characteristic: previous ED visits.

Methods: We conducted a retrospective analysis of patients discharged from EDs from 80 hospitals in seven states from January 2014 - July 2016. Encounter data were obtained from CEP America, a multistate physician partnership that contracts with hospitals to provide ED staffing.

Using a multivariable logistic regression we regressed short-term return visit on patient demographics and comorbidities, visit characteristics, physician, hospital characteristics, community characteristics, and an indicator for frequent visitor. We defined frequent visitor as a patient having two or more visits in the six months preceding the index visit; we conducted sensitivity analysis using several thresholds for number of previous visits to define frequent visitor, and also for alternate time horizons for return visit.

Results: Over the study period, there were 11,871,943 total visits; after excluding non-eigible visits the sample size was 6,099,717. The overall risk of 14-day revisit was 12.6%. Patients defined as frequent visitors were significantly more likely to have a 14-day return visit than non-frequent visitors (odds ratio [OR] 3.52, 95% confidence interval [CI] 3.50 - 3.53); they accounted for 18.7% of all visits and 40.2% of all 14-day revisits.

In the full model, frequent visits was associated with the highest odds of a revisit: OR 3.06 (95% CI 3.04 - 3.07). Other predictors of 14-day revisits were skin and infection, particularly in patients reporting symptoms of a viral u-like illness. These findings support the CDC’s recommendation for routine screening of all patients ages 13 to 64 unless the prevalence of undiagnosed HIV infection in the population is less than 0.1%. Emergency departments consistently have a prevalence of undiagnosed HIV infection greater than 0.1%, even in areas in which overall HIV prevalence is low. As these symptoms are virtually indistinguishable from a viral flu-like illness, emergency physicians may consider non-targeted universal screening for acute HIV infection, particularly in patients reporting symptoms of a flu-like illness.
Patient Language is Associated With Complexity of Evaluation, Disposition, Decision, and Revisit Rate
Burner E, Uribe EF, Mota AB, Lam CN, Arora S/USC Keck School of Medicine, Los Angeles, CA; USC Keck School of Medicine, Los Angeles, CA

Study Objectives: Language barriers between physicians and limited English proficiency patients may result in inadequate communication. This could result in unnecessarily elaborate work-ups as physicians are unable to rule out deadly conditions with a thorough history, or overly brief evaluations if red flags in a patient’s history are missed. In hospitals that predominantly Spanish speaking populations, such as Los Angeles County + University of Southern California Medical Center, it is possible that this is mitigated by when providers and staff who speak Spanish, but could still leave non-English/non-Spanish speakers at risk.

Methods: From an administrative database, we examined unique adult patient visits (second and greater visits not analyzed). We examined odds of use of advanced imaging (CT, MRI, ultrasound) and laboratory analyses via logistic regression, odds of ED revisit within 30 days via logistic regression, length of stay in ED by linear regression, and disposition from ED (admit, home, transfer, left against medical advice) via multinomial logistic regression using patient language preference as the predictor (English, Spanish or another language). We adjusted the regression analyses for age, insurance, sex, triage acuity, and homelessness.

Results: We examined 92,307 unique adult patient visits. 45 were missing patient language. 2468 were missing a disposition. Compared to English speakers, Spanish-speaking patients had 16% higher odds of receiving advanced imaging (CI 20-38%), and non-English/non-Spanish speaking patients had 16% higher odds (CI 8-23%). Compared to English speakers, Spanish speakers were more likely to get laboratory work (8% higher odds, CI 6-11%), while non-English/non-Spanish speakers were less likely (11% lower odds, CI 6-16%). Length of stay in the ED was not significantly different between groups after adjusting for multiple comparisons. Spanish speakers and non-English/non-Spanish speakers were less likely to revisit the ED within 30 days: 22% (CI 18-25%) and 49% (CI 44-54%) lower odds than English speakers, respectively. Patient disposition from the ED was also different between language groups: Spanish speakers were less likely to be admitted (32% lower odds, CI 30-34%) or leave against medical advice (46% lower odds, CI 43-49%) than to be discharged home compared to English speakers, while non-English/non-Spanish speakers were more likely to be admitted (45% higher odds, CI 35-56%) and leave against medical advice (47% higher odds, CI 40-47%) than to be discharged home. None of the unadjusted results were substantially different after adjusting for patient age, insurance, sex, triage acuity, and homelessness (see Table 1).

Table 1. Odds of specific outcomes by Patient Preferred Language

<table>
<thead>
<tr>
<th>Un-adjusted Analysis</th>
<th>English</th>
<th>Spanish</th>
<th>Other Languages</th>
</tr>
</thead>
<tbody>
<tr>
<td>Advanced Imaging</td>
<td>1.16 (1.12-1.20)**</td>
<td>1.16 (1.08-1.23)**</td>
<td>-</td>
</tr>
<tr>
<td>Laboratory analysis</td>
<td>1.08 (1.06-1.11)**</td>
<td>0.89 (0.84-0.94)**</td>
<td>-</td>
</tr>
<tr>
<td>30 day revisit to ED</td>
<td>0.78 (.75-0.82)**</td>
<td>0.51 (.46-0.56)**</td>
<td>-</td>
</tr>
<tr>
<td>Final disposition</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Admission</td>
<td>0.68 (.66-.70)**</td>
<td>1.45 (1.35-1.56)**</td>
<td>-</td>
</tr>
<tr>
<td>Home</td>
<td>Ref outcome</td>
<td>Ref outcome</td>
<td></td>
</tr>
<tr>
<td>Left against advice</td>
<td>0.54 (.51-0.57)**</td>
<td>5.37 (5.03-5.74)**</td>
<td>-</td>
</tr>
<tr>
<td>Adjusted Analysis for age, gender, insurance, ESI triage score and homelessness</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Advanced Imaging</td>
<td>1.16 (1.12-1.20)**</td>
<td>1.09 (1.02-1.18)*</td>
<td>-</td>
</tr>
<tr>
<td>Laboratory analysis</td>
<td>1.04 (1.00-1.07)*</td>
<td>0.82 (.76-0.88)**</td>
<td>-</td>
</tr>
<tr>
<td>30 day revisit to ED</td>
<td>0.88 (0.84-0.92)**</td>
<td>0.59 (.53-0.66)**</td>
<td>-</td>
</tr>
<tr>
<td>Final disposition</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Admission</td>
<td>0.69 (.66-0.72)**</td>
<td>1.29 (1.19-1.40)**</td>
<td>-</td>
</tr>
<tr>
<td>Home</td>
<td>Ref outcome</td>
<td>Ref outcome</td>
<td></td>
</tr>
<tr>
<td>Left against advice</td>
<td>0.57 (.54-0.60)**</td>
<td>4.43 (4.12-4.78)**</td>
<td>-</td>
</tr>
</tbody>
</table>

Conclusions: Non-English/non-Spanish speaking patients were more likely to get advanced imaging in this ED. Additionally, these patients are more likely to be admitted to the hospital or to leave against medical advice, but are not more likely to “bounce back” within 30 days. This may indicate that the communication is suboptimal and this higher rate of admissions was unnecessary, or that on-English/non-Spanish speaking patients are seeking further care in other hospitals that better communicate with them.

Unexpected Benefits of Emergency Department-Based Social Support Intervention for Patients With Diabetes
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Study Objectives: Diabetes and its complications result in over 2 million ED visits annually in the United States. This burden on patients, communities and the health care system is particularly pronounced in safety-net hospitals. Both social support-based and mobile health (mHealth)-based interventions have improved glycemic control and health behaviors while reducing ED visits among vulnerable populations. We designed a project combining the two modalities, delivering text messages to social supporters of ED patients with diabetes. In this study, we employed qualitative methods to provide a nuanced evaluation of this social support mHealth intervention for low-income, inner-city Latinos with diabetes receiving care in the ED.

Methods: We conducted 6 focus groups in Spanish and English with a total of 22 participants (14 patients and 8 family members) who had received a text-message-based mobile health diabetes intervention with coordinated and synchronized messages sent to a selected family member. We imported verbatim transcripts into a computerized qualitative analysis program, Dedoose. A rigorous text-based coding system was used. Transcripts were analyzed in an iterative process, reexamining the earlier transcripts with the new codes derived from each round of analysis until saturation was reached. Broad categorical themes arose from the initial codes and were developed into a paradigm of barriers and strategies to management of diabetes.

Results: We reviewed 297 pages of transcripts, in a line-by-line process. Through three rounds of co-coding iteratively, we developed a set of 52 codes and subcodes. Inter-rater reliability Kappa was 0.86.

Participants in the interviews were overwhelmingly positive about the program. The most impactful messages were those that had specific calls for action and those that called on patients to try to stay healthy to honor their responsibilities. The focus groups were designed to identify program aspects that were most persuasive. Through our inductive analysis, we also found benefits that were not intentionally designed.

Two themes of benefits that were not intentionally designed were 1) improved family members’ health behaviors and 2) strengthening the existing relationship.

Family members noted they were more mindful of their own health decisions, and believed participation improved their own health. For example, one family member noted: “A Challenge Message would say, ‘don’t eat bread or sweets or carbohydrates’ or something like that, and tell the person that you are doing the same thing... it makes you conscious of your own diet and how screwed up it is, you know?”

Patients and family members noted communication had improved, and thought the intervention enriched their relationships. One patient explained:

“I thank you very much for this, the messages, because that’s how my husband would communicate with me. Let me tell you, he and I did not have a good relationship. But now, he is my support.” (Translated from Spanish)

Conclusions: Augmenting a mobile health diabetes intervention with social support messages to family members was well received, and had unintended benefits to family members’ health decisions and the quality of relationships between patients and their family members. Investigators should consider measuring supporters’ health outcomes in future interventions. Social support delivered via mobile health may be a powerful and easy to implement and scale addition to ED-based behavioral interventions.

Acute Care Redesign and Alternative Payment for Emergency Medicine Within Accountable Care Organizations: A Qualitative Study
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Study Objectives: Accountable care organizations (ACOs) are physician and hospital networks that provide care for populations of patients with the goal of improving quality while reducing cost. It is unknown how care redesign within ACOs impacts acute unscheduled care delivery and payment for emergency medical care.

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Methods: We are performing a qualitative study of ACOs using a purposive sampling strategy to identify early adopter organizations. We perform semi-structured interviews of key informants responsible for strategy, care redesign, and payment reform from each ACO (eg, Chief population health officer) and associated ED leadership (eg, Chair of emergency medicine). We analyze transcripts for key themes using a constant comparative method.

Results: We present preliminary findings from 11 interviews across 4 sites. All sites were enrolled in the Medicare Shared Savings Program; however, sites varied in region and maturity with respect to population health initiatives. The Table describes care redesign examples by site. Nearly all sites were focused on reducing low-acuity ED visits and expanding alternate venues for acute unscheduled care (eg, urgent care). All sites were engaged in care redesign to reduce ED admission rates. All sites were expanding ED care coordination, although in different ways. All sites had programs to engage high-risk populations, older adults and frequent ED users were most frequently mentioned. All sites were engaged in initiatives to develop alternatives to inpatient hospitalization ranging from hospital at home to expanded use of direct transfer to skilled nursing facilities from the ED. Conversely, there has been no significant reform of payment for emergency medical care within these ACOs. All sites reported no change in fee-for-service reimbursement for ED services, while acknowledging that value-based payments for emergency care may require new payment methods and realignment of incentives. ED staffing models included independent contract groups, large national contract groups, and multispecialty faculty practices. ACO leaders at two sites indicated that future ED staffing contracts may incorporate value-based population health incentives. Respondents at two sites indicated fee-for-service EM payments are already tied to value. One site indicated that success in ACO value-based population health incentives. Respondents at two sites indicated fee-for-service ED payments are already tied to value. One site indicated success in ACO value-based population health incentives. Respondents at two sites indicated fee-for-service ED payments are already tied to value.
205 Opioid Prescriptions Given in the Emergency Department Have Decreased from 2015 to 2017

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Study Objectives: After introduction of pain as a “fifth vital sign,” physicians were encouraged to treat pain more effectively. Unfortunately, this has led to an increase in prescriptions for opioids, opioid addiction and deaths due to opioids. This has been reported extensively in the medical literature and the lay press. We hypothesize that due to the increased awareness of the opioid problem, emergency department (ED) physicians have reduced prescribing of opioids.

Methods: Design: Retrospective multihospital cohort of ED visits. Setting. Four New Jersey suburban and urban EDs with annual visits from 30,000 to 90,000.

Population: Consecutive patients seen by emergency physicians from 1/1/2014 to 4/30/2017. Protocol: We identified patients given a prescription for opioids and the specific opioid using an electronic medical record. Data Analysis: We computed and plotted the number of prescriptions for opioids for each month over the time period of the study correcting for length of month. We calculated the change and 95% confidence interval (CI) for the months with the highest and lowest number of prescriptions for opioids.

Results: Of the 821,292 patients in the database, 53,448 (6.5%) received opioid prescriptions. The median age of patients prescribed opioids was 41 years (interquartile range, 30 to 53 years); 51% were female. Of the total opioid prescriptions, 87% contained morphine, 9% hydromorphone and 0.1%, long-acting oxycodone. Examination of the plot showed no clear trend before May 2015. Thereafter there was a decline in the monthly opioid prescriptions. From May 2015, the month with the highest number of prescriptions, to April 2017, the month with the lowest number, there was a statistically significant decrease of 56% (95% CI; 52%-59%) in the number of opioid prescriptions. The median age of patients prescribed opioids was 41 years (interquartile range, 30 to 53 years); 51% were female. Of the total opioid prescriptions, 87% contained morphine, 9% hydromorphone and 0.1%, long-acting oxycodone. Examination of the plot showed no clear trend before May 2015. Thereafter there was a decline in the monthly opioid prescriptions. From May 2015, the month with the highest number of prescriptions, to April 2017, the month with the lowest number, there was a statistically significant decrease of 56% (95% CI; 52%-59%) in the number of opioid prescriptions.

Conclusions: From May 2015 to April 2017 the number of monthly opioid prescriptions given in the ED markedly decreased. We speculate that this is due to increased awareness by ED physicians of the opioid problem.

207 Management of Dental Pain in the Emergency Department

Singer AJ, Morris M, Wright J, Osman N, Thode HC, Jr/Stony Brook University, Stony Brook, NY

Study Objectives: Toothaches and other dental complaints are common causes of pain and reasons for visiting the ED. However, their management is unclear, especially in the era of enhanced concerns for excessive prescription of opioids. We describe the incidence of dental complaints, their pain severity, and management in the ED.

Methods: Study Design—secondary analysis. Setting—National Hospital Ambulatory Medical Care Survey (NHAMCS) for the latest years available (2010-2013). Patients—all patients visiting an ED with a toothache or other dental complaint. Measures—demographic and clinical characteristics including pain severity. Outcomes—analgesics administered in the ED and prescribed at discharge. Data analysis—univariate and multivariate analyses used to determine association between predictor variables and outcomes.

Results: Between 2010-2013 there were an estimated 517 million ED visits of whom 10.1 million (1.9%) had a dental complaint. Mean age was 32 years; 53% were females, 12% were pediatric (<19 years). 82% of the dental patients had a reported pain score and, of these, three quarters had a severe level of pain at presentation (7 or higher on 0-10 scale from none to worst). Females were more likely to report severe pain (78% vs 71%, p=0.01). Severe pain by age showed an inverted U shaped pattern with young children (age <10) least likely to report severe pain, followed by older adults (>65) and teens/adults (29%, 41%, and 79%, respectively, P<.001). In a multivariate model including age and sex, both were significantly related to severe pain. Of all dental patients, 44% received an analgesic in the ED including opioid (31%), NSAIDS (5%), acetaminophen (5%), and/or a local anesthetic (6%). Age and sex were not predictive of receiving an analgesic in the ED. Severe pain was positively associated with receiving an analgesic with 38% of patients with a pain score of <7 receiving an analgesic compared to 46% of those participating in deep sedation cases. Evidence is lacking, however, that a two-physician approach improves safety outcomes. We compared the safety of ED procedural sedation between a two-physician and a single-physician policy in a small, single-coverage community ED.

Methods: This is a before/after single-center observational study of prospectively collected data from January 2013 through December 2016. The study population included a consecutive series of ED patients of any age who received procedural sedation for any indication during the study period. Data collection occurred within the context of a facility-wide quality assurance and process improvement program that included standardization of sedation data reporting and monthly structured safety audits of all procedural sedation cases in the medical center. In 2012 a policy was implemented which required two physicians to participate in deep sedation in the ED. Given the practice environment in this small single-coverage community ED, it was frequently impractical to have two physicians reliably available for time-sensitive urgent, and often emergent, procedures in the ED. This led to impaired delivery of modern, high-quality ED sedation services, most notably delays in patient care. In September 2014, our medical center switched from a two-physician policy to a single-physician policy requiring only one emergency physician, accompanied by a sedation-trained ED registered nurse, and often a respiratory therapist. The primary outcome was a sedation-related escalation of care that resulted in one of the following adverse events: dysrhythmia (symptomatic bradycardia or ventricular arrhythmias), cardiac arrest, endotracheal intubation, or unanticipated hospitalization. Secondary outcomes included hypoxemia (peripheral oxygen saturation less than 90% for greater than one minute), the need for bag-valve mask ventilation (BVM), use of a reversal agent, laryngospasm or pulmonary aspiration.

Results: We performed 381 sedations during the study period: 135 patients in the two-physician group (before) and 246 patients in the single-physician group (after). The two groups were comparable in age and sex. Procedures for which sedation was indicated were similar between the groups, with joint or fracture reductions being the most common. Deep and dissociative sedation was more commonly employed in both groups, but was significantly more common in the single-physician group than the two-physician group (93% vs 68%, p<0.001). Propofol and ketamine were the most commonly used sedative agents for deep sedation in both groups. There was no occurrence of the primary outcome, and no clinically relevant adverse events in either group. Secondary outcomes were uncommon, and were similar in the two groups. The use of BVM was 1.5% in the two-physician group and 3.2% in the single-physician group (p=0.5). Rates of hypoxemia and other expected sedation events were uncommon (0-1.5%) and were similar in both groups.

Conclusions: In this small, single-coverage community ED, replacement of a two-physician policy with a single-physician policy for deep sedation in the ED was not associated with an increase in adverse events.
with severe pain ($p < .01$). Sex was not associated with receiving an opioid analgesic in the ED, but opioid medication had an inverted U shape association with age ($p < .001$). After controlling for pain severity in a logistic regression, age was no longer associated with opioid medication. Age, sex, and severe pain were not related to the use of an anesthetic in the ED. There were no time trends in the use of anesthetics, opioids, or anesthetics in the ED. 64% were prescribed an anesthetic on discharge from the ED including NSAIDS (20%), opioids (5%), acetaminophen (5%), and/or a topical anesthetic (0.7%). Sex was not associated with analgesic or opioid prescription. Age showed an inverted U shape pattern with both analgesic prescription and opioid prescription (both $p < .001$). Severe pain was associated with both prescribing any analgesic (72% vs 47%, $p < .001$) and opioid prescribing (56% vs 64%, $p < .001$). In a multivariate model both age (OR 2.98 and 2.46 for ages 10-64) and severe pain (OR 2.34 and 2.67 for severe pain) were associated with any prescribed and with opioid prescribed analgesia respectively. There were no time trends in prescribing anesthetics, opioids, or anesthetics in the ED.

Conclusions: Almost 2% of ED patients have a dental complaint and must have severe pain. Less than half were administered an analgesic and about a third received an opioid. Few patients received local anesthetics. Efforts to improve pain control in ED patients with dental pain are recommended.

208 Low-Dose Intravenous Ketamine for Acute Migraine in the Emergency Department: A Randomized Placebo-Controlled Trial

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Study Objective: To evaluate and compare analgesic efficacy and safety of low-dose ketamine to saline placebo for treatment of acute migraine in the emergency department (ED).

Methods: This prospective, randomized, double-blinded, placebo-controlled trial evaluated patients aged 18 to 65 in the ED with acute migraine. Patients were randomized to receive 0.2 mg/kg ketamine or an equivalent volume of normal saline intravenously. Subjects were assessed at baseline and at 30 and 60 minutes post-treatment for pain Numeric Rating Scale (NRS) scores, categorical pain, functional disability, side effects, and adverse events. The primary outcome was reduction in NRS score at 30 minutes. Secondary outcomes included categorical pain and functional disability improvement, rescue medication request, patient satisfaction, and adverse events. Side effects were evaluated using the Side Effects Rating Scale for Dissociative Anesthetics (SERSDA) model.

Results: 35 subjects were enrolled (ketamine=17, placebo=18). Subjects averaged 35 years old (SD=12), were 66% Caucasian and 77% female. There were no statistically significant differences in demographics except age (ketamine=39 vs placebo=31, $p=0.032$). There was no statistically significant difference in NRS score reduction between arms. Median NRS score reductions at 30 minutes for ketamine and placebo arms were 1 [interquartile range (IQR) 0,3] and 2 (IQR 0.75) ($p=0.59$), respectively. Categorical pain and functional disability each improved at 30 minutes in 6 (35%) ketamine subjects, while 9 (50%) placebo subjects improved in categorical pain and 7 (39%) in functional disability. Rescue medication was requested at 30 minutes with similar frequencies in ketamine and placebo arms (71% vs 78%, $p=0.82$). Treatment satisfaction was similar in both arms (60% vs 65%, $p=0.909$). Ketamine subjects had significantly higher SERSDA scores at 30 and 60 minutes for generalized discomfort with median scores of 4 (IQR: 2.4) vs 2 (IQR 0.3) in placebo arm, $p=0.032$ and 8 (IQR: 2.4) vs 1 (IQR 0.2) in placebo arm, $p=0.007$, respectively. Ketamine subjects had significantly higher SERSDA scores for fatigue at 60 minutes with a median score of 2 (IQR 1.4) vs 0.5 (IQR 0.1) in placebo arm, $p=0.040$. All other differences in SERSDA scores were not statistically significant. No serious adverse events occurred.

Conclusions: 0.2 mg/kg IV ketamine did not produce a greater reduction in NRS score compared to placebo for treatment of acute migraine in the ED. Generalized discomfort was significantly greater in the ketamine arm at 30 and 60 minutes, as well as fatigue at 60 minutes. No other side effects were significantly different between treatment arms at 30 and 60 minutes.

209 Cadaveric Study of Serratus Anterior Block

Alfred C, Liu Y, Katrich A, Chaliyanda L, Stark E/Harbor-UCLA Medical Center/LA Biomed, Torrance, CA; David Geffen School of Medicine at UCLA, Los Angeles, CA; UCLA, Los Angeles, CA

Study Objectives: Serratus plane block was first described by Blanco et al in 2013 as a novel regional anesthetic technique that provides analgesia of the lateral region of the thorax. Three case reports and one case series described its efficacy to manage pain in patients with rib fractures.

We performed a cadaveric study to conduct an anatomical evaluation of the serratus plane block.

Methods: Design: We performed ultrasound-guided serratus plane block on unembalmed cadavers, injecting 20 ml of 1% undiluted lidocaine mixed with food dye in the serratus anterior muscle plane at the mid-axillary line at the level of rib 4. This was followed by tracheal intubation and bag valve mask ventilation at 14 breaths per minute for five minutes. Subsequently, the cadavers were dissected to evaluate the injectate spread in the superficial and deep serratus anterior muscle plane, as well as penetration into intercostal muscles. Maximum spread in the anterior-posterior plane and superior-inferior plane were photographed and measured. Dye staining on relevant nerves was also noted.

Setting: Anatomy Laboratory at the Center for Health Sciences - UCLA David Geffen School of Medicine University of California Los Angeles, California, USA.

Participants: Unembalmed cadavers with hemithoraces free of prosection or skin and/or chest wall disruption.

Results: We designed to inject 5 hemithoraces with the described method above. Data collection is on-going, and expected to be by August. To date, ultrasound-guided serratus plane blocks were performed on 4 hemithoraces in 3 unembalmed cadavers. The average anterior-posterior (AP) spread of injectate was 9.5 cm (Max 12, Min 6 cm). The average superior-inferior (SI) spread of injectate was 15 cm (Max 21, Min 8 cm). The ribs were stained from superior to 2nd rib to the 9th rib in 25%, n = 1 hemithoraces. The long thoracic nerve was stained in 100%, n= 4 hemithoraces.

Conclusions: There is one previous anatomical evaluation for serratus plane block by Mayes et al. In lightly fixed cadavers where they injected methylene blue into 6 hemithoraces, they showed an average AP spread of 10.4 cm, and an average SI spread of 13.6 cm. Our study is unique in the following ways: 1. we used unembalmed cadavers. Embalming may change tissue properties and affect injectate spread. 2. Our injectate consisted of 1% undiluted lidocaine with food dye (not methylene blue or latex) to simulate actual clinical use with minimal differences in viscosity of injectate. 3. We ventilated our cadavers post block to resemble a real clinical intervention. Chest wall and thoracic muscle movements likely promote anesthetic spread in living patients and served a role in the efficacy of the regional block. Our results provided an anatomical basis to support the use of serratus anterior block in rib fractures.

210 EMF Changes in Health-Related Quality of Life for Geriatric Patients After an Emergency Department Visit

Dresden SM, Lindquist LA, Courtney DM/Northwestern University Feinberg School of Medicine, Chicago, IL

Study Objectives: The Geriatric Emergency Innovation Departments (GEDI) program has decreased hospitalizations. The impact on health-related quality of life (HRQoL) is unknown. The objective of this study is to evaluate the impact of GEDI on overall self-reported health and priority domains of HRQoL including physical function, anxiety, depression, and the ability to participate in social roles and activities. 

Methods: We performed a prospective cohort study comparing GEDI patients to control patients. All patients age 65+ were eligible. Patients were excluded if they were non-English speaking, or if they had altered mental status as measured by the six-item screener. Eligible patients provided informed consent while in the ED. Patients were enrolled from 3/2015-8/2015 and from 1/2017 to present. Enrolled patients completed a series of patient reported outcomes measures in the ED using Patient Reported Outcomes Measures Information System (PROMIS). Clinical data were obtained through the Enterprise Data Warehouse. Follow-up measures were performed at 10 days, 4 weeks, and 8 weeks. Follow-up was performed via phone or email per patient’s choice. In this preliminary report, we analyze data from the baseline instruments and 10-day follow-up. Data were recorded in REDCap. Categorical variables were evaluated using chi squared test. Continuous variables were evaluated using Student’s t test.

Results: Of the 415 patients approached, 219 provided consent, and 210 completed the baseline measures. There were significant differences between the GEDI and the control groups in age, race, baseline physical function, and baseline depression (Table 1). Compared to national population data across age groups, baseline PROMIS measures indicated that patients in the GEDI group were at the 36th percentile in physical function, 41st percentile for satisfaction with social roles, 53rd percentile for...
anxiety, and 53rd percentile for depression. Patients in the control group were at the 40th percentile for physical function, 42nd percentile for satisfaction with social roles, 51st percentile for anxiety, and 49th percentile for depression.

At 10 days’ post ED visit, compared to control patients, GEDI patients were less likely to say their overall health was much worse (5.1% vs 23.9%), and more likely to report it as unchanged (35.9% vs 18.2%) (p=0.03). Compared to control patients there was no significant difference in change of any PROMIS measures at 10 days post ED visit: physical function -2.7 points for GEDI -1.1 points for controls (p=0.28), satisfaction with social roles -3.0 points for GEDI -1.4 points for controls (p=0.45), anxiety -2.1 for GEDI -0.8 for controls (p=0.29), depression -0.6 points for GEDI +0.4 points for controls (p=0.34).

Conclusions: In this preliminary analysis, we have found that geriatric patients in the ED have lower HRQoL related to physical function and social roles than the general population, but nearly average HRQoL for anxiety and depression. At 10 days post ED visit compared to control patients GEDI patients are less likely to report their health as much worse and more likely to report it as unchanged from baseline taken in the ED. However, significant differences between changes in PROMIS measures were not yet observed.

### Table 1

<table>
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<tr>
<th>GEDI</th>
<th>Control</th>
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<tbody>
<tr>
<td>Age (mean, sd)</td>
<td>79.0(7.7)</td>
<td>72.9(6.5)</td>
</tr>
<tr>
<td>Female (n,%)</td>
<td>15 (50.0)</td>
<td>51 (59.3)</td>
</tr>
<tr>
<td>Race</td>
<td></td>
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<tr>
<td>White</td>
<td>33 (46.5)</td>
<td>60 (46.2)</td>
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<tr>
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<td>16 (22.5)</td>
<td>16 (12.3)</td>
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<tr>
<td>Hispanic</td>
<td>14 (19.7)</td>
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<td>Other</td>
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<tr>
<td>ESI</td>
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</tr>
<tr>
<td>2</td>
<td>37 (55.2)</td>
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<tr>
<td>Excellent</td>
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<td>8 (6.0)</td>
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<td>9 (12.5)</td>
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<tr>
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<td>25 (34.7)</td>
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<td>Fair</td>
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<td>Baseline PROMIS Measures (mean,sd)</td>
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<tr>
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<td>Satisfaction with Social Role</td>
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<td>21.0 (11.4)</td>
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<tr>
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<tr>
<td>Depression</td>
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### 211 Emergency Department Revisits Within Three Days of an Emergency Department Discharge for Urinary Tract Infection Among Geriatric Patients

Brennan JJ, Chan TC, Vilke GM, Killeen JP, Hsia RY, Castillo EM/University of California, San Diego, San Diego, CA; University of California, San Francisco, San Francisco, CA

Study Objectives: Emergency department (ED) visits for urinary tract infections (UTI) are common among the elderly. Elderly patients have higher rates of complications and treatment failures from UTIs. The purpose of this study was to identify and describe repeat visits to the ED within 3 days following an ED visit with a return ED visit, 2529 (48.2%) were identified as having at least 1 comorbid condition, 934 (17.8%) had a mental health-related diagnosis, and 283 (5.0%) had a substance abuse-related diagnosis. The predictor with the highest independent association with 3-day return ED visits in logistic regression analysis was female sex (OR=0.63, 95% CI=0.59-0.67). No other significant independent associations were noted.

Conclusions: In this study of 325 non-military licensed EDs in California, 10% of all geriatric patients who were discharged from an ED for UTI returned to the ED within 3 days, and approximately one-third of these return ED visits resulted in admission. Novel approaches, such as acute home health care services, may reduce some of these ED revisits and admissions.

### 212 The Prevalence of Benzodiazepine Use in a Geriatric Emergency Department Population

Minns AB, Kreshak AA, Tolia VT, Killeen JP/University of California, San Diego, San Diego, CA

Study Objectives: The American Geriatric Society (AGS) has placed both benzodiazepines and non-benzodiazepine GABA<sub>A</sub> receptor (NBGR) agonists on the Beers list of medications to avoid in patient over 65 years old because of the increased risk of confusion, falls/fractures, and overall mortality. Although traditionally used for ambulatory care settings, emergency departments (ED) are starting to use the Beers criteria as a guide for ED prescribing. Despite existing recommendations, these medications are still administered in this vulnerable age group. The purpose of this study was to evaluate emergency department (ED) patients age 65 years old or older who received a benzodiazepine or NBGR during their ED stay.

Methods: This was a retrospective observational study conducted at a tertiary care ED from July 1, 2012 to June 30, 2016. Charts from all patients age 65 years old or older were analyzed. We sought to determine the prevalence and pattern of benzodiazepine and NBGR agonist administration while admitted to an emergency department. Descriptive statistics are reported for patients who received these medications.

Results: There were 28,356 patients over the age of 65 years old presenting to our ED from July 1, 2012 to June 30, 2016. A total of 1750 (6.2%) patients received a benzodiazepine or NBGR agonist during their ED stay. Of these patients, 784 were males (45%) and 966 were females (55%). Most patients (n=389, 57%) were between 65 years old and 74 years old, followed by 541 (31%) between 75-84 years old, 220 (13%) patients were 85 years old or older. The most frequently administered medication was lorazepam (n=820, 47%), followed by diazepam (n=534, 31%). Zolpidem was given to 265 patients (15%). Chlordiazepoxide was the least frequently administered (n=17, 10%). Patients received more than one type of benzodiazepine. The five most common chief complaints in which benzodiazepines or NBGR agonists were used were shortness of breath (n=176, 10%) neck/back pain (n=175, 10%), dizziness/vertigo (n=129, 7%), abdominal pain (n=125, 7%), and chest pain (n=100, 6%). A minority of patients who received these medications presented with a psychiatric chief complaint (24 patients with suicidal ideations; 17 patients with anxiety). Only 10 patients received benzodiazepines for an alcohol-related problem; and 21 patients received benzodiazepines for seizures. 60 patients obtained a psychiatric evaluation during their ED stay. 1026 (58%) patients were admitted to the hospital or transferred to another acute care hospital. 712 (41%) patients were discharged, and 12 patients left against medical advice.

Conclusions: Although several major psychiatric and geriatric organizations advise against the use of benzodiazepines and NBGR agonists in patient older than 65 years old, these medications continue to be used for a variety of conditions. Optimizing medication use to treat conditions in the ED while avoiding adverse drug events is often challenging, particularly in the older adult who is already at risk for drug-related problems. Although benzodiazepine administration may at
times be indicated, further education is warranted. Providing emergency physicians with evidence-based alternatives to benzodiazepine use and designing ED specific guidelines need to be explored.

**213 High Diagnostic Uncertainty and Inaccuracy in Older Adult Emergency Department Patients With Dyspnea**

Hunold KM, Caterino JM/Ohio State University, Columbus, OH

Study Objectives: Dyspnea is one of the most common chief complaints among emergency department (ED) by older adults and is an independent predictor of mortality. The accurate diagnosis of dyspnea in older adults presents a challenge to emergency physicians. We describe the degree of diagnostic uncertainty and inaccurate diagnosis among the three most common causes of dyspnea: pneumonia, chronic obstructive pulmonary disease (COPD), and congestive heart failure (CHF) in a national dataset.

Methods: National Hospital Ambulatory Medical Care Survey (NHAMCS) data from 2009-2013 were analyzed. Among visits by individuals aged 65 years and older with reason for visit codes consistent with dyspnea, we estimated the survey-weighted proportion of visits in which patients were diagnosed with pneumonia, CHF, and/or COPD to describe rates of co-diagnosis. Among admitted patients, we examined ED discharge diagnosis agreement with hospital discharge diagnosis.

Results: There were 12.5 million ED visits nationally for dyspnea in older adult patients from 2009-2013, or 2.5 million visits per year. Of all dyspneic patients, 16% (95% Confidence Interval (CI) 14-18%) were diagnosed with >1 of pneumonia, COPD, and CHF with 53% (95% CI 30-36%) with “dyspnea not otherwise specified.” Among the 56% admitted to the hospital, 92% (95% CI 90-94%) had a hospital discharge diagnosis different than ED diagnosis.

Conclusions: Older adults frequently present to the emergency department with shortness of breath or dyspnea and suffer from diagnostic uncertainty and inaccurate diagnosis. As ED care is known to profoundly impact subsequent care, improved ED diagnostic accuracy is necessary to improve morbidity and mortality among older adults ED patients and inpatients presenting with dyspnea.

**214 A Prospective Study of Screening, Triage, Referral, and Follow-Up of Screen-Positive Depressive Patients in a New Geriatric Emergency Department**

Keyes D, Muller S/University of Michigan, Ann Arbor, MI

Study Objectives: Dedicated senior (geriatric) emergency departments (SEDs) are becoming more common in the US. Selected SEDs currently screen for depression in seniors. An important feature of senior EDs is that they feature enhanced screening for common comorbidities in the elderly. It is critical to validate the selection of individual tests that are used in this screening, and there is currently debate as to the inclusion of depression screening. The value and importance of treatment for depression is widely accepted, including in the geriatric population. The purpose of this study is to measure 1) the prevalence of depression with ED screening, and 2) among those who screen positive for active depression to determine what proportion are not being treated.

Methods: This is a prospective observational study conducted in the senior ED of a community hospital with an ED annual volume of approximately 45,000. The study included screening, consenting, interview, and chart review of SED patients > 65 years of age. All patients were screened using the Yesavage/Stanford Geriatric Depression Scale (GDS, 5-point). Patients with a GDS of > 2 were assessed for prior diagnosis of depression and whether they are currently under treatment. Demographic features and insurance status were recorded.

Results: A total of 6312 patients were screened using the Geriatric Depression Scale. Ninety-three patients screened positive for depression with a GDS of > 2. Of these, 63 patients consented for the study (34.4% male). These patients were then assessed for prior diagnosis of depression and whether they are currently under treatment. Forty-six patients (73.0%) had not been previously diagnosed with clinical depression and/or were not taking an antidepressant medication as determined by interview and chart review, and 1% stated they were unsure. Fifty-six patients (87.5%) received no social work referral during their current visit.

Conclusions: It is important to validate the screening methods being used by the growing number of senior emergency departments, including depression. This study found a low percentage of geriatric patients with depression. However, the majority of the screen-positive depressive patients had not yet been treated, indicating an important opportunity for improved follow-up and intervention.

**215 Development of a Brief Motivational Interview Intervention to Promote Advance Care Planning for Older Adults After Leaving the Emergency Department**

Ouchi K, George N, Schuur JD, Tulszy JA, Block SD/Brighton and Women’s Hospital, Boston, MA; Dana-Farber Cancer Institute, Boston, MA; Dana-Farber Cancer Institute / Ariadne Labs, Boston, MA

Study Objectives: The majority of older adults with serious illnesses visit the ED near the end of life, yet most do not have advance directives. In the time-pressed ED environment, the lack of a feasible method to facilitate advance care planning (ACP) constrains our current practice. We sought to develop and refine a brief motivational interview (BMI) intervention for older adults to engage in ACP conversations with their primary outpatient clinician.

Methods: We conducted iterative cognitive interviews to refine our BMI intervention. We adapted a well-established BMI intervention previously designed for alcohol dependence to empower older adults to seek ACP conversations with their primary outpatient clinicians. Using an expert panel consisting of palliative care researchers and BMI researchers, we created a prototype to meet the needs of older adults with serious illness. The prototype was refined using mock clinical encounters and iterative cognitive interviews. Emergency medicine clinicians administered the intervention to the patient family advisory council members (prior ED patients who volunteered to improve the care we deliver) and standardized patients. After the mock encounters, individual cognitive interviews were performed to understand both the clinician and patient perspectives. An acceptability Likert-scale survey was administered to all participants. The scripted text was refined based on participants’ inputs, and the iterative refinements were reviewed by a second, blinded, attending emergency physician and the expert panel to ensure feasibility in the ED and maintenance of BMI and serious illness communication principles. This process was deemed when >75% of participants rated the intervention acceptable.

Results: We conducted 16 mock clinical encounters with 11 attending emergency physicians, 3 physician assistants, and 7 patients. 71% of the clinicians were male. Clinicians had broad range of clinical experience (57% with < 5 years, 7% with 5 to 10 year, and 36% with > 10 years of experience after training). Patients were 50% male, including 3 standardized patients. The mean acceptability Likert scale (0 not acceptable, 1-4 somewhat unacceptable, 5-9 somewhat acceptable and 10 completely acceptable) was 7. Clinicians spent mean of 6.8 minutes administering the BMI intervention. Examples of refinement included explicit stating the need for goals of care in the setting of worsening serious illness, using patient-centered language, eliminating readiness numerical scale, focusing to prepare for ACP conversation at the follow-up outpatient visit, allowing administering clinicians to use their judgment to avoid redundancy, and including specific actionable items that patients can take home to prepare for their follow-up visit. Participants also recommended shortening the script in concern for time, including caregiver (if present), and offering an opt-out process for patients to refuse the intervention if necessary can further improve the intervention acceptability.

Conclusions: An ED BMI intervention for ACP conversations has been developed and refined. This intervention may improve the rate of ACP conversations for older adults after leaving the ED. Further study is needed to understand how older adults in the ED perceive this intervention.

**216 A Quality Improvement Intervention That Promotes Goals of Care Discussions Between Emergency Physicians and Patients Near the End of Life**

Loffredo A, Torbati S, Nuckols T, Robertson V, Geiderman J/Cedars Sinai, Los Angeles, CA

Study Objectives: Emergency physicians frequently treat patients who may be near the end of life and often must decide whether to admit these patients to the intensive care unit. Goals of care discussions can facilitate such decisionmaking, but emergency
Physicians seldom document these discussions. We sought to design and pilot test an intervention that increases the rate at which emergency physicians document goals of care discussions among end-of-life patients admitted to the intensive care unit.

Methods: In an emergency department with an annual census of approximately 88,000 patients at a tertiary urban academic medical center, electronic medical record review of intensive care unit admissions appearing to be a physician champion revealed a very low rate of emergency physician goals of care documentation. The physician champion and emergency department co-chairmen developed an intervention. From June 2015 through October 2016 the champion reviewed emergency physician documentation among intensive care unit admissions who appeared to be near the end of life, and submitted reports to the co-chairmen for further review. Severe trauma, acute stroke and acute coronary syndrome patients were excluded since consultants typically have these goals of care discussions in the emergency department. End of life was defined as patients with a reviewer-estimated life expectancy of six months or less, and categorized according to previously described trajectories of dying: (1) advanced cancer, (2) bed bound from severe neurologic disease such as dementia or stroke, or (3) advanced organ system failure. Emergency physician-documented review of pre-existing goals of care documentation was in cases where patients lacked capacity and no surrogate was available. Reviewers e-mailed positive feedback to emergency physicians for documenting goals of care. Co-chairmen performed academic detailing per their discretion when goals of care were not documented.

Results: We reviewed 1286 intensive care unit admissions and identified 151 patients who appeared to be near the end of life. Seventy-eight (52%) had advanced cancer, 43 (28%) were bed bound from severe neurologic disease, 26 (17%) had patients who appeared to be near the end of life. Seventy-eight (52%) had advanced organ system failure. Emergency physician-documented review of pre-existing goals of care documentation was in cases where patients lacked capacity and no surrogate was available. Reviewers e-mailed positive feedback to emergency physicians for documenting goals of care. Co-chairmen performed academic detailing per their discretion when goals of care were not documented.

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Conclusions: We found it feasible to implement a quality improvement intervention that promotes emergency physician goals of care documentation for intensive care unit admissions appearing to be near the end of life. We plan to conduct a linear time-series analysis to formally evaluate effectiveness.

217 Making the Diagnosis of Concussion in the Emergency Department: Are We Hitting the Mark?
Myers K, Kondamudi N, Hartsgrove C, Weingart A/Rutgers New Jersey Medical School, Newark, NJ

Study Objectives: There has been increased interest in concussion among the scientific and lay press in the last 20 years, and the emergency department (ED) is where patients commonly seek medical evaluation after a head injury. The diagnosis of concussion can be easily missed because it is a clinical diagnosis, often made after ruling out other diagnoses which require no form of intervention, (2a) Benign pathologic findings not requiring further workup. Group 3 was subcategorized as follows (3a) Requiring attention before discharge and (3b) requiring follow-up as outpatient.

Results: Of the 610 patient evaluated for head injury (2013: 221, 2015: 389), 238 (39%) had features compatible with the diagnosis of concussion (2013: 100, 45%, 2015: 138, 35.5%). Diagnosis of concussion was documented in 89 patients (2013: 35, 2015: 54), for overall underdiagnosis rate of 62.6% (2013: 65%, 2015: 61%). The majority of patients were boys (67%), and the mean age was 11 years (SD 5.3). There was no difference in these demographics between 2013 and 2015. CT scan of the head was performed in 167 patients (2013: 69, 2015: 98), resulting in an overall head CT scan rate of 70% (2013: 69%, 2015: 71%). Among the 2015 data, the most common mechanism of injury was falls (23%) followed by assaults (15.9%) and motor vehicle accidents (15.2%).

Conclusions: The prevalence of concussion in this study is just under 1% of all pediatric ED visits and 39% among patients presenting to the ED with head injury. Underdiagnosis occurred in 65% of patients with signs and symptoms compatible with this diagnosis. As it is a clinical diagnosis, lack of provider recognition of the constellation of signs and symptoms that satisfy the diagnostic criteria may have contributed to such a large underdiagnosis rate. It is important to make the specific diagnosis of concussion for parent and school understanding, and to facilitate appropriate treatment, discharge instructions, and follow-up.

218 Incidental Findings on Pediatric Abdominal Computed Tomography at a Pediatric Trauma Center
Philip A, Daoud Y, Atitberg G, Leider H, Neuman J, Hahn B/Staten Island University Hospital, Staten Island, NY

Study Objectives: The use of computed tomography (CT) in pediatric abdominal trauma has increased due to the availability of CT scans. This has led to increased detection of incidental findings which can be benign, while others may require follow up or urgent evaluation. This study describes the frequency and type of incidental findings on abdominal CT of trauma patients at a pediatric trauma center.

Methods: This was a retrospective, observational study of pediatric patients ≤ 21 years of age presenting to the emergency department (ED) between January 1, 2004 and July 31, 2016. The study was conducted at Staten Island University Hospital, a 700-bed, tertiary-care teaching hospital in Staten Island, NY. The pediatric ED is a level II trauma center with a census of 25,000 patient visits per year. Information was extracted from a computer database. Prior to review, a consensus panel consisting of board certified emergency, pediatric and radiology physicians determined the appropriate classification of incidental findings. Each record was reviewed by a physician trained in the study protocol and data abstraction and was then reviewed by a second board certified physician to ensure consistency and accuracy. All findings were categorized into three groups; (1) Benign anatomic variants which require no form of intervention, (2a) Benign pathologic findings not requiring further investigation based on the known natural histories of these lesions, (2b) Likely benign pathologic, may require outpatient monitoring and (3) Pathologic findings requiring further workup. Group 3 was subcategorized as follows (3a) Requiring attention before discharge and (3b) requiring follow-up as outpatient.

Results: 1073 trauma patients underwent a CT of the abdomen and pelvis during the study period. The mean age 15.5 years and 707 (66%) were male. 418 incidental findings were identified in 345 subjects. Of these, 290 (69%) were benign, 60 (14%) were likely benign pathologic, requiring possible outpatient monitoring. The most common findings in this category were adrenal and renal cysts. 68 (16%) of incidental findings required some form of further evaluation. The most common pathological findings were
hepatic steatosis and hyponatremia. Inter-rater agreement for classification of incidental findings was 0.96 (95% CI 0.93-0.98). Of those requiring further evaluation, 5 findings (1%) wanted further evaluation prior to discharge (Table 1).

Conclusions: Nearly one third of patients had at least one radiographic finding not related to their traumatic injury. Of these, more than two-thirds had injuries not requiring further evaluation, but a significant number of patients required some form of further evaluation. Although the clinical significance of these findings is unclear, systems need to be in place for informing patients of these findings.

| Table 1: Distribution of Pathologic Classifications Based on Demographic Variables |
|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|
|                  | Male            | Female          | Insured         | Uninsured       | Age [50]         |
|                  | Class 1         | Class 2a        | Class 2b        | Class 2c        | 16 [4]          |
|                  | Class 3a        | Class 3b        | Class 3c        | Class 3d        | 17 [4]          |
|                  | 58              | 72              | 9               | 1               | 14              |
|                  | 132             | 76              | 31              | 1               | 17 [4]          |

219 Long-Term Outcomes following Pediatric Traumatic Brain Injury Presentations to the Emergency Department

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Study Objectives: To determine prognostic factors of long-term outcome in pediatric patients who presented to the emergency department with traumatic brain injury (TBI).

Methods: A prospective database study was conducted using the Children’s Health-Children’s Medical Center Dallas (CMCD) Brain and Nerve Injury Center Repository and Database (BNIRD). Patients, ages 0-17 years, were queried from 2001 to 2012. Outcomes and clinical study variables were abstracted from a separate prospective database for patients prior to the formation of the BNIRD in 2005, using a similar protocol. Since the Glasgow Outcome Scale Extended Pediatric (GOSEP) was not available prior to 2005, the Glasgow Outcome Scale (GOS) was used for data collected from 2001-2004. Subjects were admitted to the CMCD Pediatric Intensive Care Unit if TBI was secondary to blunt force trauma from accidental mechanism. Children were excluded if their brain injury was penetrating or abusive, or if they were not expected to survive. Statistical analysis was done using chi-square, Fisher’s Exact Test, and logistic regressions in SPSS and the R statistical computing software.

Results: Of the 307 patients included in the study, with an average age of 6.7 years. Of the 307 patients, 66% had severe TBI (GCS 3-8), 15% had moderate TBI (GCS 9-12), and 18% had mild TBI (GCS 13-15). The GOS available in 258 patients and the GOSEP available in 137 patients were assessed at discharge and again on average 16 months after injury. For the GOS group, 47% had improved from poor outcome (GOS 1-3) to good outcome (GOS 4-5) on reassessment, and for the GOSEP group, 24% had improved from poor outcome (GOSEP 5-8) to good outcome (GOSEP 1-4) on reassessment. Of the 8 patients who were discharged in a vegetative state, 7 regained consciousness, with 2 ultimately having good outcome. All patients with a fall mechanism had a good outcome, while those with a motor vehicle collision (MVC) were associated with worse outcomes (RR=0.31 for GOS and RR=0.28 for GOSEP). Favorable predictors included higher GCS in the emergency department (p=0.01) and equal bilateral reactive pupils on arrival (p=0.04). Factors predictive of poor outcomes included intracranial pressure monitor placement (p<0.01), seizures (p=0.01), neurosurgical intervention (p=0.02), asymmetric reactive pupils on arrival (p=0.04), and CPR on scene (p=0.02) or in the ED (p=0.06).

Conclusions: Despite poor neurologic status in the emergency department and at hospital discharge, many children who suffered a TBI improved in the long term. As a mechanism of injury, falls were associated with a favorable prognosis, whereas MVC’s portended worse outcomes. Poor outcomes were more likely in patients requiring CPR, patients with asymmetric or fixed dilated pupils upon arrival, or those requiring intracranial pressure monitor placement.

220 Adherence to the Pediatric Emergency Care Applied Research Network Head CT Rule: 2013 to 2015

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Study Objectives: Pediatric head injury is common and accounts for approximately 600,000 emergency department visits and over 7,600 deaths in the United States annually. Although the vast majority of children have minor injuries, a small number, even among well-appearing children, have serious injuries with the potential for deterioration and significant sequelae. The Pediatric Emergency Care Applied Research Network (PECARN) performed a large multicenter prospective cohort study and identified seven criteria that correlate with increased risk of clinically important traumatic brain injury (ciTBI). This study was conducted to determine whether the emergency department at the author’s institution (17K annual pediatric visits in 2015) is following the PECARN guidelines for head CT scans in children with minor head injury.

Methods: A retrospective review was performed of all pediatric head injury presenting to the emergency department in July-December 2013 and January-December 2015. The EMR database was accessed to obtain all emergency department visits for patients <18 years old with documentation of “head injury.” Patient were excluded if they did not have blunt head trauma or if their GCS was <14. Adherence to the PECARN rule was determined based on documentation of the injury and physical exam, and whether the patient obtained a head CT. Secondary analysis was conducted to see if there was any improvement in adherence between 2013 and 2015 after implementation of department-wide education regarding the utilization of the PECARN rule.

Results: Of the 627 charts reviewed (2013: 228, 2015: 399), 47 encounters were excluded for not meeting inclusion criteria (9 penetrating injuries, 17 without head trauma, and 21 with GCS<14). Among the remaining 580 encounters (2013: 207, 2015: 373) and based on the PECARN criteria, 108 (18%) were considered “high risk” for ciTBI (2013: 40, 2015: 68), 220 (38%) were “low risk” (2013: 74, 2015: 146), and 252 (45%) were “very low risk” (2013: 93, 2015: 159). Head CT is recommended in the “high risk” category, and among these patients, 93 (86%) were scanned (2013: 31/40 - 77.5%, 2015: 62/68 - 91.2%). Among the “low risk” patients, 162 (75.6%) were scanned (2013: 64/74 - 86.5%, 2015: 98/146 - 67.1%). Among the “very low risk” patients, 30 (11.9%) received a head CT (2013: 17/93 - 18.3%, 2015: 13/159 - 8.2%). The overall adherence to the PECARN rule in 2013 was 87.4%, and the overall adherence in 2015 was 94.9%. This indicates a relative improvement in PECARN adherence by 60% between 2013 and 2015.

Conclusions: Overall adherence to the PECARN rule for head CT in patients with mild TBI improved by 60% between 2013 and 2015 to an absolute adherence rate of nearly 95% in 2015. Notably, there was also a decline in number of head CTs performed among the patients who met “low risk” criteria, in which cases clinical judgement is recommended (87% in 2013 to 67% in 2015). Over the course of 1 year and after implementation of department-wide education regarding head CT in children with head injury, we have made significant improvement in adherence to the PECARN rule, leading to fewer unnecessary scans and better clinical decisionmaking.

221 Do Practitioners Still Recommend Rest for Acute Concussion Management?

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Study Objectives: Children sustain approximately 1 million closed head injuries annually, almost all of which are classified as concussions. The majority of those injured recover from symptoms within four weeks; however, about one-third take longer to recover. The disability from prolonged concussions includes physical and cognitive dysfunction, sleep disturbances, and behavioral changes that may lead to missed days of school or work. Historically, acute concussions were managed with physical and cognitive rest; however, recent literature has questioned the efficacy of cognitive rest. There is limited published data regarding cognitive and physical rest prescription patterns of pediatric emergency medicine (PEM) clinicians in concussion management. To address this knowledge gap, we collected information on provider management of two hypothetical acute concussion scenarios using recommendations on time off from work or school.
school as a proxy for cognitive rest, and time off before returning to sports as a proxy for physical rest. We hypothesized that the majority of providers would recommend a concussion management strategy that is based on cognitive rest.

Methods: PEM providers (attending, fellows, and clinical associates) and pediatric primary care clinic attendings from an urban tertiary care pediatric hospital and affiliated outpatient clinic were surveyed. Surveys were completed by 61 providers. The survey consisted of two clinical scenarios of pediatric closed head injuries—a female scenario with a mild concussion and male scenario with a moderate concussion. Practitioners were asked two questions for each scenario regarding their management recommendations for returning to school and returning to sports/activity. Data was collected and analyzed using the Redcap software system. A Fisher’s exact test analysis was performed to compare the management of the two scenarios.

Results: 61/151 (40%) providers completed the survey, including 46/78 (59%) PEM physicians. In the female/mild concussion scenario, 43/61 providers (70.5%) recommended time off from school compared to 53/61 providers (86.9%) in the male/moderate concussion scenario (p <0.0001). In the mild concussion scenario, the majority of providers (50.8%) recommended clearance by a physician before returning to sports, compared to 72.1% in the moderate concussion scenario. Overall, 69% of providers indicated they would prescribe (some degree of) rest in both the mild and moderate concussion scenarios.

Conclusions: In both hypothetical concussion scenarios (mild vs. moderate concussion), a substantial majority of providers recommended a management strategy that included some degree of a delay of return to school. Providers were significantly more likely to suggest time off from school in the moderate concussion scenario. Given recent evidence suggesting that cognitive rest may not be associated with reduced risk of prolonged concussion syndrome, recommendations of periods of cognitive rest, particularly absences from school, should be approached cautiously. Additional investigations, including prospective studies investigating the relationship between provider concussion management recommendations, cognitive rest, and prolonged concussion symptoms are warranted.

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**222 The Pediatric Blast Injury: Out-of-Hospital and Emergency Department Resuscitation and Resource Utilization in Iraq and Afghanistan**

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Study Objectives: Pediatric trauma care is a significant challenge in the deployed setting in accordance with medical rules of engagement. Traumatic injuries due to explosives are largely unique to the combat-zone setting. Thus, little data exist specific to care of the pediatric patient with trauma due to explosion. We describe the out-of-hospital and emergency department (ED) care of the pediatric explosive injury.

Methods: We queried the Department of Defense Trauma Registry (DODTR) for all pediatric subjects admitted to US and Coalition fixed-facility hospitals in Iraq and Afghanistan from January 2007 to January 2016. We stratified subjects by age based on Centers for Disease Control age groupings: <1, 1-4, 5-9, 10-14, 15-17. Descriptive and inferential statistics were utilized.

Results: From January 2007 to January 2016, there were 3,439 pediatric trauma encounters in the registry. Of those, 1,480 (45.0%) had explosive listed as the primary mechanism of injury. Amputation rates increased with age (p=0.001). The most common intervention in the out-of-hospital setting was external warming followed by wound dressings and tourniquets. In the ED, the most common interventions were external warming, vascular access and imaging. Composite injury severity scores and mortality were not significant across age groups (p=0.866, p=0.319, respectively).

Conclusions: While not necessarily the target population for care by military physicians, it is not uncommon for gravely injured pediatric patients to receive care in US battlefield hospitals. It is therefore essential for future planning purposes to further understand these patients, their needs, and the resources required to care for them.

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**223 Effect of the Affordable Care Act Medicaid Expansion on Psychiatric Boarding Times in the Emergency Department**

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Study Objectives: The enactment of the Affordable Care Act (ACA) led to a dramatic change in the balance between insured and uninsured. In February 2013, the ACA’s Medicaid expansion program was launched as “CountyCare” in a large urban area.

Objectives: To analyze the effect of a large shift in insurance status on psychiatric boarding times in the 80-bed emergency department (ED) of a tertiary-care, safety-net hospital. Our hypothesis was that the advent of CountyCare would be associated with a decrease in psychiatric boarding times for all-comers regardless of insurance status, and that psychiatric boarding times for patients with CountyCare would be shorter than those for uninsured patients.

Methods: This is a quasi-experimental, retrospective, single-center cohort study of all adult patients (age ≥ 18) admitted from the ED to any psychiatric hospital between February 1, 2013 and December 31, 2014. Exclusion criteria included any charts with missing triage or discharge time data, and any erroneous entries. The study was approved by the hospital’s institutional review board.

Boarding times were generated based on the difference of patient checkout and arrival times. Patient insurance status was aggregated into four groups: uninsured, private, CountyCare, and other public insurance. Due to unequal variances between group boarding times, a Welch procedure was performed to test for statistically significant boarding time mean differences between the insurance status groups, and a Games Howell posteriori test was conducted to reveal any significant boarding time differences between CountyCare and each other insurance status group. Data were analyzed using Microsoft Excel 2011.

Results: 1,074 patients were included in the study. The mean boarding time and number of enrolees are shown in Figure 1. The Welch procedure indicated that there was a statistically significant difference between boarding times for the four insurance status
groups. \[F(3, 165) = 75.06, p < .001\]. Further, post hoc comparisons using the Games and Howell test revealed CountyCare boarding times were ten hours and thirty minutes less than the uninsured group, five hours and thirty minutes less than the other public insurance group, and nine hours and twenty-two minutes less than the private insurance group, 95% CIs [-12:23, -8:44], [-6:43, -3:23], and [-15:45, -3:00], respectively.

Conclusions: We conclude that mean ED boarding times for all patients admitted to psychiatric hospitals decreased as the number of CountyCare enrollees increased. While there may be confounding factors that affected the change in boarding time, our data suggest that the increased percentage of patients with insurance may have helped decrease mean wait times for psychiatric patients in the ED.

We also concluded that patients with CountyCare insurance had statistically significantly shorter boarding times than uninsured patients and patients with other public insurance. This implies that patients who are newly insured as a result of the ACA Medicaid expansion may have quicker access to psychiatric facilities. Comparisons between CountyCare patients and privately insured patients are limited due to a small privately insured sample.

Results: 161 patients were entered into the study, 95 (58%) were female and mean age of all was 15 (95% CI 15-16) with an IQR of 13-17. The number of patients seen after release was 94 vs 68 before for a proportion of 0.58 (95% CI 0.5 to 0.68; p value < 0.05). There was no statistically significant change in numbers of patients presenting before/after with regards to SI (p 0.53), SA (p 0.43) or SI/SA combination (p 0.45).

There was no significant difference in age before or after 15 vs 15.4 mean difference 0.4 (95% CI -0.3 to 1.2, p 0.28). There was no difference in admission rates before and after, difference in proportions 0.009 (95% CI -0.14 to 0.16; p value 1.0). The peak in Google searches for the show occurred between 4/08-4/18/2017 with a second smaller peak on 5/8/2017 while peak presentations to the ED occurred 5/1-5/11/20017. There did not appear to be a graphic change in searches for “How to commit suicide” on Google during the study period.

Conclusions: There was a statistically significant increase in presentations to the emergency department for psychiatric evaluation post release of “13 Reason Why.” However, we found no change in SI/SA presentations or admission rates in the pre- vs post-release period. This preliminary data shows media may have profound influence on patients in this age range. Further studies are warranted to determine if this is a positive or negative effect.

Study Objectives: Among young Americans suicide is the third leading cause of death according to the US Centers for Disease Control and Prevention with 157,000 people in the 10-24 age range seeking medical care for self-inflicted injuries each year. The release of “13 Reasons Why” www.netflix.com/title/80117470, has caused controversy amongst parents, mental health professionals, educators, and producers of the show. Proponents feel it serves as a catalyst for conversation and can bring light to issues people with mental illness face. Opponents state it may sensatilize or glamorize suicide in vulnerable populations making suicide seem romantic or acceptable, as well as giving the notion that suicide can be a way to teach others a lesson. We hypothesized that with the release of “13 Reasons Why” on March 31, 2017 there may be an increase in the numbers of patients between 11 and 18 years of age presenting to the emergency department with chief complaint or final diagnosis of mood disorder, depression, or suicide attempt/ideation. We further hypothesized that admission rates for psychiatric illness during this time period would be higher.

Methods: Retrospective Cohort Protocol: We compared the number of presentations to the emergency department for mood disorders, suicide or depression classified by ICD 9 codes for the 41-day period before and after the release of “13 Reasons Why” (Feb 18, 2017- May 11, 2017). Data was collected from the EDIMS charting system at an urban teaching hospital with an adult/pediatric visit of 85,000. We examined chief complaint, SI and or SA, admission rate, and age differences using appropriate statistical tests with a significant p value of 0.05. We also used Google Trends to determine peak interest in the show as related to searches for “13 Reasons Why” on www.google.com and to determine if an increase in searches for “How to commit suicide” occurred.

Conclusions: We examined chief complaint, SI and or SA, admission rate, and age differences using a charting system at an urban teaching hospital with an adult/pediatric visit of 85,000.

Abstracts

Research Forum

224 “13 Reasons Why” Pediatric Psychiatric Presentations to an Emergency Department in Relation to Release Date

Salo D, Kairam N, Sherson L, Fiesseler F, Patel D, Wall A/Morrisstown Medical Center, Morristown, NJ

Study Objectives: Among young Americans suicide is the third leading cause of death according to the US Centers for Disease Control and Prevention with 157,000 people in the 10-24 age range seeking medical care for self-inflicted injuries each year. The release of “13 Reasons Why” www.netflix.com/title/80117470, has caused controversy amongst parents, mental health professionals, educators, and producers of the show. Proponents feel it serves as a catalyst for conversation and can bring light to issues people with mental illness face. Opponents state it may sensatilize or glamorize suicide in vulnerable populations making suicide seem romantic or acceptable, as well as giving the notion that suicide can be a way to teach others a lesson. We hypothesized that with the release of “13 Reasons Why” on March 31, 2017 there may be an increase in the numbers of patients between 11 and 18 years of age presenting to the emergency department with chief complaint or final diagnosis of mood disorder, depression, or suicide attempt/ideation. We further hypothesized that admission rates for psychiatric illness during this time period would be higher.

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Abstracts

Research Forum
To identify rates of mental health co-morbidities and exposure to adverse childhood events in patients presenting to the emergency department with opioid misuse-related complaints.

Methods: In response to the opioid epidemic Indianapolis EMS created a quality improvement project (POINT) to meet opioid misusing patients in the emergency department and help link them to ongoing care. As a part of patient’s intake into project POINT they have a psychosocial evaluation with an ED outreach professional. Included in this assessment is the ACE survey as well as questions regarding their mental health history. This project used intake data from project POINT to calculate rates of common mental health diagnoses and assess ACE scores for this cohort.

Results: Of the 82 patients enrolled in Project POINT from February to December of 2016, 63.4% were male and the median age was 33. Fifty-five percent had a mental health history. The most common mental health co-morbidities were depression 20.7%, bipolar 12.2%, and PTSD 9.8%. Of the 46 patients who the ACE survey, 28 (60.8%) had scores of 4 or more.

Conclusions: With the growing opioid epidemic, EDs and EMS systems are looking for novel and effective ways to reduce mortality and help bridge patients into recovery. Our data suggests that a substantial proportion of patients who present to the ED with opioid misuse-related complaints have co-morbid mental health issues and high rates of early childhood trauma exposure. Taking these factors into consideration when designing and implementing ED-based outreach and referral programs is crucial.

227 Measuring Emergency Care Survival: The Implications of Risk-Adjusting for Race and Poverty
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Study Objectives: We sought to assess the impact of including race and poverty on risk adjustment models of hospital quality used by the Center for Medicare and Medicaid Services (CMS) for public reporting and benchmarking, as well possible future reimbursement penalties and incentives. We limited our study specifically to inhospital mortality due to five emergency care sensitive conditions (ECSCs), trauma, sepsis, stroke, cardiac arrest, and ST-elevation myocardial infarction, with evidence of sociodemographic disparities, in accordance with National Quality Forum (NQF) guidelines.

Methods: We analyzed statewide, all-payer inpatient administrative discharge data covering all adult admissions to 168 hospitals in Pennsylvania in 2011. We developed risk-adjustment logistic regression models, both omitting and using patient race (white vs. non-white) and poverty status (non-poor vs. poor, if uninsured, on Medicaid, or living a zip code in the bottom quartile of median household income) to predict in-hospital mortality. We compared the goodness of fit for each model with a C-statistic, and then computed and ranked standardized mortality ratios (SMRs) for each hospital using both models. In order to identify hospitals likely to benefit or to be penalized with sociodemographics included in modeling, we examined characteristics of hospitals which, between the two models, moved into or out of the bottom and top deciles of SMR.

Results: Sociodemographics were significantly associated with higher odds of mortality: non-white adjusted odds ratio [aOR] 1.23 (95% CI 1.16-1.30), and poverty aOR 1.15, (95% CI 1.08-1.22). Inclusion of race and poverty had a significantly higher predictive accuracy than excluding these variables (p=0.0001), but absolute differences in C-statistic values were small (0.8260 without; 0.8264 with). No hospitals had a statistically significantly different number of ACE scores than excluding these variables (p=0.0001). However, the 3 hospitals which moved out of the bottom decile each had significantly larger young, non-white and poor patient populations compared to all other hospitals (Table).

Conclusions: Inclusion of race and poverty status minimally changed the goodness of fit of risk-adjustment models, consistent with NQF’s prior analysis. However, inclusion of the socioeconomic factors did improve hospital mortality rankings for hospitals treating a large number of non-white and poor patients, traditionally known as “safety net” hospitals, which might enable these hospitals to avoid penalties in current value-based purchasing models.

Table. Descriptive characteristics of hospitals moving into and out of the bottom decile of standardized mortality ratio (SMR) when adding race and poverty to risk-adjustment model

| Hospitals that Moved In or out of Bottom Decile of Hospital Mortality Rankings (Mean (SD) with P-value by t-test against all other hospitals) |
|-------------------------------|------------------|------------------|
| Moved Out | Moved Into | All Hospitals |
| Number of Hospitals | 3 | 3 | 157 |
| ECSC admissions | 1,375 (1,605) | 296 (268) | 1,088 (1,319) |
| Mean Age | 62 (9) P=0.005 | 74 (1) P=0.19 | 74 (7) |
| Median Age | 62 (11) P=0.002 | 79 (1) P=0.043 | 74 (3) |
| Mean Number of Comorbidities | 2.5 (0.6) P=0.88 | 2.7 (0.3) P=0.19 | 2.6 (0.5) |
| Median Number of Comorbidities | 2.3 (1.2) P=0.043 | 2.7 (0.6) P=0.19 | 2.4 (0.6) |
| Non-white patients | 68% (28%) | 5% (3%) P=0.00005 | 11% (17%) |
| Poor patients | 56% (29%) | 10% (3%) P<0.00005 | 10% (7%) |

228 Comparison of Primary Compliance in Electronic Versus Paper Prescriptions Prescribed From the Emergency Department
Andrusaitis J, Billimek J, Osborn M, Rudkin S, Toohey S/UC Irvine School of Medicine, Irvine, CA

Study Objectives: Health policies of the past decade have effectuated the rise of electronic prescriptions (e-prescriptions) as the predominant prescription form in the US. The Medicare Improvements for Patients and Providers Act, passed by Congress in 2008, encouraged the use of e-prescriptions. The HITECH Act of 2009 mandated their use in order to receive full Medicare reimbursements. In 2016, New York became the first state to ban all non-electronic prescriptions. 

The absence of empirical data that e-prescribing is both feasible and improves care has raised concerns that e-prescribing may not be efficient nor effective in some clinical settings. The emergency department and the patient population it serves may be just such a setting. Emergency physicians fear that their unique patients may have a difficult time utilizing the e-prescription system. We hypothesized that, given the nature of the chaotic, unplanned, and irregularly timed emergency department visit, many times by visitors who are not from the area, emergency department patients would have a lower compliance with e-prescriptions as compared to traditional paper prescriptions. We hypothesized that a paper prescription that could be taken more easily to any pharmacy at any time would be more likely to be filled than an e-prescription.

This study aimed to determine whether the recently mandated use of e-prescriptions is consistent with high quality care for emergency department patients. The primary outcome of this study was the fill rates of e-prescriptions and paper prescriptions, as measured by insurance pharmacy claim data.

Methods: A retrospective chart review was performed in the emergency department of a large urban, academic hospital with tertiary care capabilities to identify insured adult patients who were given a non-controlled substance prescription in either the paper or electronic form. Pharmacy claim data to insurance was used to determine whether these prescriptions were filled. The sample size of each group was calculated to be 187 in order to detect a 15% difference at a 5% significance level and a power of 80%.

Results: Of the 405 encounters included, 218 had e-prescriptions and 187 had paper prescriptions. Our findings showed that non-controlled paper prescriptions are filled at the same rate as electronic prescriptions (58.3% versus 57.8% p=1.0) in the insured adult emergency patient population. The presence of an accompanying
controlled substance prescription in addition to the prescription(s) of interest had no effect on the fill rate of the prescription(s) of interest.

Conclusions: While this study was limited to insured patients presenting to a single site, the data show that patients in this study population are as likely to fill an e-prescription as they are to fill a paper prescription. Our findings contrast with the assumptions of many emergency physicians who believe patients are more likely to fill paper prescriptions. These data may encourage emergency physicians to increase utilization of e-prescriptions and thus may alter prescribing practices in emergency medicine. Further research should try to capture a broader patient base that includes multiple clinical settings and non-insured patients.

229 EMS Can Safely Transport Patients to a Sobering Center as an Alternate Destination
Smith-Bernardim SM, RN, Kennel M, Glenn M, Yeh C/University of California-San Francisco, San Francisco, CA; San Francisco Sobering Center, San Francisco, CA

Study Objectives: This purpose of this study is to evaluate the ability of the sobering center to operate as a safe alternative destination for paramedics [EMS] by evaluating all secondary transports from the Center to the emergency department (ED). Our aims are to 1) introduce the concept of a sobering center as an alternative destination for EMS, and 2) quantify and analyze all secondary transfers from the sobering center to the ED.

Methods: Setting: The San Francisco Sobering Center, a 24/7 nurse-managed Department of Public Health facility, was opened in 2003 to provide care for adults aged 18 and older with acute alcohol intoxication. Since inception, paramedics have been able to utilize a system-wide county EMS protocol to identify patients who are eligible for evaluation at the sobering center rather than transport directly to an emergency department. In addition, individuals may self-refer to the center or be referred by police, emergency departments, or street outreach teams. Services provided by registered nurse and medical assistant staff include: vital sign monitoring every 2 hours, oral rehydration, nutrition, activity of daily living (ADL) support, basic wound care, and referrals to stabilizing services including detoxification, urgent care, and shelter. Licensed clinical social workers provide advanced care coordination and intensive case management, including psychiatric evaluation and housing referrals.

Design: This study is a secondary data analysis of all admissions to and transports from the Sobering Center between July 2014 and June 2016. Two nurse leaders performed a case review on all patients that were secondarily transferred from the Sobering Center to an ED. The reason for transfer was categorized by reasons for transfer (ie, measures of vital sign instability such as abnormal blood pressure or temperature, seizure activity, chest pain, death), and if there were disagreement, a consensus decision was reached. Two emergency physicians independently verified case review findings.

Results: From July 2014 to June 2016, a total of 7,617 adults aged 18 and older were referred to the sobering center. Of these individuals, 2,723 were transported directly by EMS/ambulance. Overall, 4.5% (n=344) of all patients and 6.7% (n=242) of those brought in by ambulance were secondarily transferred to an ED. Evaluating only those who initially arrived by ambulance (n=242), primary reasons for transfer were: tachycardia (27%), developing evidence of alcohol withdrawal (19%), pain control (18%), emesis (13%), client request without obvious need (13%), and elevated blood pressure (12%). There was one death (cocaine intoxication).

Evaluating only those who initially arrived by ambulance (n=242), primary reasons for transfer were: tachycardia (27%), developing evidence of alcohol withdrawal (19%), pain control (18%), emesis (13%), client request without obvious need (13%), and elevated blood pressure (12%). There was one death (cocaine intoxication).

Conclusions: Overall we found high willingness to commit to taking medications only as directed and dispose of excess pills. We found that not only was there no difference in commitment to pill security and limited opioid use when comparing previous opioid use and attitudes toward opioid use, but there was no difference when we looked at various other demographic factors as well, such as race, sex, and age. This is a promising finding going forward, showing that interventions focused on safe opioid use, storage and disposal will be by adolescents in an urban emergency department.

230 The Willingness of Adolescents to Commit to Safe Use, Storage, and Disposal of Prescription Opiates in the Emergency Department
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Study Objectives: Monitoring the Future report shows that almost 1 out of 10 children has misused a narcotic by 12th grade. Importantly, the leading diversion source is leftover pills from their own previous prescriptions – the majority of which originate in the emergency department. Although decreasing prescriptions has been the primary focus of ED-based interventions and policies, in April 2017 the American Medical Association Task Force to Reduce Opioid Abuse released new official recommendations promoting safe use, storage and disposal of prescription opioids after a prescription is written. However, the willingness of adolescents to follow such recommendations is unknown. In this study, we assess 1) current attitudes of adolescents towards the potential harm of opioid use/misuse and 2) if adolescents are willing to consider to committing to pill security and limited opioid pain medication will vary according to their attitude towards opioid misuse and previous experience with prescription opioids.

Methods: For assessment, a electronic 31-question survey was given to a consecutive sample of patients aged 15-22 years old who were seen in the LAC-USC ED. Subjects provided verbal consent. Exclusion criteria included critically ill patients, patients with psychiatric complaints and non-English speaking patients. The survey was generally administered during the morning and afternoon ED shifts according to research assistant availability.

Results: A total of 91 subjects were enrolled and completed the survey. Mean age was 19 years and 56% were male. Overall 29.7% of adolescents had previously received a prescription for opioids and 61.3% of respondents disapproved of any form of opioid misuse. 87.9% of the sample was willing to commit to take prescription opioids only as prescribed and 83.5% was willing to commit to securely disposing of leftover opioids. Contrary to our hypothesis, adolescents who had previously been prescribed opioids were equally willing to commit to take opioids only as those who had no previous opioid exposure (88.9% vs. 87.5% (diff = 0.01 CI -0.16%-0.14%, p=0.85)) and to dispose of excess pills (85.1% vs. 82.8% (diff =-0.02% CI -0.19%-0.15%, p=0.78)). Similarly adolescents who did not disapprove of opioid misuse were equally likely to commit to taking opioids as prescribed (94.1% vs. 84.2% (diff 0.09% CI -0.04%-0.23%, p=0.16)) and to commit to disposing of excess pills as adolescents who disapproved of opioid misuse (88.2% vs. 80.7% (diff 0.07% CI -0.09%-0.25%, p=0.35)).

Conclusions: Overall we found high willingness to commit to taking medications only as directed and dispose of excess pills. We found that not only was there no difference in commitment to pill security and limited opioid use when comparing previous opioid use and attitudes toward opioid use, but there was no difference when we looked at various other demographic factors as well, such as race, sex, and age. This is a promising finding going forward, showing that interventions focused on safe opioid use, storage and disposal will be by adolescents in an urban emergency department.
non-shoppers (rate difference of -0.7 events per 1000; 95% CI: -3.0 to 1.6). These findings were robust to various definitions of opioid shopping.

Conclusions: Prescription opioid shopping is not independently associated with increased risk of death or non-fatal overdose events, and may be a marker of drug diversion. Efforts to improve outcomes among prescription opioid recipients should focus on other validated predictors of overdose risk.

Urgent Care Transfers to the Emergency Department Are Often Unnecessary

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Study Objectives: The number of urgent cares has risen substantially over the last 20 years. Although urgent cares could play a role in reducing the number of low-acuity visits to the emergency department and reducing health care costs, it is not clear that they actually accomplish either of these goals. If patients initially present to an urgent care and then get unnecessarily transferred to an emergency department, there is the potential for an increased burden on the health care system. No prior published study has evaluated the cohort of patients who are transferred from urgent cares to emergency departments. We sought to determine the frequency with which transfers from urgent cares to our emergency department could have been avoided.

Methods: This was a single-center retrospective chart review of a sample of patients who were transferred from local urgent cares to our emergency department. The chart review was performed by three trained research assistants who were blinded to the study hypothesis. Each chart was reviewed to determine if the transfer could have potentially been avoided. A transfer was considered potentially avoidable if none of the following occurred in the emergency department: advanced imaging was performed, an advanced procedure was performed, a specialist was contacted, or the patient was admitted or transferred to another facility.

Results: We identified a sample of 3232 patients who were transferred from an urgent care to our emergency department over a one-year period using an identifier that the triage nurse marked in the chart. Amongst those 3232 patients, 1042 (32.2% [95% CI 30.7% to 33.9%]) were admitted, 2072 (64.1% [95% CI 62.4% to 65.8%]) were discharged, 101 (3.1% [95% CI 2.6% to 3.8%]) eloped or left against medical advice, and 17 (0.5% [95% CI 0.3% to 0.9%]) were transferred to another facility. In total, 1156 patient transfers (35.8% [95% CI 34.1% to 37.4%]) were admitted, 2072 (64.1% [95% CI 62.4% to 65.8%]) were discharged, 101 (3.1% [95% CI 2.6% to 3.8%]) eloped or left against medical advice, and 17 (0.5% [95% CI 0.3% to 0.9%]) were transferred to another facility. In total, 1156 patient transfers (35.8% [95% CI 34.1% to 37.4%]) met our criteria as potentially avoidable. Most notably, 59.2% (95% CI 55.3% to 63.0%) of transfers of total, 1156 patient transfers (35.8% [95% CI 34.1% to 37.4%]) met our criteria as potentially avoidable transfer. Using a sample of 40 charts, we calculated an interrater reliability of γ = 1.0 for the application of our definition of a potentially avoidable transfer.

Conclusions: The majority of patients transferred to our emergency department from urgent cares are discharged, and about 1/3 of transfers could potentially have been avoided. In particular, transfers of pediatric patients are frequently unnecessary. The interplay between emergency departments and urgent cares needs further assessment.

Safety and Efficacy of Intravenous Lidocaine for Pain Management in the Emergency Department: A Systematic Review and Meta-Analysis

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Study Objectives: This is a systematic review and meta-analysis to evaluate the safety and efficacy of intravenous (IV) lidocaine in adult patients with acute and chronic pain undergoing pain management in the emergency department (ED).

Methods: We searched Ovid Central, Ovid EMBASE and Ovid MEDLINE databases for randomized controlled trials and observational studies from inception to January 2017. Meta-analysis was performed with random-effects models and summary effect estimates were reported as weighted mean differences (WMD) and incidence rates with associated 95% confidence intervals (CI). Efficacy outcomes included reduction in pain scores from baseline to post-intervention and need for rescue analgesia. Safety outcomes included incidence of adverse events.

Results: From a total of 1947 titles screened, 61 articles were selected for full-text review. Eleven studies met the inclusion criteria and 8 provided data for meta-analysis. IV lidocaine had a higher reduction in pain score (visual analogue scale, 0-10) from baseline to 10-15 minutes than active controls (369 patients, WMD: -1.22; 95% CI -1.49 to -0.95), and at 20-30 minutes (410 patients, WMD: -1.06; 95% CI -1.06 to -0.66). There was no difference for pain scores between IV lidocaine and active controls at 60 minutes (206 patients, WMD: 0.00; 95% CI -1.24 to 1.24). Across 8 studies (228 patients), the overall incidence of adverse events was 59 per 1,000 patients (95% CI 1 to 170), incidence of minor events was 58 per 1,000 (95% CI 0 to 153) and incidence of major events was 7 per 1,000 (95% CI 0 to 20). The quality of the evidence was moderate to low for the different outcomes.

Conclusions: Intravenous lidocaine appears to be a safe and effective intravenous medication for short-term pain relief in the ED.

Emergency Department Frequent Users

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Adjunctive Nitrous Oxide to Lidocaine Anesthesia During Emergency Department Incision and Drainage of Abscess in Adults: A Randomized Controlled Trial

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Study Objectives: To describe the safety and efficacy of nitrous oxide adjunct to lidocaine in decreasing pain in adults during incision and drainage of cutaneous abscesses in the emergency department (ED).

Methods: We enrolled 22 patients 18 years of age and older in a prospective, double-blind, randomized controlled trial presenting to the ED with cutaneous abscess ≤ 5 centimeters, requiring incision and drainage. Subjects were randomly assigned to receive either 100% oxygen or 50% nitrous oxide-50% oxygen for 10 minutes before the procedure and continued until 10 minutes after the procedure was completed. Primary outcome was the level of pain before and after the procedure using the Visual Analog Scale (VAS) for pain. Secondary outcomes were patient and physician satisfaction as reported on a brief satisfaction questionnaire.

Results: The mean difference in VAS pain score from before Nitrous Oxide or O2 was administered and 10 minutes post procedure was 15 mm (95% CI: 6 – 36mm) for patients receiving 100% oxygen, and 23.5 mm (95% CI: 6.2mm – 40.4 mm) for patients receiving nitrous oxide (p=0.3). There were no documented adverse events or episodes of respiratory depression or hypoxia. The majority of the subjects within the NO group was satisfied with the level of pain relief using NO (70%; n=10) and would use NO in the future (90%; n=10). The patients in the O2 group were less satisfied with pain relief (25%; n=12); however, the majority were still satisfied with the delivery device (75%, n=12). Physicians were more satisfied with the analgesic effects in the NO group (70%; n=10) than the O2 group (41%; n=12). All the patients (100%, n=22) and the majority of physicians (95%; n=22) in both groups indicated that the NO delivery system was easy to operate. More patients in the NO group (90%; n=10) would recommend the addition of nitrous oxide compared to the O2 group (75%; n=12) for future pain treatment in the emergency department.

Conclusions: This preliminary data suggests the adjunct of inhaled NO appears to be a safe adjunct to local anesthesia for incision and drainage of cutaneous abscesses and the patients and physicians are more satisfied the analgesia. Nitrous oxide offers the advantage of rapid onset analgesia and anxiolysis without the concern for respiratory depression. This may provide a novel adjunct to improving pain relief during incision and drainage along with increasing patient and provider satisfaction.

A New Method for Assessing Pain in the Emergency Department

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Study Objectives: Pain is the most common chief complaint in the emergency department (ED), with up to 78% of patients reporting pain as the primary reason for visiting the ED. The visual analog scale (VAS) and the numeric rating scale (NRS) are the most commonly used tools that assess the severity of pain in the ED, but they do not capture how pain interferes with the patient's daily functions, which is important to guiding pain management. The Brief Pain Inventory, Short Form (BPI-SF) is a validated, self-administered questionnaire designed to assess the severity of pain and the impact of pain on the patient's daily functions. Despite its wide use to assess chronic and acute pain intensity and pain interference in outpatient and inpatient settings, the BPI-SF has not been used to evaluate pain in the ED population. The objective of this study is to determine the utility and feasibility of administering the BPI-SF in the ED setting. We also aim to assess the validity of the BPI-SF when compared to the NRS in the ED population.

Methods: We prospectively enrolled a convenience sample of adult patients presenting with the chief complaint of chest pain, abdominal pain, or musculoskeletal pain to an emergency department at an academic hospital in Boston MA. The BPI-SF was either self-administered or administered by a research assistant. Pain on arrival to the ED was quantified on a 0–10 NRS. Median and interquartile ranges (IQRs) were calculated for the BPI-SF pain interference score, the BPI-SF pain severity score, the BPI-SF total score (pain interference and severity scores combined), and the NRS score. Time needed to the BPI-SF was recorded. Patients were also asked to compare the BPI-SF and the NRS in assessing their pain in the ED. Linear regression was performed to evaluate the strength of correlation between the NRS score and the BPI-SF pain interference score. One-way ANOVA, linear regression, and Pearson’s chi-square test were conducted to determine the effect of patient demographics, levels of pain severity and interference, and types of pain on patient’s preference for the BPI-SF over the NRS.

Results: One hundred two patients aged 18-81 years were enrolled and 100 (98.0%) had data. Mean time for patients to the BPI-SF on their own was 3 minutes 33 seconds. When administered by a research assistant, the mean time for completion was 4 minutes 36 seconds. Median pain level on arrival to the ED was 7 (IQR 5–8) on the 0–10 NRS. Median pain interference was 36 (IQR 24–50) on a 0–70 scale on the BPI-SF. Median pain severity was 21 (IQR 15–28) on a 0–40 scale on the BPI-SF. Median total BPI-SF score was 57 (IQR 43.6–73) on a 0–110 scale. Higher pain interference score, pain severity score, and total BPI-SF score were associated with higher NRS score on ED arrival (P<0.01). Seventy-five percent of the patients preferred the BPI-SF to the NRS for pain assessment in the ED. We observed a strong association between the location of pain and patients’ preference for the BPI-SF over the NRS (X^2(6) = 12.6, p = .050).

Conclusions: The average time needed to the BPI-SF in the ED setting was brief and less than what has been cited in the literature (5 minutes). BPI-SF total scores and subset scores, including pain interference, were associated with the severity of pain assessed by the NRS. The majority of the patients considered BPI-SF to be a better tool than the traditional NRS for assessing their pain in the ED.

A Randomized Clinical Trial of Naproxen + Placebo, Orphenadrine, or Methocarbamol for Acute Low Back Pain

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Study Objectives: Low back pain (LBP) causes more than 2.5 million visits to US EDs annually. LBP patients are often treated with non-steroidal anti-inflammatory drugs (NSAIDs) and skeletal muscle relaxants (SMRs). We compared functional outcomes and pain one week and three months after ED discharge among patients randomized to a one-week course of naproxen+ placebo vs naproxen+orphenadrine vs. naproxen+ methocarbamol. Orphenadrine and methocarbamol are each used in more than 250,000 ED visits annually.

Methods: This was a randomized, double-blind, comparative efficacy trial conducted in two urban EDs. Patients presenting with acute, non-traumatic, non-radicular LBP of ≤ 2 weeks duration were eligible for enrollment immediately prior to discharge from an ED if they had a score ≥5 on the Roland-Morris Disability Questionnaire (RMDQ), a validated 24-item inventory of functional impairment due to LBP. Higher scores on the RMDQ indicate greater functional disability. The primary outcome was improvement on the RMDQ between ED discharge and one week later. Secondary outcomes included pain intensity one week and three months after ED discharge, as measured on a four-point descriptive scale (severe, moderate, mild, none). All patients were given 14 tablets of naproxen 500mg, to be
Mortality of Motor Vehicle Accidents by Elderly Drivers: A Nationwide Hospital-Based Registry in Japan

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Study Objectives: Japan is the leading aging country, and motor vehicle accidents (MVAs) by elderly drivers have been exceedingly increasing in recent years. However, there were no clinical studies evaluating the impact of MVAs by elderly drivers in Japan. We aimed to assess the MVA incidence and outcomes by elderly drivers, especially those aged ≥75 years who were transported to emergency department and registered in the Japan Trauma Data Bank.

Methods: This was a prospective nationwide hospital-based registry for trauma patients from 256 institutions in Japan, and enrolled all MVA drivers having more than legal age for driving between 2004 and 2015. We divided the registered patients into the following three groups; the adult (aged ≤64 years), the young-old (aged 65-74 years), and the old-old (aged ≥75 years). The primary outcome was in-hospital mortality, and the secondary outcome was length of hospital stay (LOS) and discharge place. The trend in the proportion of MVAs caused by the young-old or the old-old group was evaluated using the Cochran-Armitage trend test. To assess the association of the old-old group with in-hospital mortality compared to the adult group, we applied a multivariable logistic regression analysis.

Results: During the study period, a total of 236,698 trauma patients were registered, and 39,691 patients were eligible for our analysis. The proportion of MVAs caused by the young-old and the old-old group significantly increased from 8.1% and 3.6% in 2004 to 10.6% and 13.2% in 2015, respectively (each P for trend < 0.001). As for the primary outcome, unadjusted in-hospital mortality rate increased with age, but the mortality rate decreased year by year irrespective of age group. In the multivariable logistic regression analysis, in-hospital mortality rate was significantly higher in the old-old group than in the adult group (17.3% [584/3372] versus 8.0% [2556/31,985], adjusted odds ratio 4.80; 95% confidence interval 4.06-5.67). In addition, among survival cases, LOS was longer in the old-old group than in the adult group (median [interquartile range], 19 [8-41] versus 13 [4-31], p < 0.001), and the old-old group was more likely to discharge to health care facilities such as nursing home or long-term care institutions than the adult group (46.9% [1580/3372] versus 33.0% [10,553/31,986], p < 0.001).

Conclusions: In the super-aging society of Japan, the proportion of MVAs by elderly drivers increased year by year, and the mortality rate was highest in the old-old group. We should pay further attention to the trend in the MVA incidence and outcomes by elderly drivers, especially the old-old group, to decrease the MVA mortality in Japan.

Association Between the Elderly Frequent Attender to the Emergency Department and 30-Day Mortality: A Retrospective Study Over 10 Years

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Study Objectives: To determine if elderly frequent attenders are associated with increased 30-day mortality, assess resource utilization by the elderly frequent attenders and identify associated characteristics that contribute to mortality.

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Figure
Methods: Retrospective observational study of electronic clinical records of all emergency department (ED) visits over a 10-year period to an urban tertiary general hospital in Singapore. Patients aged 65 years and older with 3 or more visits within a calendar year were identified. Outcomes measured include 30-day mortality, admission rate, admission diagnosis and duration spent at ED. Chi-square-tests were used to assess categorical factors and Student t-test was used to assess continuous variables on their association with being a frequent attendant. Univariate and multivariate logistic regressions were conducted on all significant independent factors to the outcome variable (30-day mortality), to determine factor independent odds ratios of being a frequent attendant.

Results: 1.381 million attendance records were analyzed. Elderly patients accounted for 25.5% of all attendances, of which 31.3% are frequent attendees. Their 30-day mortality rate increased from 4.0% in the first visit, to 8.8% in the third visit, peaking at 10.2% in the sixth visit. Factors associated with mortality include patients with neoplasms, ambulance utilization, male sex and having attended the ED the previous year.

Conclusions: Elderly attenders have a higher 30-day mortality risk compared to the overall ED population, with mortality risk being more marked for frequent attendees. This study illustrates the importance and need for interventions to address frequent ED visits by the elderly, especially in an aging society.

Responding to Older Adults in the Emergency Department: A National Survey of Geriatric Emergency Departments

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Study Objectives: ACEP's new 2017 initiative to accredit emergency department care of older adults recognizes the salience of this ED patient population. Since 2007 geriatric emergency departments (GEDs) have self-identified and these specialized centers have rapidly expanded nationwide. Yet, despite a joint publication of best practice recommendations in March 2014, GED Guidelines (ACEP, SAEM, AGS, ENA), the heterogeneity of the delivery of geriatric emergency care within these centers remains significant. This study sought to document current GEDs and analyze their organization, staffing, education and training, resource availability, outcome tracking and familiarity or adherence to the 2014 best practice guidelines within identified GEDs.

Methods: This study identified hospital emergency departments (EDs) promoting geriatric-focused ED services through a systematic internet search, review of current literature, and consultation with professional association interest groups. Settings were contacted by phone to confirm the existence of geriatric focused emergency services and a letter introducing the study was sent to each GED coordinator/ED director. We employed a previously used online survey instrument (Hogan, 2013), with modifications, and sent this electronically to each GED coordinator. Follow-up emails and phone calls were made to non-respondents. A total of 83 GEDs were identified. Repeated follow-up efforts yielded N=54 completed surveys for a 65% response rate.

Results: Demographically, hospitals reporting GEDs were primarily community based (91%) as opposed to university/academic center based, less than 500 beds in size (84%). The most common ED size was 26-50 beds (40%) and treated between 5,000-10,000 age >65 patients annually (44%). The most common reasons for establishing a GED was to improve patient safety (70%). Over 80% of sites reported modifications to beds, flooring, colors, and lighting of the department. Dedicated GED staffing was identified by only 33.3% of respondents; however, 83.3% reported GED nurses had undergone special education in care of geriatric patients. Referrals to outpatient clinic programs and services included primary care providers (65%), skilled nursing facilities (63%), acute rehabilitation (54%), geriatric specific clinics (41%), and subspecialty clinics (30%). Outcomes tracked include GED length of stay (61%), ED repeat visits (64%), hospital admission admissions (66%), ACEP adopted GED guidelines had been reviewed by only 43% of identified centers.

Conclusions: GEDs and the delivery of geriatric emergency care are increasing throughout the country, especially within community-based hospital systems. These services are, however, not standardized and there is considerable variability. Additionally, more than half of all GEDs that responded had not reviewed the current ACEP-adopted GED guidelines. These study findings can inform ACEP's GED accreditation initiative as well as how to target outreach efforts to hospital systems about current geriatric emergency services available, areas for growth/improvement and the need to increase the awareness of GED guidelines and evidence-based protocols for application to older adult ED populations.

Adverse Events After Falls Among Thai Elderly Emergency Patients: A Prospective Study

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Study Objectives: We sought to determine the rate of and risk factors for adverse events within 6 months after an emergency department (ED) older adult falls visit. A secondary objective was to determine the prevalence of falls in elderly ED patients in a middle-income country.

Methods: Prospective cohort study at one urban teaching hospital in Thailand. We included patients aged ≥65 years who presented to the ED with fall or had a fall within 14 days. We collected data on baseline demographics, specific fall relevant co-morbidities following the Geriatric Emergency Department guidelines, high risk fall medications, and the 20 questions from a Stopping Elderly Accidents, Death, and Injuries (STEADI) guideline and conducted follow-up phone calls after 6 months. Multiple logistic regression analysis was performed using backward stepwise and selection a subset of STEADI questions for pre-determined risk factors for adverse outcomes (defined as a composite outcome of death, ED revisit, subsequent hospitalization, and recurrent falls as well as each of these specific outcomes) within 6 months of their ED fall visit.

Results: We screened 2,631 patients over a 10-month period. 421 (16.0%) patients had a fall within 14 days prior to ED visit and 235 patients were eligible for the study. 10 (4.25%) patients were lost to follow-up after 6 months. Ultimately our study had 225 patients. At 6 months 27 (12%) patients had a recurrent fall, 62 (27.6%) patients had an ED revisit, 47 (20.9%) patients had a subsequent hospitalization, 10 (4.4%) patients died and 100 (44.4%) patients had an adverse event composite outcome. Using multiple logistic regression, the question "feel unsteady when walking sometimes" predicted recurrent falls. Similarly, "Use or have been advised to use a cane or walker" predicted ED revisit, subsequent hospitalization and the composite outcome. Benzodiazepine use predicted ED revisits and subsequent hospitalization and "Take medications that sometimes makes them feel light-headed or more tired than usual" predicted composite outcomes.

Conclusions: Forty-four percent of elderly patients in a middle-income country experienced adverse events after an index ED fall visit within 6 months. Benzodiazepine use and three specific questions from the STEADI guideline increased fall-related adverse outcomes. Future research should be an ED intervention to reduce the risk of post ED fall-related adverse events.

Physical Therapy: Impact on Emergency Department Revisit Rates Among Seniors With a Ground-Level Fall

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Study Objectives: Falls are the leading cause of morbidity, mortality, and emergency department (ED) visits among Americans aged 65 and older. However, a number of studies have demonstrated that seniors adopting physical therapy (PT) or exercise regimens following a fall can reduce the risk of future falls. Based on prior research, incorporating PT services (eg, information, diagnosis, and referral) for seniors presenting to the ED for a fall may help reduce future fall-related ED visits within this population. Thus, our goal was to examine differences in ED revisit rates among seniors who present to the ED for a ground-level fall and receive PT services compared to those who do not receive similar services.

Methods: We leveraged Centers for Medicare and Medicaid Services (CMS) Inpatient and Outpatient base claims and revenue center Standard Analytical Files (SAFs) from the 2012-2013 Limited Data Sets (LDS) to evaluate Medicare claims for those 65 and older. We compared claims for 30- and 60-day fall-related ED revisits between those that did and did not have PT services associated with a fall-related index ED visit. A "fall-related ED visit" was defined as an ED claim including an ICD-9-CM E-Code indicating a ground-level fall. Furthermore, we included only outpatient visits for the index ED visit based on prior research suggesting this population would derive greater protective benefits from PT services.
compared to observational and inpatient populations (among those whose injury severity and/or prevalence of complicating comorbidities is assumed higher). We also excluded weekend ED visits, considering PT services are generally less likely to be available on the weekends.

Results: Overall, there were 409,618 unique senior Medicare outpatient claims for fall-related ED visits in 2012-2013. Overall 30-day and 60-day ED revisits among all index ED visits for a ground-level fall was 2.43% (9,937) and 3.56% (14,573) respectively.

Of the 409,618 unique outpatient claims for a fall-related ED visit, we identified 14,338 claims for PT services associated with the index ED visit. Among claims with PT services, revisit rates were 1.67% (240) within 30 days and 2.61% (374) within 60 days, compared to 2.45% (9,097) within 30 days and 3.59% (14,199) within 60 days among those that did not receive PT service in the ED. Based on further analyses, our results demonstrate a significant difference in revisit rates between the PT and non-PT cohort, at both 30 (p<0.0001) and 60 days (p<0.0001).

Conclusions: We found that both 30- and 60-day ED revisit rates following ED visits for a ground-level fall were significantly lower among seniors who received PT services during their index ED visit compared to those who did not. According to our findings, expanding PT services in the ED including providing relevant information, diagnosis, and referrals for future outpatient PT services may reduce future fall-related ED utilization among seniors. Additional analyses will assess this trend in more depth, including evaluating these data for potential confounders or interaction effects.

No Pain, No Gain? Parental Valuation of Watchful Waiting Versus Catherization in the Diagnosis of Urinary Tract Infection in Very Young Children
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Study Objectives: Parental perceptions of their child’s pain during various medical procedures have been studied, but there is little literature regarding how parents value the information gained from these procedures. In the instance of young children with fever, urinary catheterization, a potentially painful procedure, is often considered by clinicians to diagnose a urinary tract infection (UTI). Our objective was to query parents as to what they valued more: preventing potential pain, or knowing the proper diagnosis.

Methods: From Nov 2016 to Mar 2017, we surveyed a convenience sample of parents presenting to our pediatric emergency department with a child under the age of 2 years, with a medical issue that would unlikely require a urinary catherization. We collected information regarding the child and parent’s age, parent’s level of education, presence of medical training, and previous experience with catherization, as well as parent’s perception of how painful the procedure would be. We presented standard gamble style scenarios (see Figure 1) involving a child with fever +/- urine catherization, +/- AT, and asked parents to rank them from 1-6, 1 being the best and 6 being the worst possible outcome for their child.

Results: We obtained 101 surveys, 18 of which were excluded for inresponses. Of the respondents, 74% were female, 41% had undergone catherization and 12% had children who had undergone catherization. Parents most often believed that catherization would be equally painful for both sexes (53%), while 36% stated it was more painful for males and 11% for females. Fathers never thought it would be more painful for their daughters, while 35% of mothers thought it was more painful for sons. Pain was rated as severe by 43% of parents, moderate by 28% and mild by 17%; 11% thought there would be no pain. The average rankings of the 6 standard gamble scenarios are shown in Table 1. There was no significant difference in average ranks amongst different age group or sex of parent, however, parents with a higher level of education were more likely to rank scenario #5 as more desirable.

Conclusions: Doctors’ decisions regarding procedures versus watchful waiting involves balancing potential risks of the procedure with the potential knowledge gained. However, we have little data to assist us in understanding how parents weigh these factors. More parents selected to forego initial intervention, despite the possibility of missed UTI. Age, sex, and level of education of parent did not affect scenario rankings regarding most desirable outcomes. Even amongst scenarios when the child has a UTI, parents still slightly preferred to not catherize on the initial visit. This suggests parents may prefer watchful waiting over immediate catherization when urinary tract infection is being considered.
A Pre-Operative Clinical Scoring System to Distinguish Perforation Risk With Pediatric Appendicitis

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Study Objectives: To determine efficacy of commonly assessed pre-operative variables in stratifying perforation risk in children with appendicitis.

Methods: Design: Retrospective analysis of consecutive cases. Setting: A large urban hospital pediatric emergency department. Participants: 448 consecutive cases of CT-confirmed pediatric appendicitis during a 6-year period: 162 with perforation and 286 non-perforated. Main Outcome(s) and Measure(s): To correlate clinical and laboratory variables with distinguishing perforation outcome in children with appendicitis.

Results: Regression analysis identified 3 independently significant variables associated with perforation outcome - and determined their ideal threshold values: duration of symptoms greater than 1 day; ED-measured fever (body temperature greater than 38.0°C); CBC WBC absolute neutrophil count greater than 13,000/mm³. The resulting multivariate ROC curve after applying these threshold values gave an AUC of 0.89% for perforation outcome [p < 0.001]. Risk for perforation was additive with each additional predictive variable, linearly increasing from 7% with no variables present, to 85% when all 3 variables are present.

Conclusions: A combination of 3 commonly assessed pre-operative clinical/laboratory variables generates a useful pre-operative scoring system to stratify perforation risk in children with appendicitis.

Average probability of perforation based on additive number of positive predictive variables utilizing ideal threshold values

Performance of Clinical Gestalt in Predicting Pediatric Appendicitis: Does Experience Matter?

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Study Objectives: Appendicitis is the most common surgical emergency in children and delays in diagnosis are associated with increased morbidity. Clinical prediction tools can risk stratify patients presenting to the ED with abdominal pain based on symptoms, findings and laboratory results. Gestalt, a synthesis of provider experience and clinical perception, is reported to perform as well as these prediction tools, but has not been well studied. We evaluated the performance of clinical gestalt as a predictor of pediatric appendicitis and stratified on provider characteristics.

Methods: Attending emergency physicians prospectively enrolled patients aged 5-20 years with suspected appendicitis in an electronic health record (EHR)-based risk stratification tool, entering patient characteristics and symptoms; laboratory data (white blood cell and absolute neutrophil count) was imported from the EHR. Prior to imaging, physicians entered their gestalt for appendicitis on a continuous scale (0-100%). The primary outcome, acute appendicitis, was identified using diagnosis and procedure codes and confirmed by chart review. We calculated the receiver operating characteristic (ROC) curve for gestalt as a continuous variable overall and stratified by provider experience and sex.

Results: Of 1000 eligible patients, 800 (80%) were enrolled; patients with gestalt entered after imaging had been ordered were excluded. Their median age was 10 years (IQR 7-14) and 11.7% had appendicitis. Of 281 enrolling physicians, the mean age was 41, with 86% of respondents between 30-49 years and 11% less than 5 years out of residency (mean 12 years post residency); 40% were female. The overall c-statistic for gestalt as a predictor of appendicitis was 0.89. Among physicians with < 5 years experience, the c-statistic was 0.77 versus 0.91 among more experienced physicians. The c-statistic increased with experience for both male and female physicians from 0.81 to 0.91, and 0.70 to 0.89, respectively. The rate of appendicitis in patients in the lowest gestalt category (0-10%) was 0.33%, while in the highest gestalt category (90%-100%), it was 68.8%.

Conclusions: In this prospective study, clinical gestalt performed well in predicting appendicitis in children, especially at extremes of appendicitis risk.
not vary significantly, with 1 missed SBI pre-pathway and 0 missed SBI post-pathway implementation.

Conclusions: Implementation of a clinical pathway for the management of febrile infants aged 29 to 60 days old improved antimicrobial stewardship by decreasing overall antibiotic usage and variation of antibiotic selection. Additionally, it resulted in more appropriate administration of antibiotics to patients without an increase in the rate of serious bacterial infections.

Figure 1: Percent of infants at low risk for serious bacterial infection who received antibiotics. (a) Febrile infant journal club with pediatric hospitals (2/2015); (b) Febrile infant journal club with pediatric emergency medicine providers (4/2015); (c) Clinical pathway go-live (7/11/2016); (d) Clinical order set go-live (10/13/2016); (e) Rotating emergency department resident education (1/16/2017); (f) Ceftriaxone order panel go-live (4/1/2017).

249 A Systematic Review of the Literature on Survival Time of Torsed Testicles

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Study Objectives: The primary research question was to determine the relationship between time to treatment and the rate of survival for testicles of male patients presenting with testicular torsion.

Methods: A systematic review of the literature was performed and structured according to PRISMA guidelines. An exhaustive library search was performed after search strategies were developed for multiple databases that included PubMed, Cochrane library, Ovid MEDLINE, Web of Science and ProQuest theses and Dissertations. Two different searches were developed including “testicular torsion” (TT) and TT with the search term “time” added. Articles specifically reporting testicular torsion case series, testicle outcomes and time to surgical or manual treatment were selected for review. In addition to and preceding the systematic review an exhaustive manual search of the literature was also performed by the authors. As a result of these searches a total of 30 studies with data considered relevant to the research question were included. The information extracted from the articles was tabulated in regards to time intervals to treatment and survival outcome. As the time to treatment was reported variously in different case series, the three most common formats for reporting time to treatment and outcome were used.

Results: The systematic review process and protocol are reported in this paper. A total of 30 studies were found that reported case series of testicular torsion patients and their outcomes as well as time to treatment. From these reports a total of 2,116 testicular torsion patients were culled and their outcomes and time to treatment are reported. Because time to treatment was reported in three different time formats, three different table formats were created. When overlap between the tables existed, the data was tallied and reported cumulatively. When reported in six-hour intervals (1,282 patients) survival at 0 to 6 hours was 97.2%, 7 to 12 hours 79.3%, 13 to 18 hours 57.3%, 19 to 24 hours 42.5%, 25 to 48 hours 24.2% and greater than 48 hours 7.4%. Testicle survival after testicular torsion was significant beyond the commonly held six-hour time frame and even after more than 24 hours of ischemia. And cumulative testicular salvage (based on 2,116 patients) is 90.4% in the first 12 hours. From 13 to 24 hours survival is 55.1% and after 24 hours survival is 18.8%.

Conclusions: Survival of the testicle irrespective of subsequent atrophy, decreased spermatogenesis or impaired endocrine function following testicular torsion can be much longer than the six to eight hours that is commonly taught. Our systematic review of the literature demonstrates that survival percentages are significant even past 24 hours of torsion. This information should encourage aggressive management of patients presenting with testicular torsion pain that has been ongoing for many hours.

250 HIV and Syphilis Testing and Antibiotic Administration in Adolescents Diagnosed With Pelvic Inflammatory Disease in Pediatric Emergency Departments

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Study Objectives: Almost 1 million cases of pelvic inflammatory disease (PID) are diagnosed annually, 20% occurring in adolescents and the majority diagnosed in emergency departments. PID is a complication of undiagnosed or undertreated sexually transmitted infection (STI) and patients are at increased risk for syphilis and HIV. Centers for Disease Control and Prevention (CDC) recommend HIV screening for all women diagnosed with PID and syphilis screening for all individuals at high risk for infection. The frequency of HIV/syphilis screening in adolescent women diagnosed with PID has been under-investigated.

To calculate the frequency of HIV and syphilis screening and correct antibiotic administration among adolescents diagnosed with PID.

Methods: We performed a cross-sectional study using the Pediatric Health Information System database of 48 children’s hospitals from 2010 through 2015 of all ED visits by females ≤ 21 years with an ICD 9 or ICD 10 diagnosis of PID to calculate the frequency of HIV and syphilis testing and frequency of antibiotics administration adherent to published CDC treatment guidelines. We performed separate multivariable logistic regression analyses to identify patient-level (age, race/ethnicity, insurance status, and disposition) and hospital-level (geographic region and bed number) factors associated with HIV and syphilis testing and correct antibiotic administration.

Results: There were 10,698 diagnosed cases of PID (mean age 16.7 years; 53.9% non-Hispanic black race/ethnicity; 66.7% publicly insured; 37.8% hospitalized), 22.0% (95% CI 21.2%, 22.8%) underwent HIV screening and 27.7% (95% CI 27.1%, 28.8%) underwent syphilis screening. 18.4% (95% CI 17.6%, 19.1%) underwent both HIV and syphilis testing. Gonorrhea and chlamydia testing occurred in 82.0% and 84.4% of cases, respectively. Patients diagnosed with PID received antibiotics regimens concurrent with CDC guidelines in 45.4% (95% CI: 44.4%, 46.4%) of cases.

On bivariate analysis, younger age (12-17 years), black race, non-private insurance, living in the Northwest, South, or West regions of the US, seeking care in smaller hospitals (<300 beds) and admission to the hospital were associated with HIV and syphilis screening (P value < 0.05). After adjusting for potential confounders, HIV screening was less likely to occur in patients who were discharged from the ED compared to patients who were admitted (aOR 0.14, 95% CI 0.13-0.16). Similar results were seen for syphilis screening (aOR 0.21, 95% CI 0.20, 0.24). Older age, black race, non-private insurance, Northeast region, and care at larger hospitals were related to receiving correct treatment for PID (P value<0.05). Living in the South was associated with incorrect treatment (P value<0.0010). Patients treated in the emergency department and discharged home were less likely to receive antibiotics concurrent with CDC guidelines compared to admitted patients (OR 0.15, 95% CI 0.14, 0.16).

Conclusions: Among adolescents diagnosed with PID in children’s hospital EDs, we found low rates of HIV and syphilis screening and low rates of adherence to CDC PID treatment guidelines. The results indicate the need for increased education and systems improvements to improve compliance of PID management in children’s hospitals EDs.
Study Objectives: Emergency department (ED) patients are disproportionately impacted by poverty and other social stressors. Research in selected populations has found food insecurity to be an important social determinant of health. While studies have shown that ED patients are more likely to be food insecure than the general population, little research has examined the relationship between food insecurity and frequency of ED use.

Methods: We surveyed a random sample of ED patients at an urban, public hospital from November 2016-April 2017. Eligible patients were ≥18 years old, clinically stable, not arrested or incarcerated, spoke English or Spanish and had not already participated in the survey. RAs verbally administered a 20-40 minute survey covering a wide range of health-related topics. Frequent ED use was defined as self-report of ≥4 ED visits in the past 12 months, including the current visit. Food insecurity was defined as responding positively to any of four food insecurity questions from the U.S. Department of Agriculture Adult Food Security Module: running out of food before getting money to buy more, food not lasting until having money to buy more, being unable to afford balanced meals, and eating less than they felt they should have due to financial concerns, all in the past 12 months. We performed statistical testing for bivariate relationships between food insecurity and frequent ED use with chi-square and Kruskal-Wallis tests. Multivariable logistic regression controlling for age, race/ethnicity, sex, and self-reported overall health was conducted to better assess the effect of food insecurity on frequent ED use.

Results: 1157 of 1412 eligible patients participated (81.9%). Mean age was 48 years. 41.7% were female, 53.5% were Hispanic/Latino, 22.1% were white, and 29.0% were black. One-third (31.8%) reported frequent ED use and 51.1% reported food insecurity. Rates of food insecurity were higher among frequent vs. non-frequent ED users, 60.5% vs. 46.7% (p<0.001). Differences by question were: 47.1% vs. 35.4% worried about food running out (p<0.001), 46.5% vs. 30.4% food not lasting (p<0.001), 49.6% vs. 32.9% being unable to afford balanced meals (p<0.001), and 38.2% vs. 22.6% eating less than they felt they should (p<0.001). In multivariable logistic regression analyses, food insecurity continued to be a significant predictor of frequent ED use.

Conclusions: ED patients in this study had high rates of food insecurity. Food insecurity was significantly associated with frequent ED use. Future research will include analysis of the pathways through which food insecurity may be related to frequent ED use and will examine whether the relationship between food insecurity and ED use is stronger for patients with certain “food-sensitive” illnesses (eg, diabetes). These early findings suggest that food insecurity may be important to consider in studies of and interventions for frequent ED users.
ED were African-American, 98 (77.2%) SMD patients who did not use the ED were also African-American. Of the patients who visited the ED within one year of their 2014-2015 SMD encounter, 19 (10.6%) had stable living conditions, 66 (36.9%) had unstable living conditions, and 22 (12.3%) lived outside. Of the patients who did not visit the ED, 12 (9.4%) had stable living conditions, 32 (25.2%) were unstable housed, and 12 (9.4%) lived outside. The "unsure" denotation indicates the patient did not specifically disclose their living arrangements.

Conclusions: Based on observations of the SMD population, the subset of the homeless who use EDs are more likely to have unstable housing situations, and are more likely to use street drugs. These findings are consistent with previous studies of high ED utilizers, and suggest that only a comprehensive approach, addressing social, physical, and mental health needs of this population will be effective in reducing unnecessary ED use and health care costs.

## Rates of Naloxone Prescriptions Following Implementation of a Take-Home Naloxone Program from the Emergency Department

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**Study Objectives:** Opioid-related overdose death has more than quadrupled over the past three decades, mirroring trends in emergency department (ED) visits for opioid-related misuse and abuse. Recent studies have shown decreased mortality due to opioid overdose in communities with take-home naloxone (THN) programs. The methods of naloxone distribution vary across programs, with some programs providing naloxone directly to the patient and others providing naloxone prescriptions. The objective of this study was to determine the effectiveness of a THN program that utilizes naloxone prescriptions, with medication dispensing at a pharmacy, at two tertiary care EDs for patients presenting with opioid overdose.

**Methods:** A multidisciplinary THN program was implemented at Harborview Medical Center and the University of Washington Medical Center in Seattle, WA. Eligible patients for THN (4mg/0.1ml nasal spray or 1mg/ml syringe) included those who were being discharged from the ED and met any inclusion criteria for risk of opioid overdose. Prior to discharge, patients received teaching, a naloxone prescription, and discharge instructions specific to heroin or pharmaceutical opioid overdose risk. Patients were then encouraged to fill the prescription at the hospital pharmacy, at no cost if needed, during available business hours (0900-1930) or through an after-hours pharmacy protocol where the naloxone was delivered to the ED. Pharmacists or ED staff, depending on pharmacy hours, dispensed the medication and provided teaching on naloxone. For this analysis, we reviewed data from October 1, 2015 to September 30, 2016 for patients who had a chief complaint consistent with opioid overdose, identified patients who received THN prescriptions, and then verified those who utilized THN at one of our affiliated hospital pharmacies.

**Results:** A total of 744 patient encounters were identified to be at risk of opioid overdose between the two emergency departments over the study period. Take-home naloxone prescriptions were written for 83 encounters (11.1%) and 12 prescriptions (1.6%) were filled. Two patients were given and filled multiple prescriptions.

**Conclusions:** Opioid overdose is a frequent presentation to the emergency department, but rates of naloxone prescription and filling through this THN program were marginal. True prescription fill rates may be underestimated due to limitations in naloxone prescription tracking and a lack of outside pharmacy dispensing data. Additionally, it is unclear if patients were offered THN, but declined or were noted to already have THN. To further understand the impact of a THN program, EDs should consider prescription filling patterns, pharmacy access, and EHR data limitations. Identifying barriers to naloxone prescription and filling, unique to the emergency department, may improve naloxone distribution.

## Long-Term Mortality in Pediatric Firearm Assault Survivors: A Retrospective, Multi-Center, Comparative Cohort Study

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**Study Objectives:** Children and youth in the United States face an inordinately high risk of firearm violence, but the long-term mortality risk of pediatric survivors of firearm assault is poorly understood. Therefore, we aimed to determine whether children surviving to hospital discharge after firearm assault are at increased risk of mortality and to elucidate the factors associated with later mortality.

**Methods:** We performed a retrospective triple-cohort study of pediatric patients aged 0 to 16 years seen at three trauma centers in Oakland and San Francisco, California between 2000 and 2009. By consecutively sampling from the trauma registries using International Classification of Diseases, Ninth Revision (ICD-9) E-codes, we constructed three cohorts comprised of all patients who presented for (1) firearm assault, (2) assault without firearm and (3) unintentional trauma. We excluded patients who were seen for suspected child abuse or suicide attempt. Additional demographic and clinical information was obtained from the medical record, including subsequent emergency department visits for trauma and gunshot wound. We queried the Social Security Death Master File and the California Department of Public Health Vital Statistics (2000-2014) to identify those who died after surviving their initial hospitalization and to determine cause of death. Cox proportional hazards regression was employed to determine hazard ratios, adjusting for demographic and clinical covariates.

**Results:** The trauma registry query yielded 413 firearm assault, 405 non-firearm assault, and 7062 non-assault-based trauma patients who survived their index emergency department visit and hospitalization. During a median follow-up of 8.2 years (inter-quartile range [IQR] 6.6-9.9 years), 9.0 years (IQR 7.1-11.6 years) and 9.3 years (IQR 7.1-11.8 years), a total of 75 deaths occurred, including 5.9% (n= 16), 3.2% (n= 13), and 0.7% (n= 46) of the three cohorts, respectively. Deaths occurred at a median age of 19.7 years and a median of 5.4 years after index injury. Two-thirds of all deaths following index visit (n= 50) were due to homicide. Adolescent age (adjusted hazard ratio [AHR] 2.9; 95% confidence interval [CI] 1.3-6.6), male sex (AHR 3.0; 95% CI 1.3-7.1), black race (AHR 3.3; 95% CI 1.2-9.4), and public insurance (AHR 2.5; 95% CI 1.2-5.2) were independent risk factors for long-term mortality. Firearm assault (AHR 1.8; 95% CI, 0.82-4.0) and non-firearm assault (AHR 1.9; 95% CI, 0.93-3.9) patients experienced increased risk of long-term mortality compared to non-assault trauma patients, although these differences did not reach statistical significance. Among adolescents aged 12 to 16 years, being assaulted (either with or without a firearm) was an independent risk factor for long-term mortality (AHR 1.9; 95% CI 1.01-3.6). Severe injury severity score, location of injury, and violent crime index by city of residence were not significant predictors of mortality.

**Conclusions:** Among children seen in urban trauma centers, young adolescents who survive after exposure to assault, either with or without a firearm, have increased long-term mortality compared to those who survive unintentional, non-violent trauma. Given that most of these deaths are due to homicide, further studies are needed to identify effective methods of secondary prevention for this high-risk population.

## Validating AUDIT Using Serum Phosphatidylethanol

**Moongpongjimorn W, Anderson CL, Danishgir L, Mobayed O, Loftispour S/University of California, Irvine, Irvine, CA**

**Study Objectives:** To detect and treat at-risk alcohol users is the key to preventing alcohol-related injury. Given over a million of emergency department (ED) visits were related to excessive alcohol consumption, we should initiate an alcohol screening and treatment in the ED. The National Institute of Alcohol and Alcoholism recommended alcohol screening tool is the Alcohol Use Disorders IdentificationTest (AUDIT). AUDIT is a validated, self-reported questionnaire inquiry regarding subject behavior within the past year. The self-reporting method and one-year recall raise a concern in its accuracy. Recently, a direct alcohol biomarker, Phosphatidylethanol (PeTH), shows promise in alcohol screening with its high sensitivity and specificity. We aim to correlate the relationship between AUDIT score and PeTH level in ED patients.

**Methods:** We conducted a prospective cohort study at a level 1 trauma center, university-based ED. We enrolled adult ED patients who met inclusion criteria and can provide consent to the research. The subjects completed AUDIT and their demographic characteristics.
Evaluation of Mobility and Fall Risk Among Seniors Presenting to the Emergency Department

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Study Objectives: Increasing number of senior 65 years of age and older are presenting to emergency departments (EDs) for care. This number is projected to double in the next 25 years. Mobility, ambulation, and fall risk are significant challenges for this population that may impact overall health and wellbeing, especially following an ED visit or hospitalization. The ED represents an opportunity to assess and screen for mobility and fall risks in this population. The objective of this study was to investigate the use of a mobility screening tool (Get-Up-and-Go or GUG) in the ED setting and determine what proportion may be at risk for injury.

Methods: We conducted a prospective trial in a busy quaternary academic medical center ED (census 30,000 annually) with a high proportion of visits from for a five-month period from December 1, 2016 until April 30, 2017. Data was collected by nursing staff from patients age 65 or older who presented to the ED for care utilizing the GUG (Get-Up-and-Go) screening tool assessing mobility, balance, ambulation, and fall-risk. All ED nurses are required to be certified (by medical center policy) in performing the GUG screen. Descriptive statistics are presented. Data was collected electronically and statistical analysis was performed via SPSS ver 23.

Results: During the study period we saw 12,200 patients in the ED, 3,073 of which were seniors (age ≥65) representing 29.9% of all adults. During the study period, 2,777 seniors (75.6%) underwent GUG screening. Of these, nearly 40% (39.2%) had GUG values that demonstrated abnormal mobility testing. Furthermore, 339 patients (12.2%) demonstrated moderate or severely abnormal ambulation and mobility placing that high risk for fall and injuries either during the ED stay, hospitalization, or upon discharge from the ED. A patient with a score of 3 or higher on the GUG is considered at high risk for falls.

Conclusions: The use of the GUG screening tool in our ED on all senior patients aged 65 and older, identified a significant portion of senior patients at risk for mobility and ambulation issues including but not limited to falls and the complications as a result. This data has helped start other initiatives in our geriatric ED including more resources and availability of physical and occupational therapists. Further study is needed to determine the impact of PT/OT assessments in the ED on length of stay, disposition, and patient/caregiver satisfaction.

Factors Associated With Ambulance Use in Emergency Department Patients

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Study Objectives: There has been an increase in the usage of the EMS and EDs nationwide contributing to crowding and delays. This study seeks to identify and describe patterns of and reasons for ambulance use among ED patients. The study identifies clinical characteristics of patients who presented to the ED via ambulance vs non-ambulance. Furthermore, it attempts to elucidate factors causing some acute patients to come to the ED by means other than EMS. Also assessed is the possibility of alternatives to ambulance transports that could be used to help decrease the increasing demand on EMS and ED services in the community.

Methods: This is a multi-center prospective survey study among a convenience sample of ED patients. Formally trained research associates utilized a survey tool to collect data from patients arriving by both ambulance and non-ambulance modalities. Inclusion criteria included all English-speaking patients 18 years of age and older who utilized emergency services at the UC San Diego Hillcrest and Thornton emergency departments. Data collected included patient demographic information, education and socioeconomic factors, past and current use of ED and ambulance services, and patient’s willingness to consider alternatives for transportation for medical care. For descriptive analyses, frequency distributions of all study variables were evaluated.

Results: A total of 344 survey responses were collected. 41.6% were male, 83.7% responded that it was not their first time to the ED. Of those who currently drive a car, 16.5% arrived by ambulance compared to 37.3% of those who do not currently drive a car (p<0.001). Of patients who live alone, 40.3% arrived by ambulance compared to 16.1% of patients who live with someone (p<0.001). 71.5% of all patients regardless of mode of arrival believed that patients brought in by ambulance are seen quicker. As to why patients called 911, 38.5% responded that someone else had made the call, 38.0% believed their life was in danger, and 9.0% were told by someone else to call 911. What is notable is that 12.8% answered that they called 911 because they did not have another means of transportation, 56.4% of patients answered that they would have used a taxi as transportation if paid for by the hospital, 58.4% answered that they would have used an alternate source of medical transportation (such as 611) for non-emergency care if it had been available. 21.5% of patients were unwilling to pay for such services.

Conclusions: This descriptive analysis of this survey study showed that 12.8% of ED patients brought in to the ED by ambulance called 911 because there were no other means of transportation. A majority of patients would be willing to use either taxi or alternative medical transportation for non-emergency care if provided and costs were covered. These results imply that alternate means of transporting patients to the ED who do not require an ambulance might be well received and utilized by the community. This could potentially provide more efficient and effective use of EMS services and possibly decrease current demand and costs related to ambulance overuse.
incumbent candidates who did not support firearm background check legislation than to candidates in support of background check legislation. This analysis is limited as candidates’ positions on other issues of importance to ACEP and NEMPAC, such as tort reform, may be correlated with their positions on firearm legislation. Organized emergency medicine’s political contributions to 2016 congressional races were not aligned with ACEP’s policy on background checks.

**EMF**

**Electronic Health Record Innovations to Improve Referral for Asymptomatic Hypertension in the Emergency Department**

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Study Objectives: Emergency department (ED) providers often overlook asymptomatic hypertension (HTN) in the ED. Clinical decision support can help improve adherence to the emergency nursing and emergency medicine (ACEP) clinical policy for asymptomatic HTN. 1) Determine the efficacy of an electronic health record clinical reminder, on nursing (RN) blood pressure (BP) measurement for patients who were found to be hypertensive on initial ED triage vital signs; 2) compare the relative efficacy of an ACEP guideline-initiated automated referral on improvement in BP management, as measured by HTN awareness, HTN treatment, and adherence to follow-up and 3) explore qualitatively, barriers and facilitators to follow-up using two open-ended questions.

Methods: We conducted a 2-arm, clustered RCT, at an urban academic facility in New York City. Adult patients with an initial BP reading ≥140/90 mmHg were included in Aim 1. ED nurses (RN) were randomized to receive a “Best Practice Alert” (BPA) (N=53) or not receive a BPA alert (N=54) reminding him/her to recheck the BP. For Aims 2 and 3, ED providers (physician assistants and assistants) were randomized to receive a “Best Practice Alert” (BPA) [(N=16), MD N=25] or not receive a BPA alert [PA (N=15), MD (N=21)] reminding him/her to refer for outpatient follow-up. Patients with two BP readings ≥140/90 mmHg, who were asymptomatic and were being discharged home were recruited in the ED for patient interviews conducted at baseline in-person and at 4-6 weeks post-ED visit by telephone. Descriptive statistics that included univariate and bivariate analysis were used to characterize patient demographics and obtain preliminary unadjusted measures of association between the intervention and control group.

Results: For Aim 1, 16,378 unique patient encounters comprised the sample population; 3,611 patients cared for by RNs randomized to the intervention group and 12,767 patients by RNs in the control group. 31.1% of patients in the total sample, and 53.06% in the RN intervention and 24.89% in the RN control group, had a pre-existing diagnosis of HTN. 21.5% were current smokers at the time of their visit: 19.92% in BPA group and 22.05% in control group). In the intervention RN vs. control RN groups, 2.05% v. 1.34% had a prior diagnosis of myocardial infarction; 5.59% v. 3.70% congestive heart failure; 6.81% v. 3.07% cerebrovascular disease; 25.17% v. 12.97% diabetes without complication; 6.73% v. 2.50% diabetes with complication; 10.66% v. 4.74% renal disease. RNs were more likely to repeat BP after receiving a BPA alert (56%) compared to RNs who did not receive an alert (44%)(unadjusted OR=2.3, CI 2.1-2.5; p<.001). Patients who received BP reassessment were more likely to be male (40.47%) versus female (39.80) (p<.39); aged 45-64 (35.64% vs. p<.0001); and triage category ESI 3 (60.94% p<.0001). Multi-level modeling is ongoing. As per the study protocol, since the BPA alert was effective, it is now seen by all nurses whenever the patient’s initial BP is ≥140/90. Aim 2 and 3 data collection is in progress with 35-of-100 patients presently enrolledd.

Conclusions: The BPA alert was effective in increasing BP reassessment by ED nurses. As a result of these findings, all RNs who care for a patient who has an initial BP ≥ 140/90 mmHg now receive a BPA alert reminding him/her to recheck the BP prior to patient discharge.

**EMF**

**Title: Pilot Testing of the “Response to Symptoms” Scale to Measure Patient Uncertainty in the Emergency Department**

Rising KL, Powell RE, Gerolamo AM, Gentsch A, Nord G, Kovalsky D, LaNoe M/Thomas Jefferson University, Philadelphia, PA

Study Objective: Prior work has identified patient fear and uncertainty related to experiencing symptoms as drivers of emergency department (ED) use, and ongoing uncertainty as a primary struggle at the time of ED discharge. We sought to develop a scale to measure patient uncertainty during an ED visit, called the “Response to Symptoms Scale.” The objective of this work is to perform initial item and scale reliability and validity testing of the Response to Symptoms Scale for measuring levels of uncertainty related to experiencing symptoms among patients in the ED.

Methods: Specific scale items were developed based on the results of a group concept mapping study that enrolled patients from a large urban ED and elicited patient-identified domains of uncertainty related to symptoms. These domains included consequences and severity of symptoms, quality of emergency department services, primary care options, finances, psychological concerns, self-management, causation of symptoms, diagnosis and treatment plan, trust in the provider and institution, accessibility, and alternative care options. Scale items were mapped to the cluster results of the concept mapping study and at least two questions from each domain established in the concept mapping study were used to develop the scale. Seven questions were reverse coded and a five-point Likert scale was used for responses, where 1 = “strongly disagree” and 5 = “strongly agree.” Questions were piloted with five patients and refined for clarity, resulting in a 34-item scale which was administered to 200 patients at the time of ED discharge from a single urban setting. The 34-item “Response to Symptoms Scale” was co-administered with the six-item short-form of the State Trait Anxiety Index (STAI), the 12-item neuroticism subscale from the NEO-PI (R) instrument, and four uncertainty questions administered via Visual Analog Scale (VAS). Items- and scale-level analysis, in addition to exploratory factor analysis, were used to further refine the scale for internal consistency and validity.

Results: Four scale items were deleted based on “alpha if removed,” unbalanced responding, and/or item total correlation criteria. The final 30-item scale is normally distributed with a mean of M = 68.30 (SD = 18.77). Alpha of the final scale was .927, with an average inter-item correlation of .53. Correlations with criterion measures are shown in table 1.

Conclusions: The “Response to Symptoms Scale” is an internally consistent 30-item self-report measure with evidence for concurrent and divergent validity. Further work is needed to establish the factor structure of the scale, and to ascertain predictive validity. Future work will test the ability of the “Response to Symptoms Scale” to measure uncertainty and predict risk for return visits and acute health care utilization.

### Table 1. Correlations and Criterion Measures

<table>
<thead>
<tr>
<th>Domain</th>
<th>STAI</th>
<th>Neuroticism</th>
<th>VAS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.0</td>
<td>0.85</td>
<td>0.76</td>
<td>0.78</td>
</tr>
<tr>
<td>2.0</td>
<td>0.80</td>
<td>0.73</td>
<td>0.75</td>
</tr>
<tr>
<td>3.0</td>
<td>0.82</td>
<td>0.74</td>
<td>0.76</td>
</tr>
<tr>
<td>4.0</td>
<td>0.83</td>
<td>0.75</td>
<td>0.77</td>
</tr>
<tr>
<td>5.0</td>
<td>0.84</td>
<td>0.76</td>
<td>0.78</td>
</tr>
</tbody>
</table>

**EMF**

**Anticipated Impact of Alternative Payment Models for Emergency Medicine**

Lin MP, Schuur JD, Pines J, Richardson LD/Icahn School of Medicine at Mount Sinai, New York, NY; Brigham and Women’s Hospital, Boston, MA; George Washington University, DC, DC

Study Objectives: Health care payment is shifting from volume-based fee-for-service towards value-based alternative payment models (APMs); however, emergency medicine payment continues to be reimbursed fee-for-service. The ACEP APM Task Force has proposed advanced alternative payment models for emergency physicians;
EMF

Epidemiology of Lumbar Punctures in Hospitalized Patients in United States

Vickers A, Donnelly JP, Moore JX, Wang HE/UAB, Birmingham, AL

Study Objectives: Lumbar puncture (LP) is an important technique for assessing and treating neurological symptoms. The current epidemiology of LPs for hospitalized patients is unknown. The objective of this study was to describe the characteristics of for lumbar punctures among hospitalized patients in the United States.

Methods: We analyzed 2010 US ED visit data from the National Emergency Department Sample. We identified all ED patient visits associated with the performance of an LP. We identified LPs using ICD-9-CM procedure code 03,31 and Current Procedural Terminology code and Healthcare Common Procedure Coding System (CPT/HCPCS) code 62270. In addition to primary diagnoses, we characterized LP patient characteristics and LP hospital characteristics. Using descriptive statistical techniques, we calculated the number and incidence of LPs performed in the United States emergency departments in 2010.

Results: Of an estimated 155 million ED visits, the estimated numbers of LP were: 362,718, including 273,612 (75%) among adult hospitalizations and 89,106 (25%) among pediatric hospitalizations. Among children, over 18% of LPs were performed on hospitalized patients 0-5 years old. Of the LPs performed 136,764 (58%) were known to have occurred in the ED. The most common conditions associated with LP among children were fever of unknown origin, other perinatal conditions meninits and seizures and among adults were headache and meninits.

Conclusions: Lumbar puncture is a continued important procedure for diagnostic and therapeutic uses in United States hospitals.
interventions, such as anti-depressants, that can be used to avoid adverse TBI-related sequelae. Furthermore, the test can provide guidance for clinical trials designed to assess the efficacy of preventive treatments to ameliorate depressive symptoms after TBI.

265 Rethinking the Standard of Care for Patients With Central Retinal Artery Occlusion

Wagner BP, Lindenbaum E, Logue CJ, Masters TC, Westgard BC, Walter JW, Hendriksen SM/Hennepin County Medical Center, Minneapolis, MN

Study Objectives: Central retinal artery occlusion (CRAO) is an emergency causing unilateral, sudden, painless vision loss. Although generally due to thromboembolic vascular occlusion of arteries in the cerebral circulation, CRAO has historically not been worked up in the same manner as a thromboembolic stroke. Recently, there has been a push for stroke workup in CRAO patients including admission, but there is little published data supporting such recommendations. We present a retrospective review of CRAO patients referred to a large urban medical center for hyperbaric oxygen therapy (HBO). These CRAO patients also received an emergency department and inpatient diagnostic workup similar to thromboembolic stroke. This review was performed to assess findings of the stroke workup in CRAO patients.

Methods: Patients who presented between November 2014 and July 2016 were included in this retrospective review. Patients received a standardized workup in the emergency department that included bedside ocular ultrasound, lab draw, neurology/stroke consult, ophthalmology consult with dilated eye exam, and HBO consult. Chart review of the electronic medical record was used to compile a dataset of the characteristics of stroke workup and interventions in CRAO patients. Inpatient workup included brain magnetic resonance imaging (MRI), echocardiogram, carotid imaging, lipid panel, and hemoglobin A1C.

Results: During the study period, 58 CRAO patients were treated. An acute or subacute brain infarct was identified on 15 of 47 patients (32%) who received an MRI. Intracardiac shunt was identified on 11 of 55 patients (20%) who received echocardiography. 44 of 58 patients (76%) had addition or modification of anticoagulation or antiplatelet medications. 34 of 58 patients (59%) were either started on a statin, changed to a more potent statin, or had a dose increase. Findings from carotid imaging led to interventionalist consult or follow-up for 11 of 58 patients (19%), two of whom had carotid stenting during the initial hospitalization. One patient returned with an acute thromboembolic stroke 8 days after CRAO presentation.

Conclusions: The findings of this study strongly support recommendations that in the emergency department, CRAO patients should receive workup and treatment similar to that for thromboembolic stroke patients. The MRI findings that 32% had acute or subacute brain infarct further demonstrate the high risk of these patients necessitating workup and admission from the emergency department.

266 The Relative Frequency of Akathisia from Parenteral Antidopaminergics: A Systematic Review and Meta-Analysis

Goldberger E, Friedman BW/Albert Einstein College of Medicine, Bronx, NY; Montefiore Medical Center, Bronx, NY

Study Objectives: Parenteral antidopaminergic medications are frequently administered in the acute setting for nausea, vomiting, and headache. Extrapyramidal symptoms, which are extremely distressing to patients, may develop in the near term after parental administration of these medications. In this study, we performed a systematic review and meta-analysis to determine how frequently these symptoms arise in the aftermath of antidopaminergic medication use.

Methods: PubMed, Embase, Web of Science, and the Cochrane Library were searched in January 2017 for randomized controlled trials and prospective cohort studies in which a parenteral antidopaminergic drug was administered for headache, migraine, nausea, or vomiting. Articles were selected based on independent determinations of two investigators. Data was abstracted into a standardized form. Evidence was graded using the Cochrane risk of bias tool. Weighted mean frequencies were calculated for each type of extrapyramidal symptom. Meta-analysis, using random effects models, was performed when appropriate—results are reported as OR (95% CI).

Results: A total of 36 studies with 4643 participants were included (median number of participants=98). Most were set in the emergency department. Baseline demographics were generally comparable amongst the included studies. In general, the quality of the studies was good with low risk of bias.

Akathisia was the only consistently reported extrapyramidal side effect. The overall rate of acute drug-induced akathisia was 16.3% (642/3942). Prochlorperazine induced the highest rates of akathisia at 27.3% (95% CI [24.8%, 30.0%]), followed by haloperidol at 19.6% (95% CI [10.8%, 32.7%]), droperidol at 13.1% (95% CI [10.4%, 16.4%]), promethazine at 11.6% (95% CI [6.4, 19.7%]), and metoclopramide at 11.0% (95% CI [9.5%, 12.2%]). Overall, dystonic reactions occurred in 2.9% (6/206) of antidopaminergic administrations. For metoclopramide the frequency of dystonic reactions was 3.9% (95% CI [1.2%, 10.0%]) and for droperidol 1.9% (95% CI [0.1%, 7.2%]). There were no reported cases of tardive dyskinesia.

Metoclopramide was more likely to cause akathisia than non-antidopaminergic standard therapy (OR 15.5 95% CI [2.1, 117.1]). Similarly, prochlorperazine was more likely to cause akathisia than non-antidopaminergic therapy (OR 4.7 95% CI [1.2, 18.8]). Slow infusion was less likely to cause akathisia than bolus administration for both metoclopramide (OR 3.0 95% CI [2.0, 4.6]) and prochlorperazine (OR 1.3 95% CI [0.8, 2.2]). Antidopaminergics other than metoclopramide were more likely to cause akathisia than metoclopramide itself (OR 2.2 95% CI [1.0, 5.1]), while antidopaminergics other than prochlorperazine were less likely than prochlorperazine to cause akathisia (OR 0.6 95% CI [0.4, 1.0]).

Conclusions: Overall, akathisia occurs in 16.3% of patients administered a parenteral antidopaminergic. Other extrapyramidal side effects were much less common. Akathisia is much more common after administration of antidopaminergics than when non-antidopaminergic therapy is given. Metoclopramide is less likely to cause akathisia than other antidopaminergics while prochlorperazine is more likely to cause akathisia.

267 Identification of Unrecognized Delirium in Senior Emergency Department Patients

Tolia VT, Chan TC, Kreshak AA, Killeen JP, Vilke GM, Castillo EM/University of California, San Diego, San Diego, CA

Study Objectives: Increasing number of patients aged 65 years and older (seniors) are presenting to emergency departments (EDs) for care. This number is projected to double in the next 25 years. We are developing a geriatric ED to focus care on this elderly cohort, with initial entry criteria being a positive ISAR (identification of seniors at risk) screening tool score $\geq 2$. Seniors with a positive ISAR were then referred to the Geriatric ED for further screening and assessments by a Geriatric Emergency Nurse Initiative Expert (GENIE), a senior ED RN who has specialized training in geriatric evaluation and care needs. One assessment for the GENIE was to evaluate the high risk geriatric patients for unrecognized cognitive issues including delirium, which can have negative consequences if not addressed. The ED represents an opportunity to screen and identify these patients, potentially impacting their health and long term wellbeing. Prior studies have suggested that up to 10% of seniors will have delirium, with two-thirds going unrecognized. The purpose of this study was to investigate the use of the Confusion Assessment Method (CAM) in the ED setting to determine what proportion of high-risk seniors presenting to the ED may have an unrecognized delirium.

Methods: We conducted a prospective trial implementing the ISAR screening tool and GENIE nurse evaluation in our quaternary academic medical center (30,000 annual cases) for a five-month period from December 1, 2016 until April 30, 2017. ED case nurses conducted an initial screen of all seniors utilizing the ISAR (Identifying Seniors at Risk) tool. For those patients with at risk ISAR scores $\geq 2$, a specially trained ED nurse (GENIE) then conducted the CAM evaluation (when GENIE available and patient/family consent) which focuses on 4 features: acute onset and fluctuating course, inattention, disorganized thinking, and altered level of consciousness. Data was collected electronically and statistical analysis was conducted using SPSS ver 23 to evaluate the recognition of cognitive impairment and delirium in the ED senior population.

Results: During the study period we saw 12280 patients in the ED, 3673 of which were seniors (age $\geq 65$) representing 29.9% of all patients. A total of 2626 seniors underwent ISAR screening with scores ranging from 0 (lower risk) to 6 (higher risk), with 468 (17.8%) scoring 4 or higher (high risk), and 1248 (47.5%) scoring positive with scores $\geq 2$ thus making them eligible for GENIE services. 225 patients underwent CAM testing. Of these, only 5 patients (2.2%) were identified as positive for confusion and cognitive issues by CAM score. The features identified in descending order of frequency were inattention (6.2%), acute onset (5.3%), disorganized thoughts (3.1%), and altered mental status (2.7%).

Conclusions: The use of the CAM screening tool in our study ED selecting at-risk seniors identified a small portion of patients at risk for delirium and cognitive impairment. Further study is needed on the impact of a program that refers these patients for further cognitive testing, as well as acute intervention by the treatment team after learning of these results in the ED to help identify a reversible cause.
Study Objectives: Cerebral vasospasm (CVS) is a complication observed in 17-40% of subarachnoid hemorrhage (SAH). Since CVS deteriorates patients' outcomes, various treatments have been tried to prevent CVS. The administration of Fasudil hydrochloride (FH) is given Grade A recommendation level in Japanese stroke guidelines for CVS prevention. However, robust study analyzing the effect of FH on CVS prevention is scarce. Therefore, we decided to verify the CVS preventive effect of FH using a large database of hospitalized patients in Japan.

Methods: This was a retrospective cohort study using the Japanese national inpatient database. The database contains about half of patients hospitalized in acute hospitals in Japan. Over the study period (July 2010 to March 2014), we included patients: (i) older than 18 years; (ii) underwent clipping surgery or intravascular coil embolization within 72 hours from the admission with SAH. Patients with unknown modified Rankin Scale (mRS) or coma (Japan Coma Scale 100 or higher) at the time of visit and those who died within 3 days after intervention were excluded. Based on the timing of FH administration (less than 3 days from surgery or embolization or not), the patients were divided into two groups. Thirty-day mortality and mRS at discharge were compared between two groups. The other collected variables were age, sex, mRS prior to intervention, admission to ICU or SCU, and type of intervention such as clipping or coiling. We compared the proportions of categorical variables between the groups using the chi-square test and the length of stay between the groups using the Mann-Whitney U-test. We hypothesized that the providers' decision regarding prophylactic administration of FH is dependent on the treatment policy of each facility rather than individual patient situations. Therefore, we used instrumental variable method to analyze the preventive effect of FH. A partial F test was also conducted to verify that the administration trend in each facility was not a weak instrument variable.

Statistical analysis was performed using STATA 14/SE and SPSS ver 22.

Results: The eligible patients were 24,068. The average age was 62.1 years (SD 14.1), and the male was 51.2% (7510 people). Of the eligible patients, 77.0% (18,542 people) had received FH. The total 30-day mortality rate was 5.7% (900 patients) and 35.4% (8512 patients) had poor neurological outcome (mRS≥2) upon discharge. Analysis based on the instrumental variable method showed that FH did not reduce 30-day mortality (-1.8%; 95% CI, -3.8% to 0.2%). However, FH significantly reduced poor neurological outcome (-7.8%; 95% CI, -12.3% to -3.4%).

Conclusions: Prophylactic administration of FH for CVS prevention to patients with SAH did not reduce 30-day mortality. However, FH significantly reduced poor neurological outcome (-7.8%; 95% CI, -12.3% to -3.4%).
Methods: This was a prospective, cross-sectional study. We enrolled a convenience sample of adult, hemodynamically stable, oriented, consenting patients at an academic inner-city ED. Each patient completed a written survey providing demographic, chief complaint information, and questions regarding their imaging history. Patients’ estimates of prior CT imaging exposure were then compared with electronic records from a 6-hospital system database that includes over 80% of all ED visits within a 12-county region (2005-present). Categorical data presented as frequency of occurrence and analyzed by chi-square. Continuous data presented as means+/-SD and analyzed by t-tests.

Results: There were 298 patients enrolled; mean age 41 +/- 16 years, 49% female, 67% Hispanic, 35% income < $20,000, 34% < or = high school education, 14% private insurance, 43% presented for painful conditions. 39.9% (119/298) of patients underestimated their total number of prior CTs by at least one (difference = patient reported CTs - in system CTs in electronic records). The following patient characteristics were not associated with underestimation: age (p=0.08), female sex (p=0.38), less than high school education (p=0.15), Hispanic race (p=0.47), income < $20,000/year (p=0.91). 12.4% of patients underestimated their total number of chest CTs, while 24.2% underestimated their total number of abdominal CTs. 66.1% (197/298) patients reported that they had not had any imaging outside of our hospital system. For patients with no reported outside system CTs, 35.0% (69/197) underestimated their prior CT exposure by at least one. Within the overall study group, 35.6% overestimated their total CTs by at least one.

Conclusions: For our predominantly Hispanic, urban poor study group, emergency department patient recall for prior CT imaging history was poor. There were a significant proportion of patients who either underestimated or overestimated respectively their prior exposure.

271 Implementation of an Opioid Detoxification Management Pathway Reduces Emergency Department Length of Stay
Bellw SD, Collins SP, Barrett TW, Russ S, Jones I, Self WH/Vanderbilt University, Nashville, TN

Study Objectives: Increasingly more patients are presenting to emergency departments (EDs) requesting detoxification from opioids. Traditional recommendations for ED management have focused on referral to substance use treatment facilities. Further, the demand for detoxification services has far outpaced supply, leaving providers with limited options for these patients. We set out to standardize, streamline, and improve the care of patients presenting to our ED seeking opioid detoxification. We implemented a management pathway and measured the effects of this intervention.

Methods: We conducted a before and after study of the effect of our management pathway on ED length of stay, use of resources (social worker consultation, laboratory tests obtained), and prescribing. Adults requesting detoxification from opioids were eligible. Patients were excluded if they were: less than 18 years old; known to be pregnant; had a psychiatric emergency (endorsed suicidality, homicidality, or psychosis); were concomitantly dependent on benzodiazepines, alcohol, or barbiturates; or had a coincident medical illness requiring additional care. Our intervention included: medication recommendations (a clonidine taper, promethazine, and dicyclomine) and revised discharge instructions with community resources information. The primary outcome was ED length of stay. The pathway was implemented on October 25, 2016. To study the effects of the intervention, charts with any ED diagnosis ICD-10 code of “opioid-related disorders” were reviewed for exclusion criteria, first by ICD-10 code, then by chart review. Charts were reviewed for ED length of stay, sex, ICD-10 diagnosis, insurer, exclusion criteria, preferred drug of abuse, disposition, social work consultation obtained, laboratory tests obtained, prescriptions written, and return visits. The difference in length of stay in the pre-intervention and post-intervention groups was compared using the Wilcoxon Rank-Sum test. Categorical data were compared using the Fischer Exact test.

Results: From August 1, 2016 to January 31, 2017, 112 patients presented to the ED who met criteria, 59 in the pre-intervention period and 53 in the intervention period. The pre-and post-intervention groups were similar with respect to age, sex, and drug of choice. Median length of stay in the pre-intervention group was 301 (IQR 185-458) minutes as compared to 151 (IQR 93-237) minutes after the intervention (p=0.003). Patients in the post-intervention period were less likely to have a social work consultation (83.1% vs. 34.0%, p<0.001) or have laboratory tests obtained (76.4% vs. 34.0%, p<0.001), and were more likely to have been prescribed a medication for withdrawal symptoms (27.1% vs. 56.6%, p=0.002).

Conclusions: Implementation of an ED management pathway for patients requesting opioid detoxification consisting of standardized medications and follow-up information for outpatient programs was associated with a decrease in both ED length of stay and utilization of resources, and an increased proportion of patients prescribed medications for symptom relief.

Outcomes before and after implementation of management pathway

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Pre-Intervention (n=59)</th>
<th>Post-Intervention (n=53)</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Social work consult</td>
<td>49 (83.1)</td>
<td>18 (34.0)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Labs obtained</td>
<td>14 (23.7)</td>
<td>35 (66.0)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>None</td>
<td>32 (54.2)</td>
<td>12 (22.6)</td>
<td></td>
</tr>
<tr>
<td>Urine</td>
<td>13 (22.0)</td>
<td>6 (11.3)</td>
<td></td>
</tr>
<tr>
<td>Blood</td>
<td>16 (27.1)</td>
<td>30 (56.6)</td>
<td>0.002</td>
</tr>
<tr>
<td>Prescribed at least one medication for withdrawal symptoms</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Medications prescribed</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Clonidine</td>
<td>12 (20.3)</td>
<td>25 (47.2)</td>
<td>0.005</td>
</tr>
<tr>
<td>Anti-emetic</td>
<td>16 (27.1)</td>
<td>28 (52.8)</td>
<td>0.007</td>
</tr>
<tr>
<td>Anti-diarrheal</td>
<td>2 (3.5)</td>
<td>18 (34.0)</td>
<td>0.000</td>
</tr>
<tr>
<td>ED length of stay (minutes)</td>
<td>301 (185-458)</td>
<td>151 (93-237)</td>
<td>0.003</td>
</tr>
</tbody>
</table>

272 A Broader View of Quality: Identifying Other Specialties’ Choosing Wisely Recommendations With High Relevance to Emergency Care
Maughan BC, Rabin E, Cantrill SV/Emergency Physicians Integrated Care, Salt Lake City, UT; The Icahn School of Medicine at Mount Sinai, New York, NY; University of Colorado, Aurora, CO

Study Objectives: ACEP joined the Choosing Wisely campaign in 2013 and has produced 10 recommendations for emergency care. Recommendations from other specialties may suggest opportunities to further improve patient safety and increase the value of care. We sought to identify and describe Choosing Wisely recommendations from other professional societies with the highest relevance to emergency care.

Methods: In July 2016, the ACEP Quality and Patient Safety Committee convened a modified Delphi panel of members from its Choosing Wisely (CW) workgroup. All 413 current CW recommendations from other specialties were obtained from the American Board of Internal Medicine Foundation. Workgroup members scored recommendations on relevance to emergency care using a validated 7-point Likert item (MORE, McMaster University) (1=not relevant, 7=highly relevant). Recommendations consistently identified as highly relevant (median score ≥ 7) underwent the same scoring a scoring used to select the original ACEP CW recommendations: rating on 5-point Likert items for three categories: cost savings (1=large savings, 5=no savings), risk/benefit profile (1=benefit>risk, 5=risk>benefit), and actionability by emergency physicians (1=completely actionable, 5=not actionable). Results are presented as overall means and category means with standard deviations.

Results: Initial review identified 49 items that were highly relevant to emergency care. Eleven were removed due to redundancy with current CW emergency medicine recommendations, leaving 38 items from 25 different professional societies. Overall scores (mean of means) for individual items ranged from 1.57 to 5.1. Recommendations had an average cost saving score of 3.2 (SD 0.6, range 1.9-4.3), a risk-benefit score of 1.9 (SD 0.4, range 1.1-2.6), and an actionability score of 1.6 (SD 0.5, 1.0-2.7). The most common conditions in these recommendations were infectious diseases (14 items; 37%), followed by head injury and primary headache disorders (4 items each; 11%). The most frequently
addressed interventions were imaging studies (11 items; 29%) and use of antibiotics (9 items; 24%). Recommendations with the 10 highest overall ratings are shown in the Table; due to a 4-way tie for 10th place, 13 items are included. Within this group, six items address imaging studies, including four that address imaging in children. Another five items focus on antibiotic use, including two regarding respiratory infections and another two regarding asymptomatic bacteruria.

Conclusions: 38 CW recommendations from other specialties are highly relevant to emergency care. Imaging studies and antibiotic use are heavily represented among them.

### 273 Emergency Providers Did Not Adequately Manage Patients With Spontaneous Intracranial Hemorrhage and Suspected Intracranial Hypertension

**Strong J, Gatz JD, Al Rebh H, Kersey J, Jenkins R, Pope K, Tuteja G, Nguyen T, Chang WT, Tran QK/University of Maryland, Baltimore, MD**

Study Objectives: Spontaneous intracranial hemorrhage (sICH) often presents with markedly elevated blood pressure. Systolic blood pressure (SBP) above 140 to 150 mmHg has been found to be associated with higher morbidity and mortality. The 2010 American Heart Association and American Stroke Association (AHA/ASA) guideline recommends reduction of SBP among these patients to less than 160 mmHg if presenting SBP ≥160 mmHg. However, a retrospective study in 2013 of 78 patients with non-traumatic subarachnoid hemorrhage showed that emergency providers treated only 71% of patients with SBP ≥160 mmHg. Therefore, we hypothesized that more than 50% of patients with hypertensive sICH will not have SBP <160 mmHg at ED departure. Our study objective was to assess the effectiveness of emergency providers’ blood pressure management among critically ill patients with sICH and suspected high intracranial pressure (ICP).

Methods: We performed a retrospective study of adult patients with diagnosis of sICH transferred from referring EDs to a quaternary academic center between 01/01/2011 and 09/30/2015 and received external ventricular drains (EVD) during hospitalization. Patients were identified by International Classification of Disease, version 9 (ICD-9 codes of 430.XX, 431.XX) and procedure code 02.21. Patients were excluded if a) not transferred directly from an ED; b) ED triage SBP ≥160 mmHg; c) no ED records available. Primary outcome was percentage of patients with SBP ≤160 mm Hg at ED departure; secondary outcome was ICP at time of EVD placement. Data was expressed in median and interquartile range [IQR]. Mann-Whitney U test was used to compare median values between groups.

Results: A total of 434 patients were electronically identified. One-hundred eighty-seven (187) patients, transferred from 40 unique referring EDs with triage SBP ≥161 mm Hg and received EVD during hospitalization, were included in analysis. Median Glasgow Coma Scale (GCS) at ED presentation was 13 [7-15]. Median SBP’s at ED triage and departure were 199 [IQR 175-221] and 163 [IQR 138-176], p<0.001, respectively. One-hundred one (54%) patients had transfer SBP (sSBP) ≥161 mmHg, while 86 (40%) patients had sSBP ≤160 mmHg. Median time from triage to SBP <160 was 142 [70-236] minutes while median time from triage to EVD placement at academic referral hospital was 426 [320-678] minutes. Intracranial pressure for patients with sSBP ≥161mmHg, comparing to patients with sSBP ≤160 mm Hg respectively, was 20 [15-25] vs 24 [15-30] mm Hg, p=0.437.

Conclusions: Emergency providers’ management of hypertensive patients with sICH and suspected intracranial hypertension was inadequate with only 46% of patients’ SBP at time of transfer meeting recommended treatment guidelines. Further education opportunities exist to encourage emergency providers to treat critically ill patients with spontaneous intracranial hemorrhage more effectively.

### 274 Development and Testing of a Patient-Reported Outcome Measure for Use With Emergency Department Patients Who Are Discharged Home

**Vaillancourt S, Dainty K, Seaton MB, Linton D, McGowan M, Maybee A, Intr T, Schull M, Laupacis A, Beaton D/University of Toronto, Toronto, ON, Canada; St. Michael’s Hospital, Toronto, ON, Canada; Sunnybrook Health Sciences Centre, University of Toronto, Toronto, ON, Canada**

Study Objectives: Patient-reported outcome measures (PROM) are sophisticated questionnaires that are increasingly used to elicit care outcome information from patients. We sought to develop and validate the first PROM for use with general patients receiving emergency department (ED) care and not hospitalized.

Methods: PROM development required an extensive multi-phase process based on national and international organizations guidelines (FDA, NQF, ISPOR). Phase 1: Definition of Outcome Concepts - Qualitative research with ED patients post-discharge was used to develop a conceptual framework of ED care outcomes. Phase 2: Item generation - A review of the literature and existing instruments identified candidate questions relevant for each domain; Phase 3: Cognitive debriefing - Existing and newly written questions were tested for understandability problems and wording preference for understandability of questions with ED patients; Phase 4: Field and validity testing - Pilot testing on large cohort of discharged ED patients through a survey panel; Phase 5: Final item reduction - Based on Delphi process involving ED clinicians, researchers, patients and system administrators.

Results: We completed qualitative interviews with a diverse group of 46 patients within days of their care in the ED to define core outcome domains to ED care. Four core outcome domains were conceptualized: (1) Understanding; (2) Symptom relief; (3) Reassurance and (4) Having a plan. The conceptual framework of ED care outcome informed a review of existing relevant questionnaires and instruments and the writing of additional questions that formed an initial long-form questionnaire. Eight patients participated in cognitive debriefing of the questionnaire within days of their ED visit to test for understanding and wording. Expert clinicians, researchers and patient partners provided input on item refinement and reduction. Over 400 patients completed a second version of the long-form questionnaire which informed the final item reduction process by a modified Delphi method to create PROM-ED version 1.0.

Conclusions: Using instrument development methodology, we have developed the first PROM instrument for use with ED patients who are not hospitalized. Such a questionnaire could be used to systematically gather care outcome information from patients that could support and inform improvement work in ED care.

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275 An Observational Study to Determine the Feasibility and Compliance Rates for Patients Turning in an Emergency Department for Pressure Ulcer Prevention
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Study Objectives: Emergency department (ED) stays that exceed two hours have been associated with increased pressure ulcer risk. Therefore, initiation of pressure ulcer prevention protocols that include the regular turning of high-risk patients should be implemented. Compliance for turning protocols in an ED setting can be difficult to achieve and have not been previously evaluated.

Methods: The authors used the six-criteria Braden scale to assess a patient’s risk of developing a pressure ulcer. Patients who presented to a busy 21-bed emergency department over a six-month period with a Braden Scale score ≤18 and who were expected to be admitted to the hospital were placed on a two-hourly turning protocol. These patients had wearable wireless sensors placed which monitor patient turning and were monitored for 1,119 hours before being admitted to a nursing unit. Four patients had community-acquired pressure ulcers before their ED admission; no HAPU’s were documented during or immediately following their ED stay. The average turn compliance for the study period in the day shift was 92%, and 84% in the night shift. Daily average compliance varied between 45% and 100%. During the study period, the initiation of patient turning protocols in the ED contributed to an overall 38% reduction of HAPU.

Conclusions: Timely patient repositioning is feasible in the emergency department and can help reduce overall HAPU incidence.

276 Assessing Fluid Status With Ultrasound in Pediatric Emergency Department
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Study Objectives: Ultrasonic measurements of the inferior vena caval index (IVCI), the aorta diameter/IVC diameter index (Ao/IVC), the aorta area/IVC area index (Ao/IVCA) according to fluid administration in children requiring intravenous fluid resuscitation.

Methods: This is a prospective, observational study. Children who presented to the pediatric emergency department (PED) between May 2014 and January 2015 were enrolled. The maximum diameter of the aorta from inner wall to inner wall, and the long and short axis diameters of the IVC were measured using a convex array transducer in the transverse view. Subsequently, diameter of IVC was measured at subxyphoid area during inspiration and expiration in longitudinal view. IVCI, Ao/IVC, and Ao/IVCA were calculated per administration of 10ml/kg of normal saline.

Results: Immediately after administration of 10ml/kg NS, IVCI and Ao/IVCA were significantly changed. Significant change was not observed in IVCI and Ao/IVC. But Ao/IVCA showed significant change between 10ml/kg and 20ml/kg of NS and 20ml/kg of IVCA, respectively (1.87, IQR 1.41-2.42 vs. 1.43, IQR 1.12-1.86 vs. 1.08, IQR 0.87-1.45, P value <0.001). Ao/IVCA demonstrated significant correlation with fluid administration. Coefficient between fluid and 10ml/kg administration of normal saline was -0.396 (P value=0.010), and coefficient between 10ml/kg and 20ml/kg administration of normal saline was -0.516 (P value=0.038).

Conclusions: IVCI showed better correlation with fluid status than IVCI an Ao/IVCA. Ao/IVCA might be a promising index for the assessment of effect of fluid administration in children.

277 Intranasal Ketamine for Peripheral Venous Access: A Randomized Double Blind and Placebo-Controlled Study
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Study Objectives: Effectiveness of intranasal ketamine as an analgesic and sedative for pediatric procedures in pediatric intensive care unit (PICU) has been reported previously. Few studies evaluated IN ketamine comparing with placebo as sedative agent.

Methods: Randomized, double blind, placebo-controlled study conducted at PICU from November 2015 to August 2016. Children needing venous access were randomized to receive intranasal ketamine (4mg/Kg) or normal saline solution. Groups were compared regarding the time for venous access, facility for performing the procedure, adverse events, disturbances in vital signs and perception of the accompanying adult.

Results: 39 children (21 Ketamine; 18 Placebo) were included without differences regarding to age, sex, weight, reason for hospitalization and professional experience. The median age was similar (19.8 ± 15.8 months), as well as the median weight (10.0 ± 11.3kg). Ketamine reduced the length for venous access (23.3 ± 67.5 seconds; p=0.03). Ketamine induced sleepiness 15 minutes after its administration (p=0.003) and reduced the number of people for the child’s restraint (p=0.025). No difference was verified between groups regarding adverse effects or vital signs disturbances.

Conclusions: Intranasal ketamine reduces the time for venous puncture, facilitates the procedure to the nurse, and provides a calm environment.

278 Intranasal Ketamine for Procedural Sedation in Children: A Randomized Controlled Pilot Study
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Study Objectives: The pain of intravenous (IV) insertion is rated by children as second only to disease-related pain. Procedural sedation and analgesia (PSA) is a common indication for IV insertion in the emergency department (ED). Ketamine is the most frequently used agent for PSA in children. Intranasal ketamine (INK) has shown effectiveness for PSA in a limited number of painful procedures (IV insertion, gastric aspiration, and laceration repair) but no studies have explored INK for fracture reduction in children. Our objective was to evaluate the feasibility of INK for PSA in children who sustained a fracture requiring a closed reduction.

Methods: This was a randomized, blinded, controlled, trial comparing the effectiveness of INK versus intravenous ketamine (IVK). We included children 4-17 years, ≤40 kg with a non-shortened distal forearm fracture requiring PSA for closed reduction. Participants were randomized using a double-dummy approach to receive single dose (i) INK 8 mg/kg (maximum 320 mg) + 0.9% IV normal saline OR (ii) IVK 1 mg/kg (maximum of 40 mg) + 0.9% normal saline. The primary outcome was the proportion of participants with adequate sedation during closed reduction as defined by a University of Michigan Sedation Scale (UMSS) score of ≥3 of 4. Secondary outcomes included need for additional IV sedation, adverse effects, time to sedation defined as a UMSS score of ≥3 of 4, and length of stay.

Results: Fifteen participants were consecutively recruited from March 1, 2016 to Feb 1, 2017. Seven children (3 females) received INK and the mean (SD) age was 6.6 (3.1) years. Eight children (3 females) received IVK and the mean (SD) age was 5.9 (2) years. Adequate sedation was achieved by 4/7 (57.1%) versus 7/8 (87.5%) participants in the INK and IVK groups, respectively (p = 0.28). The median (IQR) time to sedation was 10 (11.3) versus 5 (0) minutes in the INK and IVK groups, respectively (p = 0.01). Additional IVK was required by 5/7 (71.4%) versus 2/8 (25%) of participants in the INK and IVK groups, respectively (p = 0.13). Adverse effects consisting of nausea, vomiting, or dizziness were seen in 4/7 (57.1%) versus 2/8 (25%) of participants in the INK and IVK groups, respectively (p = 0.32). No participants experienced emergence agitation and there were no serious adverse events. The median (IQR) length of stay in the INK and IVK groups was 364 (153) versus 290 (113) minutes, respectively (p = 0.13).

Conclusions: The adequacy of sedation for INK 8 mg/kg is inconsistent for closed reduction of distal forearm fractures in children. Greater sedative efficacy may be achieved with a higher INK dose (9-10 mg/kg), consistent with demonstrated effectiveness in other studies of PSA in children undergoing painful procedures.
Pediatric Out-of-Hospital Analgesia in Iraq and Afghanistan

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Study Objectives: Pain is a common symptom after trauma. Previous studies have evaluated out-of-hospital analgesia during combat operations in Iraq and Afghanistan but were limited to the adult population. Pediatric care comprises a notable volume of medical care as part of combat operations. We sought to describe out-of-hospital analgesia in pediatric trauma patients during combat operations.

Methods: We queried the Department of Defense Trauma Registry (DODTR) for all pediatric subjects admitted to US and Coalition fixed-facility hospitals in Iraq and Afghanistan from January 2007 to January 2016. We separated subjects by age based on Centers for Disease Control age groupings: <1, 1-4, 5-9, 10-14, 15-17. Descriptive and inferential statistics were utilized. Binary logistic regressions were performed to determine odds ratios. High/low injury severity scores (ISS) values utilized a cut off of 15 did not significantly increase the likelihood of receiving an analgesic agent. The following interventions were associated with receipt of an analgesic agent: wound dressing application, tourniquet placement, IV and IO placement, IV fluids, intubation and external warming.

Conclusions: Overall, there were low rates of analgesia administration in this population. Those receiving analgesic agents had higher rates of concomitant interventions.

Sedation and Analgesia Use in Lumbar Punctures at a Pediatric Tertiary Care Center

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Study Objectives: To assess whether different sedation and analgesia medications affect pediatric lumbar puncture outcome.

Methods: A retrospective review was conducted on the records of patients who had LPs from 01/2012 to 12/2016 at a pediatric tertiary care center. Data abstracted included patient age, race, procedure location, medications used in procedure, resident performance of procedure, and procedure outcome. Outcome of LP was defined as unsuccessful if the record included a subjective description of unsuccessful attempt by performer, a CSF red blood cell count of >400 cells/microliter, or the need of a second LP within 24 hours. Patients with LPs performed in oncology clinic, as a therapeutic procedure, and records with missing information were excluded. Data was analyzed via chi-square analysis and logistic regression. Survey responses from attending physicians regarding LP medications used at Children’s Hospital were obtained.

Results: 8465 patients were reviewed and 4489 (53%) were included in the study after exclusion criteria. Three thousand seventeen patients (67%) were less than 2 years old, 1014 (23%) were 2-12 years old, 416 (9%) were 12-21 years old, and 42 (1%) were greater than 21 years old. There were 1273 (29%) unsuccessful LP attempts. 2032 (45%) patients received some form of sedation or analgesia. Of these patients, 702 (15%) received fentanyl, 686 (15%) received midazolam, 544 (11%) received morphine, 344 (8%) received propofol, 529 (7%) received nitrous, and 82 (2%) received ketamine. In chi-square analysis, patients who received midazolam (RR 0.66, CI 0.60-0.74) and fentanyl (RR 0.80, CI 0.71-0.89) were less likely to have a successful LP. Ketamine (RR 3.50, CI 1.72-7.12), propofol (RR 2.54, CI 1.90-3.38) and nitrous (RR 1.76, CI 1.38-2.24) were associated with success. Morphine was not significant in the chi-square analysis. In the multivariate regression, fentanyl (OR 0.76, CI 0.62-0.97), nitrous (OR 0.62 CI 0.41-0.94), and ketamine (OR 0.30, CI 0.14-0.67) were associated with higher chances of success. Morphine, propofol, and midazolam were not significant in the regression. As age increased, the chance of success increased (OR 0.97, CI 0.94-0.98). Resident attempt under supervision was associated with unsuccessful LP.

Incidence and Predictors of Elbow Injury in Children With Distal Forearm Fractures

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Study Objectives: Pediatric distal forearm fractures are one of the most common injuries seen in the emergency department. Providers are often advised to radiograph the joint above and the joint below the fracture site to assess for concurrent injury, even if there are no historical or physical exam findings suggestive of an additional injury at those sites. Despite this teaching, there is little evidence to suggest that elbow injuries are common in children with distal forearm fractures. Similarly, there is little data that help the clinician predict which children are at higher risk for co-injury.

Methods: We performed a cross-sectional study, using the 2011 National Emergency Department Sample (NEDS) dataset. Children age 2 to 17 years with any of the 19 International Classification of Disease Ninth Revision (ICD-9) codes corresponding to forearm fractures of the distal radius and/or ulna were included in the study. The primary outcome of interest was an “elbow” injury, defined as any of the 40 ICD-9 codes for proximal radius, proximal ulna, or distal humeral fracture. Multivariable logistic regression was performed using patient demographics, Injury Severity Score, mechanism of injury, and underlying medical conditions.
Results: 54,262 children with distal forearm injuries were included, 99.3% of which were closed fractures. Of all patients with distal forearm fractures, only 0.38% (n=462) had an elbow injury. Supracondylar fractures of the humerus were the most common elbow injury seen (48.2%). Children were more likely to have a co-injury if they were younger (7.5 years vs. 9.6 years p<0.01), female (50.0% vs. 36.2%), injured via fall (78.5% vs. 69.3% p<0.01), had a higher Injury Severity Score (4.5 vs. 4.1 p<0.01), or were admitted for their injuries (20.8 vs. 1.6% p<0.01). In the adjusted model, only age and disposition were predictors of co-injury. Isolated buckle fractures of the ulna were associated with a statistically significant increase in the odds of concurrent elbow injury (OR 5.34, 95% CI 1.69-12.93). An isolated buckle fracture of the radius and Colles-type fracture of the radius were protective against elbow injury (OR 0.32, 95% CI 0.19-0.54 and OR 0.37, 95% CI 0.21-0.62, respectively).

Conclusions: Children with distal forearm fractures very rarely have concurrent elbow injuries. These injuries are more likely in younger patients and those admitted to the hospital.

282 Optimizing Enrollment Strategies for Traumatic Brain Injury Clinical Trials: A Secondary Analysis of the ProTECT III Trial
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Study Objectives: No targeted pharmacotherapy has proven effective for the treatment of acute traumatic brain injury (TBI). One potential explanation for these failures is the inclusion of patients who likely will not benefit, either because they die very early in their hospital stay or have excellent early outcomes. The goal of this study was to describe 1) factors associated with mortality over time and, 2) factors associated with early discharge home for patients with TBI.

Methods: This secondary analysis of the randomized and placebo-controlled Progesterone for Traumatic Brain Injury Experimental Clinical Treatment (ProTECT) trial (conducted at 49 trauma centers across the United States) included adults age ≥ 18 years who had moderate to severe TBI due to a blunt mechanism (initial Glasgow Coma Scale [iGCS] score 4 to 12), and were randomized to treatment with either progesterone or placebo (72-hour infusion followed by a 24-hour taper) within 4 hours of injury. Primary outcomes for this study were death up to 180 days (poor outcome) and early discharge home before hospital day 3 (good outcome). Factors associated with death and early discharge were independently examined via proportional hazards model and logistic regression respectively. Rotterdam scores were derived from the initial CT scan and scores were dichotomized into low (1-3) and high (4-6) for the poor outcome regression model and baseline head CT result (normal or abnormal) was considered for good outcome in the analyses.

Results: Of the 882 patients enrolled, 442 (50.1%) were randomized to intravenous progesterone; the majority were male (73.7%), and the median age (min-max) was 35.5 (17-94). 152 patients died during the 180-day study period; the median age (min-max) was 35.5 (18-94), 30.3% were female, 30.3% were intubated prior to randomization, 50.0% had moderate to severe injury (iGCS 6-8) and 46.1% had high Rotterdam scores. Thirty-five (35) patients were discharged early; the median age (min-max) was 29 (18-71), 25.7% were female, 28.6% had abnormal baseline head CT scan, 40.0% had moderate injury (iGCS 9-12) and the mean injury severity score (ISS) was 7.3 ± 4.9. The table presents the main results of 1) hazard ratios for death and, 2) the odds ratios for early discharge. After accounting for CT findings, the interactions of age and iGCS category were associated with death whereas increases in age and in the ISS were associated with a decreased odds of early discharge (good outcome).

Conclusions: Increasing age, in combination with iGCS score, and CT findings may be a useful aid to identify patients with TBI who are more likely to experience mortality. Conversely, younger patients, those with a lower ISS, and those with normal CT results were more likely to be discharged early with a good outcome. Since most studies of moderate to severe TBI therapies exclude patients who are less likely to benefit from therapies that require longer-term dosing, such as patients who are likely to die early and those with less severe injury (discharged very early with good outcomes), these factors may be worth consideration when designing therapeutic clinical trials for TBI patients.

Table. MULTIVARIABLE ANALYSES

<table>
<thead>
<tr>
<th>Hazard Ratios for Survival at 6 Months</th>
<th>Hazard Ratio</th>
<th>95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>0.94</td>
<td>0.66-1.34</td>
</tr>
<tr>
<td>Low Rotterdam Scorea</td>
<td>0.26</td>
<td>0.19, 0.37</td>
</tr>
<tr>
<td>Placebo Arm</td>
<td>0.85</td>
<td>0.62, 1.17</td>
</tr>
<tr>
<td>Age*Moderate Injuryb</td>
<td>1.09</td>
<td>1.06, 1.11</td>
</tr>
<tr>
<td>Age*Severe Injuryc</td>
<td>1.05</td>
<td>1.03, 1.06</td>
</tr>
<tr>
<td>Age*Most Severe Injuryd</td>
<td>1.03</td>
<td>1.01, 1.05</td>
</tr>
</tbody>
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<table>
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<tr>
<th>Odds Ratios for Early Discharge</th>
<th>Odds Ratio</th>
<th>95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal CT Scan</td>
<td>4.09</td>
<td>1.67, 10.06</td>
</tr>
<tr>
<td>Age</td>
<td>0.95</td>
<td>0.92, 0.99</td>
</tr>
<tr>
<td>ISS</td>
<td>0.78</td>
<td>0.72, 0.85</td>
</tr>
</tbody>
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(a) Low Rotterdam Score=1-3, High Rotterdam Score=4-6; (b) Moderate Injury: iGCS=9-12; (c) Severe Injury: iGCS=6-8/Motor=4-5; (d) Most Severe Injury: iGCS=4-5/Motor=2-3; Abbreviations: CI, confidence interval; ISS, Injury Severity Score.

283 Can Patients Who Present With Isolated Subarachnoid Hemorrhage Have Normal Mental Status Be Discharged From the Emergency Department?
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Study Objectives: For patients who present to the ED with isolated subarachnoid hemorrhage (isSAH), the general standard of care at the study hospital is ICU admission with neurosurgery consult and repeat CT scans. These patients spend the day in the ICU with frequent neurological checks, increased radiation exposure through repeat CT scans, and will then be downgraded and discharged with minimal complications. This current standard raises the question that what exactly is the complication rate and could this change the standard of care?

To evaluate the varied disposition of patients who present with isSAH to the ED with a GCS of 13-15 and observe individual outcomes after 12 month follow-up period across five different hospitals in southern California.

Methods: IRB-approved retrospective chart review of patients who presented with isSAH at five different hospitals in closed health care system in southern California from 2010 to 2015.

Inclusion criteria: isSAH with GCS 13-15.

Exclusion criteria: Other coexisting intracranial injury, anticoagulants, pregnant, minors.

Patients were followed for one year after injury to assess for any complications or neurological decline resulting from the initial injury.

Results: Chart review across the five hospitals revealed 316 patients who presented with isSAH. 198 were excluded leaving 118 patients who qualified for the study. Mean age was 69.4 years (range 20-101) with 54 (45.8%) male and 64 (54.2%) female. During the twelve-month follow-up period for those 118 patients, no patients experienced any complications or neurological decline and did not require any neurological intervention. Presenting GCS was 15 for 110 (93.2%) patients, 14 for 8 (11.8%) patients and discharge GCS was 15 for 111 (94%) and 14 (11.8%) for 7 patients.

Disposition after presentation across the five hospitals was highly variable including 39 (33%) patients to ICU, 7 (5.9%) to Step Down, 43 (36.4%) to Med/Surg floor, and 28 (23.7%) were discharged home.

Eighty-eight (74.5%) had repeat imaging (CT Head or MRI Brain) either in the ED or while admitted. Only two of these patients had worsening of the CT Head yet without clinical decline, altered mental status, nor neurological changes. 118 (100%) of the patients had a neurological consult yet 0 (0%) required neurological intervention. A total of 333 hospital days were spent on these 118 patients.

Conclusions: This study revealed a wide variability across several hospitals inside a closed health care system of patients who presented to the ED with isSAH with 33% admitted to the ICU to 23.7% being discharged home. All of them had a neurological consultation but none required any neurological intervention. 74.7% had repeat imaging with only two of them worsening but without clinical significance. Despite the wide variability of disposition ranging from ICU to discharging them home, all patients had the same outcome which included no complications nor neurological decline. This highlights that for patients who present to the ED with isSAH without other
Biometric Analysis of Cervical Movement During Ambulance Trauma Transport

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Study Objectives: Historically, emergency medical service (EMS) professionals have used a long spine board (LSB) with multiple straps and foam headblocks to immobilize patients with potential spine injury. Although historically ubiquitous, there is mounting concern that the LSB may do little to manage spinal motion, and may have more risk than benefit. This project sought to precisely measure head-torso biomechanics and motion during ambulance transport. The purpose of this study was to evaluate the movement of the spine during ambulance transport comparing different immobilization techniques. The goal was to identify the optimal transport conditions to minimize cervical spine movement. Based on preliminary data, we hypothesized that transport on a mattress with the head of the bed elevated without the LSB would limit cervical movement more than transport on a LSB.

Methods: This was a randomized 10-treatment adult healthy volunteer crossover trial. Real-time 3D motion analysis of head position relative to the torso was measured using a wireless motion tracker system (Xsens Technologies BV, Netherlands). Positions analyzed included: zero degrees and ten degree incline on LSB, and EMS stretcher with head elevated to 10, 30, 45, and 60 degrees without LSB. All subjects were fitted with a rigid cervical collar (c-collar) and headblocks when on LSB. Subjects on stretcher without LSB were fitted with a c-collar and were transported with and without foam headblocks secured to the stretcher in each position. Each subject underwent simulated ambulance transport over a set course on city streets at or below posted speed limits. The driver was blinded to the subject position. For each subject and each position, linear motion in all three axes, angular motion, and composite volume of motion were measured. Descriptive statistics were used to define the mean, standard deviation, and range of motion allowed during each iteration, and aggregate movement for each position. Statistical significance was determined using t-test based on mean, standard deviation, and number of subjects.

Results: Nine healthy subjects participated, 66% were male. Movement for one patient in the LSB supine condition was excluded due to loss of data fidelity. Comparing movement between LSB and no LSB respectively, there was no statistical difference in axial (21 ± 0.07 mm vs. 0.22 ± 0.05 mm) flexion/extension (24 ± 12 mm vs. 22 ± 10 mm) range of motion and rotation (5.1 ± 19 degrees vs. 5.8 ± 20 degrees). There were significant differences in lateral (3.7 ± 7 mm LSB vs. 2.0 ± 5 mm no LSB) movement and the three dimensional volumetric movement of the head (120 ± 172 mm³ LSB vs. 77 ± 86 mm³ no LSB). The two positions that allowed the lowest mean volume of head movement was with the head of the bed elevated to 30 and 45 degrees and 45 degrees with headblocks adhered to the stretcher mattress (20 ± 22 mm³ and 12 ± 6 mm³, respectively).

Conclusions: In healthy volunteers, cervical motion was small in all groups; however, those secured on a stretcher mattress had less cervical spine motion than did those secured to a long spine board. Of the 10 immobilization treatments studied, subjects secured to a stretcher mattress using headblocks with the head of the bed elevated to 30 - 45 degrees had the least cervical spine motion. These data call into question 1) the efficacy of the long spine board as an immobilization device and 2) the value of the supine position as the optimal immobilization position.

Predictive Accuracy of Adding Shock Index to the American College of Surgeons’ Major Resuscitation Criteria for Adult Trauma Triage

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Study Objectives: The American College of Surgeons’ Major Resuscitation Criteria (MRC) are used to define when a trauma surgeon should be involved in a patient’s care in the emergency department (ED). While hypotension is strongly predictive of critical illness or the need for emergent intervention, hypotension may not occur during early stages of significant hemorrhage or in some populations (eg, young) during later stages of hemorrhagic shock. Our objective was to assess the added predictive accuracy of shock index (SI) to the MRC.

Methods: Design: Retrospective cohort study. Setting: Urban level 1 trauma center with an approximate annual ED census of 60,000 adult patients, 600 of which have major multi-systems injuries. Population: All patients (≥18 years of age) who presented for care following trauma and included in our trauma registry. Data collection: We used prospectively collected trauma registry data from September 1, 1993 through November 30, 2006 as part of a structured evaluation of trauma triage. Outcomes: Emergent operative intervention (EOI), defined as operative intervention by a trauma surgeon within 1 hour of arrival; emergent procedural intervention (EPI), defined as cricothyrotomy or emergency department thoracotomy; and injury severity score (ISS) > 15. All outcomes were confirmed by physician abstractors blinded to the purpose of the study. Analyses: Sensitivities, specificities, and 95% confidence intervals (CIs); subgroup analyses by age strata.

Results: 20,872 patients met criteria for inclusion with a median ISS of 9 (interquartile range [IQR]: 4 - 16) and a median SI of 0.7 (IQR: 0.6 - 0.9). Prevalences of individual MRC were: SBP < 90 mm Hg: 1,760 (8%); respiratory compromise: 3,111 (15%); GCS to the neck, chest, or abdomen: 791 (4%); GCS score < 8: 2,561 (12%); transfer from another hospital and requiring blood: 68 (0.3%); and physician discretion: 139 (0.7%). Of all patients, 4,663 (22%) met at least 1 MRC criterion. EOI or EPI was required in 1,099 (5%; 95% CI: 5% - 6%) and 5,552 (27%; 95% CI: 26% - 27%) had an ISS > 15. Sensitivity and specificity of the MRC only for EOI or EPI was 86% (95% CI: 83% - 88%) and 81% (95% CI: 80% - 81%), respectively; sensitivity and specificity of the MRC only for ISS > 15 was 57% (95% CI: 56% - 58%) and 90% (95% CI: 89% - 91%), respectively. Addition of SI thresholds modified predictive accuracies with MRC plus SI ≥ 0.8 significantly improving sensitivities (86% to 92%; +6%; 95% CI: 4% - 9%; p<0.001 for EOI/EPI, and 57% to 73%; +16%; 95% CI: 14% - 18%; p<0.001 for ISS > 15) but with a substantial decrease in specificity (81% to 61%; +20%; 95% CI: 19% - 21%; p<0.001 for EOI/EPI, and 89% to 68%; -21%; 95% CI: 20% - 22%, p<0.001) (Figure). No significant differences were identified when stratified by age.

Conclusions: Among a large adult trauma population, the addition of SI to the MRC significantly changed predictive accuracies for EOI, EPI, and ISS > 15. Addition of a SI threshold ≥ 0.8 significantly improved sensitivities but with a relatively greater reduction in specificities. Adoption of this MRC plus SI trauma triage strategy would increase trauma activations by approximately 33% while decreasing the number of under-triaged patients with EOI/EPI by 6% and ISS > 15 by 15%.
Study Objectives: Our objective was to develop a set of physical exam and laboratory findings that in selected pediatric patients, combined with the FAST exam results, were sensitive and specific in detecting intra-abdominal injuries that correlated with CT scan results.

Methods: This was a retrospective chart review of all trauma patients aged 0-17 years who were evaluated at an academic American College of Surgeons (ACS) verified Level 1 Adult and Pediatric Trauma center between January 1, 2015 and December 31, 2015. Inclusion criteria were: 1) complaint of blunt abdominal trauma; 2) a FAST exam and an abdominal CT scan performed; and 3) lab diagnostics completed. The included laboratory diagnostics were: blood count, liver function tests and lipase. After reviewing 392 patient records, 133 were included in the final analysis. We reviewed the literature and determined the history, physical exam and cutoff laboratory results to be used in the final analysis. The sensitivity, specificity, PPV and NPV of the FAST exam alone and in combination with the predetermined diagnostic criteria were calculated and the results were analyzed for correlation with CT scan results then reported using the phi-coefficient of correlation.

Results: The FAST exam for detecting intra-abdominal injury in our selected patients had a sensitivity of 2.6% (95% CI: 0.7-8.5), a specificity of 97.2% (95% CI: 91.4-99.8), a PPV of 33.5% (95% CI: 1.7%-87.5%), and a NPV of 64.9% (95% CI: 54.4%-73.4%). The FAST exam, combined with our clinical criteria for detecting intra-abdominal injuries in our selected patients, had a sensitivity of 86.2% (95% CI: 67.4%-95.5%), a specificity of 96.4% (95% CI: 79.7%-99.8%), a PPV of 96.2% (95% CI: 78.4%-99.8%), and a NPV of 87.1% (95% CI: 65.2%-95.8%). When combined with the clinical criteria, the FAST exam correlated with the CT scan results (Φ = 0.83; p<0.0001), while the FAST exam alone did not (Φ = -0.01; p=1).

Conclusions: When combined with clinical findings, the FAST exam was sensitive and specific for detecting intra-abdominal injuries in select pediatric patients and correlated with abdominal CT scan findings. These results may be used to guide further imaging decisions in the assessment of pediatric blunt abdominal trauma.

Study Objectives: The current study seeks to assess the impact of methamphetamine on mortality outcomes in trauma patients as well as to assess the vital roles of methamphetamine-positive patients in this demographic.

Methods: This retrospective study analyzed patients between 18 to 55 years old who suffered a traumatic injury and were seen in the emergency department (ED) from 2005 to 2015. Patients included must have undergone a urine drug screen (UDS) in the ED to screen for the presence of methamphetamine, cocaine, and cannabis. Patients were excluded if they did not undergo a UDS in the ED, did not have a noted mechanism of injury, had a recorded use of any rate-control medications, or UDS indicating a positive result for any drug other than methamphetamine (ie, cocaine and cannabis). Patients who screened positive for only methamphetamine (MA(+)) were compared to those with a triple negative urine drug screen for methamphetamine, cocaine, and cannabis (MA(-)). The primary outcome studied was the impact of methamphetamine on trauma patient mortality. Secondary outcomes included the hospital length of stay, heart rate on scene and upon arrival to the trauma center, systolic and diastolic blood pressure at the scene and upon arrival to the trauma center, and the total amount of blood products utilized during the hospital stay.

Results: Among the 4532 patients included in this study, 1113 were patients with MA(+), and 3239 patients were MA(-). Between the MA(+) and MA(-) groups, there were no significant differences between injury severity score and mechanism of injury (blunt vs. penetrating). A small but statistically significant difference in age was noted between the groups (34.77 vs. 33.95 years for MA(+) and MA(-) respectively, p<0.0008). The presence of methamphetamine on UDS were associated with a longer hospital length of stay (7.23 vs. 5.83 days in MA(+) and MA(-) respectively, p<0.0001), an increased heart rate on scene (101.69 vs. 97.72 beats per minute for MA(+) and MA(-) respectively, p<0.0001), and an increased heart rate on arrival to the trauma center (99.34 vs. 95.71 beats per minute for MA(+) and MA(-) respectively, p<0.0001). No significant changes were observed in mortality, blood product usage, and systolic or diastolic blood pressure on scene or upon arrival to the trauma center between the MA(+) and MA(-) groups.

Conclusions: Methamphetamine use does not impact mortality outcomes in trauma patients with similar mechanisms of injury and injury severity. However, methamphetamine use was associated with a longer hospital length of stay and increased heart rate on scene and upon arrival to the trauma center in trauma patients.

Study Objectives: To implement and assess the feasibility and reach of an emergency department-based palliative intervention (PI) program, which identifies cancer patients with unmet palliative care needs and addresses those needs via existing emergency department (ED) resources at an urban academic medical center.

Methods: The Screen for Palliative and End-of-Life care needs in the Emergency Department (SPEED) is a validated, ED-based palliative needs assessment tool. An adapted rapid needs assessment, 5 SPEED, focuses on five key areas of palliative care: pain management, home care, medication management, psychological support, and goals of care. Starting 12/20/2016, all patients presenting to the Northwestern Memorial Hospital (NMH) ED with active cancer (as defined by cancer treatment in last year and/or presenting symptoms thought to be due to cancer) are screened for palliative care needs by nurses using the 5 SPEED screen. 5 SPEED positive patients are then flagged for an automatic ED-based palliative intervention (PI) based on their identified need.

We performed a cohort study: data were collected from 12/20/2016 to 4/30/2017 via the Northwestern Enterprise Data Warehouse. Primary outcomes of interest were number of ED patients with unmet palliative care needs, and percent of patients with corresponding PI. Secondary outcomes were ED length of stay (LOS) and repeat ED visits within the next 10 days. Baseline clinical and demographic information were additionally obtained to provide enhanced understanding of this patient population and their clinical needs. Categorical variables were evaluated using chi squared or Fischer’s exact test as appropriate. Continuous variables were evaluated using Student’s t test.

Results: Of 291 patients who screened positive for unmet palliative care needs, 103 (35.2%) had an ED PI. Demographic and clinical variables are reported in Table 1. The two groups were similar across all variables.

The breakdown of palliative care needs and corresponding PI are as follows: 95 (32.4%) had difficulty with their medications; 27 (28.4%) of them had a pharmacy consult. Of the 208 (71.0%) patients suffering from pain, 48 (23.1%) had a pharmacy consult. Of the 86 (29.4%) with home care needs, 14 (16.3%) had a social work consult. Of the 95 (32.4%) with goals of care needs, 27 (28.4%) had a goals of care discussion. Of the 164 (56.0%) who were overwhelmed, 7 (4.3%) had a documented referral to supportive oncology.

The mean ED LOS for patients who received any intervention was 457 minutes, and 414 for patients with palliative care needs but no intervention, mean difference 42.8 (95% CI 6.9 to 92.5 minutes). There was no difference in ED LOS for patients who returned within 10 days compared to those who did not return, mean difference 42.8 (95% CI 6.9 to 92.5 minutes).

Conclusions: By leveraging existing resources, we can effectively screen for palliative needs in cancer patients who present to the ED and enhance their access to palliative services without increasing ED LOS. However, a majority of patients with palliative care needs are not receiving corresponding interventions while in the ED. Interventions to increase staffing, engage current staff, or improve documentation should be implemented to improve access to these important interventions.
hospital mortality rate was 30%. Late palliative consults were associated with increased hospital charges, in-hospital mortality, and disposition. Patients were categorized into 4 groups: those with a palliative consult less than or equal to 4 days from admission, those with a consult after 4 days, those having a non-palliative provider discuss goals of care, and those with no palliative consult or documented goals of care discussion. Generalized linear models and logistic regressions were used to examine associations. Patients with a consult after 4 days, those having a non-palliative provider discuss goals of care, and those with no palliative consult or documented goals of care discussion were more likely to have a chest tube (OR < 0.05), a central line placement (OR = 15.8, p < 0.05), and to have a central line placement (OR = 4.40, p < 0.05), while those who received no palliative consult at all were more likely to have a chest tube (OR = 15.8, p < 0.01).

Conclusions: Early palliative consults present an opportunity to ascertain preferences of patients and families and to change the trajectory of septic patients and affect overall outcomes. Among all patients receiving a palliative consult, early consults are associated with significantly lower health care utilization compared to late consults.

Study Objectives: Emergency medicine (EM) resident physicians frequently have difficult conversations with patients regarding goals of care, such as choices around code status. However, many surveyed EM residents report feeling uncomfortable having these conversations. The “Best Case / Worst Case” tool was developed in 2015 to help guide surgeons in discussing care options with patients, but its use by EM providers has not been studied. Our goal was to assess the usability and acceptability of this tool for EM providers.

Methods: EM residents and faculty in one US EM residency were invited to attend a two-hour session held during the weekly residency conference, during which they were introduced to the “Best Case / Worst Case” tool through a video and presentation based on curriculum made by the tool’s creators. Attendees then tried utilizing the tool themselves, under the guidance of EM and palliative medicine providers, through sample cases. Afterwards, attendees had the option to a voluntary and anonymous survey, either in-person or online, and results were summarized and analyzed.

Results: Twenty-seven (27) providers attended the interactive session and twenty-three (23) filled out surveys afterwards. The results are summarized in Table 1. Overall, respondents viewed the “Best Case / Worst Case” tool positively, responding that they felt the tool would benefit patients (82.6%, 19 / 23), lead to improved use of resources while helping severely ill patients (73.3%, 11 / 15), and felt it would be a reliable tool (83.3%, 15 / 18). Additionally, most respondents indicated this tool was better than their usual approach (72.2%, 13 / 18), and that they would feel more comfortable having a Code Status conversation using this tool (77.8%, 14 / 18).

Conclusions: After a brief educational session, the “Best Case / Worst Case” tool was described by EM providers as both usable and acceptable. Further study of this and other tools to aid EM providers in leading goals of care conversations is indicated.
Factors Associated With Emergency Department Providers’ Prediction of One-Year Mortality Among Patients With Heart Failure: A Descriptive Analysis of the Surprise Question

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Study Objectives: Advanced heart failure (HF) is characterized by recurrent symptom exacerbations and elevated risk of mortality after an ED visit. While emergency physicians have proven adept at treating the presenting symptoms of HF, oftentimes the opportunity to facilitate connection with much needed palliative care or advanced care planning services is missed and holistic management suffers. Emergency physicians lack an accurate prognostic tool to help identify advanced HF patients at elevated risk of mortality who may benefit from referral to palliative care. The “Surprise Question” (SQ) has emerged as a simple prognostic tool, based on emergency physicians’ gestalt, that can aid in the identification of ED patients at risk for 1-year mortality. In this study, we aim to evaluate factors associated with the SQ in patients with advanced HF presenting to the ED.

Methods: Observational study of consecutive patients presenting to a single, urban academic hospital ED between 11/1/2016-2/1/2017. Any patient whose symptoms were suspected by the ED team to be secondary to heart failure were included. The attending physician responsible for care of each patient was asked to respond to the question “Would you be surprised if this patient died in the next 12 months?” Emergency physicians responded “No” if they would not be surprised if the patient died. Bivariate analysis of all variables was performed using Wilcoxon sum and chi square analysis. Standard deviations and 95% confidence interval (CI) were calculated.

Results: 194 patients were identified and data was available for 95% of observations (n=186). Emergency physicians responded “no” in 55% of cases (n=99). The mean age among the “no” group was 78.7 vs. 69.2 in the “yes” group (p < 0.05). There was no statistically significant difference between the two groups in the presenting vital signs, creatinine, or ejection fraction. Troponin and BNP elevation was twice as likely among the “no” group, as was frequent ED visits (24/99 vs 12/87). The only co-morbidity with statistically significant difference between the groups was anemia (34.7% vs. 12.5%; p < 0.05).

Conclusions: The SQ is a simple, single-question tool based on provider gestalt used to aid prognostication of 1-year mortality among patients with advanced illness. In an observational cohort, emergency physicians stated that they “would not be surprised” if 55% of their HF patients died in the next 12 months. Factors associated with predicting 1-year mortality included advanced age, history of anemia, and presence of elevated cardiac biomarkers. Future studies should evaluate the prognostic accuracy of the SQ for HF patients presenting to the ED.

Early Palliative Care Consultation Associated With Decreased Length of Stay

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Study Objectives: A growing body of literature supports early palliative care (PC) interventions as benefitting patients, families, as well as hospitals. Most critically ill patients begin their hospital journey in the emergency department (ED), thus increased consideration should be given to commence PC consultations in the ED. We sought to understand the effect PC consultation has on length of stay (LOS) once a patient is admitted and what aspects of the hospitalization affect LOS.

Methods: Through a descriptive cross-sectional study design, we evaluated data from all patients on whom PC was consulted from June - November of 2016 in an academic tertiary care hospital and trauma center. Variables we analyzed included patient’s age, primary diagnosis, service line that requested PC, date of admission, date of PC consultation, date of discharge, changes in code status, and disposition. Of the 286 patients enrolled, 260 had information on our department’s existing internal data collection form. Statistical analysis was conducted via Healthcare Environment Data and Survey Software (HEDSS), G-Power, and SPSS 22.0. LOS, as a dependent variable, was examined in relationship to independent variables, using several regression equations.

Results: The patients’ ages ranged from 31 - 110 (mode = 81). The most commonly reported primary diagnoses were cancer (n = 102), dementia (n = 48), cardiovascular disease (n = 40), and COPD (n = 15). Lung cancer was the most common type of cancer (n = 26), followed by head and neck (n = 11) and colon (n = 9). PC consultation was most commonly requested by private physician service lines (n = 88; p < 0.001), followed by hospitalists, then medical service. Admission to time of PC consultation ranged from 0 - 30 days (average days = 6.7 + 6; p < 0.001). Change in code status to new “do not resuscitate” orders were noted in 102 patients (60%). LOS declined over the length of the study by 3.4% (p = 0.003) with an average LOS of 15 days + 11 (range: 0 - 57 days). Most patients were discharged without hospice care (n = 203). Others were discharged with hospice to either home (n = 38), nursing home (n = 24), or an inpatient unit (n = 4).

Conclusions: A decrease in LOS was most significantly correlated with timing of initial PC consultation. The earlier consultations were requested, the greater impact on decreasing LOS. Another significant variable was the service line private physicians were more likely to request PC services earlier. This indicates a need to expand education of all residents and ED attendings to identify untimely PC needs. Studies have shown significant improvement in patient care and satisfaction with early PC consultation, especially in the ED. Our study adds to growing body of literature that early PC consultation may ultimately reduce LOS, prevent suffering by aggressive symptom management, avoid unnecessary hospital admissions, especially to intensive care settings, and decrease hospital costs.

Goals of Care Determination Prior to Transfer: A Missed Opportunity

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Study Objectives: To determine the prevalence of goals of care discussion documentation by sending institutions among adults transferred to our tertiary care medical center who died within the first 48 hours of their transfer.

Methods: We performed a retrospective chart review of patients 18 years and older transferred from outlying hospital emergency departments and inpatient units to our rural tertiary medical center as either floor level or critical care level patients from October 2011 through April 2016 who died within 48 hours of arrival. Data was abstracted from both the referring hospital’s documentation provided upon transfer and our electronic medical record. Physiologic and laboratory data was abstracted from the referring facilities chart or our electronic medical record reflecting the patient’s condition at the time of transfer; this was used to calculate the Charlson Age-Comorbidty Index. The presence of documented goals of care was specifically determined through review transfer documentation accompanying the patient. Data was analyzed using STATA 10 statistical software.

Results: A total of 181 patients met the inclusion criteria. The average age was 69.3 years and 47.5% were female. 76% of the referring hospitals were critical access hospitals. 45% came from emergency departments, 55% from inpatient units. The mean Charlson Age-Comorbidty Index score was 5.5±2.7. Mode of transfer to our facility was local EMS 52.5% of the time, critical care helicopter 32%, and critical care ground transport 15.5%. The cause of death was septic shock for 24.9%, cerebrovascular accident for 14.4%, and acute myocardial
infarction or cardiogenic shock for 12.7%. Documented goals of care discussion was available in 18 of 181 (10%) of transfer records. Our chart review revealed 22 (12%) instances of initial goals of care discussion taking place on admission to the hospital which resulted in the decision to transition to a comfort-based end-of-life care upon arrival. Care was transitioned to a comfort-based care within the first 24 hours for 88 (49%) of the patients.

Conclusions: While transfer to a higher level of care is often necessary, the sought after care should be in line with the patient’s goals. In this single center review of critically ill patients, it was striking that only 1 in 10 patients who were critically ill had a discussion about their goals of care addressed and documented prior to transfer. Although the decision to transfer a critically ill patient must often be made with in information, these results suggest an opportunity to improve on the current state. The 12% of patients transitioned to comfort-based care upon arrival to our hospital suggests an opportunity to improve patient care while also decreasing unnecessary transfer. Addressing goals of care along with aggressive medical interventions is important to providing a therapy consistent with our patients’ goals and avoiding costly and invasive treatments that do not align with their goals of care.

294 Treatment of Headache in the Emergency Department: Haloperidol in the Acute Setting
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Study Objectives: We sought to evaluate the efficacy and safety of 2.5 mg intravenous (IV) haloperidol in the treatment of benign undifferentiated headache in the emergency department (ED).

Methods: A randomized, double-blind, placebo-controlled trial utilizing a convenience sample to enroll 118 patients, 58 to the haloperidol group and 60 to the control group. Patients who presented to the ED with benign headache between the ages of 13 and 55 were enrolled. Patients were excluded if any of the following were present: high blood pressure (>200/100), sudden or rapid onset of headache, fever, acute trauma, history of masses, stroke, or abnormal intracranial anatomy, prolonged QT, GCS < 15, allergy to haloperidol, abnormal neurologic exam, CT scan of brain for that visit, pregnancy, prisoner or state ward. Patients were randomized to receive either 2.5 mg of haloperidol administered intravenously or 5 ml of 0.9% normal saline as placebo. Following drug administration, vital signs, visual analog scale (VAS) pain score and side effects were documented at 0, 30, 60 and 90 minutes. Individuals who did not exhibit a 50% reduction of pain at 60 minutes received IV ketorolac or metoclopramide as rescue. Akathisia was treated with IV diphenhydramine or lorazepam. QT measurement was performed prior to medication administration and at discharge. If both the study medication and rescue medication failed to improve the patient’s symptoms at 120 minutes, further treatment was to be determined by the primary emergency physician at their discretion. Phone calls were made to patients over 24 hours following discharge to collect final follow-up data.

Results: Patients in the haloperidol group reported a statistically significant reduction in VAS of -2.9 at 30 minutes versus -1.5 in the control group, and a -4.8 reduction in VAS at 60 minutes compared to -1.9 in the control group. Over 90% of patients reported a pain score of 7 or greater at time 0. The majority of patients in the haloperidol group (37 patients, 65%) experienced at least 50% pain relief at 60 minutes, with 20 of those patients (34%) reporting this level of pain relief at 30 minutes. Both of these time points for the haloperidol group were statistically different from the control group (p < 0.005). Conclusion: This study presents new data that 2.5 mg IV haloperidol is a safe, rapid and effective treatment for acute, severe, benign headache in ED patients aged 18-55.

295 Interhospital Transfer is Not a Predictor of In-Hospital Mortality for Patients With Nontraumatic Intracranial Hemorrhage
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Study Objectives: Interhospital transfer of acute, critically ill patients expose them to numerous care transitions and has been shown to potentially be associated with worse outcomes among trauma patients; however, little is known about the impact of interhospital transfer on patient outcomes for neurologic emergencies. Therefore, we sought to examine the relationship between interhospital transfer and in-hospital mortality for patients with nontraumatic intracranial hemorrhage.

Methods: We performed a retrospective, observational analysis of patients admitted to a tertiary, urban, academic medical center for non-traumatic intracranial hemorrhage between January and December 2015. Patients were identified based on emergency department diagnosis codes and hospital transfer logs. We included all patients with intracranial hemorrhage and excluded patients with trauma, age < 18, and those who expired in the ED. The primary outcome measure was in-hospital mortality. We describe the primary outcome between each route of care transition: 1) interhospital transfer between outside hospital ED to our ED and 2) no interhospital transfer (initial presentation in our ED). As a secondary analysis, we examined differences in in-hospital mortality among the subset of intracranial hemorrhage patients with subarachnoid hemorrhage (SAH), who are at highest risk of delays to surgical intervention. We constructed logistic regression models to also assess differences in mortality between care transition route adjusted for known predictors of mortality including: age, Glasgow Coma Scale, hyponatremia, narrow pulse pressure, elevated INR, and ED disposition to non-intensive care.

Results: A total of 277 patients were included in the study year. Of these, 148 (53.4%) arrived via interhospital transfer and 129 (46.6%) presented initially to our ED. There was no significant difference in in-hospital mortality between both groups in unadjusted analyses (21.6% vs. 16.3%, OR: 1.419, 95% CI: 0.77 - 2.64) or adjusted analyses (Beta coefficient for interhospital transfer 0.130, p = 0.730). In our secondary analysis of 95 patients with SAH, 64 (67.4%) arrived via interhospital transfer and 31 (32.6%) first presented to our ED. We found no difference in mortality between these groups in unadjusted analyses (21.9% vs 19.4%, OR: 1.09, 95% CI: 0.73 - 1.66) and no difference between these groups in adjusted analyses (Beta: 0.0, p = 0.98).

Conclusions: Among non-traumatic intracranial hemorrhage patients transferred to a regional, academic ED we found no increased odds of mortality in comparison to patients initially presenting to our ED. This held true for the subset of patients with SAH. These findings may be explained our small sample size, or by shorter travel times and a robust out-of-hospital provider program in our region. Future
studies should examine the risk of mortality in less regionalized acute care geographies. Given the perceived quality and safety risks reported by clinicians, future work should also explore outcomes beyond in-hospital mortality including more rare safety outcomes.

296 A Novel Use of Out-of-Hospital Telemedicine to Decrease Door-to-Computed Tomography Results in Acute Strokes
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Study Objectives: An acute stroke is estimated to occur every 40 seconds in the United States. Timely emergency department (ED) arrival and recognition is key to reducing morbidity and mortality. The primary objectives of this quality improvement initiative are to demonstrate the utility of out-of-hospital telemedicine to rapidly assess patients with stroke symptoms and mobilize resources prior to ED arrival; improve times to key metrics, such as door to computerized tomography (CT) scan and door to CT scan result. CT results are critical in determining thrombolytic therapy eligibility, the administration of which is time dependent on stroke symptom onset, as well as catheter-based interventions. The overarching goal is to reduce time to thrombolytic administration in appropriate candidates, thereby reducing morbidity and mortality, potentially improving long term function.

Methods: The Reading Hospital Emergency Department partnered with 5 local emergency medical service (EMS) agencies to equip 17 ambulances with the capability to conduct a non-recordable video interaction evaluation with an emergency physician. The equipment included an iPad with video capability, a mounting system, and noise canceling headphones for EMS and ED. EMS requested a physician video conference on any patient with a positive out-of-hospital Cincinnati Stroke Scale. The emergency physician conducted an NIH Stroke Scale with the paramedic. Paramedics were educated via an online presentation and hands-on competency. Patients with confirmed stroke symptoms were transported and placed directly on the CT scanner table where they were met by the emergency physician, brain attack nurse, and radiology technologist. After CT scan completion, the emergency physician and brain attack nurse completed the NIH Stroke Scale, along with a full history and physical.

Results: We measured four important time intervals in the management of acute stroke: ED arrival to CT order, ED arrival to CT start, CT order to CT result, and total time from ED arrival to CT result. We evaluated the times for patients transported to the ED via EMS vehicles equipped with telemedicine acute stroke symptoms. We compared patients who underwent a out-of-hospital telemedicine evaluation with those who did not have out-of-hospital telemedicine evaluation. We analyzed the times using a two-sample T-Test, comparing mean times of those receiving the intervention to those who did not receive the intervention. There was a statistically significant improvement in all time intervals for those patients undergoing out-of-hospital telemedicine stroke evaluation. Improvement in time from ED arrival to CT order 6.0 minutes, (95% CI, 3.6 to 8.5, p = 0.000). Mean time decrease from ED arrival to CT study start 12.0 minutes, (95% CI, 9.4 to 14.6, p = 0.000). Mean time decrease from CT order to CT result 6.9 minutes, (95% CI, 4.5 to 9.3, p = 0.000) and mean time decrease from ED arrival to CT result 12.6 minutes, (95% CI, 9.7 to 15.5 minutes, p = 0.000).

Conclusions: Out-of-hospital telemedicine for rapid assessment between paramedics and an emergency physician for acute stroke patients significantly decreased times for all metrics studied, including the time from ED arrival to CT result. Out-of-hospital telemedicine may have an important role in increasing the percentage of stroke patients eligible for thrombolytic therapy, and/or earlier catheter directed vascular intervention.

297 Utility of a Brief EEG Training Module On Improving Emergency Physicians’ Ability to Identify Nonconvulsive Seizure
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Study Objectives: Nonconvulsive seizures (NCS) and other EEG abnormalities are common in emergency department (ED) patients with altered mental status (AMS). NCS and non-convulsive status epilepticus (NCSE) are serious, treatable acute neurological emergencies given the time-dependent survival of neurons during seizure activity. Approximately 5% of ED patients with AMS have NCS (including NCSE). According to the literature, approximately half of the patients with NCSE are diagnosed more than 24 hours after arrival to the ED. Therefore there is a clear need for early, accurate diagnosis of NCS/NCSE by EEG and initiating the treatment as soon as possible. Early ED-based diagnosis and treatment of NCS/NCSE require that an EEG is recorded and interpreted in a timely fashion, as soon as the high risk for NCS/NCSE is determined. Since emergency physicians encounter such patients first in the ED, they should be familiar with general EEG principles as well as the EEG presentation of NCS/NCSE.

To test the utility of a brief training module in enhancing and assessing emergency physicians’ ability to identify seizure (NCS/NCSE) on EEG.

Methods: Randomized control trial conducted in 3 academic institutions. Board certified emergency physicians were recruited. Those with previous EEG training were excluded. Variables: Level of experience (years from graduation), sex, and test scores. Subjects were randomized to control or intervention groups using a random number generating software. Participants allocated to the intervention group received a self-learning PowerPoint presentation (training module) and were asked to take a quiz after reviewing the PowerPoint presentation. The control group was asked to take the quiz without reviewing the training slides. EEG training module: A slide presentation describing the basic principles of EEG including EEG recording techniques, montages, and views; followed by characteristics of normal and abnormal patterns was developed with the assistance of epileptologists and experts in educational research. The goal of the presentation was to familiarize the participants with EEG presentations of seizure. Test material: Participants in both groups were tested on their ability to identify abnormal from normal EEG as well as seizure by reviewing 20 test EEGs (one-page snapshots). These de-identified EEGs were previously recorded from actual patients. Each test EEG was accompanied by two questions: Normal or abnormal, and seizure vs no seizure. The test scores range from 0 (all wrong answers) and 40 (all correct answers). Outcomes: Overall correct percentage of test scores upon completion of the training. Data are reported as medians and quartiles. The medians for percentages of correct answers were calculated and compared between the two groups using Mann-Whitney-U test.

Results: A total of 30 emergency physicians were enrolled (10 per site, a total of 15 controls and 15 interventions). Participants were 52% male with median years of practice of 9.5 years (3,14). Groups were similar in regards to years of practice and sex. The percentage of correct answers in the intervention group (65%; 63%, 75%) was significantly different (p=0.002) from that of the control group (50%; 45%, 60%).

Conclusions: A brief self-learning training module improved the ability of emergency physicians in identifying seizure activity on EEG.

298 Who Gets tPA? Beyond the Basic Demographics
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Study Objectives: tPA is the standard of care for patients with 3-4.5 hours of an acute ischemic stroke who meet criteria, and yet only 50% of those eligible receive it. One of the ways to expand treatment availability is to study who gets tPA and who doesn’t, in order to address the gap.

To understand which segments of the population are most afflicted with the burden of stroke, and who among them gets tPA most frequently, and to see if there is a discrepancy.

Methods: Patients who presented to any of our network of 165 hospital emergency departments with symptoms consistent with acute stroke were included via ICD-9 codes. In addition to age, sex, and race, the tapestry segmentation category was obtained. Tapestry is a geodemographic segmentation where...
Results: 93,877 patients were in the cohort, which was 52% female. 6092 patients got tPA, for a rate of 7.6% after excluding intracranial hemorrhages. 73% were White, and 16% Black. The median age was 70, with an interquartile range of 58 to 80. 65% were Medicare. 44% were ultimately discharged home, 11% were sent to a skilled nursing facility, and 6% expired. In terms of tapestry segmentation for having a stroke, the 2 largest groups who had a stroke were 7C and 10A (8%), whereas the groups that got tPA most frequently were groups 7A and 2C (23%).

Group 7C are termed “American Dreamers” and consists of 1.7 million households with a median income of 48K. Most are married couples with children of all ages or single parents; multigenerational homes are common. Most residents derive income from wages or salaries, but the rate of poverty is a bit higher in this market. Approximately 63% hold only a high school diploma.

Group 10A, termed “Southern satellites” consists of 3.7 million households with a median income of 44K. Their median age is 39.7. This is typically a nondiverse market, where 1/3 are mobile homes. Married couples with no children are the dominant household type, with a number of multigenerational households. 40% have a high school diploma only.

Group 7A, within termed “up and coming families” is one of the 2 groups that got tPA most often includes more than 2.5 million up and coming families, with a median income of 64K and 66% college educated.

Group 2C, the other group to receive the highest rates of tPA, represents the “urban chic,” consists of 1.5 million households with a median age of 42.6, median income of 98K, and 60% are college educated. Compared to 7A, this group makes higher median income and is slightly older, but the thing the groups both have in common is that they are ambitious, working hard to get ahead, and willing to take some risks to do so.

Conclusions: tPA is given most often in young ethnic families as well as the urban chic. Compared to the groups in which strokes occur the most often, the groups that received tPA are better educated, have a higher employment rate, and a significantly higher income. Understanding the mapping of strokes vs. strokes that get tPA beyond simple characteristics such as sex and race may be helpful in helping to plan community based support programs for active treatment of stroke.

Study Objectives: The National Institutes of Health Stroke Scale (NIHSS) is a quantitative measure of stroke-related neurological deficit composed of 11 items rating speech and language, cognition, motor and sensory impairments, and ataxia. The score correlates with chronic functional outcome, hospital disposition after stroke, and in-hospital mortality. Furthermore, the score has a crucial role in guiding the decision to administer tPA. NIHSS score >22 and <4 (with no dysphasia) are relative contraindication to tPA administration. There have been several studies conducted to assess the validity and inter-rater reliability of NIHSS, including non-neurology physicians; however, there have not been studies investigating the proficiency of emergency medicine (EM) residents in assigning this score. This is critical to highlight as EM residents are not required to go through NIHSS certification process during their residency. The primary objective of the study is to assess the interobserver reliability in assigning NIHSS scores between EM and neurology residents. We compared and assessed for the discrepancies between initial NIHSS scores assigned by the EM and the neurology residents.

Methods: This is a retrospective chart review study in which all patients with a stroke alert between 1/1/2015 to 12/31/2015 were analyzed. NIHSS scores recorded on arrival by EM and neurology residents were reviewed. Data was extracted from medical records, emergency department (ED) records, and nursing charts. The differences in NIHSS scores assigned by EM and neurology residents were calculated. We compared overall and categorically assigned scores between both groups of residents. Descriptive statistics and t-test were used for analyses.

Results: A total of 201 cases reviewed, 106 of them were excluded due to incomplete/missing data. Ninety-five cases were included in the analysis. Overall, 72% of the time discrepancies were found between the scoring of the EM and the neurology residents. Concordance on NIHSS scale were 28.4% between EM and neurology residents. When comparing the overall scores assigned by EM and neurology residents, there was no statistical difference (p=0.31). However, on reviewing of individual categories, we detected differences between EM and neurology residents in assessing limb ataxia (p=0.023) and extinction and inattention (p=0.046). There were no differences noted in the other 13 categories.

Conclusions: We found discrepancies between the overall and individual component of NIHSS scores assigned by EM compared to neurology residents. Failure to identify subtle but debilitating neurological deficiencies such as ataxia, extinction, and inattention by emergency physicians might lead to inaccurate assessing the degree of deficits which may preclude the decision to administer tPA by emergency physicians. We should strongly consider the inclusion of NIHSS competency training should perhaps within EM residency curriculum.

Study Objectives: Among the patients who revisit the emergency department, we studied: 1. The proportion of emergency department return visit. 2. The causes of emergency department return visits. 3. The outcome of the second visit. 4. The level of physician who treated the patient in the first visit.

Methods: This is a retrospective observational study (chart review) of all patients who revisited the emergency department at King Fahad University Hospital in the period of January 2016 to May 2016 within 72 hours of their initial emergency visit. Five-month period was chosen to overcome the seasonal variation that might have an effect on the revisit rate. We excluded patients who came after 72 hours and patients who were seen in another emergency departments. Factors possibly contributing to the revisit were categorized to physician-related, patient related and system related factors. Physician related included suboptimal management and no improvement of symptoms, complications of disease and or treatment, called back for abnormal investigation results, follow-up and admission. Patient factors included recurrence of same complain, no improvement of symptoms or for medication refill. System related factors included follow-up, called back for abnormal investigations, for admission and refill medications. The authors identified the participants using electronic database and their charts were pulled for analysis. A predefined tested form was used to collect the data from the electronic and printed medical records by trained research coordinators.

Results: 79279 patients visited ED during the study period, among them 1000 patients had revisit within 72 hours which represent (1.6%). 51.3% (n=513) of them were males and 48.7% (n=487) were females with a mean age of 31.5 with SD 17.7. Majority of them (57.1%) have no comorbidity, followed by hypertension (11%), Bronchial asthma accounts for (10.5%). Of the revisit patients, 86.1% (n=770) were initially managed by resident physician, 13.3% (n=119) by specialists and consultants in 0.6% (n=5) of cases. The majority of the revisits patients were of triage category IV with 59.8% (n=594). Patient-related causes for ED revisits were the most reported attributed factors seen in 635 patients (63.5%), followed by physician-related factors in 167 patients (16.7%) and the least were system-related factors seen in 42 patients (4.2%). The recurrence of the same complaint was the highest among the patient-related factors (80.5%) and suboptimal management and no improvement of symptoms in 71.3% among the physician-related factors. The most common ED revisits complaints were fever 29.1% (n=291), then abdominal pain and vomiting in 12.4 % (n=124), followed by body and back pain in 9.7 % (n=97), headache in 9.5% (n=95), cough in 8.5% (n=85), trauma in 6% (n=60), dizziness in 3% (n=30), shortness of breath in 2% (n=20) and others 19.8% (n=198). The final outcomes of the revisit to the ED were mainly discharge of 96.7% (n=967), admission of 1.2% (n=12) and death in 0.2% (n=2).

Conclusions: Recurrence of the same complaint, no improvement of symptoms and suboptimal management by the physician as well as being assessed initially by a resident physician contributed to the most of the ED revisits within the 72 hours. Emphasizing and encouraging the physicians on giving the patients clear instructions and educating them upon discharge regarding the disease and its red flags and when to come back to the emergency department might help in decreasing the revisit rate.
301 Barriers to Prescribing Stroke Prophylaxis for Atrial Fibrillation in the Emergency Department: A Qualitative Provider Perspective

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Study Objectives: Current guidelines recommend oral anticoagulation (OAC) to reduce stroke risk in high-risk atrial fibrillation (AF) patients. However, emergency department (ED) prescribing is inconsistent. The provider factors influencing OAC prescribing in the ED are unknown. This study aimed to identify factors that prevent and support OAC prescribing for AF by ED physicians.

Methods: These results are part of a larger study to identify barriers to optimal atrial fibrillation management in the ED at a tertiary care academic hospital. We completed semi-structured interviews with 18 providers who had treated a patient for new-onset AF in the ED within the previous 30 days. A qualitative, grounded theory framework was applied to data collection and analysis to develop a theoretical foundation to examine prescribing practices among physicians in a single ED setting. Data collection, transcription, and analysis were conducted simultaneously, using line-by-line coding and constant comparative analysis in Atlas.ti, and reviewed for agreement by two analysts. We stratified data by years of experience: 0-4, 5-10 and greater than 10 years post-residency.

Results: Two themes emerged in our analysis: (1) OAC prescribing at the time of discharge and (2) variable use of guidelines for OAC prescribing in our analysis. OAC prescribing: Stratification by years of experience demonstrated that providers with less than 10 years of experience are least likely to prescribe anticoagulation at discharge unless the patient was already on an OAC medication. Alternatively, these providers will consult with cardiology if the patient was already on an OAC medication. However, providers with greater than 10 years experience frequently discharge patients on OAC, with only a few relying on a cardiology consult. Regardless of experience, ED providers consider multiple issues in the decision-making process for OAC prescribing: stratification by years of experience demonstrated that providers with less than 10 years of experience are least likely to prescribe anticoagulation at discharge unless the patient was already on an OAC medication. Alternatively, these providers will consult with cardiology if the patient was already on an OAC medication.

Conclusions: The decision to prescribe OACs is complex and multifaceted and involves the close collaboration with the primary care provider, type of insurance, and several social factors. Guideline use: Irrespective of how long they have been in practice, the majority of providers indicated that they are unaware of, and do not typically use, particular guidelines or protocols when treating patients with AF in the ED. Providers that do utilize existing guidelines cited CHADS2, CHADS2-VASc, and HAS-BLED, as well as expert opinion. There were statistically significant differences in age, sex, or race between patients admitted to the ED, ICU, or those who required ICU step-up. The median hospital length-of-stay of ICU step-up patients was 172.9 hours, with a 95% confidence interval (92.5-330) that is not different from the ICU (157.8, 79.2-227.1). Based on this result, there was a significant difference in the transfer EWS score for step-up patients being admitted to Pulmonary Medicine (2.37 ± 2.10 vs. 1.26 ± 1.62, p = 0.002) compared to ward patients (1.0 ± 1.35, p < 0.0001). Additionally, using a previously validated screening cut-off score of 4, roughly 18% of patients who decompensated would have triggered an alert at time of discharge, as compared to only 6% of patients who remained stable. A pre-defined subgroup analysis revealed a significant difference in the transfer EWS score for step-up patients being admitted to Pulmonary Medicine (2.37 ± 2.10 vs. 1.26 ± 1.62, p = 0.002) and those whose admitting diagnosis was sepsis/infection (2.32 ± 1.89 vs. 1.46 ± 1.61, p = 0.02) compared to similar patients who remained on the ward.

Conclusions: Patients requiring ICU step-up had significantly increased length of stay and mortality compared to ward patients, consistent with previous studies. Despite only minor differences in individual vital signs, the average EWS for step-up patients was significantly higher than ward patients, and was even more notable in certain patient subgroups. These results support the use of an electronic EWS at time of transfer to screen for patients at risk of early clinical deterioration.

302 Use of a Modified Early Warning Score to Predict Early Clinical Deterioration in Admitted Emergency Department Patients

Glick J, Harrington D, Greenwood J, Shofer F/Hospital of the University of Pennsylvania, Philadelphia, PA

Study Objectives: Early Warning Scores (EWS) have been validated as a means of identifying patients at risk of physiologic deterioration and who may benefit from early transfer to an intensive care unit (ICU). Delays in the ICU transfer of these patients (“step-ups”) are associated with increased morbidity and mortality in both admitted and emergency department (ED) patients. Several studies have also found that EWS systems can be used in the ED to predict disposition, cardiac arrest, and even mortality. The goal of this study was to determine if an EWS, based on the last set of vital signs prior to admission, could identify patients at risk for deterioration within the first 48 hours of inpatient care.

Methods: This retrospective study examined patients presenting to two urban, academic, tertiary care hospitals over a six-month period. All ED patients who required inpatient admission were included for review. The last set of vital signs prior to departure from the ED, as well as data regarding length of stay, admitting service, admitting diagnosis, and mortality was collected. Using this data, a modified EWS was then calculated using the previously validated scoring system. Data from patients who underwent an escalation of care within 48 hours of hospital admission was compared to patients who remained in the ward. Subjects were screened for differences in baseline characteristics, transfer vital signs, EWS score, and ultimate patient outcomes.

Results: Data sets were available for 2,240 patients, with 119 of those patients experiencing an ICU step-up. There were no statistically significant differences in age, sex, or race between patients admitted to the ward, ICU, or those who required ICU step-up. The median hospital length-of-stay of ICU step-up patients was 172.9 hours, with a 95% confidence interval (92.5-330) that is not different from the ICU (157.8, 79.2-227.1). Based on this result, there was a significant difference in the transfer EWS score for step-up patients being admitted to Pulmonary Medicine (2.37 ± 2.10 vs. 1.26 ± 1.62, p = 0.002) compared to ward patients (1.0 ± 1.35, p < 0.0001). Additionally, using a previously validated screening cut-off score of 4, roughly 18% of patients who decompensated would have triggered an alert at time of discharge, as compared to only 6% of patients who remained stable. A pre-defined subgroup analysis revealed a significant difference in the transfer EWS score for step-up patients being admitted to Pulmonary Medicine (2.37 ± 2.10 vs. 1.26 ± 1.62, p = 0.002) and those whose admitting diagnosis was sepsis/infection (2.32 ± 1.89 vs. 1.46 ± 1.61, p = 0.02) compared to similar patients who remained on the ward.

Conclusions: Patients requiring ICU step-up had significantly increased length of stay and mortality compared to ward patients, consistent with previous studies. Despite only minor differences in individual vital signs, the average EWS for step-up patients was significantly higher than ward patients, and was even more notable in certain patient subgroups. These results support the use of an electronic EWS at time of transfer to screen for patients at risk of early clinical deterioration.

303 Early Identification and Intervention in Patients With Atrial Fibrillation in the Emergency Department Can Significantly Improve Guideline-Based Anticoagulation and Reduce the Risk of Stroke

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Study Objectives: Although nonvalvular atrial fibrillation (NVAF) patients are at a 4 to 5-fold increased risk of stroke, high-risk patients are undertreated. The PINNACLE Registry reported that 40.2% of patients with a CHA2DS2-VASc score greater or equal to 2 are treated with aspirin only, despite American College of Cardiology and American Heart Association Guideline recommendations for anticoagulation. Sharp Chula Vista Medical Center piloted a study in the emergency department (ED) involving a multidisciplinary team approach to manage the treatment gap in this population. The team consists of emergency physicians, electrophysiologists (EP) and the ED pharmacist, all collaborating in a shared decisionmaking model to identify, assess, and initiate guideline-based oral anticoagulation (OAC) in high-risk NVAF patients.

We aim to decrease the treatment gap by utilizing a multidisciplinary approach to increase the percentage of properly anticoagulated high-risk patients at discharge. The study will compare the percentage of patients on OAC at admission and discharge for the baseline group vs intervention group (multidisciplinary team) to observe if our method will significantly impact the treatment gap.

Methods: All NVAF patients were identified by EKG or device interrogation by the emergency physician upon arrival. A standardized risk-scoring process and referral to the EP Panel for consult was established to evaluate all patients presenting to the ED with a diagnosis of NVAF. The ED pharmacist calculates the CHA2DS2-VASc and HAS-BLED scores to determine eligibility and to initiate proper OAC in high-risk patients using a shared decisionmaking model. When OAC is prescribed, the ED pharmacist provides transitions of care services by expediting access to the medication, providing med-to-bed service and post-discharge follow-up with assistance in scheduling post-discharge appointments with the specialists (eg, electrophysiologist and/or cardiologist).

Results: In the Baseline Group (n = 99), 62.3% of patients with a moderate-high risk of stroke (CHA2DS2-VASc score ≥ 2) were discharged on guideline-based OAC therapy.
In the Multidisciplinary Team Cohort group (physicians and pharmacist, n = 131), 87.8% of patients with a moderate-high risk of stroke were discharged on guideline-based OAC therapy, a 25.5% improvement in the treatment gap for appropriate anticoagulation in high-risk NVAF patients (p-value < 0.001, 95% CI (0.14-0.37)). This comparison is a combination of patients admitted through the ED and discharged home from the ED or from inpatient admission.

Conclusions: Early identification and intervention of NVAF patients in the ED can significantly improve the percentage of high-risk patients that are discharged home with proper OAC. Although current guidelines do not clearly indicate the ED physician’s role in prescribing chronic OAC, our study demonstrates that a multidisciplinary shared decision-making model can successfully address the current treatment gap. We hope the results of our study will promote the implementation of this multidisciplinary model in EDs around the United States, as well as advocate for the American College of Cardiology to collaborate with ED organizations to create ED-specific guidelines for the management of atrial fibrillation.

304 The Effect of Emergency Department Crowding on Mechanical Ventilation Practice Patterns: An Observational Study
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Study Objectives: Best practices for mechanical ventilation favor lung protective ventilation (LPV) strategy with tidal volume settings of ≤ 8 ml/kg predicted body weight, especially for patients at risk for acute respiratory distress syndrome (ARDS). We aimed to identify patient factors associated with LPV usage for patients on mechanical ventilation in the emergency department (ED) and to measure the effect of ED crowding on LPV adherence.

Methods: We conducted a retrospective chart review of all adult (≥18 years) mechanically ventilated patients in the ED who were admitted to the Medical Intensive Care Unit (ICU) between January 2012 and June 2015, at a single urban, academic tertiary-care center with a high volume ED. Patient characteristics, severity of illness (Mortality Probability Model-III on admission, MPMIII; ED Lung Injury Prediction Score, ED-LIPS), and hospital clinical course were obtained through the electronic medical record via standardized chart abstraction. ED census variables were obtained at 5-minute intervals for the duration of mechanical ventilation in the ED and were averaged out by total patient counts, stratified by acuity and disposition. Ventilator settings were obtained at initial recording in the ED, final recording in the ED, and initial recording upon arrival to the ICU. Bivariate analysis and multivariate logistic regression models were utilized to predict likelihood of LPV adherence prior to departure from ED.

Results: During the study period, 455 patients (52.1% female) received mechanical ventilation in the ED. The study cohort had a mean age of 52.2±16.0 years, mean body mass index (BMI) of 28.1±8.5 and median ED time on mechanical ventilation of 3.8 hours (interquartile ratio, IQR, 2.3, 5.9). The mean ED-LIPS was 7.2±2.6 and of the 573 patients with an ED-LIPS ≥ 5, 31 (8.3%) were diagnosed with ARDS by ICU admission. Initial ED and final ED ventilator settings differed in 101 (22%) patients, whereas final ED and initial ICU ventilator settings differed in 296 (65.1%) patients. A significantly lower proportion of female patients were placed on LPV, compared to males (33.3 vs. 80.7%, p<0.001). Median BMI was significantly lower in patients placed on LPV (25.2, IQR 21.7, 29.7 vs. 28.2 IQR 24.2, 33.4; p<0.001). In the multivariate model controlling for patient factors, lower odds of LPV adherence were seen when there were higher proportions of ED patients requiring admission (OR 0.03; 95% CI 0.01, 0.83) and higher proportions of ED patients without a disposition decision (OR 0.05; 95% CI 0.01, 0.96). MPMIII score, ED-LIPS, and ARDS diagnosis were not significantly associated with differential odds of LPV usage.

Conclusions: Though lung protective ventilation is recommended for all intubated patients, ED patients often receive excessive tidal volumes and remain on unchanged settings from ED intubation through ICU admission. LPV was underutilized in female patients and those with higher BMIs. Subgroups of patients for whom providers may be misestimating predicted body weight. To our knowledge, this study is the first to quantify the negative impact of ED crowding on the likelihood of a patient receiving LPV. Hospitals should focus on systematic efforts to increase LPV adherence in times of crowding, especially for patients at risk or with a diagnosis of ARDS.

305 Language Assistance for Limited English Proficiency Patients in the Emergency Department: Determining the Unmet Need
Taiara BR, Orue A/Olive View-UCLA Medical Center, Sylmar, CA

Study Objectives: Many patients who present to public emergency departments (EDs) have limited English proficiency (LEP). LEP patients have worse understanding of their conditions and high rates of ED readmission often due to poor understanding of their care. LEP patients are entitled to language assistance under title IV of the 1964 Civil Rights Act. The objective of this study is to characterize the unmet need for language assistance in a public ED.

Methods: Retrospective chart review of 48 hours of successive patients in a public ED. Registration workers ask each patient their preferred language and whether they would like an interpreter. On recent implementation of a new electronic health record, however, providers were unable to see the responses recorded by registration. When discovered, this created a natural experiment to compare patient request for language assistance with documented practice of the providers who were unaware of the patient’s stated preference. Setting: A public ED, annual census of 50,000 visits, with language assistance services available 24/7 via video units and phone line. Subjects: All patients presenting to the ED for a 48-hour period. Those with altered level of consciousness and those who left before being seen were excluded. Measures and outcomes: Age, race, ethnicity, preferred language, preference for language assistance, status of the provider as certified bilingual, documentation of language assistance use, type of language assistance (video, phone, bilingual staff or ad hoc), and language concordance of discharge instructions (preprinted handouts and free-text instructions) were captured. Quality of Spanish language free-text discharge instructions was graded as Y/N for presence of obvious errors in the Spanish translation. The unmet need was determined for both spoken and written language assistance. Analysis: Descriptive statistics were used with proportions and 95% CIs to describe the unmet need. Spanish free-text instructions were rated by two independent observers and interrater reliability reported with the kappa statistic.

Results: In total, 253 encounters met inclusion criteria. Mean age was 41 years, 201/253 (79.5%) were Hispanic or Latino, and 134/253 (53%) preferred a language other than English (97% Spanish, 2% Armenian and 0.8% Tagalog). Of the 110/253 (43%) requesting language assistance, 12 (10.9%) were seen by a certified bilingual provider and 5 (4.6%) had documentation by the primary provider that language assistance was used. The calculated unmet need for spoken language assistance in our ED was 93/110 (84.5%) of patients requesting language assistance or 93/253 (36.8%, 95% CI 31-42.9%) of total ED patients. Of the 110 patients requesting language assistance, 95 were discharged from the ED, 66/95 (69%) received a language concordant preprinted discharge instruction sheet, and 32/95 (33.7%) received free text instructions in Spanish, of which 24/31 (77.4%) had obvious errors in translation (kappa=0.81). The unmet need for language concordant written instructions was 29/95 (30%) of those requesting language assistance or 29/253 (11.5%, 95% CI 8.1-16.1%) of total patients.

Conclusions: In this public ED, there is a large unmet need for language assistance for LEP patients. Future research will test interventions to promote the use of language assistance by providers to improve care for this at-risk group.

306 Utility of Steroid Use in Prevention of Biphasic and Protracted Anaphylaxis
Harina M/SUNY Downstate, NY

Study Objectives: To determine the efficacy in the prevention of biphasic and protracted anaphylaxis in pediatric patients in the emergency department (ED) using systematic review and meta-analysis approach. Using a test-treatment threshold model we studied whether administration of steroids in pediatric emergency departments effectively prevented episodes of protracted and biphasic anaphylaxis.

Methods: We searched PUBMED, EMBASE, SCOPUS, and research meeting abstracts from January 1966 to April 2017 for studies on pediatric patients presenting to the ED with either anaphylaxis or anaphylactoid reactions. We used Quality Assessment Tool for Diagnostic Accuracy Studies (QUADAS-2) to evaluate quality of included studies. The operating characteristics of the interventions in prevention of biphasic and protracted anaphylaxis were measured. We included prospective
randomized and quasi-randomized controlled trials comparing glucocorticoids with any control (either placebo, adrenaline (epinephrine), an antihistamine, or any combination of these).

Results: A total of 204 patients with biphasic anaphylaxis were identified with follow-up. All patients either experienced confirmed biphasic or protracted reactivity. Average time to onset of the second phase was 10.2 hours (CI: 2-38). Time to resolution of initial symptoms was significantly longer for biphasic reactors (112 vs 133 minutes; P = .03). All biphasic and protracted anaphylactoid reactions received corticosteroids. Most importantly, patients who received steroid administration vs those who did not were equally as likely to experience protracted and biphasic reactions (P=.04).

Conclusions: Biphasic and protracted anaphylaxis is a potential outcome for those experiencing anaphylactoid reactions. Prevention of this outcome is primarily unproven and based on observed data; there is no benefit of steroid administration in the prevention of biphasic/protracted anaphylaxis. This necessitates the need for further investigation into their efficacy.

**307 Early Transport Versus On-Scene Management of Pediatric Out-of-Hospital Cardiac Arrest**
Banerjee PR, Pepe PE, Singh A, Ganti L/University of Central Florida/HCA GME Emergency Medicine Residency Program of Greater Orlando, Orlando, FL; School of Public Health and Office of Health System Affairs, the University of Texas Southwestern Medical Center, Dallas, TX

**Study Objectives:** To evaluate neuro-intact survival when comparing traditional early transport for pediatric out-of-hospital cardiac arrest (POHCA) to a more focused orientation emphasizing on-scene resuscitation.

**Methods:** Setting: A county 9-1-1 EMS agency using a comprehensive Utstein-style database with prospective collection of all relevant data for adult and POHCA cases. Prior to 2014, EMS crews only provided certain initial rapid interventions for POHCA on-scene but then transported soon after arrival. Intervention: In 2014, based on other published database analyses associating better outcomes with increased scene time, applicable training was introduced to purposefully support care provider comfort with on-scene resuscitation efforts including methods to expedite treatment while on-scene. Neuro-intact hospital discharge rates for the 2 years prior to the roll-out of the new approach were compared to the 2 years following roll-out. Protocols for the entire 4 years followed the 2010 American Heart Association guidelines. The main change was the training which also included psychological and cognitive management strategies for on-scene POHCA care.

Results: EMS crews encountered 94 consecutive POHCA cases, 38 in period 1 (2012-13) and 56 in period 2 (2014-15), the majority of which presented with asystole (74%) and PEA (14%) and only one ventricular dysrhythmia. The mean on-scene time was 15 min in period 1 and 18 min in period 2, but a large proportion of those intervals involved non-treatment time, both in finding the patient and in departing the scene and loading into the ambulance. In resuscitated patients, however, the time to epinephrine fell from 16.5 to 7.25 min, and children were intubated and received an intravenous site more often on-scene. There were no other significant differences before and after the new protocol in terms of age, sex, presenting rhythm or sequence of drug infusions. However, the rates of return of spontaneous circulation (ROSC) rose dramatically after the intervention, from 2 of 38 (5.26%) to 17 of 56 (30.4%); p = 0.0004 by 2-tailed Fisher’s exact test) with a resulting survival to hospital discharge with intact neurological status improving almost immediately in 2014 (23.8%) and sustained throughout 2015 (22.9%), totaling 13 of 56 (23.2%) intact survivors in 2014-2015 versus 0 of 38 during 2012-2013 (p = 0.0006).

Conclusions: While dealing with critically ill children can be anxiety-producing, a common resulting practice of early hospital transport may be detrimental. Based on this study and other published correlative data, encouraging and supporting well-planned, expedited on-scene management of POHCA cases can result in substantial improvements in life-saving. Although this was a historically-controlled study, the profound elevation in survival rates was immediate and sustained (Fig). The specialized training involving pre-arrival psychological tools, more efficient treatment strategies and trusted encouragement from medical supervisors likely played the most significant roles and not necessarily extended scene times in themselves.
anticonvulsant needs. During seizure neuroresuscitation, hemispheric rSO2 has shown its utility as an adjunct neurologic tool and should be included in acute neurologic monitoring.

### 309 D-Dimer in Children With a Radiographically Diagnosed Pulmonary Embolism

**Sharaf N, Mace SE/Cleveland Clinic Emergency Services Institute, Cleveland Clinic Lerner College of Medicine, Cleveland, OH**

Study Objectives: Pulmonary embolism (PE) is an important cause of morbidity and mortality. Guidelines for the diagnosis and treatment of PE in adults use D-dimer testing to aid in risk stratification. Currently, the usefulness of D-dimer assays for PE in children is unknown. This study aims to evaluate the use of D-dimer in pediatric patients with a radiographically diagnosed PE and suspected PE.

Methods: This is a sub-analysis of a retrospective chart-review of patients ≤21 years, presenting with a PE diagnosed by CTA or high-probability VQ. Data was collected from 1 ED/hospital from 1996 to 2016 and from another 3 ED/hospitals across 2 states from 2013-2016. D-dimer results from pediatric patients with a PE were compared with a control group of high-risk pediatric patients being evaluated for suspected PE by CTA.

Results: Out of 144 patients, 45.1% (65/144) had a radiographically confirmed PE and 54.9% (79/144) had suspected but negative PE by CTA. Of patients with a radiographically confirmed PE, 96.9% (63/65) were diagnosed by CTA and 3.08% (2/65) high-probability VQ.

There were no significant differences in demographics for PE versus suspected PE patients: median age 19.3 years (13.5-21.9) versus 18.9 years (10.0-21.9), female 70.8% (46/65) versus 69.6% (55/79), Caucasian 56.9% (57/65) versus 53.2% (42/77), African American 36.9% (24/65) versus 27.8% (22/79), and other 4.62% (3/65) versus 3.80% (3/79).

D-dimers drawn less than 4 days from onset of symptoms were obtained in 69.2% (45/65) of patients with PE and 98.7% (78/79) patients without PE. Elevated D-dimers were falsely-negative in 11.1% (11/100) of patients with PE and 54.9% (21/38) of patients without PE. D-dimer in pediatric patients with PE was higher in those with central PE compared with peripheral PE. D-dimer in pediatric patients with PE is sensitive but not specific.

### Characteristics of patients with a false-negative D-dimer

<table>
<thead>
<tr>
<th>D-dimer ng/mL</th>
<th>Age (years)</th>
<th>Sex</th>
<th>Chief complaint</th>
<th>History</th>
</tr>
</thead>
<tbody>
<tr>
<td>99</td>
<td>16.1</td>
<td>F</td>
<td>Acute onset SOB</td>
<td>OCP 20-year-old cousin died from a blood clot</td>
</tr>
<tr>
<td>137</td>
<td>21.3</td>
<td>F</td>
<td>Acute onset pleuritic CP, palpitations</td>
<td>Congenital adrenal hyperplasia</td>
</tr>
<tr>
<td>190</td>
<td>21.9</td>
<td>F</td>
<td>Acute SOB, non-pleuritic CP, hemoptysis</td>
<td>Injectable hormonal birth-control</td>
</tr>
<tr>
<td>460</td>
<td>18.5</td>
<td>F</td>
<td>Non-pleuritic CP, hemoptysis</td>
<td>OCP Brother: sickle-cell trait</td>
</tr>
<tr>
<td>499</td>
<td>16.9</td>
<td>M</td>
<td>Acute onset SOB</td>
<td>Congenital pulmonary stenosis Grandfather died of HCM</td>
</tr>
</tbody>
</table>

### 310 Assessment of Smartphone Otoscope Use on Diagnosis and Management of Ear Complaints in a Pediatric Emergency Department

**Chan KN, Silverstein A, McCracken CE, Little WK, Shane AL/Emory University, Atlanta, GA; Children’s Healthcare of Atlanta, Atlanta, GA**

Study Objectives: Acute otitis media is a leading cause of health encounters and antimicrobial prescriptions in children worldwide. This diagnosis accounts for over two million emergency department visits annually. A smartphone otoscope device (CellScope-Oto) employs the technology and light source of a smartphone to capture reproducible images of the ear canal and tympanic membrane. We hypothesized that the rates of antimicrobial prescribing by pediatric emergency department (PED) physicians using a smartphone otoscope would be less than the rates of those using a conventional otoscope.

Methods: We conducted a randomized controlled study in two affiliated children’s hospital emergency departments. Eleven volunteer PED physicians were randomly assigned to use a smartphone otoscope and 10 to use a conventional otoscope for a six-month period from October 2016 to April 2017 for otic examinations performed for a non-traumatic chief complaint. Electronic medical records for eligible encounters were abstracted; statistical analyses were performed using SAS v.9.4 (Cary, NC). Physicians assigned to use the smartphone otoscope completed an acceptability survey at the conclusion of the study period.

Results: Five hundred encounters were reviewed; 480 (96%) were included. One-hundred and sixty-seven (35%) were completed by smartphone otoscope users. Among the patients examined, the mean age of those examined with conventional and smartphone otoscopes were 3 years and 3.5 years, respectively. The prevalence of tympanic tubes (p=0.01) and ear pain (p=0.03) was significantly greater in the patients examined by the smartphone than the conventional otoscope users. Smartphone otoscope users documented notable left ear exam findings in 50 (30%), p=0.01 and notable right ear exam findings in 43 (26%), p=0.18 compared with conventional otoscope users. Otocone users diagnosed acute otitis media in 49 (29%), p=0.05 and prescribed an antibiotic in 45 (92%), p=0.65 of these encounters, compared with conventional otoscope users.

Controlling for age and tympanostomy tube presence, logistic regression demonstrated that physicians assigned to use the smartphone otoscope were more likely to prescribe an antibiotic for a diagnosis of acute otitis media (OR=1.69, p=0.03) and for any otic examination abnormality (OR=1.89, p=0.01) than physicians assigned to use a conventional otoscope. Handling the device while using the application “app” software was reported to be more cumbersome than using a conventional otoscope; however image quality was reported as being equal or better than that of a conventional otoscope. The capability to share still images and videos captured by the smartphone otoscope during the otic examination for education and documentation was reported as beneficial.

Conclusions: Our findings suggest that increased rates of otic abnormalities and subsequent antimicrobial prescribing among smartphone otoscope PED physicians...
compared with conventional otoscope users may have resulted from improved visualization during the otic examination. The ability to share and document otic exam images with a smartphone otoscope has the potential to improve care of children with otic complaints in the PED.

311 Are Pediatric Senior Residents Ready to Perform as Team Leaders During Pediatric Codes?
Doyman S, Rizvi M, Stefanov D, Kim J, Giambruno C/Downstate Medical Center, Brooklyn, NY

Study Objectives: With scarcity of exposure to real codes during pediatric residency training, mock codes provide an opportunity to increase trainee's confidence, knowledge, and comfort in managing pediatric emergencies.

We hypothesized that pediatric senior residents perform better as team leaders if they are exposed to weekly mock codes compared to monthly mock codes during their training.

Methods: Prior to implementation of weekly mock codes, our residents were exposed to them monthly. They were tested as code leaders at baseline (control group) before implementation of weekly mock codes and again one year after implementation. Leadership skills were assessed by using Team Emergency Assessment tool (TEAM). TEAM rates 11 behavioral aspects of the whole team on a Likert scale of 0-4. Paired t-test was used to compare mean TEAM scores between the groups. SAS 9.4 (SAS Institute Inc. Cary NC) was used for the analysis. P<0.05 was considered statistically significant.

Results: Senior residents' leadership skills improved after exposure to weekly mock codes on average by 9.6 points (71.93 vs 81.4 respectively, p = 0.01). Teamwork and task management skills also improved although not statistically significant.

Conclusions: Senior residents should be exposed to frequent simulation sessions in order to achieve milestones in emergency preparedness and skills as leaders in case of real life code.

312 Chronic Subdural Hemorrhage After Mild Traumatic Brain Injury Among Patients With Antiplatelet Therapy: A Population-Based Cohort Study
Su Y-C/Dalin Tzu Chi Hospital, Buddhist Tzu Chi Medical Foundation, Chiayi, Chiayi County, Taiwan

Study Objectives: Mild traumatic brain injury is a common occurrence at the emergency departments worldwide. Nowadays the antiplatelet drugs are increasingly prescribed and there is a general feeling about the higher risk of brain hemorrhage in this population. However, there are few studies focused on the risks of chronic subdural hemorrhage in antiplatelet drugs users after mild traumatic brain injury.

In this study, we aim to verify the risks for chronic subdural hemorrhage in patients under antiplatelet prescription suffering from mild traumatic brain injury.

Methods: The data from 1,000,000 National Health Insurance beneficiaries in Taiwan were utilized. The study cohort consisted of 2584 antiplatelet drugs users (60 with dual-antiplatelets prescription) and 55,802 unexposed subjects. All experienced at least one episode of mild traumatic brain injury among 1 January 2005 and 31 December 2013. Patients were followed from 14th day after mild traumatic brain injury to 2 months to evaluate if they were admitted to receive surgeries for chronic subdural hemorrhage. Cox regression models were applied to compare the hazards adjusted for potential confounders.

Results: After controlling for age, sex, urbanization level, socioeconomic status, chronic liver disease, hypertension, coronary artery disease, hyperlipidemia, malignancies, smoking, chronic obstructive pulmonary disease, obesity, history of alcohol intoxication, chronic renal insufficiency and Charlson Comorbidity Index score, the adjusted hazard ratios of chronic subdural hemorrhage were 3.24 (95% confidence interval, 1.60—6.54). In patients with dual-antiplatelets prescription, the hazard ratio of chronic subdural hemorrhage was significant higher (hazard ratio, 10.62; 95% confidence interval, 1.43—79.07).

Conclusions: This cohort study provided evidence of antiplatelet prescription and risks of chronic subdural hemorrhage in patients with mild traumatic brain injury. Clinicians should weight the benefits and harms of keeping antiplatelet drugs prescriptions when facing this common situation.

313 Evaluation of Phenylalanine and Tyrosine Concentrations in Traumatically Injured Patients
Johnston BE, Quigley CA, Griffin SM, Limkakeng AT Jr., Darrabie MD, Cheeseman JA, Kirk AD, Elster EA, Surgical Critical Care Initiative (SC2i)/Duke University Medical Center, Durham, NC; University of Florida, Gainesville, FL; Uniformed Services University of the Health Sciences & Walter Reed National Military Medical Center, Bethesda, MD

Study Objectives: Surgical Critical Care Initiative (SC2i) is a consortium designed to improve outcomes of traumatically injured civilians and military personnel. We have previously established that trauma patients have elevated phenylalanine levels, which are associated with more severe poly trauma. Accumulation of circulating phenylalanine concentrations in trauma patients is proposed to be due to reduced conversion to tyrosine by phenylalanine hydroxylase (PAH). However, further amino acid markers of injury severity remain unknown.

We hypothesize that high plasma phenylalanine to tyrosine (phe/tyr) concentration ratios in traumatically injured patients are associated with longer intensive care unit length of stay (ICU LOS).

Methods: DESIGN — This study was an observational, prospective, single-site study of traumatically injured adults, part of the SC2i Tissue and Data Acquisition Protocol.

Academic, urban, level I trauma center emergency department (ED). Participants were 23 traumatically injured adults presenting to hospital, mean age= 44 (min=18, max=70), with mean hospital stay 12.5 days in the hospital (min=1, max=51). Patients had a mean ISS of 18.9 (min=4, max=34).

Patients were followed from ED to discharge from the hospital. The first plasma samples were collected, on average, 2.6 days from injury (min= 0.1, max= 12.1). The initial blood draws from patients following arrival were analyzed for relative plasma amino acid concentrations of phenylalanine and tyrosine utilizing the Absolute IDQ p180 kit. Secondarily, ICU LOS was collected. Three linear regressions were conducted on relative phenylalanine, tyrosine, and phe/tyr concentrations to predict ICU LOS in traumatically injured patients controlling for age.

Results: Of the 23 patients enrolled, mean phenylalanine was 71.5 μM (min.38, max. 137.0), and mean tyrosine was 63.1 μM (min. 34.5, max. 102.0). We calculated phe/tyr ratios for each patient. The mean ICU LOS was 11.1 days (min=2, max=42.6). Phenylalanine concentration was noted to have a positive association with ICU LOS (p<.0001, r=0.53, r=0.75). A high phe/tyr ratio was also significantly associated with ICU LOS, (p=.016, r=0.618, r=.53). No significant association between tyrosine and ICU LOS was found (p=.154, r=0.363, r=.30).

Conclusions: Higher levels of circulating phenylalanine and the phe/tyr ratio were associated with ICU LOS in traumatically-injured patients. Distinct phenylalanine and phe/tyr signatures may serve as an early indication of a more critical clinical course. Further studies are needed in examining the role of amino acid profiles and potential causes behind amino acid accumulation of critically injured patients.

314 Hypoxemia During Rapid Sequence Intubation of Trauma Patients in the Emergency Department is Associated With Mortality
Clunimo E, Strueve P, West JR/Lincoln Medical and Mental Health Center, Bronx, NY; Lincoln Medical and Mental Health Center, New York, NY

Study Objectives: The objective was to determine predictors of mortality in adult trauma patients requiring rapid sequence intubation (RSI) in the emergency department (ED).

Methods: We conducted a standardized retrospective analysis of adult trauma patients undergoing RSI at a Level I academic trauma center from February 2011 - November 2016. We excluded patients who were pulseless on arrival and not successfully resuscitated in the ED and those who did not receive RSI during the initial trauma resuscitation. Only etomidate was available for RSI during this period, and there are no current guidelines recommending a specific induction agent for RSI of trauma patients. Following each intubation, the intubating operator completed a data collection form on peri-procedural conditions and physiologic variables (including pre-RSI oxygen saturation and lowest oxygen saturation within two minutes after confirmation of intubation). The intubating
operator was blinded to our study outcomes. Data from these forms and patient demographic data was systematically collected by trained abstractors who were blinded to our study objectives. Data was separately checked for accuracy by the investigators. Hypoxemia was defined as oxygen saturation < 90%. The primary outcome was mortality evaluated by multivariable logistic regression adjusting for the following potential confounders: pre-RSI hypoxemia, hypoxemia during RSI, Injury Severity Score (ISS), Glasgow Coma Scale (GCS), neuromuscular blocking agent (NMBA) for paralysis, and type of injury. Statistical significance was determined by a P value of < 0.05.

Results: 245 patients were included in our analysis. One patient was excluded for indata. The investigators found no other errors in the data collection. There were 40 deaths among the included patients. 186 (76%) did not have hypoxemia during RSI and 59 (24%) had documented hypoxemia during RSI. The two groups were similar with regard to mean pre-RSI oxygen saturation (97% versus 96%), frequency of pre-RSI hypoxemia (6% versus 7%), median ISS (27 versus 27), mean GCS (10 versus 10), the presence of head or facial trauma (45% versus 41%), blunt versus penetrating injury (14% versus 20%), mean systolic blood pressure (133 mmHg versus 132 mmHg), mean heart rate per minute (99 versus 93), mean respiratory rate per minute (21 versus 22), operator level training, or mortality (15% versus 20%). There was no multico linearity detected. Our 4-variable (ISS, pre-RSI hypoxemia, hypoxemia during RSI, and GCS) logistic regression model was aided by the use of ISS as a scale variable (P < 0.001). Pre-RSI hypoxemia was not significantly associated with mortality in the model. Hypoxemia during RSI had an adjusted OR (aOR) of 2.6 (95% CI: 1.0 - 6.4; P = .044), and GCS < 8 had an aOR of 4.2 (95% CI: 1.8 - 10.0; P = 0.001) for mortality. The addition of type of injury, choice of NMBA, and operator level of training to the model did not change the statistical significance (P = < 0.05) of hypoxemia during intubation and GCS < 8 or the insignificance (P = > 0.05) of pre-RSI hypoxemia to predict mortality.

Conclusions: Hypoxemia during RSI, but not pre-RSI hypoxemia, and low GCS in trauma patients undergoing RSI in the ED are predictors of mortality. This study is the first to report that transient hypoxemia during RSI of trauma patients is associated with in-hospital mortality. Our results support the avoidance of hypoxemia during RSI in trauma patients regardless of the oxygen saturation prior to intubation.

Compliance with the CPG was very good for pneumothorax, hemothorax, and bilateral fractures at 97% (233/240). When looking at the number of fractures, the compliance was lower at 77% (185/240).

Conclusions: This study confirms that the ED discharge pathway of the rib fracture CPG is safe and a FVC of 1500 mL is a safe minimum criterion for discharge in the absence of hemothorax, pneumothorax, or bilateral fractures. Compliance with the number of fractures lagged, but number of fractures did not predict return to ED and will be excluded from the CPG. Interestingly, it appears that older age is protective. More work needs to be done on effective pain control to decrease return to ED visits using this CPG.

Study Objectives: The "pan scan" strategy for blunt trauma patients has been adopted by many American trauma centers to avoid missing significant injury. CT of the chest (CCT) identifies "occult" injuries not found on initial chest radiograph (CXR), for which 40.8% and 29.1% of patients with hemothorax (HTX) and pneumothorax (PTX) respectively receive chest tube drainage. The value of chest tubes for "occult" injury is questionable. We compared output, duration, and length of stay between chest tubes placed for "occult" vs. "non-occult" (CXR-visible) injury.

Methods: We reviewed a prospective cohort of 5,451 patients with blunt chest trauma from a Level 1 trauma center in 2010-13. Of these, 402 patients (7.4%) had either PTX, HTX, or both, and had both CXR and CCT. One hundred forty-eight (36.8%) had chest tubes placed (65 (43.9%) for PTX, 7 (4.9%) for HTX and 76 (51.2%) for both. Our primary outcome measure was total chest tube output between "occult" and "non-occult." Our secondary comparisons were initial and first 24 hour output for any HTX, duration of chest tube placement and hospital length of stay (LOS). We used a generalized-linear model with log link function and Gaussian error term to fit the log-normal distribution.

Results: Total chest tube output for "occult" patients was less, at 648cc (interquartile range [IQR] 200-1435) vs. 1120cc (300-2810) for "non-occult" injuries visible on initial CXR (p = .0002). For any HTX, initial output for "occult" injury was 60cc (25-180) vs. 120 cc (10-250) (p =.025) for "non-occult" injuries, and 230cc (110-600) vs. 275cc (78-1150) in the first 24 hours (p =.002). Average duration of chest tube placement for all patients was shorter at 4.5 days (2.5-8.5) for "occult" vs. 6.0 days (3-11) for "non-occult" injuries (p =.003), as it was for PTX-only patients (p =.0005) and patients with any HTX (p =.039). Patients with chest tubes for "occult" and "non-occult" injuries had similar median LOS (10 days), but "occult" patients’ IQR was 5-15 vs. 5-25 for "non-occult" patients (p =.001).

Conclusions: Chest tubes placed for "occult" injury drain 43% less total fluid, remain in place for 1.5 days less, and are associated with similar median but narrower range of LOS as those for "non-occult" injury. These findings might influence the decision to forgo chest tube for "occult" injuries. Prospective study is needed for firm conclusions.
317 Over-Imaging of Hanging Injuries
Gupta N, Piner J, Shah K/Icahn School of Medicine at Mount Sinai, New York, NY

Study Objectives: To assess whether imaging is being over utilized in patients with hanging injuries.

Methods: This is a retrospective study conducted at a Level I Trauma Center in an urban setting. Charts for patients diagnosed with a clinical impression of “Hanging, Strangulation, or Asphyxiation” (ICD-9 E93.0) from February 2008 to March 2014 were extracted from the electronic medical record system and reviewed. Isolated strangulation injuries in the absence of suspension were excluded due to a fundamental difference in mechanism. Frequency of imaging orders and their results and implications were reviewed. Logistic Regression was done to determine which factors are associated with increased rates of imaging. Statistical analysis was done using the R statistical computing software.

Results: 100 patient charts were extracted and reviewed. 22 charts were excluded, 21 for being isolated strangulations and 1 due to unclear documentation during an electronic medical record downtime. Of the remaining 78 patients, the average age was 34 years and 86% were male. Physical signs of injury were noted on 53% of patients, 65% were witnessed hangings, 58% had loss of consciousness, and 76% were incarcerated. Intubation prior to arrival occurred in 4 patients, while 7 required intubation in the emergency department. Otolaryngology consultation was requested in 76% of patients. CT of the head (CTH) without contrast was done in 77% of patients. CT of the neck without contrast in 88%, CT angiography (CTA) of the neck in 85%, and chest X-ray in 86% of patients. In total, 195 CT scans and 67 X-rays were done. Highest-level trauma activation occurred in 76% of patients and was associated with an increased rate of imaging, with the likelihood of CTH being increased by 31% (p<0.01). Of the neck without contrast by 19% (p<0.01), CTA of the neck by 25% (p<0.01), and chest X-ray by 25% (p<0.01). Highest-level trauma activation was also associated with a 21% increase in otolaryngology consultation (p=0.05). Incarcerated patients were noted to have a 21% increase in rate of highest-level trauma activation (p=0.05). Of note, 7 patients presented with cardiac arrest in the field, of which only 1 survived. Imaging was not performed in 4 of the cardiac arrest patients. Of the 78 patients, only 4 patients were identified with abnormal findings on imaging. Of these, 2 were deemed unrelated to the hanging, 1 was found to have a sternal fracture with subcutaneous air, and 1 was found to have a questionable carotid dissection on CTA. For the questionable carotid dissection, follow-up Magnetic Resonance Angiography showed no dissection. Surgical intervention was not required in any of the 78 patients.

Conclusions: In this retrospective study, imaging in patients with hanging injuries did not significantly alter hospital course and treatment plans. Surgical intervention was never required. Highest-level trauma activation was associated with increased rates of imaging. A more selective approach to imaging in the case of hanging injuries should be considered. Offering activation of the highest-level trauma to every patient with a mechanism of hanging is likely unnecessary and costly.

318 Comparision of the Initial Glasgow Coma Scale and Serum Cholinesterase Level to the ICU Stay in Acute Organophosphorus Poisoning Presenting to a Tertiary Care Hospital in Madurai, India
Balaji K, Jena NN, Smith J, Douglass K/Meenakshi Mission Hospital and Research Centre, Tiruchirapalli, India; Meenakshi Mission Hospital & Research Centre, Madurai, Madurai, India; Ronald Reagan Institute of Emergency Medicine, George Washington University, Washington, DC

Study Objectives: Intentional ingestion of organophosphorous (OP) is a common type of poisoning in central and southern parts of India. Subjective evaluation of clinical status by individual clinicians may differ in measurement of illness severity. It is essential to establish an effective management strategy for such cases of poisoning. A simple standardized system based on presenting Glasgow Coma Scale is likely to be most useful in low income countries (limited resources) where the majority of OP poisoning occurs. The objective of the study is to compare the initial Glasgow coma scale and Serum Cholinesterase level to the ICU stay in Acute Organophosphorus poisoning presenting to a tertiary care hospital in Madurai, India.

Methods: This is a prospective observational study from March 2015 till December 2016 where a specific set of data were collected from the study population. A total of 154 patients were enrolled, of which 33 were excluded as per exclusion criteria, which included mixed ingestions except alcohol, age less than 18, discharge against medical advice, and consumption to door time more than 24 hours. Data abstraction was done for initial GCS, serum cholinesterase level, and interventions in ED. The duration of ICU stay and outcome was followed until discharge. Further Pearson correlation was used to compare, if the GCS at initial presentation to ED had a correlation with the length-of-stay in the ICU.

Results: Intentional ingestion of organophosphorous compounds (OPCs) was more common in patients who were single, unemployed, and had alcohol abuse. Among the incidence of GCS from the total number of 121 patients, 71 patients had a GCS of more than ten, 28 patients within the range of 6-10, and 22 under five. The Glasgow Coma Scale and ICU stay was compared and the mean average was plotted. Then a Pearson correlation was calculated and there was a negative correlation of -0.64 (ie, if GCS decreased the ICU stay increased and vice versa), 0.64 value is of good correlation, which is significant.

319 Risk of Epilepsy After Carbon Monoxide Poisoning: A Nationwide Cohort Study
Chang C-M, Hsieh M-S, Huang H-H, How C-K, Hung-Tsang Y, Chen D/Taipei Veterans General Hospital, Taipei, Taiwan; Taipei Veterans General Hospital, Taoyuan Branch, Taoyuan City, Taiwan

Study Objectives: Carbon monoxide (CO) poisoning may cause significant toxicity to the central nervous system. This study aimed to evaluate the risk of epilepsy after CO poisoning with and without hyperbaric oxygen (HBO) therapy using nationwide database.

Methods: We conducted a population-based cohort study and retrieved the patients with CO poisoning between 2000 and 2010. We included 8,264 patients with CO poisoning (1,917 patients, 23.20%, receiving HBO, and 6,347 patients, 76.80%, not receiving HBO) as the study cohort, and 41,320 matched patients without CO intoxication as the comparison cohort after matching for age, sex, and index year. In a proportional hazards regression was conducted to evaluate the hazard ratios (HRs) of epilepsy in patients with CO poisoning. Baseline comorbidities, such as hypertension, hyperlipidemia, diabetes mellitus, coronary artery disease, stroke, and chronic obstructive pulmonary disease were identified and further adjusted. All patients were followed until a new diagnosis of epilepsy, death, or December 31, 2013.

Results: An association was identified between CO poisoning and subsequent epilepsy development after adjustment for potential confounders (adjusted HR: 8.40 (95% CI: 6.48-10.88), P<0.001). In subgroup analysis, the patients with CO poisoning who received HBO did not have an obviously increased HR to develop epilepsy than those who did not receive HBO (HR: 1.17 (95% CI: 0.81-1.69), P=0.395).

In stratification analysis, the young patients with CO poisoning had an increased adjusted HR to develop epilepsy than the older patients (adjusted HR: 11.06 (95% CI: 7.17-17.08) in patients aged 20-39 years; adjusted HR: 8.53 (95% CI: 5.76-12.63) in patients aged 40-64 years). The Kaplan-Meier analysis (Figure 1) showed a higher IR for epilepsy in the CO poisoning patients compared with the patients without CO poisoning (log-rank test, P<0.001).

Conclusions: The patients with CO poisoning had an increased risk of epilepsy than the patients without CO poisoning, especially in young population. HBO may attenuate the risk of epilepsy in the patients with CO poisoning in long-term follow up.
Study Objectives: Epistaxis is a common reason for presentation to the emergency department (ED). First-line treatment includes the application of intranasal vasoconstrictors. Three commonly used medications include phenylephrine, oxymetazoline, and epinephrine, each of which carry a precaution against use in patients with hypertension. However, patients with epistaxis are very commonly hypertensive. Thus, these warnings are commonly overridden by clinical necessity. While there have been numerous case reports of intranasal vasoconstrictors resulting in hypertensive crisis, there has yet to be placebo-controlled experiments demonstrating the hemodynamic effects of these medications. We set out to determine the effects of phenylephrine, oxymetazoline, and epinephrine on blood pressure.

Methods: We conducted a single-center, randomized, double-blinded, placebo-controlled trial. A convenience sample of patients being discharged from the ED were recruited. Patients were ineligible if they were under the age of 18, had a contraindication to use of the medication, or were concomitantly using an antihypertensive or antiarrhythmic. At the time of enrollment, the research pharmacy assigned subjects to one of four arms (phenylephrine 0.25%, oxymetazoline 0.05%, lidocaine 1% with epinephrine 1:100,000, or bacteriostatic 0.9% sodium chloride) via a simple randomization schedule. The study drugs were delivered in treatment-blinded-syringes and administered in one naris via a medication soaked pledget. Baseline blood pressure and heart rate measurements were obtained as well as six successive sets of measurements at five minute intervals, three with the medication in place and three after removal. Count data was compared using the Fischer-Exact test. The mean greatest increase in blood pressure (highest recorded value minus baseline) was compared between each experimental group and the control group using analysis of the variance. Additionally, changes in hemodynamic measures over time in each arm were compared to the control group using repeated-measures analysis of the variance.

Results: From November of 2014 to August of 2016, sixty-eight patients were enrolled. Five subjects withdrew. In total, 15 patients in the oxymetazoline group, 20 in the phenylephrine group, 11 in the epinephrine group, and 17 in the saline group completed the study. There were no statistically significant differences in age, sex, chief complaint, baseline hemodynamic parameters, or reported side effects. There were no statistically significant differences in MAP over time between phenylephrine and saline (p=0.63), oxymetazoline and saline (p=0.95), or epinephrine and saline (p=0.17) (See Figure 1). The mean greatest increase from baseline in MAP, SBP, and HR for each of the treatment groups as compared to saline was also not significantly different.

Conclusions: Intranasal vasoconstrictors do not significantly increase blood pressure in patients without a history of hypertension. While further studies in patients with hypertension and epistaxis are indicated, our findings reinforce the practice of using these medications in patients who present to the ED with epistaxis, regardless of high blood pressures.
Conclusions: This study shows resuscitation and stabilization, timely interventions like early administration of antidote, shock management, intubation and appropriate ventilator settings and proper ICU and nursing care altogether may nullify mortality resulting from organophosphorus compounds poisoning.

<table>
<thead>
<tr>
<th>INTERVENTION</th>
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<tr>
<td>Surface decontamination,</td>
<td>All organophosphorus compound poisoning</td>
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<tr>
<td>Gastric lavage and</td>
<td>patients</td>
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<tr>
<td>activated charcoal</td>
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<tr>
<td>Atropine</td>
<td>DUMBELLS</td>
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<td>Intubation and</td>
<td>Need for mechanical ventilation</td>
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<td>mechanical ventilation</td>
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<tr>
<td>Electrolyte correction</td>
<td>Dyselectrolyemia including Ca++, Mg++, K+</td>
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<td>Inotropes / vasopressors</td>
<td>Shock refractory to fluids</td>
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<td>Central venous access</td>
<td>GCS ≤ 9</td>
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<tr>
<td>Arterial access</td>
<td>Seizure</td>
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<tr>
<td>Sodium bicarbonate</td>
<td>Intermediate syndrome</td>
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<tr>
<td>Antiepileptics</td>
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<tr>
<td>Tracheostomy</td>
<td>Prolonged mechanical ventilation</td>
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<td>Glucose – insulin – potassium</td>
<td>Signs of myocardial injury like</td>
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<tr>
<td>Glycemic control</td>
<td>Persistent bradycardia (refractory to atropine</td>
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<td>Temperature control</td>
<td>Hypotension refractory to inotropes</td>
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<td>and vasopressors</td>
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<td>ST segment changes</td>
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<td></td>
<td>Decrease in ejection fraction</td>
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<td>Global hypokinesia</td>
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Subjects were consenting participants and were eligible for inclusion if they had been inflicted with a new stingray injury and were 7 years or older. Standard treatment by lifeguards is to submerge the wound in water heated to 108-113 degrees F until pain has reasonably subsided as determined by the affected individual. Lifeguard preference dictated use of topical povidone-iodine prior to submersion. A trained researcher conducted an enrollment survey to obtain the following information: age, sex, health conditions, and medications. Researchers also examined the wound to provide a general description of the injury and judge the presence or absence of foreign bodies. Duration of hot water submersion and pain score measured on the NRS-11 scale of 0-10 before and after treatment were recorded. Patients were contacted via telephone survey on post-injury days 3, 7, and 14 to assess pain score and any ongoing symptoms, treatments, or complications of their injury.

Results: A total of 22 subjects (male n=17) were included in the study, mean age was 29.7 years. Wound types were classified as puncture (n=12) and laceration (n=10). Mean wound length was 8.6mm (range=2.0-20mm). All injuries were distal lower extremity and without foreign bodies. There were no identified medical issues or concurrent antibiotic use among subjects. 10 subjects were treated with hot water submersion and povidone-iodine, 12 with hot water submersion alone. Ongoing symptoms included mild pain, erythema, edema, and pruritus around the wound. These symptoms were noted at 3-day follow-up in 6 of 22 patients (27.3%); all but one of these subjects had resolution with conservative treatment by day 7 and remained well on day 14. The one subject with an ongoing complication developed increased swelling, erythema, and purulence diagnosed as cellulitis by his primary care physician on post-sting day 8, which was treated with antibiotics to resolution. Minor complications were seen more commonly in patients treated with hot water and povidone-iodine (5 of 10) when compared with those treated with hot water alone (p=0.056). There was a significant difference in wound size between those with and without ongoing symptoms at 3-day follow-up (p=0.0102) using a t-test. This significance was confirmed using a linear discriminate analysis (p=0.010). No wounds less than 1 cm long developed any minor complications. Average duration of water submersion was 73.6 minutes (range 35-145 minutes). Mean pain score pre-treatment was 7.36 and post treatment was 2.18, with an average decrease of 5.18 (95% CI 4.22 - 6.15).

Conclusions: Stingray injuries among a healthy population respond well to hot water immersion for pain control when performed on-site. Wound size appears to correlate with incidence of minor and major complications. Subjects treated with topical povidone-iodine had a higher incidence of minor complications, but this did not achieve statistical significance (p=0.056). Skin and soft tissue infection was diagnosed in 1 of 22 patients (4.55%).

323 Diagnostic Accuracy of a Rapid Telemedicine Encounter in the Emergency Department


Study Objectives: Emergency department crowding is an increasing problem, leading to poor patient experience, delays in treatment, and increased risk of mortality. Mitigating front-end strategies have been developed that have successfully improved many operational metrics. We have created a novel telemedicine physician intake (“tele-intake”) process which has demonstrated improvement in operational metrics over an in-person intake physician.

In this study, we compared the orders placed by tele-intake physicians with traditional in-person intake physicians to assess the accuracy of work-ups and interventions. Previous studies have focused on ED throughput metrics such as time to physician evaluation and door to disposition; our work is the first to specifically assess the tele-intake model for clinical accuracy.

Methods: We retrospectively reviewed ED visits at a high acuity, tertiary care academic hospital after implementation of the tele-intake process, looking specifically at labs, imaging studies, and medications ordered by the tele-intake physician as compared with the previous in-person physician-directed intake process.

The primary outcome was diagnostic accuracy, defined as the degree to which additional orders were necessary by the subsequent ED provider. Our secondary outcome assessed the number of orders discontinued by the second...
provider. A priori subgroup analysis for each outcome was performed by order category: lab test, X-ray, CT, MRI, ultrasound, and pharmacy. We excluded orders that were discontinued by the same provider, patient status orders, and duplicate orders.

Results: For in-person and tele-intake physician encounters between September 2015 and February 2017, there were 6592 and 6073 unique patient visits, respectively, with subsequent ED provider completed the patient care. There were 27,256 (66.8%) and 27,525 (69.1%) unique orders initiated by the in-person intake and tele-intake physician, respectively, and 15,546 and 12,229 respectively by the second provider. The majority of lab and X-ray orders, and approximately half of CT, ultrasound, and pharmacy orders were initiated by the intake physician (Table 1). A two-sample t-test showed no significant difference between the number of orders added by the second provider (p = 0.22). For both tele-intake and in-person encounters, less than 1% of orders were cancelled by the second provider, and a chi-square test showed dependence (p = 0.0016), meaning that there was no significant difference between the two.

Conclusions: Here, we present a novel analysis of an innovative patient care model, with specific focus on the accuracy of the intake provider’s orders. The analysis shows that tele-intake is a viable alternative to in-person intake with no significant differences between the two for primary and secondary outcomes and less than 1% order cancellation rate for both. This study suggests that the operational benefits of tele-intake as a replacement for in-person physician-directed intake are not at the cost of over or under utilization of diagnostic testing or interventions.

<table>
<thead>
<tr>
<th>Order Class</th>
<th>In-Person Physician</th>
<th>Tele-Intake Physician</th>
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<tbody>
<tr>
<td>Order Count</td>
<td>Percent</td>
<td>Order Count</td>
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<tr>
<td>Lab 17880</td>
<td>84.0</td>
<td>18258</td>
</tr>
<tr>
<td>X-Ray 2565</td>
<td>76.9</td>
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<td>CT 919</td>
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<td>Ultrasound 218</td>
<td>50.8</td>
<td>166</td>
</tr>
<tr>
<td>MRI 57</td>
<td>27.5</td>
<td>36.0</td>
</tr>
<tr>
<td>Medication 5817</td>
<td>41.9</td>
<td>5615</td>
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<td>Total 27256</td>
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<td>Lab 3360</td>
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<td>X-Ray 771</td>
<td>23.1</td>
<td>664</td>
<td>21.4</td>
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<td>CT 982</td>
<td>51.7</td>
<td>953</td>
<td>54.0</td>
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<td>Ultrasound 211</td>
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<td>205</td>
<td>55.3</td>
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<td>MRI 150</td>
<td>72.5</td>
<td>142</td>
<td>79.8</td>
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<tr>
<td>Medication 8072</td>
<td>68.1</td>
<td>6989</td>
<td>55.5</td>
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<tr>
<td>Total 13546</td>
<td>33.2</td>
<td>12229</td>
<td>30.9</td>
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<th>Orders Discontinued by Second Physician</th>
<th>Order Count</th>
<th>Percent</th>
<th>Order Count</th>
<th>Percent</th>
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<tr>
<td>Lab 64</td>
<td>0.234</td>
<td>92</td>
<td>0.336</td>
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<tr>
<td>X-Ray 24</td>
<td>0.0880</td>
<td>37</td>
<td>0.135</td>
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<tr>
<td>CT 27</td>
<td>0.0990</td>
<td>23</td>
<td>0.0841</td>
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<td>Ultrasound 3</td>
<td>0.0110</td>
<td>7</td>
<td>0.0256</td>
<td></td>
</tr>
<tr>
<td>MRI 1</td>
<td>0.000307</td>
<td>0</td>
<td>0</td>
<td></td>
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<tr>
<td>Medication 63</td>
<td>0.231</td>
<td>95</td>
<td>0.347</td>
<td></td>
</tr>
<tr>
<td>Total 182</td>
<td>0.663</td>
<td>254</td>
<td>0.921</td>
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</table>

325 Telemedicine Model of Physician Intake Decreases Door-to-Provider Time


Study Objectives: To reduce delays in patient care, expedite patient flow, and qualify for metrics-based payment bonuses, emergency departments (EDs) have...
utilized different strategies including physician staffing in the triage and intake process. A telemedicine model of physician-directed intake provides new opportunities for scalability and flexibility in high volume EDs and implementation in lower volume EDs that may not be able to justify a physician in person due to workflow and cost. The study objective was to determine the impact of an innovative telemedicine model of physician directed intake (“tele-intake”) on ED metrics compared with a traditional model of an intake physician physically present in the ED.

Methods: We performed a retrospective database review of emergency department visits to a large, urban, tertiary care academic hospital in which primarily patients assigned ESI level 2 and 3 were initially evaluated by an intake physician physically present within the department, by a physician via a telemedicine model with remote audio/visual capabilities, or without any physician staffing in the intake process. Our primary outcome was median door-to-provider time, with secondary outcomes of median triage to initial provider disposition and time to disposition decision.

Results: We analyzed a sample of 13,912 emergency department encounters between September 2015 and February 2017, with 7,326 patients evaluated by the traditional in-person physician intake model and 6,586 patients evaluated by the telemedicine intake model. Results for our primary and secondary outcomes are summarized in Table 1. The door-to-provider time was significantly reduced with the tele-intake model compared to the traditional physician intake model (32 minutes vs. 44 minutes, p < 0.001). Total door-to-disposition times were identical in the tele-intake and traditional intake groups (326 minutes). When patients completed the intake process and were then seen by the second physician who would be primarily responsible for the patient’s ongoing treatment, the time to disposition was significantly reduced for both tele-intake and traditional intake groups (116 minutes) compared to when there was no physician in the intake area helping to order diagnostic studies and therapeutic interventions (165 minutes) (p < 0.001).

Conclusions: In a high volume, high acuity, tertiary care emergency department, a telemedicine model of a physician intake process can positively impact door-to-provider time when compared with traditional physician intake with similar time to disposition decision metrics.

Table 1. Emergency Department Metrics According to Intake Model

<table>
<thead>
<tr>
<th>Metric Measured (minutes)</th>
<th>Intake Model</th>
</tr>
</thead>
<tbody>
<tr>
<td>Day-to-Provider Time</td>
<td>32</td>
</tr>
<tr>
<td>Total Day-to-Disposition Time</td>
<td>326</td>
</tr>
<tr>
<td>Time From Triage to Disposition Time</td>
<td>116</td>
</tr>
</tbody>
</table>

326 Mobile Integrated Telehealth: A Feasibility Study With Community Paramedicine Providers and Frequent 911 Users

Howard J, Jensen AM, Ence T, Contreras L, Dunford J/UC San Diego, San Diego, CA; San Diego Fire-Rescue, San Diego, CA

Study Objectives: The San Diego Resource Access Program (RAP) is an example of an emergency medical services (EMS) based mobile integrated health (MIH) program with community paramedicine providers (CPPs) that has been shown to decrease health care costs and utilization among frequent 911 users. The use of telehealth in MIH with CPPs may provide an opportunity to connect a vulnerable population to providers in the out-of-hospital arena.

Methods: CPP/RAP client pairs used an iPad® on a commercial cellular carrier to establish HIPAA compliant telehealth visits with a remote physician connected to a wireless local area network (WLAN) or fixed wired internet connection. Qualitative and quantitative measures related to the telehealth visit were recorded based on the physician and CPP/RAP Client pair’s experience, in addition to recording the RAP Clients self-reported social needs perception.

Results: A total of 20 telehealth face-to-face audio-video interactions were completed for a total time of 2 hours 48 minutes and 7 seconds. There were no dropped calls and total interruptions were minimal including audio 1.4% time and video interruptions 0.4% of total time. Both the physician and CPP/client pair had favorable overall satisfaction while RAP Clients also had a variety of perceived social needs.

Conclusions: Out-of-hospital telehealth visits with CPPs and frequent 911 users using a commercial cellular carrier on an iPad® with a remote provider on a WLAN or fixed wired internet connection are feasible with minimal interruptions and favorable satisfaction. This model could be used for a number of non-moving EMS applications including online medical direction.

327 A Novel Emergency Department-Based Telemedicine Program: How Do Older Patients Fare?

Greenwald P, Stern ME, Clark S, Hsu H, Sharma R/NewYork-Presbyterian Hospital/Weill Cornell Medicine, New York, NY

Study Objectives: Popular wisdom suggests telemedicine care may be less readily by older patients and providers may have concerns about the use of novel communication technology in the evaluation of older adults. We describe patient characteristics, diagnosis, ED management, likelihood to return to the ED for unplanned care, and patient satisfaction among older patients being evaluated by telemedicine as part of their ED care as compared to a younger group of patients receiving the same type of evaluation.

Methods: We analyzed a retrospective cohort of all adult patients who presented to the ED of our large, urban, academic medical center and who agreed to be seen by our telemedicine ED Express Care service between July 15, 2016 and May 31, 2017. In this program, patients who have a low acuity complaint receive a screening medical exam by an Advanced Practice Provider. They are then offered the opportunity to be seen by a doctor remotely via video rather than in person. Participation is voluntary. Patients 60 and older were compared to patients 21-59 years old by sex, ED length-of-stay, x-ray order, and diagnosis. Return to the ED within 72 hours was compared between older and younger groups, as was the change in treatment plan and need for hospitalization on return. Patient satisfaction as measured by Press Ganey (PG) was compared between older and younger patients.

Results: 1052 patients were seen in the telemedicine Express Care service at our main hospital site between July 15, 2016 and May 31, 2017. Average age was 45; 49% of patients were female. Patients 60 and older comprised 24% of the total. In this group, the average age was 72; the oldest patients were 99 years old. Younger patients ranged in age from 21 to 59 with average age of 37. Older patients were more likely to be female and were slightly less ill than younger patients. Older patients were more likely to be evaluated for wound check or suture removal and less likely to have a diagnosis of infectious illness or acute traumatic injury. X-rays were ordered less often for older patients, and older patients had shorter ED length-of-stay. There were no significant differences by age group in 72 hour returns or likelihood to have a change in treatment plan on return. No patient required admission after return within 72 hours (Table 1). PG scores across 4 indicators (MD courtesy, MD listening, MD informed regarding treatment, MD took time to listen, and overall MD score) did not differ significantly between older and younger groups.

Conclusions: One-quarter of patients seen at our novel ED-based telemedicine ED Express Care program at NewYork-Presbyterian/Weill Cornell Medicine were 60 or older. These patients received expedited care and did not have a higher rate of 72 hour return visits or change in treatment plan on return than younger patients. Older adults were as satisfied with telemedicine evaluation as the younger cohort. Our experience at NYP/Weill Cornell suggests that clinical pathways involving telehealth technology can be safely implemented and, once implemented, can be effective and readily by older adults.
Table 1. Comparison of Younger and Older Adult ED Express Care Patients

<table>
<thead>
<tr>
<th>Age (years), mean ± SD</th>
<th>Age ≥60</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (years), mean ± SD</td>
<td>37 ± 11</td>
<td>72 ± 9</td>
</tr>
<tr>
<td>Sex (%)</td>
<td>363 (45%)</td>
<td>194 (63%)</td>
</tr>
<tr>
<td>Male</td>
<td>459 (55%)</td>
<td>95 (30%)</td>
</tr>
<tr>
<td>Time to provider contact (min)</td>
<td>9 (5-14)</td>
<td>8 (5-12)</td>
</tr>
<tr>
<td>ED length of stay (min), median (IQR)</td>
<td>35 (25-53)</td>
<td>31 (22-46)</td>
</tr>
<tr>
<td>ESI</td>
<td>27 (14)</td>
<td>0 (0%)</td>
</tr>
<tr>
<td>3</td>
<td>111 (15%)</td>
<td>14 (6%)</td>
</tr>
<tr>
<td>4</td>
<td>91 (14%)</td>
<td>10 (6%)</td>
</tr>
<tr>
<td>5</td>
<td>44 (6%)</td>
<td>100 (60%)</td>
</tr>
<tr>
<td>6</td>
<td>250 (31%)</td>
<td>134 (54%)</td>
</tr>
<tr>
<td>Received x-ray (%)</td>
<td>180 (22%)</td>
<td>34 (14%)</td>
</tr>
<tr>
<td>Diagnostic (%)</td>
<td>&lt;0.001</td>
<td></td>
</tr>
<tr>
<td>Wound check/nature removal</td>
<td>255 (29%)</td>
<td>129 (17%)</td>
</tr>
<tr>
<td>Nontraumatic extremity/tissue complaint</td>
<td>120 (15%)</td>
<td>29 (12%)</td>
</tr>
<tr>
<td>Isolated traumatic injury</td>
<td>141 (18%)</td>
<td>28 (11%)</td>
</tr>
<tr>
<td>Skin complaint/rash/sulcullitus</td>
<td>99 (10%)</td>
<td>18 (7%)</td>
</tr>
<tr>
<td>Infectious illness (excluding skin)</td>
<td>134 (29%)</td>
<td>17 (7%)</td>
</tr>
<tr>
<td>Other</td>
<td>53 (10%)</td>
<td>6 (6%)</td>
</tr>
<tr>
<td>Nontraumatic back pain</td>
<td>31 (4%)</td>
<td>4 (2%)</td>
</tr>
<tr>
<td>Medication refill</td>
<td>5 (1%)</td>
<td>3 (1%)</td>
</tr>
<tr>
<td>Burn</td>
<td>21 (3%)</td>
<td>2 (1%)</td>
</tr>
<tr>
<td>Nontraumatic eye problem</td>
<td>1 (1%)</td>
<td>0 (0%)</td>
</tr>
<tr>
<td>Allergy</td>
<td>0 (0%)</td>
<td>0 (0%)</td>
</tr>
<tr>
<td>Chest/abdominal pain</td>
<td>6 (1%)</td>
<td>0 (0%)</td>
</tr>
<tr>
<td>Repeat visit within 72 hours (%)</td>
<td>21 (7%)</td>
<td>7 (3%)</td>
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<tr>
<td>Unplanned repeat visit within 72 hours (%)</td>
<td>16 (2%)</td>
<td>4 (2%)</td>
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<tr>
<td>Repeat visit within 72 hours with change in treatment plan (%)</td>
<td>5 (0.6%)</td>
<td>2 (0.3%)</td>
</tr>
<tr>
<td>Repeat visit within 72 hours resulting in admission (%)</td>
<td>0 (0%)</td>
<td>0 (0%)</td>
</tr>
</tbody>
</table>

328 A Path to Telemedicine: An Academic Institution’s Implementation of a Novel Telemedicine Practice for Emergency Medicine Patients to Telemedicine


Study Objectives: Health care institutions seeking to provide telemedicine services need to ensure that these programs are of comparable quality to traditional in-person patient care. We describe initiation of an emergency medicine telemedicine program in an academic medical center with physicians who had not provided this type of care previously.

Methods: Sixteen board certified emergency physicians caring for low acuity emergency department (ED) patients by video conference (telemedicine). The experience of these patients was compared to that of low acuity patients requiring similar ED evaluation who were cared for using a traditional, in-person process. Physician comfort providing telemedicine was evaluated before beginning telemedicine work and again after 80-200 hours of shift work.

Results: 62 telemedicine patients were compared to 27 traditional pathway patients. Median length-of-stay was shorter for telemedicine patients compared to traditional pathway patients (28 vs. 60 minutes; p<.001). Overall ED score and patient satisfaction were similar in both groups, and both groups were equally likely to recommend the ED to family and friends. When asked to comment on their care experience, telemedicine patients were more likely to mention time efficiency (91% vs. 50%; p<0.001). More than half of physicians reported being ‘somewhat uncomfortable’ providing telemedicine care at initiation of the program. After working 80-200 hours all physicians were ‘comfortable’ or ‘completely comfortable.’

Conclusions: ED patients receiving telemedicine evaluations had shorter ED length-of-stay than traditional pathway patients, had similar satisfaction, and were more likely to comment on the efficiency of their care. ED physicians who used video to evaluate low acuity patients rapidly became comfortable with telemedicine practice.

329 Emergency Providers and Documentation of Interfacility Transferred Aortic Disease Patients


Study Objectives: Patients with aortic disease (AoD) are often transferred from community emergency departments (EDs) to tertiary referral facilities for higher levels of care. Currently, there exist frameworks for documentation in compliance with the Health Insurance Portability and Accountability Act (HIPAA) from the American College of Emergency Physicians (ACEP) and Society of Critical Care Medicine (SCCM). These recommendations include documentation of consultation with the accepting physicians and presence of transfer consent. Additionally, the 2010 American Heart Association’s (AHA) guideline recommends fast reduction of systolic blood pressure (SBP) to <120mm Hg, heart rate (HR) ≤ 60 beats/minute (bpm), and pain management. Therefore, documenting these measures shows proper treatment of patients in the EDs. This study aims to: a) assess the compliance of ED charts containing required HIPAA elements and clinical assessments for this critically ill group of transferred AoD patients; b) to identify demographic or clinical factors associated with inadequate documentation.

Methods: This is a retrospective study of AoD patients transferred to a quaternary academic referral center between 01/01/2011 and 09/30/2015. Patients were identified by ICD-9 billing codes of 441.XX. Exclusion criteria were a) not a direct interfacility transfer from a referring ED unit and b) no ED documentation. Primary outcome was percentage of charts with HIPAA compliance. Secondary outcome was percentage of charts with good clinical practice, defined as presence of triage SBP and HR, as well as ≥ 2 clinical assessments for SBP and HR both before and after AoD diagnosis. Outcomes were dichotomized (Good vs. Bad documentation). Stepwise backward regression was performed using sixteen demographic and clinical independent variables.

Results: We electronically identified 565 patients, of which 285 patients were included in analysis. One hundred and fifty-nine (56%) of the patients charts contained elements meeting HIPAA requirement for transfer of critically ill patients. One hundred and sixty (56%) of the patients charts had triage SBP and HR, as well as ≥ 2 clinical assessments before and after AoD diagnosis. Among 16 demographic and clinical factors, only Emergency Severity Index (ESI) was associated with poor HIPAA documentation, with a correlation coefficient of 0.0951 and p<0.007. For clinical
documented, three variables were negatively associated with poor documentation of frequent clinical assessment: sex (cc = -0.184, p = 0.023), age (cc = -0.101, p = 0.038), triage SBP (cc = -0.214, p < 0.001), while triage time of day was positively associated with poor clinical documentation (cc = 0.204, p = 0.011).

Conclusions: ED provider documentation for critically ill patients with AoD is poor. Although certain demographic and clinical factors may be associated with poor documentation, emergency providers should thoroughly document their care for critically ill patients, for both clinical and legal reasons.

330 Reducing Door-to-CT Times in Patients Presenting With Acute Stroke
Apterbach W, Floyd J, Charlelon J, Apterbach G/LU Valley Stream, Valley Stream, NY

Study Objectives: The purpose of this study was to determine the best process to reduce the “door-to-CT,” (“DtC”) time and “door to read” (“DtR”) time for patients presenting to the emergency department (ED) with an initial triage assessment of acute stroke.

Methods: This was a ten-month retrospective chart review of the DtC and DtR times for all patients presenting to the ED with an initial triage assessment of acute stroke between February 2016 and November 2016. The study site is located in a diverse suburban setting with a volume of 44,000 patients per year. It is a 911-receiving Stroke Center with a single CT scanner located 565 feet from the ED. The baseline process was activation of a “code stroke,” at triage, after which the patient was moved to an empty treatment bay to be evaluated by an emergency physician (EP) and then sent to CT. Two interventions were sequentially compared from baseline: direct transport to CT from triage on the Emergency Medical Services (EMS) to CT versus immediate transfer to a dedicated “Stroke Stretcher” (SS) at triage with subsequent transport to CT (SS to CT). For both interventions, the EP was called to evaluate the patient at triage. Descriptive statistics were computed for study variables to ensure that all data values were within expected ranges.

Results: A one-way analysis of variance (ANOVA) was conducted to explore the impact of EMS to CT and SS to CT on the time it would take for patients presenting with acute stroke to undergo a CT and obtain the results. Three groups were created based on the procedure used to get the patient to CT: Baseline: n = 131; EMS to CT: n = 30; SS to CT: n = 42. In order to determine efficiency of each procedure, time in minutes was obtained from the time patients: (1) entered the door to the time the results were read (DtR), (2) entered the door to the time they arrived for a CT scan (DtC), and (3) time from CT scan to radiology read (CT to Read). There was a statistically significant difference (p < .001) in the DtR and DtC times. Post-hoc comparisons showed that for the DtR time, there was a significant difference between baseline (35.9 minutes) and EMS to CT (23.9 minutes, p = .001), and baseline and SS to CT (28.6 minutes, p = .029). There was no significant difference between EMS to CT and SS to CT (p = .646). Comparisons also showed that there was a significant difference in time for DtC between baseline (24.0 minutes) and EMS to CT (12.9 minutes, p < .001) and baseline and follow-up (15.8 minutes, p = .001). There was no significant difference between EMS to CT and SS to CT (p = .957). Comparisons of the CT to Read groups showed no significant difference between any group (baseline: 11.8 minutes, EMS to CT 11.0 minutes, SS to CT 12.7 minutes).

Conclusions: Reducing the DtC and DtR times is essential in the treatment of patients presenting with acute stroke that are eligible for tissue plasminogen activator (TPA) treatment. This is especially true in EDs that do not have a contiguous CT scanner within the department. This study showed no statistical difference in EMS to CT versus SS to CT and both interventions demonstrated improvement over the baseline process. Implementing a reserved stretcher at triage for the immediate transport of patients presenting with stroke symptoms increases TPA eligibility amongst patients as fewer will fall out due to time delays. It also improves the turn around time for EMS units to return to active status. Future research will look to streamline the process further in order to deliver the most efficient care to patients presenting with strokes.

331 Observation of Minor Traumatic Brain Injury in Emergency Department Observation Units Significantly Reduces Length-of-Stay
Kapll S, Hamm E, Atallah H, Zalesky C, Ahmad F, Ratcliff J, Moore B, Rhee P, Wheatley M/Emory University School of Medicine, Atlanta, GA

Study Objectives: The Brain Injury Guideline (BIG) Criteria, published by Joseph et al in 2013, demonstrates small traumatic intracranial hemorrhages (ICH) can be managed with only a short observation period and without repeat head computed tomography (HCT), neurosurgical consultation or Intensive Care Unit (ICU) admission. Allocating these patients to ICU level care lead to increased hospital costs and increased overall length of stay (LOS). Additionally, patients can experience long LOS in the ED setting waiting for an ICU bed. Boarding patients in the ED leads to ED crowding and poor patient outcomes. We applied BIG criteria to patients presenting with small traumatic ICH to find low risk patients who would be appropriate for monitoring in the ED observation unit (EDOU). We hypothesize that management of BIG 1 and BIG 2 patient in the EDOU will result in decreased ED and overall LOS without negatively impacting outcomes of patients with small traumatic ICH.

Methods: This is a prospective case series of consecutive patients monitored in the EDOU for small traumatic ICH at a Level 1 trauma center. Patients were identified as eligible for EDOU care if their injury was consistent with BIG 1 or BIG 2 guidelines. Neurosurgical consultation was at the discretion of the attending ED physicians and trauma surgeons. EDOU care included neurologic checks every 2 hours by nurses. Repeat head CT was at the discretion of the treating providers. Patients could be discharged if their symptoms had not worsened, they were able to ambulate without difficulty, and they were able to tolerate oral food and liquids. Patient information including ED LOS, EDOU LOS, total LOS, and demographic variables were recorded. For comparison, a chart review of selected patients admitted for TBI in a three-month period in the summer of 2015 was conducted, and patients were identified by those who would meet EDOU admission criteria. Their LOS data was compared to the current set of patients.

Results: From 9/1/16-4/14/2017, 46 patients were observed in the EDOU on the protocol. Average age was 43 years, 46% male. 33 (72%) were managed without repeat HCT. 41 patients were discharged after observation, while 5 were admitted to the hospital. One of these admissions was for progression of the initial ICH. The other 4 patients were admitted for traumatic but non-ICH related complications. None of the admitted patients required surgical intervention. No adverse events (i.e. required intervention) were recorded in the EDOU protocol group. 22 of 46 patients (47.8%) were seen at follow-up appointments or contacted by phone. The remaining patients were lost to follow up but had no returns to our ED. Compared with 11 similar patients who received in-patient ICU care a year earlier, the average ED LOS was 6.23 hours (SD 3.18) for the EDOU protocol group vs 28.47 hours (SD 12.54) for the in-patient care group (p = 0.00016). EDOU LOS was 19.35 hours (SD 6.58) vs. 28.18 hours (SD 12.8) for the inpatient care group (p < 0.025). Overall LOS was 25.59 hours (SD 12.54) vs. 56.65 hours (SD 14.27) for the inpatient care group (p < 0.0001).

Conclusions: This trial demonstrates a modified application of the BIG criteria to safely and effectively use EDOU to manage small ICH while significantly reducing LOS.

332 Quality Assurance in Telehealth: Adherence to Evidence-Based Indicators
Shah A, Chang AM, Hollander JE, Halpern-Ruder D/Sidney Kimmel Medical College, Thomas Jefferson University, Philadelphia, PA

Study Objectives: Few studies have examined the quality of care in direct-to-consumer (DTC) telemedicine programs. Choosing Wisely (CW), a campaign supported by over 70 medical specialties, makes recommendations to promote...
appropriate care, such as not prescribing antibiotics in uncomplicated sinusitis. We determined the rates of following the CW guidelines for sinusitis among DTC telemedicine, Urgent Care (UC), and the emergency department (ED).

Methods: Within our DTC telemedicine health records, we searched for chief complaints for the terms cough, sinusitis, upper respiratory infection, cold, sore throat, and congestion (Sept 2015 thru Feb 2016) (82 cases). We matched on date and chief complaints 82 cases from our UC and EM services (246 cases total). Two trained abstractors then used a standardized form to determine adherence to the CW recommendations.

Results: Patients were 35 +/- 17 years old, 57% female. Overall, the rates of antibiotic prescription were 59% for DTC telemedicine, 76% urgent care, and 65% in the ED (p<0.05). Rates of following CW guidelines for sinusitis were 73% in DTC telemedicine, 62% in urgent care, and 69% in the ED (p=0.41).

Conclusions: DTC telemedicine had the lowest rate of antibiotic prescriptions and the highest rate of Choosing Wisely guideline adherence for sinusitis.

333 Creating a Regional Quality Collaborative in Emergency Medicine: The Michigan Emergency Department Improvement Collaborative

Kocher KE, Pribble JM, Uren BJ, Macy ML, Ham J, Proudflock AL, Didyk JS, White EN, Nypaver MM/University of Michigan, Ann Arbor, MI

Study Objectives: The measurement of health care quality and provider performance evaluation leads to better patient care. While emergency physician leaders have often made use of local data to drive decision-making and operations, large scale quality measurement and performance evaluation across different hospitals and groups has been lacking. We describe the development of the Michigan Emergency Department Improvement Collaborative (MEDIC), an integrated pediatric and adult, emergency physician-led quality improvement project advancing emergency care throughout Michigan.

Methods: MEDIC is supported by Blue Cross Blue Shield of Michigan and Blue Care Network as part of their Value Partnerships program. MEDIC measures, evaluates, and enhances the quality of emergency care and outcomes for adults and children treated in 15 Michigan EDs by leveraging shared knowledge and experience of site participants. A committee-based governance structure provides vision and direction for the collaborative. Cooperation between sites is supported by triannual collaborative-wide in-person meetings. General and children’s hospital EDs are recruited annually. Each participating ED selects an emergency physician clinical champion who serves as the liaison between the coordinating center and their site. Sites contribute operational data for all visits to their EDs. Data abstractors from each site conduct chart review on specific cases eligible for quality improvement initiatives that have been selected by the collaborative. Data are submitted to a central clinical data registry via a Web-based portal. Inter-institutional performance on each quality initiative is measured and shared. Performance is reported in blinded fashion at both the site and individual physician level relative to peers via an on-demand Web-based reporting platform.

Results: Since inception in 2015, MEDIC has: (1) built infrastructure (staff, clinical registry); (2) collected data (novel system of automated data flow from electronic medical records supplemented by strategic chart abstraction); (3) recruited 8 inaugural sites representing diverse settings (academic/community, rural/urban, pediatric/adult/general) with 7 new sites on-boarding in 2017; (4) specified measures and reported performance for 4 quality initiatives (minor head injury CT appropriateness for children and adults; chest x-ray [CXR] use for common pediatric respiratory conditions [asthma, bronchiolitis, croup]; diagnostic yield of pulmonary embolism [PE] CTs; and creation of clinical care pathways to provide alternatives to admission from the ED). After the first year of data collection, the MEDIC registry contains operational data on more than 550,000 ED visits, including 138,000 pediatric (<18 years old) visits. Specific to the quality initiatives, there were 20,000 minor head injury visits screened with 4,100 head CTs performed on eligible cases, 10,000 pediatric respiratory CXRs performed with 4,400 CXRs performed, and 7,000 PE CT cases. Three additional initiatives are in development. When fully operational, these 15 sites will contribute data from roughly 1.2 million annual ED visits, 25% of which are for children. The total ED volume of participating sites represents about 30% of all ED visits in Michigan.

Conclusions: MEDIC provides a robust platform for emergency physician engagement across a variety of practice settings working together to improve patient care and serves as a model for other states.

334 Patient Satisfaction: It’s Just a Matter of Time

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Study Objectives: We examined the effect of a Patient Liaison in the University of New Mexico Hospital (UNMH) emergency department (ED) waiting room on patient satisfaction.

Methods: From June 2015 to June 2016, an interventionist known as the “patient liaison” was present in the UNMH ED waiting room during the time when new patient registration volume peaked on alternating Mondays and Wednesdays. The liaison was trained to provide patients and visitors with general information about the patient care process in the UNMH ED. The liaison wore a uniform to distinguish them from clinical staff and made attempts to approach patients or visitors in the waiting room to solicit questions and offer assistance and information. After the peak on both days, a cross-section of patients assigned a room was surveyed about their understanding and satisfaction with their ED visit and waiting room experience.

Results: Patients who spent time in the waiting room (n=292) reported a mean satisfaction with time being taken to receive care of 6.7 out of 10. Patients who did not go to the waiting room reported an average satisfaction of 7.8 (n=201). Among patients who were present in the waiting room on a liaison day, 41.7% (63/151) reported they were aware of the liaison and 21.2% (32/151) reported that they spoke to the liaison. Among patients who had gone through the waiting room, those who spoke to the liaison did not report a significant difference in their satisfaction. We found a negative relationship between time spent in the waiting room and patient satisfaction (p<0.001). A linear regression analysis indicated that for every hour spent in the waiting room, patient satisfaction decreased by 0.28 points on a 10-point scale. The data shows a strong positive relationship between patient understanding and patient satisfaction (p<0.001).

Conclusions: Our results are consistent with previous findings of the impact of ED wait times on patient satisfaction. An unexpectedly low proportion of patients who went through the waiting room were aware of or spoke to the liaison. While our intervention did not impact patient satisfaction, information about the scale and rate of decline in patient satisfaction and its strong association with patient understanding of the steps being taken to provide them with care are informative for design of future interventions. Aspects of future waiting room interventions that may be more effective in improving patient satisfaction include targeting patients with the longest wait times and adopting a more personalized, proactive intervention method designed to improve each individual patient’s understanding of the steps being taken to provide them with care.
Study Objectives: To evaluate if there is a threshold number of encounters after which providers reliably perform ultrasound guided peripheral intravenous (USGPIV) catheter placements in children with a high success rate. A secondary aim was to analyze complication rates of USGPIVs placed by providers.

Methods: As part of a quality improvement program, a database was maintained for all USGPIV encounters in our emergency department (ED) from June 2011 to May 2017. Our ED is located within a free-standing tertiary care children’s hospital and sees over 90,000 children annually. The name of the ED practitioner attempting placement and whether it was successful was recorded for all USGPIV encounters. Patient electronic medical records were reviewed for the reason for IV removal. ED practitioners included attending physicians, pediatric emergency medicine (EM) fellows, nurses, and pediatric and EM residents. All USGPIVs were placed by a single-operator using dynamic ultrasound guidance in an out-of-plane approach.

The probability of successful IV placement at each encounter was calculated using Microsoft Excel (2008). These probabilities were plotted versus encounter number to graph a best-fit logarithmic regression. Using this regression equation, the number of encounters needed to achieve a probability of success of 90% was calculated. The probability of a complication after each successful USGPIV placement was also calculated, plotted versus encounter number, and overlayed with a logarithmic regression line.

Results: We analyzed 3,047 encounters involving 88 providers. Of those, 2,860 (94%) were successful and 187 (6%) were unsuccessful. 35 providers had 10 or more encounters. The probability of successfully placing an USGPIV increased as providers had more experience placing USGPIVs (Figure 1). After 2 encounters, the probability of success was 80%. After 10 encounters, the probability of success reached 88%. At 14 encounters, the probability of success was 90%.

IV removal reason was available for 1,178 encounters. 850 (72%) were removed because they were no longer needed. 260 (22%) had complications, and 68 (6%) were unintentionally dislodged. Complications included infiltration, phlebitis, line occlusion, and "other" (e.g., pain or bleeding at site). Complication rates were calculated and graphed for 31 providers who had at least 5 encounters. There was no statistically significant relationship between the number of encounters per provider and complication rates ($R^2 = 0.015$).

Conclusions: Our data suggests a threshold number of encounters after which providers reliably place USGPIVs in children with a high success rate. In our single institution study, a 90% success rate was achieved after an average of 14 encounters. Additionally, we found an overall low complication rate of 22%, and no change in complication rates as providers gained more experience.

![Figure 1: Probability of successful USGPIV placement over time](image-url)
United States alone. Current evidence suggests that intra-articular injection of the shoulder with local anesthetic agents can provide adequate analgesia to facilitate reduction and obviate the need for more resource-intensive methods such as procedural sedation. However, studies have not determined the rate at which landmark-guided shoulder joint injections (LGI) truly deposit local anesthetic into the joint space. Failure to deliver anesthetic into the joint space may increase complications and the need for additional analgesia and sedation. In the current study, we used point-of-care ultrasound to determine the accuracy of LGI. The aim of the current study was to determine the failure rate of LGI using point-of-care ultrasound.

Methods: This was a prospective observational pilot study conducted on a convenience sample of patients in the ED. A total of 20 patients presenting to an urban tertiary-care trauma center were enrolled. Included patients were over the age of 18 years with anterior glenohumeral shoulder dislocation either diagnosed by radiograph or point-of-care ultrasound. An ultrasound-trained ED provider observed the injection by acquiring a sonographic video clip of the procedure. The provider performing the injection was blinded to the ultrasound images and was not informed of the position of the needle tip prior to injection. All injections were performed using an 18- or 20-gauge spinal needle and an injection volume of approximately 15 mL of 1% lidocaine containing no epinephrine. The video clips showing the needle tip position during injection were subsequently reviewed by an ultrasound fellowship-trained board-certified emergency physician. The procedure was considered to be successful if the needle tip was visualized within the joint space at the time of injection.

Results: In 35.0% of all patients (7 of 20 patients) that received an LGI, the needle tip was visualized outside the joint space at the time of injection.

Conclusions: We found a substantial failure rate of LGI. Using ultrasound-guidance to assist intra-articular injections may increase its accuracy and thus reduce complications and the need for subsequent procedural sedation. Further research is needed to compare clinical outcomes in patients receiving ultrasound-guided shoulder joint injections with those receiving LGI.

338 Assessing the Utility of Nursing-Performed Point-of-Care Ultrasound as a Guide to Fluid Resuscitation of Septic Patients in the Emergency Department

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Study Objectives: The primary objective of this study was to evaluate the feasibility and accuracy of nursing-performed point-of-care ultrasound (NP-POCUS) in guiding the resuscitation of septic patients in the emergency department.

Methods: This was a prospective observational study. Data were collected in a single county teaching hospital emergency department. Patients included in the study were a convenient sample (>17 years of age) who were screened upon arrival to have suspected sepsis based on vital signs and presenting complaint. Nursing staff was trained on online ultrasound (US) didactics followed by hands-on live training on healthy volunteers prior to the study period. Upon enrollment of subjects, emergency physicians were surveyed as to the amount of fluid a patient would tolerate in 6 hours. Inferior vena cava (IVC) was assessed for collapsibility greater than 50%. Bilateral lung fields were scanned anteriorly in superior and inferior locations for the presence of B-lines or effusions. US was performed at zero, three, and six hours. Nursing staff made fluid resuscitation recommendations based on US findings and a resuscitation algorithm. US images were saved and presented to emergency physicians for evaluation. Emergency physicians were then surveyed regarding accuracy of nursing US assessment and if US changed management. Total fluid resuscitation volume at 6 hours was recorded. Data were input into Qualtrics and analyzed by Microsoft Excel where mean and standard deviations were calculated.

Results: There were 104 patients enrolled with a mean age of 60.4 years. Emergency physicians agreed with nursing US in 99% of cases. Nursing US changed management and increased confidence in the treatment plan 83% and 96% of the time, respectively. Emergency physicians underestimated 37.5%, overestimated 26%, and correctly estimated (within 500ml) 36.5% of the time the amount of fluid received in the first six hours of resuscitation. Over the course of resuscitation, IVC became less collapsible, the number of cases with B-lines was essentially unchanged, and less fluid was recommended (Figure 2).

Conclusions: Utilizing nurses to perform US scans allows physicians the freedom to perform other essential tasks while gaining valuable information in regards to fluid responsiveness of their patients. Without ultrasound, physicians correctly estimated the amount of fluid tolerated by patients only 36.5% of the time, suggesting the benefit of frequent ultrasonographic reassessment that may not have occurred without ancillary staff support performing US at regular intervals. The high rate of agreement in the findings of nursing performed US suggests nurses can accurately assess IVC collapsibility and basic lung US. In summary, nursing staff, after a short training period, can effectively and accurately perform basic ultrasound scans that may guide resuscitation in septic emergency department patients.

339 Comparison of Intravenous Contrast Extravasation Rates from Peripheral IVs Placed by Registered Nurses Using Ultrasound Guidance Versus Standard Methods

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Study Objectives: Placement of ultrasound-guided peripheral IVs (USGIV) is common practice in many emergency departments; many of these are used for administration of IV contrast for computed tomography (CT) examinations. A single prior study found the contrast extravasation (CE) rate amongst USGIVs placed by physicians to be greater than those placed using standard methods (3.6% vs 0.3%). Many emergency departments (EDs) have registered nurses (RNs) who have been trained in the placement of USGIVs, but whether these perform as well as those placed by physicians is unknown.

The primary outcome of this study is comparison of the CE events between USGIVs placed by RNs and those placed using standard technique. Secondary outcomes include assessment of the associations between IV characteristics (location, size, length) and patient factors and CE in patients with USGIVs.

Methods: This was a retrospective chart review, performed at an urban tertiary care facility with an annual ED volume of 65,000. Our ED has a nursing-lead program that trains RNs to place USGIVs (2.5in 18g or 1.75in 20g). All USGIVs placed by RNs are logged for quality-assurance purposes. We queried our electronic patient safety incident reporting system for all CE events (mandatory reporting is required by our hospital system) between May 2014, and February 2017, during which time the USGIV program was operational. The medical record for each extravasation event was reviewed, and data on patient and IV characteristics were recorded.

Results: During the study period, 1,500 USGIVs were placed by 27 RNs. Contrast was administered 29,508 times, 291 via USGIVs. Overall, there were 74 CEs in peripheral IVs (0.25%), of which 12 (4.1%) occurred with USGIVs, and 62 (0.21%) occurred in the standard group, 6 were located in the forearm (4 in USGIV group and 2 in standard IV group). In the USGIV group, 6 were located in the forearm, 5 in the upper arm, and 1 in the antecubital fossa (AC); there were five 18g and seven 20g IVs in this group. In the standard group, IV location was 28 AC, 24 forearm, 5 upper arm, 4 wrist/hand, and 1 shoulder; there were forty-nine 20g, five 18g, seven 22g, and one 24g IVs.
Conclusions: We found that the overall risk of CE with USGIVs placed by RNs to be lower (4.1%), but significantly greater compared to IVs placed using standard technique (0.21%). These results are similar to a previously published study, in which USGIVs were placed by physicians. While further study is needed to delineate what, if any, operator characteristics are associated with CEs, our results suggest that USGIVs placed by RNs trained in the procedure perform as well those placed by physicians. Extravasation events are relatively rare, and the small number of CEs in the USGIV group (n=12) did not allow for meaningful comparisons of IV characteristics between the two groups. Larger data sets, likely drawn from multiple institutions (given the relative paucity of extravasations via USGIVs) are needed to ascertain whether IV gauge, location, or catheter length have an effect on contrast extravasation.

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Accuracy of Point-of-Care Ultrasound for the Diagnosis of Scrotal Pathology in the Emergency Department
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Study Objectives: Acute scrotal pain is a common emergency department complaint. Ultrasound has been shown to be an accurate and rapid method of ruling out surgical emergencies of the scrotum. Previous reports of scrotal ultrasound by emergency physicians have focused on individual cases; and to date, no large-scale report of the variety of presentations is available. The objective of our study is to determine the diagnostic accuracy of emergency physician performed point-of-care scrotal ultrasound for detecting scrotal pathology in the emergency department.

Methods: This was a retrospective study of emergency department patients presenting with acute scrotal pain who received point-of-care scrotal ultrasound over a 4-year period. Emergency physicians with varied ultrasound experience performed point-of-care scrotal ultrasound examinations. Emergency department ultrasound database was reviewed for point-of-care scrotal ultrasound examinations. Medical records were reviewed for history, physical examination findings, additional diagnostic testing, consultant evaluation, surgical evaluation, disposition, final diagnosis, and follow-up information. Emergency physician-performed point-of-care scrotal ultrasound findings were compared with radiology department ultrasound or computed tomographic findings, and surgical findings. The criterion standard test for diagnosis was ultrasound or CT interpretation by a radiologist or surgical findings.

Sensitivity and specificity data were presented with 95% confidence intervals.

Results: A total of 72 patients were identified over a 4-year period. Patients' age ranged from 4 to 75 years (mean, 30 ± 19.4). Prevalence of scrotal pathology was 86%, which included a variety of conditions (testicular torsion, epididymitis, orchitis, hydrocele, appendix testis torsion, testicular microthelioma, varicocele, hematocoele, epididymal cysts, inguinal hernia, scrotal abscess, cellulitis, and Fournier's gangrene). Trauma was reported in eight cases and testicular tenderness was noted in all cases. Overall, 17 patients were admitted and 55 were discharged. A urology consultation was requested for 21 cases. Ten patients went to the operating room: orchectomy (3), orchioepididymectomy (2), appendectomy (2), incision and drainage of scrotal abscess (2), and scrotal abscess repair (2). Twenty patients received antibiotics in the ED. The overall sensitivity and specificity of emergency physician performed point-of-care ultrasound examinations for diagnosing scrotal pathology were 80% (95% CI, 67%-88%) and 100% (95% CI, 65%-100%), respectively. The positive predictive value was 100% (95% CI, 91%-100%), and the negative predictive value was 45% (95% CI, 25%-67%). Scrotal pathology not detected on point-of-care ultrasound included testicular microthelioma, appendix testis torsion, epididymitis, varicocele, epididymal cyst and inguinal hernia.

Conclusions: Our study suggests that emergency physician-performed point-of-care scrotal ultrasound was moderately sensitive and highly specific for diagnosing scrotal pathology. None of the scrotal pathology that required immediate consultation and intervention were missed by point-of-care scrotal ultrasound.

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Transfer and Under-Triage Patterns of Seriously Injured Children in California (2005-2013)
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Study Objectives: While seriously injured children should be cared for in a trauma center (TC), acutely injured children may experience primary triage to a non-trauma center (nTC). These children require regional systems to coordinate care. However, California does not have a state-wide trauma system, and the 22% of children triaged to nTCs are poorly understood. Our objective was to understand patient, hospital, and regional factors associated with transfer from a nTC to a TC. We also sought to understand rates of pediatric under- triage in California.

Methods: Retrospective cohort study of California Office of Statewide Health Planning and Development (OSSHD) linked emergency department and inpatient discharge data (2005-2013). California residents 0-17 years admitted with serious trauma diagnoses (Injury severity score (ISS) > 9) were included. For children triaged to a nTC, we identified probability of transfer accounting for age, sex, race/ethnicity, payer, ISS, injury mechanism, non-rural/rural status, hospital size, triage patterns of local emergency medical services agency (LEMSA), presence of a TC in county of residence, and distance to a TC. Lastly we calculated probability of under-triage (ISS<15 with no TC care).

Results: 5,676/25,312 (22%) of seriously injured children were initially triaged to a nTC. Of these, children < 14 were more than twice as likely to be transferred than 14-17 year olds (46% vs. 20%) and those with severe vs. moderate injury were more likely to be transferred (38% vs. 27%). Patients with public, private non-HMO, and no insurance were more likely to be transferred than patients with private HMO insurance (48%, 36%, 51% vs. 7%). Patients with a mechanism of fall vs. motor vehicle collision were more likely to be transferred (51% vs. 29%). Patients who lived in LEMSAs that triage >50% of patients to a TC were more likely to be transferred than those in LEMSAs that triage >50% of patients to a nTC and LEMSAs with no triage pattern (42% vs. 15%, 23%). Patients with a TC in their county compared to those without were less likely to be transferred (26% vs. 38%), but those who lived <10 miles from the nTC compared to those who lived farther away were more likely to be transferred (38% vs. 20%). Patients in rural vs. non-rural hospitals were more likely to be transferred (43% vs. 31%). 13,575/25,312 children had ISS>15, 1,898/11,093 (17%) were under-triaged. Patients with private HMO compared to private non-HMO, public, and no insurance were more likely to be under-triaged (37% vs. 10%, 5%, 11%). Patients who lived in LEMSAs that triage >50% of patients to nTC compared to those in LEMSAs that triage >50% of patients to a TC and LEMSAs with no triage pattern were more likely to be under-triaged (29% vs. 13%, 11%). Patients in rural hospitals compared to non-rural hospitals were almost twice as likely to be under-triaged (15% vs 8%).

Conclusions: This population perspective of trauma transfer for children with serious injuries demonstrates that transfer to a TC is highly associated with payer and regional factors such as LEMSA triage patterns and distance, as well as with age, severity, and mechanism of injury. Efforts to decrease under-triage should address these findings.

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Beyond the Denver Criteria: How Enhanced Blunt Cerebrovascular Injury Screening Changes Patient Outcomes and Captures a Previously Missed Population
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Study Objectives: The Denver criteria have been widely employed to guide utilization of screening computed tomography angiography of the neck (CTAn) for evaluation of blunt cerebrovascular injury (BCVI) in trauma patients. Recent literature has suggested that up to 20% of BCVI may be missed if strictly adhering to the Denver criteria. The primary aim of this study was to determine whether wide expansion of screening criteria for BCVI resulted in increased identification of injuries. The secondary aims were to characterize the types of BCVI, understand what patients were missed by Denver criteria, and analyze effects on mortality, hospital length-of-stay and patient morbidity.

Methods: This was a retrospective chart review of 9193 blunt injured trauma patients treated at a regional Level 1 trauma center between 2012 and 2016. Prior to May 2014 the inclusion of a CTAn for workup of BCVI was strongly based on Denver criteria. This workup was expanded after May 2014 to become a standard part of blunt trauma imaging. This created restrictive (n=4414) and expanded (n=4779) groups for comparison. We then compared the rate of BCVI identification between the two
Conclusions: Adherence to Denver criteria for BCVI screening in blunt trauma patients misses a significant group of injured patients at risk for stroke. These injuries are not limited to low-grade injuries. These changes also are correlated with decreased hospital length-of-stay, mortality, and rate of stroke with no change in morbidity. Expansion of Denver criteria should be considered to improve early diagnosis of BCVI in blunt injury trauma patients.

Study Objectives: Trauma centers (TC) are demonstrated to save lives. However, TC and especially pediatric trauma centers (pTC) are scarce and concentrated in urban areas. A population-level understanding of where injured children are initially cared for (primary triage) is incomplete. We determine patient and regional factors associated with primary triage location.

Methods: Retrospective cohort study of California Office of Statewide Health Planning and Development (OSHPD) linked emergency department and inpatient discharge data (2005-2013). California residents 0-17 years admitted with serious trauma diagnoses (injury severity score (ISS) >9) were included. Hospitals were categorized as: pTC, adult level I/II TC (aTC), level III/IV TC, pediatric non-trauma center (pediatric nTC), and adult non-TC (nTC). Using multivariable, multivariate logistic regression, we calculated predicted probabilities of primary triage to pTC, aTC and nTC, evaluating age, sex, race/ethnicity, payer, ISS, injury mechanism, intention, type, zip-code level poverty, urban/rural status, and presence of a TC in county of residence.

Results: During the study period, 25,312 children were admitted for serious injury. Primary triage to a pTC, aTC, level III/IV, pediatric nTC, and nTC occurred 37%, 36%, 26% 3%, and 22% of the time respectively. The median age of children triaged to a pTC, aTC, level III/IV, pediatric nTC, and nTC was 9 (IQR 3-14), 15 (11-17), 14 (7-16), 4 (0-12), and 13 (5-16) years. The median ISS of children in all hospital types was 16 (IQR 11-17). Half of children <14 years were triaged to pTC compared to aTC and nTC (52% vs. 22%, 26%). Conversely, half of children 14-17 were triaged to aTC compared to pTC or nTC (54%, vs. 20%, 26%). Children with public insurance were twice as likely to be triaged to pTC and aTC compared to nTC (40%, 38% vs. 22%); those with private non-HMO insurance were approximately 10% more likely to be triaged to pTC and aTC compared to nTC (36% and 37% vs. 27%); those with private HMO insurance were less likely to be triaged to pTC and aTC compared to nTC (19%, 27% vs. 55%). Children in motor vehicle collisions (MVC) were twice as likely to be triaged to pTC and aTC compared to nTC (39%, 44% vs. 17%). Children with assault were more likely to be triaged to pTC and aTC compared to nTC (33%, 40% vs. 27%). Children living in counties with a TC were more likely to be triaged to pTC than aTC and nTC (61% vs. 19%, 20%). Children from micropolitan areas were more likely to be triaged to pTC compared to aTC and nTC (51% vs. 12%, 37%), and those with zip-code median household income below 200% FPL were 10% more likely to be triaged to a pTC and aTC compared to nTC (36%, 37% vs. 27%).

Conclusions: Our population perspective of primary triage location for California children with serious injuries demonstrates that triage location is associated with age, payer, mechanism of injury, and intent. Regional variables demonstrate that children in rural areas are regionalized to pediatric trauma care.

Study Objectives: Recurrent CT imaging is believed to significantly increase lifetime malignancy risk. We previously reported that high acuity, admitted trauma patients who received a PAN (full body) CT in the ED had a history of prior CT imaging in 14% of cases. The primary objective of this study was to determine the CT imaging history for trauma patients who received a PAN CT but were ultimately deemed safe for discharge directly home from the ED.

Methods: This was an observational cohort study of consecutive ED trauma patients at an inner-city, ED (level 2 trauma center) between 3/25/16-10/25/16. Eligible patients were prospectively identified who received a PAN CT ordered at the discretion of the treating physician but were later discharged deemed safe for discharge. Authors conducted a structured review of electronic radiology records within our 6-affiliated hospital system to identify instances of prior CT. The hospitals comprise 192,073 annual ED visits (70.6% of all ED visits within a 12-county region). Categorical data analyzed by chi-square; 95% CIs calculated. Continuous data analyzed by t-tests. Primary outcome parameter was to determine the proportion of patients in the study group who had prior
Results: There were 165 patients in the study group; mean age 39±16 years, 38% were female, 64% Hispanic. The most common mechanism of injury was motor vehicle crash (66%), 25% (95% CI=19.32%) of the patients had at least one prior CT. The most common prior studies performed were: CT abdomen and pelvis (13%; 95% CI=8.4-19%), CT head (9.1%; 95% CI=5.5-16%), and CT face (6.7; 95% CI=3.6-12%), and CT chest (1.8%; 95% CI=0.54%). Multivariable logistic regression revealed that increasing age (p=0.03; OR=1.0; 95% CI 1.01-1.1) was weakly associated with positive prior CT history but other patient characteristics including mechanism were not.

Conclusions: We found that there was a positive history for prior CT for 25% of trauma patients who received a PAN CT but were discharged from the ED to home. Our results should encourage clinicians to evaluate prior CT history (patient report/records) and consider shared decisionmaking/use of selective CT algorithms in cases for which pretest assessment for risk of serious injury is relatively low.

**345 Appropriateness of Trauma Alert Activation and Validation of a Two-Tiered System for Trauma Alert Activation at an Academic Medical Center**
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Study Objectives: Level 1 Trauma Centers credited by the American College of Surgeons (ACS) follow established criteria for the activation of Trauma Alerts (TA) whose patients are at high risk for deterioration. These rules include guidelines for trauma alert (TA) based on physiologic, anatomic, and “mechanism of injury” (MOI) characteristics of victims. TAs are dichotomized into Level A and Level B based on these criteria. This project was designed to characterize the appropriateness of initiating TAs at our institution and to compare discharge rates of Level A versus Level B activations.

Methods: A retrospective chart review was performed of all patients for whom a TA was activated from April 1 through May 31, 2013. There were 287 TAs during the study period of which 8 were excluded for indata. The sample included 89 Level A and 198 Level B activations. Of these, 37 patients were discharged from the ED and comprised the sample under study. Data acquisition included the level of activation (A or B), reason for activation (to ensure all TAs were in compliance with ACS criteria), MOI, anatomic location of injuries, abnormal vital signs (AVS), and other special circumstances. Findings were compared to results from the National Trauma Database (NTDB) annual report for 2012 to assess appropriateness of TAs at our institution.

Results: The NTDB reported an overall discharge rate of 9.6% (74,245/773,293) for patients receiving a TA on arrival to the ED based on data from 744 facilities in the United States and Canada in 2012. The discharge rate for patients receiving a TA on arrival to our ED during the study period was 12.9% (377/287) (Difference = 3.3% greater; p=0.073). The discharge rate was significantly less for Level A TAs (11%; 4/37) than for Level B TAs (89%; 33/37) (Difference=78%, p=0.008). Of discharged patients, 86.5% (32) had a blunt MOI (the majority were victims of MVCs), 11% (4) had penetrating trauma and 1 patient was the victim of a hanging. The criteria for initiating a TA which resulted in the greatest frequency of discharged patients was MOI (35%; 13/37 patients) followed by “Speed Alone” (SA) > 40 mph (32%; 12/37 patients). The criterion resulting in the fewest discharges was AVS (5%; 2/37 patients).

Conclusions: Our hospital’s discharge rate for trauma patients showed a strong trend toward being higher than the national average (difference=3.3%; p=0.073). This may reflect a tendency toward excess activation of Trauma Alerts at our hospital. Trauma Victims who met Level B criteria were significantly more likely to be discharged than those who met Level A criteria (difference=78%; p=0.008), which validates a two-tiered system of TA. Mechanism of injury and “Speed Alone” were the most likely criteria to result in discharge. "Abnormal vital signs" was the least likely criterion to result in discharge. Limitations included the small sample size, charting deficiencies, and the retrospective nature of the study.

**346 Hospital Observation Upon Reversal With Naloxone: An Interim Analysis of a Prospective Validation Study**
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Study Objectives: In 2000 Christenson et al. derived a decision rule to determine which patients could be safely discharged from the emergency department after a 1 hour observation period following naloxone administration for opiate overdose. The rule suggested that patients could be safely discharged if they could mobilize as usual; had an oxygen saturation on room air of >92%; had a respiratory rate >10 breaths per min and <20 breaths per min; had a temperature of >35.0°C and <37.5°C; have a heart rate >50 beats per min and <100 beats per min; and have a Glasgow Coma Scale score of 15. We sought to validate this decision rule.

Methods: This was an interim analysis of a prospective, observational decision rule validation study. A provider assessed subjects using the rule 1 hour after administration of out-of-hospital naloxone (by citizen, police, fire, or EMS). Unlike in the derivation study the threshold for normal oxygen saturation was set at 95%, and subjects were not automatically discharged after a normal 1-hour evaluation (1HE). Subjects were judged to have a normal 1HE if all 5 criteria of the rule were met. Patients were judged to have an adverse event (AE) if they were admitted to the hospital or had one of the pre-established adverse events from the original derivation study while in the hospital.

Results: 250 subjects received at least one administration of out-of-hospital naloxone, were transported to the study hospital and had a 1 hour evaluation performed by a provider. Most patients were observed for at least 4 hours in the emergency department, even if they had a normal 1HE. 133 (53.2%) subjects had a normal 1HE and no AE. 65 (26.2%) subjects had an abnormal 1HE and no AE. 49 (19.6%) subjects had an abnormal 1HE and had an AE. 3 (1.2%) subjects had a normal 1HE and had an AE. The negative predictive value for the rule was 97.8% (95% CI: 93.6% to 99.3%). The positive predictive value for the rule was 45.0% (95% CI: 37.9 - 48.2%).

Conclusions: Data collection is ongoing for this multicenter validation study. The initial data suggest this rule has adequate negative predictive value. However, further data collection, including subject follow-up information is still required before establishing the safety of the rule.

**347 Trends in the Use of Hydroxocobalamin or Nitrites as Antidotes, 2000-2016**
Rigie SV, Borek H, Rizer J, Ngo AD, Holstege CP/University of Virginia, Charlottesville, VA

Study Objectives: Nitrites and hydroxocobalamin are potential therapies utilized in cyanide poisoning. Hydroxocobalamin was approved for use in the United States in 2006. The objective of this study is to evaluate the change in use patterns of these antidotes as reported to the U.S. poison centers.

Methods: All human exposure calls within the U.S. National Poison Data System where amyl nitrite, sodium nitrite, or hydroxocobalamin were recommended and/or performed as therapies between 01/01/00 and 12/31/16 were collected. The annual trends in the cases reporting these antidotes were documented, comparing cases where therapy was recommended or performed. Additionally, demographic and clinical characteristics of the patients were examined. Descriptive statistics, including frequencies and trends using simple linear regression, were performed.

Results: During the study period, 828 cases were identified where hydroxocobalamin was performed (52.7%), recommended (16.1%), or recommended and performed (31.2%) as therapy. The number of cases increased significantly from 4 in 2006 to 126 in 2016. The number of cases where hydroxocobalamin was recommended, as well as used without recommendations by a poison center increased over this 10-year timeframe (3 to 41, and 1 to 65 cases, respectively). The number of cases reporting amyl nitrite decreased from 16 to 4 cases, while the number of sodium nitrite cases was almost unchanged (38 to 37 cases) from 2006-2016. From 2000-2016, amyl nitrite and sodium nitrite were performed in 55.4% and 60% of the cases, respectively. Amyl nitrite was recommended in 22.3% and recommended as well as performed in 22.3% of cases, while the corresponding proportions for sodium nitrite were 15.5% and 24.5%, respectively. Carbon monoxide (43.1%) was the most frequent exposure when hydroxocobalamin was reported as the therapy, while cyanide (32.6%, and 17.8%), was the most frequent exposure for amyl nitrite, and sodium nitrite, respectively. From 2000 to 2016, the use of these antidotes was higher in males (60%) and patients aged 20-59 years. The majority of cases reporting these therapies were single substance exposures with residence noted as the site of exposure. The proportion of cases citing suicide as the reason for exposure that required antidotal therapy were the lowest for hydroxocobalamin (16.2%) and the highest for sodium nitrite (34.6%). Hydroxocobalamin therapy demonstrated an average increase of 12 reports per year [95% CI: 9.9-14.3; p <0.001], while amyl nitrite reports decreased during the same time frame.
Conclusions: After its approval, the recommendations and utilization of hydroxocobalamin as therapy have seen a significant increase, while amyl nitrate as therapy has seen a gradual decrease. Sodium nitrite as therapy has seen no change.

Methods: ToxicallTM, a comprehensive and robust case management software system that is used by 75% of U.S. PCs, was queried at a single regional poison center for ED based closed, human records where naloxone as therapy was recommended or performed from 01/01/11 through 12/31/16. The relevant demographic and clinical characteristics were descriptively assessed. Proportion of yearly “not recommended but performed” (NRP) naloxone therapy reports among overall naloxone reports were evaluated at the regional level. Annual trends in overall and NRP naloxone therapy reports were analyzed using simple linear regression methods and trends in the rates of NRP naloxone calls per 1000 human exposure calls and 1000 intentional human exposure calls were also assessed.

Results: Overall, there were 254 calls made to the regional PC for cases in or en route to the ED, where naloxone was recommended or performed as therapy. The number of calls increased from 43 in 2011 to 53 in the year 2016, despite an overall drop in PC calls during the same time period. The proportion of NRP naloxone reports at the regional level PC trended upward from 2011 to 2016 (95% vs 96.2%). Of calls where naloxone was recommended or performed as therapy, 78.7% were intentional exposures, with suicide suspected in 35.8% and abuse reported in 37.8% of cases. Overall, 20-29 years (27.6%) and 30-39 years (22.4%) were the most frequent age groups. Specifically, among drug abuse cases, the 20-29-year-old group accounted for nearly half the cases. Among the cases where naloxone therapy was reported, the proportion of males (59.1%) was higher as compared to females (40.1%). Approximately 31 patients (12.2%) exhibited major effects with 3 reported deaths. The prominent clinical effects included coma (19.2%) and drowsiness (63%). Other frequent therapies reported in conjunction with naloxone were intubation (9 cases), ventilator (11 cases), and NAC IV (7 cases). The rate of NRP naloxone reports per 1,000 human exposure ED calls received by the regional poison center was higher in 2016 as compared to 2011 (15.9 vs 13.3). Annual trends in the NRP calls per 1,000 intentional human exposure calls from the ED indicated an increase from 29.1 calls in 2011 to 34.5 calls in 2016. Regression analysis demonstrated that the number of NRP naloxone calls to the regional PC increased at a rate of 2 more calls per year (95% CI: 0.43-4.13; \( p < 0.01 \)).

Conclusions: Review of the regional data demonstrated a significant increase in naloxone as therapy from 2011-2016 associated with calls to PCs for the cases en route or in the EDs. In the majority of the cases, naloxone is being performed before calling the PC.
Hematologic Findings of Venom-Induced Coagulopathy following Korean Viper (Gloydius Species) Bite

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Study Objectives: Recent studies have demonstrated that coagulopathy following snake envenomation is a venom-induced consumption coagulopathy (VICC), in which venom activates coagulation factors at specific points rather than an entire pathway. The objectives of this study were to determine what factors are consumed when severe coagulopathy after Korean viper (Gloydius species) bite develops and what factors should be used to monitor the venom activity. Methods: We retrospectively investigated the medical records of 244 patients who were admitted to our emergency department (ED) from 2011 to 2016 due to snake envenomation. There were 25 patients (10.2%) of severe coagulopathy defined as international normalized ratio (INR) > 3.0 with or without unmeasurable activated partial thromboplastin time (APTT) and/or hypofibrinogenemia (< 100 mg/dl). Coagulation factor levels were checked at onset of severe coagulopathy. The onset time, treatment, and recovery time of severe coagulopathy were noted. Results: Most cases of severe coagulopathy (23/25, 88.0%) developed late (> 12 hours after the bite). All patients (20/20) showed hypofibrinogenemia. Decreased levels of factors II, V, and VIII were observed in 2 (10.5%), 10 (52.6%), and 3 (15.8%) patients, respectively, of the total 19 patients. Among these, 2 patients showed severe coagulation factor deficiency (< 30%) rather than fibrinogen in factor V. Fibrinogen levels were increased in all patients who were tested. Only 2 patients (of 19) showed a mildly decreased anti-thrombin III level. Increase of fibrin(ogen) degradation product (FDP) and d-dimer levels were paralleled by decrease of FDP levels as treatment with antivenin and fibrinogen-rich product were started. Conclusions: This study showed isolated hypofibrinogenemia and hyperfibrinogenemia are major hematologic findings of VICC following Korean viper bite. We suggest that the FDP level reflect the effect of venom and should be monitored during treatment for severe coagulopathy.

A Comparison of Flow Rates and Hematologic Safety Between Intraosseous Blood Transfusion Strategies in a Swine (Sus scrofa) Model of Hemorrhagic Shock: A Pilot Study


Study Objectives: Intraosseous (IO) access is used by military first responders administering fluids, blood, and medications during remote damage controlled resuscitation (dCPR). In cases where access is difficult, IO lines provide a non-collapsible method that serves as a bridge to therapy while preparations are made for central venous access. Increasing degrees of transfusion pressure are required to overcome the difference between bone and systemic circulation and improve flow rates. Current military IO transfusion strategies include gravity, pressure bags, rapid transfusion devices, and manual push-pull through a three way stopcock. The clinical effects of different pressurized IO transfusion strategies in skeletally mature adults are not fully understood. The goal of this pilot was to compare four different IO blood transfusion strategies utilized with varying degrees of transfusion pressure in a porcine model with bone density similar to an adult human.

Methods: Subjects (n=9) were placed under general anesthesia and vascular access was achieved. Through a controlled hemorrhage model, 20-25% of the subjects estimated blood volume was removed using the flow of gravity. The IO device was placed in the proximal humerus and 10-15% of the subject’s blood was infused autologously via one of the four methods assigned at random. Subjects were monitored 1 hour post infusion, blood was analyzed for lactate, thromboelastogram (TEG) and arterial blood gas values. Surviving animals were euthanized while under general anesthesia and samples collected. Two samples from upper and lower left lung were collected to assess for gross evidence of fat embolism and inflammation. The humerus of the second animal in each treatment arm was removed and cross sectioned proximal to transfusion site for histologic evaluation of the effects of transfusion on bony architecture.

Results: Infusion rates were as follows: gravity 3 and 6 ml/min, Belmont rapid infuser 31.4 and 31.5 ml/min with an average of 7 overpressure alarms. Single site gravity 78 ml/min, double site gravity 105 ml/min, push/pull 108 and 110 ml/min. One animal died 7 minutes into push/pull infusion. The second animal displayed physiologic evidence of right heart strain; however, recovered after completing infusion. One animal was lost for analysis secondary to IO malposition through the humerus. There were no increased rates of inflammation changes in the lungs between arms. No pulmonary arterial fat embolism were noted. Bony architecture at transfusion site was unaffected by transfusion strategy.

Conclusions: The optimal IO transfusion strategy for our injured service members appears to be single site transfusion with a 10-20 ml flush of normal saline followed immediately by transfusion under 300 mmHg pressure bag in the proximal humerus or sternum. The push pull and double barrel methods confer a benefit in speed of transfusion, but should be further studied under the full protocol to determine the effect increased transfusion pressures have on clinical end points like damage to the underlying bony matrix, changes in right heart pressures, and increased rates of hemolysis or pulmonary fat embolism.

EMF: Elevation of the Head and Thorax During Cardiopulmonary Resuscitation Improves Cerebral Blood Flow in a Swine Model of Prolonged Cardiac Arrest

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Study Objectives: Despite decades of research on cardiopulmonary resuscitation (CPR), the rate of neurologically intact survival following out-of-hospital cardiac arrest remains dismal. Blood flow to the brain after 5 minutes of active compression decompression cardiopulmonary resuscitation (ACD-CPR) with an impedance threshold device (ITD) in the head-up position (HUP) has been shown to be higher than supine body position (SUP) in a swine model of cardiac arrest. Since most CPR efforts last at least 15 minutes, the aim of the study was to compare cerebral blood flow blood during prolonged HUP and SUP ACD-CPR + ITD.

Methods: Following anesthetized surgical preparation of female pigs, ventricular fibrillation (VF) was induced. The animals underwent 8 minutes of untreated VF followed by 2 minutes of SUP ACD-CPR + ITD with a 30:2 compression:ventilation ratio. Animals then underwent randomization to treatment with 18 minutes of continuous CPR in either HUP, in which the head and thorax were elevated at 30°, or SUP with asynchronous ventilation at 10 breaths per minute and 10 mL/kg. The compression phase was performed at a rate of 80 per minute with a 50% duty cycle and depth of 22.5% of the
antemotor chest diameter. In the decompression phase, the chest was pulled upwards with a force of approximately 20 pounds using a suction cup device.

Neutrogen-activated microspheres were injected before VF and then at 5 and 15 minutes after CPR initiation. Arterial blood gases (ABG) and reference blood samples were drawn to determine washout curves. At the end of the experiment, animals were sacrificed and tissue samples from multiple areas of the brain, heart, and other organs were sent for analysis. Continuous data recordings included the ECG, aortic pressure, right atrial pressure, intracranial pressure (ICP), pulse oximetry, and end-tidal CO2 (ETCO2). Respiratory effort, or “gasping,” by the animals during CPR was timestamped. Cerebral perfusion pressure (CerPP) was calculated.

A priori calculations, based on prior studies and assuming an alpha of 0.05 and 80% power, suggested the need for 11 animals per group to detect an 80% difference. Studies that did not meet inclusion criteria due to severe technical difficulties, such as catheter dislodgement or inability to adequately compress the chest, were not included in the results. Data are expressed as mean ± standard deviation. An unpaired Student’s t-test was used to calculate p-values.

Results: Eighteen female pigs weighing 39.5 ± 8.2 kg were randomized to ACD-CPR + ITD in either HUP (n = 8) or SUP (n = 10). Mean cerebral blood flow after 15 minutes of CPR was 0.42 ± 0.05 mL/min/g in the SUP group and 0.21 ± 0.04 in SUP (p < 0.001). Pigs treated with HUP also had lower ICP and higher CerPP when compared to SUP (see Table). Time to first gasp was 282 ± 51 seconds for HUP group versus 457 ± 185 seconds for SUP (p < 0.05). There was no difference in ETCO2 or ABG values between SUP and HUP.

Conclusions: After prolonged ACD-CPR + ITD with 30° elevation of the thorax and head, cerebral blood flow was two-fold higher when compared to standard, supine body position. These findings provide additional, strong support to proceed with a clinical evaluation of HUP ACD-CPR + ITD in humans in cardiac arrest.

### Table. Hemodynamic Measurements During Head-Up versus Supine Active Compression-Decompression Cardiopulmonary Resuscitation with an Impedance Threshold Device

<table>
<thead>
<tr>
<th></th>
<th>Baseline (n = 10)</th>
<th>15 min ACD-CPR+ITD (n = 8)</th>
<th>15 min ACD-CPR+ITD (n = 8)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Aortic Pressure</strong></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Systolic</td>
<td>53 ± 16</td>
<td>59 ± 8</td>
<td>23 ± 4</td>
</tr>
<tr>
<td>Diastolic</td>
<td>65 ± 13</td>
<td>73 ± 10</td>
<td>76 ± 12</td>
</tr>
<tr>
<td><strong>Right Atrial Pressure</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Systolic</td>
<td>52 ± 15</td>
<td>48 ± 14</td>
<td>2.7 ± 3.4</td>
</tr>
<tr>
<td>Diastolic</td>
<td>5.1 ± 1.7</td>
<td>7.1 ± 0.9</td>
<td>7.5 ± 0.72</td>
</tr>
<tr>
<td><strong>ICP</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean</td>
<td>17.7 ± 5.5</td>
<td>7.7 ± 5.5*</td>
<td></td>
</tr>
<tr>
<td><strong>CerPP</strong></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Mean</td>
<td>28 ± 5*</td>
<td></td>
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</tbody>
</table>

Mean ± standard deviation, *p < 0.001.

ACD, active compression-decompression; CerPP, cerebral perfusion pressure; CPR, cardiopulmonary resuscitation; HUP, head-up position; ICP, intracranial pressure; ITD, impedance threshold device; SUP, supine position.

### 355 A Trial of Terlipressin Compared to Small Volume Resuscitation in a Swine (Sus scrofa) Model of Uncontrolled Hemorrhage and Severe Hemorrhagic Shock

Wootten B, Yoder J, Walker C, Davis C, Sulava E, Zawor G, Loomis A/Naval Medical Center Portsmouth, Portsmouth, VA

Study Objectives: Arginine vasopressin (AVP) is a naturally occurring stress hormone that constricts peripheral blood vessels; raising blood pressure and increasing blood flow to vital organs. AVP has been shown in animal models to be an effective treatment for hemorrhagic shock and the use of AVP has shown benefit in trauma resuscitation. AVP is limited, however, by a short half-life and storage constraints that are not suitable for austere environments such as those found in combat. Terlipressin (TP) is a vasopressin analogue with similar effects, although with a much longer half-life of 4 to 6 hours. With potentially similar benefits, a longer half-life, and ease of storage, TP may be more suitable for a combat environment than AVP. Our study compares resuscitation with TP to Tactical Combat Casualty Care (TCCC) guideline recommended colloids fluids (Hexend) in a swine hemorrhagic model.

Methods: The randomized, prospective study protocol was approved by the Institutional Animal Care and Use Committee. Subjects (n = 37) were mature Landrace/Yorkshire cross swine (Sus scrofa domestica) weighing between 35 and 45 kg. The morning of the procedure each animal was anesthetized, intubated and vascular access was achieved. A femoral artery arteriogram was created using a biopsy push and a captive-bolt gun was used to induce a mid- shaft femur fracture to create physiological effects of combat trauma. Through an uncontrolled bleed, subjects’ mean arterial pressure (MAP) was maintained at fifty percent of the subjects’ baseline measurement or 25mmHg (whichever was lower) for 30 minutes followed by the application of a TCCC standard hemostatic gauze dressing. Simultaneously resuscitation was begun with one of three treatment cohorts: Hextend and Terlipressin (HexTP, n = 12), Hextend (Hex, n = 13) or Terlipressin (TP, n = 12). The primary endpoint was survival to 4 hours. Secondary endpoints included acidosis, blood lactate levels, kidney injury and liver damage.

Results: Preliminary results (n = 37) show survival trended higher for the HexTP group followed by Hex and then TP (100%, 91%, 80% respectively). The blood lactates did not differ significantly between the groups. The MAPs were

### 354 Biomechanical Aspects of Two-Finger Versus Two-Thumb Chest Compression for Cardiopulmonary Resuscitation in Infant Manikin Model

Chi C-H, Tsou J-Y, Kao C-L, Tu Y-F, Su F-C/National Cheng Kung University Hospital, Tainan, Taiwan; Fooyin University, Kaohsiung, Taiwan

Study Objectives: Previous studies has evaluated the quality of different external chest compression (CPR) methods delivered in infant cardiopulmonary resuscitation (CPR). However, the extent of loading force applied during infant ECC remains unknown. The objective of this crossover study was to quantify actual forces applied by two-finger (TF) and two-thumb (TT) methods.

Methods: The study has a cross-over design in which forty-two emergency medical professionals performed lone rescuer infant CPR using TF and TT technique at a rate of at least 100 compressions per minute. SkillReporter™ (PC) with Resusci® Baby QCPR manikin equipped with a MatScan-pressure measurement system was used to collect data. Perceived exertion scale (modified Borg scale) was applied to rate the exercise intensity of chest compression.

Results: During TT session, the rescuers performed CPR with higher compression depth, more correct depth, better ECC quality, and a lower percentage recoil than they did during the TF. The mean compression forces (in kg), delivered in the first and second minute, were 5.53 ± 1.27 and 3.22 ± 1.11, respectively (p = 0.012) for TF; 4.11 ± 1.80 and 4.04 ± 1.83 (p = 0.568) for TT. A pairwise comparison in the first minute of ECC indicates that the compression force delivered by the TF was inferior to that delivered by TT (mean difference -0.58, 95% confidence interval [-1.15 to 0.01], p = 0.045). The force delivered by the TF was also inferior to that delivered by TT (mean difference -0.82, 95% CI, -1.39 to -0.26, p = 0.005) in the second minute. There was no statistical difference of decompression force between TF and TT in the first and second minutes. TF has higher perceived exertion than TT method (5.27 ± 4.69 vs. 4.02 ± 2.31, mean difference 2.78, 95% CI, 0.36 to 2.12, p = 0.007). The median perceived exertions for TF and TT were 5 and 4 respectively. Two minutes of infant ECC was considered a "somewhat hard to strong" exercise.

Conclusions: The two-thumb method produces greater loading force, less fatigue, and better ECC quality than two-finger method during infant CPR.

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**Research Forum Abstracts**
similar at baseline and the HexTP group was significantly higher than the other groups at various intermittent times. At baseline, creatinine in the TP group was significantly higher and remained higher than that of HexTP and Hex throughout, but peak level differences did not reach statistical significance. Alanine transaminase (ALT) levels were similar between groups at baseline; however, higher levels were seen for the TP group than the HexTP group at each time point (p<.05). Final study results are not available but projected completion date is at the end of 2017.

Conclusions: Based on initial results in this animal model of hemodynamically significant combat trauma, initial resuscitation with Terlipressin is not statistically different from Hextend, the current TCCC standard, when comparing our primary endpoint (death) or secondary endpoints (blood lactate levels, acidosis, kidney injury or liver damage). The study’s design inherently limits direct application or extension to human battlefield injuries. Our results, however, provide encouragement to continue with much-needed future research regarding to colloid resuscitation in trauma. Terlipressin may have a meaningful role in this research and possible additional applications.
Assessment of Utilizing a Standardized Checklist on Length of Time for Resident Physician Sign Out and Attending Physician Grading Consistency


Study Objectives: Transitions of patient care during physicians’ change of shift introduce the potential for critical information to be missed or distorted, resulting in possible morbidity. Since 2009, the Joint Commission has encouraged improvements in transitions of care as a national safety goal. Our study sought to determine if utilization of a sign-out checklist during emergency medicine (EM) resident transition of care affected the consistency of attending physician overall assessment and if the checklist changed length of time to sign out.

Methods: This prospective study assessed EM residents’ transition of care during departmental group sign out. After institutional review board (IRB) approval, residents of varying post-graduate years transferred their patients’ care to the incoming physician team. For two months, residents gave their typical sign out (pre-checklist cohort, PCL). For the next two months, residents utilized a standardized sign out checklist (post checklist cohort, CL). The incoming and outgoing attending physicians would assess each resident sign out, and give an overall assessment using a visual analogue scale. Intraclass correlation coefficients (ICC) using a two-way mixed model were calculated to determine the association between the two attending physician grades. ICCs were calculated for the PCL and CL cohorts. The time was also recorded from first patient sign out to last. Continuous data are reported as medians, with separate Wilcoxon calculated for the PCL and CL cohorts. The time was also recorded from

360 Specimen Collection and Labeling After Implementation of New Electronic Health Record: Work as Imagined Versus Work as Performed

Gale JY, Lewis VR, Fantegrossi A, Sinnette C, Grisworld K, Gorman J, Schuur J/Brigham and Women’s Hospital, Boston, MA; Healthcare Safety Strategies, Arlington, VA

Study Objectives: New electronic health record (EHR) systems are often designed without usability testing of work as imagined versus work as performed. In response to low adoption (63%) of a newly implemented EHR barcode specimen collection system in an emergency department (ED) setting, we investigated the barriers to successful use.

Methods: We performed a multistep task analysis of ED specimen collection workflow at two urban EDs following human factors theory. We directly observed nurses doing their work during 30 observation sessions and interviewed 22 nurses about why they did their work in the way that it was observed. An interdisciplinary team classified potential patient safety vulnerabilities and prioritized mitigation strategies according to the Socio-Technical System Hierarchy of Intervention Effectiveness.

Results: We identified 12 barriers to use of the new EHR system. Two dominant deviations from work as imagined were observed: 1) using the paper pre-EHR form and, 2) scanning Admission/Discharge/Transfer (ADT) labels instead of patient wristbands. These workarounds most often occurred in three scenarios: 1) when scanning equipment was unavailable (eg, hallway patient), 2) strict time constraints were in place (eg, during trauma activations), or 3) when nurses saw patients before providers and initiated an IV and blood draws prior to orders. The alternate workflows have the potential for misidentification and mislabeled specimens. Three recommendation categories were prioritized: additional equipment, IT/programming fixes, and creation of workflow protocols.

Conclusions: The low compliance rate with the new specimen collection system was understandable and predictable when frontline providers were observed performing the work in their environment. The recommendations provided present opportunities for EDs to improve the processes surrounding the use of specimen collection systems. The methods described in this project could be employed in health care settings to proactively examine new systems and identify and address the corresponding work process challenges. Usability testing of new EHR systems should be performed in the environments in which they will be used prior to implementation in order to minimize both workflow disruption and patient safety threats.

361 Patient Experience Scores Are Affected by Timing of Survey Administration in an Urban Academic Emergency Department

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Study Objectives: Patient experience surveys are set to become an increasing portion of alternative payment models, merit-based incentive programs, and impact improved patient outcomes. Many emergency departments are focusing efforts on new initiatives to improve overall patient experience to improve and sustain “high” scores. These broad efforts often lack specificity and timeliness as they utilize delayed survey results for assessment. Thus, targeting initiatives in real-time to specific patients at risk for low experience scores may provide a real innovation for service recovery efforts to improve official survey ratings. This study sought to assess for any differences in real-time vs delayed ratings of patient experience in the emergency department.
Methods: This study is a part of a single center, IRB-approved, pilot study to evaluate if emergency physicians can predict actual patient satisfaction scores in real-time in an urban academic ED. The goal was to assess for any differences in patient experience based on timing of survey administration. During randomly assigned time blocks, a research assistant performed anonymous tablet-based patient experience surveys on both physicians and patients as they presented to an urban academic emergency department. The survey consisted of several questions directed at the treating physician along with 4 questions directed to the patient designed to assess standard patient experience ratings of physician performance (“Courtesy of the Doctor,” “Degree to which doctor took time to listen to you,” “Degree to which doctor kept you informed of your care,” and “Doctor’s concern for comfort while treating you”), using a 5-point Likert scale from 1 (“very poor”) to 5 (“very good”). Participation was voluntary and confidential. Differences in mean satisfaction scores and percentage of “top box” scores for patients were stratified by timing (“real-time” vs “delayed”) for t-test and Chi square analysis. The “real-time” experiment surveys were compared to our official Press Ganey Survey Results as returned from patients treated during the same time frame as the experimental sample.

Results: Total 62 for the full pilot study, with 61 for this analysis (1 patient refused participation for all questions and removed from analysis); overall 98% response rate in the “real-time” group. Press Ganey Survey results (“delayed” group) n=192 with <10% response rate. Patients’ means scores for physician performance for “real-time” vs “delayed” were compared (t-test): “Courtesy” (4.69 ± 0.6 vs 4.47 ± 0.07, p=0.021), “Listen” (4.64 ± 0.08 vs 4.38 ± 0.08, p=0.026), “Informed” (4.56 ± 0.08 vs 4.31 ± 0.08, p=0.03) and “Comfort” (mean 4.46 ± 0.08 vs 4.27 ± 0.10, p=0.135). Chi-square values on the % top box scores on admitted vs discharged patients were: “Courtesy” (72.1% vs 66.2%, p=.384), “Listen” (72.1% vs 67%, p=.45), “Informed” (63.9% vs 65.7%, p=.97), and “Comfort” (59% vs 62.5%, p=.62).

Conclusions: This study sought to assess how the patient experience may be affected by survey administration timing. The mean ratings for “Courtesy,” “Listen,” and “Informed” were significantly higher in the “real-time” group as compared to “delayed” survey responses. However, percentage “top box” scores were not significantly different between groups. This initial study highlights some interesting results on how timing of surveys may affect memory and responses on patient experience.

362 Withdrawn

363 Patient Perceptions of Shared Decisionmaking in the Emergency Department: A Multi-Center Survey Study
Schoenfeld EM, Kanzaria HK, Quigley DD, Nayar N, Sabagh SH, Protzel MA /University of Massachusetts Medical School - Baystate, Springfield, MA; University of California San Francisco, San Francisco, CA; RAND, Santa Monica, CA; Icahn School of Medicine at Mt Sinai, New York, NY

Study Objectives: Shared decisionmaking (SDM) in the emergency department (ED) has recently received increased attention. We sought to elicit ED patients’ perceptions regarding desired level of involvement in their medical decisions as well as potential barriers and facilitators to SDM in the ED.

Methods: We administered a cross-sectional survey to a convenience sample of ED patients from three medical centers in the United States. The survey consisted of demographic questions, a modified Controlled Preference Scale (CPS), and survey items, developed via qualitative methods, pertaining to barriers and facilitators to SDM in the ED. After verbal consent, trained research coordinators administered the 29-item survey in person to stable ED patients.

Results: Of 594 patients approached, 497 (84%) agreed to participate. Mean age of participants was 49 years, 50.6% were female, 55% identified as white, 26% identified as Hispanic or Latino, and 79% were triaged as an Emergency Severity Index (ESI) 2 or 3. With regard to ED testing, treatment, and disposition decisions, a majority of respondents (58-66%, depending on scenario) indicated a desire for an active or collaborative role in decisionmaking, with only 9-15% electing to leave decisions solely to the physician. Regarding barriers, only a minority of patients saw time or their own potential inability to understand the medical issues as a barrier. Most patients reported they were comfortable asking physicians for clarification (95%) and expressing disagreement (85%). However, 34% agreed that they might be seen as “difficult” if they advocated for themselves or a loved one “too much,” 41% reported that they would wait for the physician to ask for their involvement, and 57% reported generally deferring to physicians. Ninety-eight percent wanted to be involved with decisions in the case that “something serious is going on with my health,” and 75% agreed that written information would facilitate their involvement.

Conclusions: In a large, diverse sample of ED patients from 3 medical centers, the majority of adult patients wanted to be involved in medical decisions and felt that they had the baseline knowledge needed to do so. The proposed barriers, such as time constraints, were generally endorsed by only a minority of patients. In contrast to previous studies in non-ED patients, ED patients overwhelmingly wanted to be involved with decisions if there was concern for “something serious.” Our results indicate that although most patients would like to be involved with decisions, many are unlikely to actively seek involvement.

364 Point-of-Care Ultrasound for the Detection of Aortic Dissections in the Emergency Department
Gibbons R, Smith D, Mufftur M, Dai T, Satz W, Goett H, Costantino T/Temple University Hospital, Philadelphia, PA; Einstein Medical Center, Philadelphia, PA; Aria Health System, Philadelphia, PA; Temple University College of Public Health, Philadelphia, PA

Study Objectives: Aortic dissections are uncommon but potentially life-threatening emergencies requiring a high index of clinical suspicion for emergency medicine providers. The most reliable diagnostic test for an acute aortic dissection is CT angiography, although this test cannot be performed at the bedside. Transthoracic echocardiography (TTE) has yielded a lower sensitivity, mainly due to its inability to diagnose Type B dissections while being nearly 100% sensitive for Type A dissections using dilution of the aortic root as the criteria. We developed an ultrasound protocol combining TTE with an evaluation of the abdominal aorta. The goal of this study was to determine the sensitivity of this point-of-care ultrasound protocol in the evaluation of patients with aortic dissection.

Methods: Single center, retrospective review of all patients evaluated in the ED after our protocol had been established from January 1, 2010 through March 31, 2017 who had a diagnosis of aortic dissection confirmed by CT angiography. According to our protocol, we used 3 signs from TTE to suggest AD: the presence of either a pericardial effusion or intimal flap, or an aortic outflow track size of greater than 3.5 cm during diastole (measured from inner wall to inner wall within 2cm of the aortic annulus). In the abdominal aorta, the presence of an undulating intimal flap suggested AD. The presence of any of these findings was considered a positive study for dissection. We excluded patients with known dissections, transfers from OSH, and 12 newly diagnosed AD without ultrasounds. The Fisher Exact test was utilized for data analysis.

Results: 442 ultrasounds were performed for suspected AD. 28 patients were identified during the study period. 12 had a Stanford type A dissection. 16 had a Stanford type B. 27 of the 28 patients had at least one of the aforementioned findings. The only patient not diagnosed with bedside ultrasound had a Stanford type B dissection limited to the descending thoracic aorta. The most common positive finding was an intimal flap, identified in 23 out of 28 patients, including 15 type B patients. These criteria showed a sensitivity of 96.4% (95% CI 81.05% - 99.91%) and a specificity of 90.8% (95% CI 87.62% - 93.42%) for aortic dissection (100% for type A & 98.75% for type B). Our protocol, provided an overall NPV of 99.73% (95% CI 98.21% - 99.96%) for both type A and B dissections. (Fisher Exact = 0, p < .001; x^2 [1] = 155.06, p < .001).

Conclusions: By combining TTE with abdominal aortic ultrasound in patients with suspected aortic dissection, we were able to diagnose 96.4% of patients who presented to our institution with an aortic dissection (100% of type A dissections). Furthermore, the presence of an intimal flap was also 100% specific for aortic dissection. Future prospective studies can further evaluate test characteristics of this combined ultrasound protocol.
365 Detecting Pericardial Effusions: Is One View Enough?
Corcoran J, Kane G, Muruganandan M, Liebmann O, Lee M, Nichols M, Kummer T /Mayo Clinic, Rochester, MN; Boston Medical Center, Boston, MA; Albert Medical School of Brown University, Providence, RI; Bethel University, St. Paul, MN

Study Objectives: To determine the diagnostic accuracy of the four standard echocardiography views (parasternal long axis [PLAX], parasternal short axis [PSAX], apical four-chamber [A4C], and subcostal [SC]) in detecting pericardial effusion.

Methods: 120 point-of-care echocardiograms were selected from our echocardiography database; all studies were performed by echocardiographers and interpreted by board certified cardiologists. We selected 60 studies with and 60 without pericardial effusion as determined by the final interpretation with effusions ranging from small to large. The cine loops were de-identified, randomized, and sent to three ultrasound fellowship-trained emergency medicine faculty for review. Reviewers were asked to determine whether an effusion was present and the size of the effusion. Sensitivity, specificity, and accuracy were calculated by comparing the reviewer consensus of each view with the composite cardiology report.

Results: Accuracy was high for all views with PLAX and SC achieving 88%, followed by A4C at 87% and PSAX at 83%. Using PSAX as the comparison, there was not a difference in accuracy between PLAX and PSAX (p=0.20), SC and PSAX (p=0.18), or A4C and PSAX (p=0.39). Except for PLAX + PSAX (p=0.40), each combination of views increased the accuracy compared with PSAX alone: p=0.010 for PLAX + A4C, p=0.001 for PLAX + SC, p=0.026 for PSAX + A4C, p=0.005 for PSAX + SC, and p=0.004 for A4C + SC. The combinations of PLAX + SC and A4C + SC resulted in the highest accuracy at 94% while the combined PLAX and PSAX was not superior to a single view.

Conclusions: Overall accuracy was high for all views; however, the combination of PLAX + SC and A4C + SC provided the highest accuracy. For the detection of pericardial fluid, providers should consider using a minimum of two views, with at least one of them being the SC view, to improve diagnostic accuracy.

366 Point-of-Care Ultrasound for Identifying Safe Tube Thoracostomy Insertion Sites
Gray EJ, Betcher JA, Huang RD, Kessler RA, Theyyunni N, Majkrzak AA/University of Michigan Medical School, Ann Arbor, MI; Michigan Medicine, Ann Arbor, MI

Study Objectives: Open and Seldinger technique tube thoracostomies are common emergency department procedures. Identification of tube thoracostomy insertion location is currently performed using a blind, landmark-based approach based on either the fifth intercostal space or inframammary crease in the midaxillary line. Previous research has shown that physicians have difficulty applying the landmark-based approach to accurately identify safe locations for tube thoracostomy insertion. Approximately 30% of tube thoracostomies result in some sort of complication. A number of studies have shown that point-of-care ultrasound is an effective means for identifying safe insertion sites for thoracostomy, a procedure similar to tube thoracostomy. This pilot study aimed to assess whether bedside ultrasound could aid in identifying safe tube thoracostomy insertion sites in emergency department patients.

Methods: A convenience sample of adults 18 years of age or older were enrolled. Prisoners and pregnant women were excluded. Study subjects were asked to lay supine with both arms above their head. The patient then identified the midaxillary line at the fifth intercostal space by inspection and palpation. This location was labeled with a piece of adhesive tape. An ultrasound probe was placed over the chest wall, centered on the marked location. Providers were then asked to determine the side of the diaphragm where the ultrasound probe was centered. This process was repeated on the contralateral hemithorax.

Results: 50 patients were enrolled, generating 100 data points. 81 (81%) of the diaphragms were below, 13 (13%) of the diaphragms were at, and 6 (6%) of the diaphragms were above the location marked using traditional landmark techniques. Of patients with COPD or asthma, zero diaphragms were at or above the marked point.

Conclusions: In this study bedside ultrasound showed that approximately 6% of sites identified using landmarks would result in a subdiaphragmatic insertion of a tube thoracostomy. Additionally, approximately 13% of the landmark sites could potentially lead to diaphragmatic injury as the diaphragm crossed the insertion site during the respiratory cycle. Bedside ultrasound is a low cost, safe, and readily available modality that has been shown to improve the safety and success rates of central lines, paracentesis, thoracentesis, and a number of other common medical and surgical procedures. While this pilot study is small, bedside ultrasound was able to identify that close to a fifth of landmark-based tube thoracostomy insertion sites might cause harm to patients. A larger, prospective, randomized trial of landmark vs. bedside ultrasound assisted identification of safe tube thoracostomy insertion sites would help clarify the efficacy of this technique.

Number and percentage of sampled diaphragms below, at, and above the marked chest wall location.

<table>
<thead>
<tr>
<th>Location</th>
<th>Right hemidiaphragm</th>
<th>Left hemidiaphragm</th>
<th>% of total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Below</td>
<td>40</td>
<td>41</td>
<td>81</td>
</tr>
<tr>
<td>At</td>
<td>7</td>
<td>6</td>
<td>13</td>
</tr>
<tr>
<td>Above</td>
<td>3</td>
<td>3</td>
<td>6</td>
</tr>
</tbody>
</table>

367 Point-of-Care Ultrasound for Evaluation of Peritonsillar Abscess
Kelley K, Dean T/UC Davis Medical Center, Sacramento, CA; Regional West Medical Center, Scottsbluff, NE

Study Objectives: The use of point-of-care ultrasound for the evaluation of peritonsillar abscess (PTA) has been described in previous case reports and small studies. The objective of this study was to evaluate the test characteristics of point-of-care ultrasound in evaluating patients with possible PTA.

Methods: This was a prospective convenience sample of patients presenting to the emergency department of a single, urban academic medical center. Eligible patients included adults 18 years or older who the treating clinician had a suspicion for PTA to the point where they were considering imaging studies or landmark-based incision and drainage. Patients underwent an ultrasound exam using a high frequency 5-9 MHz endocavity transducer by a resident or attending physician who was not part of the treatment team. All potential clinician ultrasonographers underwent a point-of-care ultrasound for PTA training session that included a 30-minute didactic presentation and a hands-on workshop. Clinicians performing the ultrasound exam completed a questionnaire documenting their impressions for the presence of a PTA. The treatment team was blinded to the impressions of the clinician ultrasonographer. Patients were considered to have a PTA by the presence of purulent drainage on drainage or abscess visualized on CT imaging. Patients were called by research staff 7 days after their visit to assess response to treatment, need for return visit or other intervention, and overall rating of the ultrasound. The primary outcome was ultrasound test characteristics for PTA. Secondary outcomes included evaluation of the patient’s experience using point-of-care ultrasound.

Results: We enrolled 48 patients. Two patients were excluded due to incomplete data collection. Of the 46 patients included in the analysis 23 (50%, 95% CI 35, 65%) had confirmed PTA. Point-of-care ultrasound had a sensitivity of 15/23, 65.2% (95% CI 42.7, 83.6%) and specificity of 11/23 47.8% (95% CI 26.8, 69.4%). Of the 32 patients that follow-up was established the mean response to their experience with point-of-care ultrasound was 4.42 (range 3 to 5).

Conclusions: Point-of-care ultrasound had modest test characteristics. Overall the patient experience with point-of-care ultrasound was very positive.
Study Objectives: Dehydration in children is a common diagnosis in US emergency departments (ED) with 179 million cases of acute gastroenteritis occurring annually, resulting in some 600,000 hospitalizations and an estimated 5,000 deaths. Current methods for identifying hypovolemia in children all have poor sensitivity and specificity. In adults, point-of-care Ultrasonography (POCUS) has emerged as an objective, noninvasive, rapid, inexpensive and validated tool to assess a patient’s intravascular volume status. However, in pediatrics there is mixed support of POCUS to assess intravascular volume. The primary objective of this study was to assess collapsibility index (CI) as measured by respiratory variation to establish reference values for the inferior vena cava (IVC) and aorta (IVC/Ao Ratio) in longitudinal and transverse views by age, height, and Broselow-Luten color groups. A secondary objective was to determine which method of sonographic measurement was more reliable.

Methods: This was a single-center, prospective, convenience study of patients who presented to the ED between January - December 2016 for complaints other than dehydration. Patients 4 months to 8 years of age, whose parent/legal guardian provided informed consent, were enrolled. Patients were recruited based on their color grouping on the Broselow-Luten tape, with a goal of at least 28 patients per group. Ultrasound examinations measured the IVC diameter in both a long and transverse axis during one respiratory cycle and the transverse aorta was measured at its maximal diameter.

Results: There were 255 patients enrolled with 15 excluded for inadequate data, leaving 240 for analysis. Fifty percent were female, most were African American (AA, 86%) followed by White (W, 7%), which was higher than our ED population of (AA, 65%; W, 30%), mean age was 2.67 years. Distribution over the color zones: (14 Pink, (28) Red, (53) Purple, (35) Yellow, (42) White, (51) Blue, (34), Orange (23) Green. Goals for enrollment were met or exceeded in all groups, except pink and green. Ultrasound summary statistics of sonographic measurement as per age, height and weight were done and the bi-variate correlations between IVC long min-max, IVC Cross min-max, and aorta min-max with the set of variables age, height, weight and color zone, were all moderate or strong positive correlations (Pearson’s correlation coefficients ranging from 0.56 to 0.75, all p<0.001).

Conclusions: The IVC and aorta longitudinal and transverse measurements show a positive correlation with age, weight, height and Broselow-Luten color group, indicating that as the patient grows the IVC and aorta increase in a predictable manner. The strongest association was with the Broselow-Luten color groups. Transverse measurements of the IVC and aorta proved more reliable, especially in the smaller-sized children due to trunk movement with normal respiration in the long axis plane.

Success and Safety of Emergency Department Ultrasound-Guided Midline Program

Coipitts K, Scheatzle M, O’Neill J/Alegheny General Hospital, Pittsburgh, PA

Study Objectives: The primary objective was to evaluate the overall success of physicians placing ultrasound-guided midlines in an academic emergency department. Secondary objectives included assessing the rate of complications, both immediate and long-term, and the correlation between the physician’s previous experience with midlines and their success rates.

Methods: This was a retrospective review of a QA dataset. A physician midline insertion program using a wire-in-needle catheter (Bard, PowerGlide®) was implemented in our emergency department. No standardized training was provided, although most physicians received some training with the catheter on a phantom. Midline placement, for patients with difficult IV access or need for a more long lasting IV, was up to the physician’s discretion. To ensure the quality of the program, QA forms were filled out following any attempted midline use. Forms included: success (yes or no), number of catheters used, reason for poor peripheral IV access, and intent to place central line if midline cannulation fails. The charts of patients with successful midline placement were reviewed to determine complications and duration of the line.

Results: QA forms were completed on 107 attempted midline placements between July 2016 and March 2017. Of these, 90 midlines were placed, for an overall success rate of 84.1%. Physicians who had attempted fewer than six midlines had a 50% success rate, while those who had attempted greater than 10 improved to 91.1%. In comparison to those who had placed fewer than ten midlines (success 54.3%, 95% CI 36% - 66%), physicians who had placed greater than ten midlines had a significantly higher success rate (95% CI 80% - 97%, p<0.0001). Complications were minor and rare. The most common complication was hemotoma (6.5%). There was also a 1.9% rate of nerve contact and 0.93% rate of arterial puncture. In admitted patients, lines lasted from 5.33 hours to 620.5 hours (median 57 hours). There were no reported cases of thrombophlebitis, DVT or catheter-related bloodstream infection. Three patients pulled out their line, and two lines were pulled because they flushed, but had no blood return.

Conclusions: Emergency physicians, using a wire-in-needle midline catheter, demonstrated a good rate of successful placement with minimal complications. This success rate markedly improved with operator experience, with reasonable proficiency being obtained at greater than 10 placement attempts. Thus efforts to increase and standardize training, such as phantom practice and expert guidance, prior to implementing a midline catheter program in the emergency department is recommended.

The Relationship Between Adult Body Mass Index and Anticipated Failure Rate of Needle Decompression Using a 5 cm Needle for Tension Pneumothorax

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Study Objectives: Tension pneumothorax is traumatic injury that can lead to rapid circumulatory collapse and death. Emergent needle thoracostomy can quickly treat tension pneumothorax, but the best anatomic location and catheter length necessary to perform the intervention has been questioned in the recent years given the increasing rates of obesity in our population.

Methods: We conducted a retrospective review of a convenience sample of all trauma patients admitted to our level 1 trauma center in Minneapolis, MN who underwent chest computed tomography (CT) during their admission between 2011 and 2012. Using these CT radiographs, chest wall thickness was measured bilaterally at the 2nd intercostal space (ICS) at the midclavicular line, and at the 4th and 5th intercostal spaces at the anterior axillary line. Baseline demographic data including age, sex, BMI, ISS and associated chest wall trauma were collected from medical chart review. Needle thoracostomy failure was defined as chest wall thickness (CWT) of > 5cm, based on the length of commonly used needle decompression needles.

Results: 141 patients who met all inclusion criteria were identified. There were no significant differences in mean CWT at any of the anatomic sites. CWT was similar between males and females. BMI > 30 was associated with an adjusted odds ratio of 13.8 (95% confidence interval 4.8-39.8) for failure with a standard 5cm catheter needle decompression.

Conclusions: In the increasingly obese general population, needle thoracostomy with a standard 5cm needle may be more prone to failure. Adult BMI > 30 is a
significant risk factor for anticipated failure of needle tube decompression. Alternative anatomic sites for needle decompression did not appear to increase the anticipated success of the intervention.

371 Prevalence of Intracranial Injury in Blunt Head Trauma Patients With or Without Anticoagulant and Antiplalette Use

Probst M, Gupta M, Hendey G, Rodriguez R, Winkel G, Mower W/Mount Sinai School of Medicine, New York, NY; UCLA School of Medicine, Los Angeles, CA; UCLA School of Medicine, Los Angeles, CA; University of California, San Francisco, San Francisco, CA; Mount Sinai School of Medicine, New York, NY

Study Objectives: We sought to compare the prevalence of significant intracranial injury (ICI) among patients who presented to the ED with blunt head trauma with and without anticoagulation and antiplalette medication use.

Methods: We conducted a multicenter, prospective, observational study of adult (age 18 and over) ED patients with blunt trauma for whom head CT scanning was ordered. Demographic and clinical variables, including use of warfarin, aspirin, and clopidogrel, were collected using a standardized data collection form prior to imaging. The determination of ICI was based on the final radiologic interpretation of all imaging studies using predefined criteria. Prevalence and confidence intervals were calculated using standard methodology.

Results: We enrolled 9,115 adult patients presenting with blunt head trauma from 2007 to 2015. Mean age was 54 years (range: 18-103 years); 39% were female. Overall, the prevalence of significant ICI was 5.9% (95% confidence interval [CI] 5.4 to 6.4%). Among patients without coagulopathy, the prevalence of significant ICI was 3.6% (213/5,916, 95% CI 3.2 to 4.1%). Among patients taking anticoagulant/antiplatelet medications, the prevalence of significant ICI was 6.1% (30/488, 95% CI 4.2% to 8.5%) for warfarin, 4.8% (43/903, 95% CI 3.5% to 6.3%) for aspirin, and 6.3% (162/256, 95% CI 3.7% to 9.7%) for clopidogrel. The relative risk (RR) for significant ICI associated with each medication as compared to no coagulopathy was as follows: warfarin, RR = 1.74 (95% CI: 1.18 to 2.57); aspirin, RR = 1.32 (95% CI: 0.96 to 1.82); and clopidogrel RR = 1.74 (95% CI: 1.06 to 2.84).

Conclusions: In our large sample of ED patients undergoing CT for blunt head trauma, the prevalence of ICI was significantly higher for those taking warfarin compared with those without any coagulopathy. For patients on aspirin or clopidogrel, there was a non-significant trend towards higher rates of ICI.

372 Derivation of a Clinical Decision Instrument to Identify Adults in a Community Setting With Mild Traumatic Intracranial Hemorrhage at Low Risk for Requiring Critical Care Intervention

Anderson TA, Warton EM, Daniels B, Lin JS, Gill K, Buss AR, McLachlan I, Garrido MX, Nishijima DK, Arasu V, Vinson DR/University of California Davis Health System, Sacramento, CA; Kaiser Permanente Division of Research, Oakland, CA; The Permanente Medical Group, Oakland, CA

Study Objectives: Adults presenting to the ED with mild traumatic intracranial hemorrhage (tICH) are commonly admitted to the intensive care unit (ICU), although critical care interventions are often unnecessary. In prior research, we found that a clinical decision instrument (CDI) derived at an academic Level I trauma center to identify adults at low risk for critical care interventions performed poorly in a community setting, likely because of substantial differences in patient case-mix. We sought to derive a more generalizable CDI among patients of a large community-based integrated health care delivery system.

Methods: This retrospective cohort study included non-anticoagulated adults (≥18 years of age) with mild tICH, defined as GCS score ≥13, across 21 community EDs from 01/2012 to 12/2013. No study facility carried a Level I trauma center designation, and only one carried a Level II designation. The primary outcome of at least one critical care intervention within 48 hours of ED arrival included intubation, neurosurgical intervention, vasopressor or inotrope use, invasive monitoring, or cardiopulmonary resuscitation. Using logistic regression with single independent variables, we identified potential predictors of the outcome, developed a 6-variable predictive logistic regression model, and created a simplified CDI to identify low-risk patients based on predicted probabilities from the model. We examined the prevalence of patients designated low-risk by both CDIs and compared performance metrics. We calculated sensitivity and specificity with Clopper-Pearson, positive and negative predictive values with standard logit, and c-statistics with Wald confidence interval (CI) estimates.

Results: Our cohort included 929 patients with mean age of 73.3 SD (17.0) years; 50% were female, and 82% were injured by a ground-level fall. Of these, 110 (11.8%) received at least one critical care intervention, 100 of whom received a neurosurgical operation, mannitol or hypertonic saline. Patients identified as low risk had none of the following: time from trauma to ED >7 days, ED admitting GCS <15, lowest ED systolic blood pressure >140 mmHg, CT evidence of skull fracture, mass effect, or midline shift >5 mm. The new CDI designated nearly three times as many patients as low-risk than the academic-based CDI with similar sensitivity and significantly higher specificity (see Table).

Conclusions: We derived a CDI to identify patients with mild tICH at low risk for requiring ICU-level care in this community setting. The community-based instrument was equally sensitive as its academic counterpart, but outperformed it with a greater specificity and positive predictive value. This lower rate of false positives may increase its ultimate clinical utility. Continued model development may further improve specificity, and a prospective validation study will be needed prior to clinical implementation.

Table. Performance metrics of a community-based and academic-based clinical decision instrument in identifying patients requiring an early critical care intervention.

<table>
<thead>
<tr>
<th>Clinical Decision Instrument</th>
<th>Community-based</th>
<th>Academic-based</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low-risk designation, n (%)</td>
<td>391 (42.1)</td>
<td>143 (15.4)</td>
</tr>
<tr>
<td>Sensitivity (%)</td>
<td>99.1 (95.0-100.0)</td>
<td>98.2 (93.6-99.8)</td>
</tr>
<tr>
<td>Specificity (%)</td>
<td>47.6 (44.2-51.1)</td>
<td>17.2 (14.7-20.0)</td>
</tr>
<tr>
<td>Positive predictive value (%)</td>
<td>20.3 (15.3-25.4)</td>
<td>13.7 (11.3-14.2)</td>
</tr>
<tr>
<td>Negative predictive value (%)</td>
<td>99.7 (98.3-100.0)</td>
<td>98.6 (97.9-99.6)</td>
</tr>
<tr>
<td>C-statistic</td>
<td>0.73 (0.71-0.75)</td>
<td>0.58 (0.56-0.60)</td>
</tr>
</tbody>
</table>

*Except where otherwise noted

373 Concussions in the Emergency Department: A Retrospective Analysis of Clinical Decision Guidelines Utilization

Lusarre B, Vucelik A, Hegsted D, Sharon M, Tillotson R, Monseau A, Baicik B, Bassler J /West Virginia University, Morgantown, WV

Study Objectives: Head injuries are a common chief complaint in clinics, urgent care facilities, and emergency departments (ED) alike. In the setting of known head injury, the possibility for significant pathology can be daunting for clinicians. The decision to obtain advanced imaging should be guided by evidence-based medicine; however, in many cases, imaging or transfer to a higher level of care is viewed as unnecessary. Few studies have evaluated head injuries and concussions in the emergency department in comparison to imaging guidelines. The purpose of this study was to evaluate patients presenting to our rural, Level 1 trauma center ED with head injuries.

Methods: In this retrospective cohort study, data were obtained from our West Virginia University Hospital electronic medical record (EMR) from January 1 to December 31, 2015 regarding patients who presented to our ED and had a final diagnosis of a head injury or concussion. Data points extracted from the EMR and analyzed descriptively included age, sex, method of arrival, whether patients were transferred from an outside facility, if any advanced imaging was conducted at another facility, whether imaging guideline usage was indicated, if the injury was sports-related, and disposition.

Results: In 2015, there were 691 patients who presented to our ED and received a final diagnosis of a head injury or concussion. The median age was 23 years, ranging from 0 to 93 years, and 71% were male. The most common mode of arrival was via ambulance (43%). Approximately 20% of these patients were transferred to our ED from an outside facility. Only 120 cases (17%) were sports-related injuries. Of those, 58 (48%) received advanced imaging and one received MRI. However, 477 of the 571 (84%) non-sports-related injuries received CT imaging. Sixty-five percent of patients received a CT scan in our ED. Of those, 25% had a positive result; 88% of these were admitted as inpatient. About 48% of all patients were discharged from the ED. Of the...
remaining 356 patients, 219 (62%) were admitted as inpatient. Utilization of evidence-based imaging guidelines was only seen in patients less than 18 years of age, but inconsistently.

Conclusions: Although limited by the retrospective nature of the study, we demonstrated characteristics of patients who presented to our ED and were ultimately diagnosed with a head injury or concussion. A small portion of our cases were sports-related injuries. In younger patients with sports-related injuries, the decisionmaking process regarding obtaining CT imaging was more frequently documented, though few notes mentioned evidence-based guidelines. Further research is needed in this area in order to develop potential interventions for implementing consistent clinical imaging guidelines in ED settings.

374 Wide Variation in Whole Body CT Utilization Despite Lack of Mortality Benefit

Harrison N, Babcock C/Beaumont Health, Royal Oak, MI

Study Objectives: Whole body computed tomography (WBCT) is a rapid diagnostic strategy used in blunt trauma. WBCT incurs more radiation exposure, and may improve diagnosis, but no clear mortality benefit has been proven, including in a recent large randomized controlled trial (REACT-2). Understanding WBCT practice variation, and differences in outcome may be beneficial. Our objective was to determine CT scanning practice variation (WBCT, Selective Scanning (SS) and No CT scanning (NoScn)) and outcome among trauma centers using the NTDB.

Methods: This study used the 2013 NTDB National Sample Program dataset, and was considered exempt by IRB. Variables extracted included: adults (>17yrs), blunt trauma, not transferred in, demographic information (sex, race, age), ED information (ISS, ED disposition, mortality, GCS, SBP), procedure codes for head, chest, and abd/pelvis CT scans, and hospital disposition status (alive vs dead). Facilities not recording CT scan procedure codes were excluded. WBCT, SS and NoScn (No head, chest or abd/pelvis) were analyzed.

Results: Average ISS/facility was 9.85 (SD 1.76, range 6.6-14.3), average % trauma patients receiving WBCT/facility 26.8% (SD=19.9%, range 0-69.4%). Average mortality was 2.9% (SD 0.92%, range of 1.2-6.0%). Although there was a strong correlation between mortality and average ISS (r=0.58), there was no correlation between mortality and average facility % trauma patients getting WBCT, % getting SS, and %NoScn (r=-0.002, 0.038, and -0.049 respectively). Additionally, there was no correlation between teaching status (Community, non-teaching and university) and % trauma patients getting WBCT/facility (r=-0.002). Additionally there was no correlation between facility average ISS score and WBCT (r=-0.15).

Conclusions: The practice of WBCT ordering likely improves diagnosis, but no prospective study has found any mortality benefit. Some facilities manage patients with conservative CT scanning (SS), while others choose WBCT. There is wide variability in the proportion getting WBCT, with a range from 0 (only SS scanning) to 69% of all trauma patients getting WBCT. While it is not known exactly how best to utilize WBCT, there is likely room for substantial improvement. Standardizing indications for WBCT may improve reflex ordering and ultimately improve patient care and outcome by decreasing future malignant complications.

375 Improving Interdepartmental Trauma Evaluation and Resuscitation Through Mock In Situ Trauma Review and Debriefing

Baur H, Kusheleva N, Folan B, Chacko J, Sorrentino C, Cohen E/Northwell Staten Island University Hospital, Staten Island, NY; Northwell Staten Island University, Staten Island, NY

Study Objectives: Effective trauma resuscitation is essential to providing patients with an optimal outcome. We implemented a curriculum to review interdepartmental, interdisciplinary mock in situ traumas from the moment EMS calls our code line all the way through the patient’s disposition.

Our primary goal is to streamline and standardize the evaluation and resuscitation of our trauma patients by improving interdepartmental communication skills, identifying and reviewing each member’s role, reviewing the clinical management of ATLS algorithms, and reviewing ATLS procedural skills.

Methods: Design: We created a curriculum to enhance the communication and skills of all members of our trauma team. The curriculum has two components: 1. The first component is an online PowerPoint module. All members of the trauma team are required to review. 2. The second component involves monthly unannounced mock in situ trauma codes. The trauma team’s response to a trauma code is reviewed through focused debriefing with a team, strategically selected for their expertise. Our debriefing process occurs immediately after the conclusion of the case. Content experts have a checklist and focus on one of six critical actions. Each of these debriefers also has an opportunity to mention one other observation for improvement within their area of expertise. Our mock in situ traumas occur in the trauma bays in our emergency department.

Type of participants: From August 2013- February 2017, we have had 32 mock in situ traumas. In total, we had 477 participants across 7 departments (emergency medicine, trauma surgery, respiratory therapy, radiology, EMS, orthopedic surgery and anesthesia) and across 9 professions (attending, physician assistant, resident, registered nurse, patient care assistant, certified registered nurse assistant, radiology technician, emergency medicine service, respiratory therapy).

Results: We tracked and classified most of our data throughout our mock in situ traumas into three categories. In the category of Leadership, we tracked: 1. The time taken for Verbal Identification of a team leader and 2. The team member’s awareness of who is the leader. In the Category of Team work and communication, we tracked: 1. Verbal role assignment to team members by the team leader, 2. The number of “thin air” commands and the total number of recaps, and 3. The Number of people in trauma box and nursing documentation. In the category of Clinical Outcomes, we tracked: 1. Room preparedness prior to patient arrival: a. Time to first set of Vitals, b. Time to primary assessment and c. Time to secondary assessment, 2. Number of critical actions completed and number of critical actions missed, 3. Formal hand off from ED to trauma team.

Conclusions: We recognize limitations in this study: 1. Trauma codes are only run once a month.2. We did not assess any direct correlation with patient outcomes as we do not measure patient outcomes. 3. We only had one observer who consistently collected all data for every trauma. 4. We modified our checklist as we determined what was most relevant. Our online instructional course and mock in situ trauma codes are demonstrating improvement in mock in situ trauma evaluation and resuscitation.

While medical proficiency is vital, teamwork and communication are the cornerstone of effective resuscitation. Our curriculum reinforces the tools that create a culture of teamwork and communication.

376 Development of a Critical Thinking Curriculum for Emergency Medicine Residents

Schechter J/SUNY Downstate - Kings County Hospital Center, Brooklyn, NY

Study Objectives: Diagnostic errors account for a large portion of medical errors, leading to significant patient morbidity and mortality. There has been a focus in the past 2 decades on increased awareness and education of critical thinking and the cognitive biases that can lead to diagnostic errors. This has trickled into medical school education, but significant education and training of residents, in how thinking and cognitive errors affect practice, is lacking. The goal of this curriculum is to impart the knowledge and skills to emergency medicine residents to understand basic cognitive theory and cognitive errors, and use that knowledge to prevent diagnostic mistakes.

Objectives: By the end of this course residents will be able to 1) explain the dual process theory of cognitive decisionmaking, 2) describe biases that can lead to diagnostic errors 3) apply the biases to clinical scenarios and 4) use tools, such as metacognition, to help prevent their own diagnostic errors.

Methods: Participants will take a pretest prior to the start of the curriculum. They will receive reading material on critical thinking and diagnostic errors to review. This information will be reinforced with a didactic lecture followed by a small group session. During the small group session, faculty with understanding of critical thinking will lead discussions based on case studies to better understand the various cognitive biases. Participants will have opportunity to provide feedback of both the lecture and small group session. Residents will receive continuous exposure to these concepts during monthly morbidity and mortality (M&M) conference. A work sheet will be given to every participant during M&M conference where they will be asked to describe the cognitive errors that may have led to the results in the cases presented. After 1 year, residents will take a post-test to determine retention and understanding.

Conclusions: Critical thinking is an important aspect to optimal and safe care of patients, but it is often excluded from resident education. This curriculum will help emergency medicine residents make better clinical decisions by understanding why and how they make those decisions.
The Patient Experience: Increasing Medical Student Awareness of Patient-Centered Care

Calise V/SUNY Upstate Medical University, Syracuse, NY

Study Objectives: The doctor-patient relationship is the cornerstone of modern medicine. Medicine continues to evolve from a paternalistic model to one focused on patient-centered care. Over the last several years, a patient’s satisfaction with her emergency department stay has gained increased importance. Satisfaction is based on a variety of factors, including interactions with staff and being involved in one’s own care decisions. Increased satisfaction is beneficial to patients, physicians, and institutions; patients are happier about the care they receive, physicians are likely to have a sense of greater job fulfillment (thus reducing burnout), and hospitals will likely get higher reimbursements as patient satisfaction scores now affect compensation.

Patient-centered care (PCC) has been linked with increased patient satisfaction, better self-management of chronic conditions, and increased efficiency. Though recognized as an integral part of the doctor/patient relationship, communication, and by extension PCC, is often minimized during the third and fourth year of medical school training. An unofficial survey done with third year medical students participating in our emergency medicine (EM) clerkship showed students felt they received little to no formal training on PCC. Introducing a formalized patient-centered care component into the EM clerkship may benefit students by increasing their awareness of PCC, help them hone their communication skills, and lay the groundwork for a career centered around PCC.

Upon completing this curriculum, learners should be able to: 1) define PCC and explain its importance in modern health care; 2) describe different ways they can increase PCC in their future patient interactions; 3) discuss how their views towards PCC have changed since the beginning of this learning module.

Methods: This course is designed for third year medical students participating in the EM clerkship to help increase their understanding of PCC. The module includes two 60-minute classroom sessions, three different reading assignments, a 15-minute standardized patient (SP) encounter followed by a 15-minute debriefing session with the SP and a mentor, a four-hour patient shadowing shift, a module debriefing session, a PCC pre-test, and a PCC post-test.

Student evaluation is done on a pass/fail grading scheme and is based on attendance, active participation, and timely completion of assignments. Learners will fill out a PCC pre-test and post-test; differences between these two will be used to determine if students’ views on PCC changed over the course of the rotation. A debriefing session will occur during the second classroom session; students will have the opportunity to discuss how their views on PCC have changed since starting this curriculum, and how it can be improved for future use. An email with the PCC post-survey will be also be sent to learners one year after the curriculum to determine if this module resulted in sustained attitude changes towards PCC.

Conclusions: This module can be used to help fill the gap that currently exists in many medical school education curricula and train providers to focus on PCC.

Understanding Emotions: Combating Burnout With Empathy During Emergency Medicine Residency


Study Objectives: In 2014, Bodenheimer and Sinsky expanded on the ‘Triple Aim’ of quality, (2) patient satisfaction and (3) costs by incorporating (4) provider burnout in their Quadruple Aim, explaining that burnout among front-line workers threatens the goals of the Triple Aim. Medical trainees develop high rates of burnout during medical school that peaks during residency, and continues to outpace their peers throughout their early career. Emergency physicians consistently report the highest levels of burnout compared to other specialties. While residents are trained to develop growing skills in quality and process improvement, patient safety, informatics, etc, to improve delivery systems, there is very little training to identify and mitigate burnout. High rates of provider burnout, depression and suicidal ideation have encouraged residency programs to support resident “wellness.” However, the responsibility is often placed on residents to improve their own well-being by finding extra time for activities such as exercising, meditating, sleeping or socializing.

Burnout includes emotional exhaustion, decreased feelings of purpose, and cynicism, and is associated with strained interpersonal relationships and a decline in empathy. Studies have shown that providers demonstrating greater empathy have higher satisfaction and that patients’ perception of their provider’s empathy even predicts outcomes. Thus, there is growing interest in empathy training for health professionals. Contemporary contemplative science, an interdisciplinary approach based on Eastern contemplative philosophy and practices, seeks to improve wellness through various applications of meditative practice. In this module, educators seek to cultivate empathy among emergency medicine residents through contemplative training of emotional awareness, attention, and emotional resilience.

Upon completion of this course, learners will be able to: (1) Describe the characteristics of emotions, (2) state the definition and benefits of attention, (3) identify the three levels of burnout, (4) reflect on intention, (5) Define compassion, empathy and practice compassion for self and others, (6) discuss the core emotions groups of anger, sadness, fear, enjoyment, disgust, contempt and surprise.

Methods: This course is designed for first-year and second-year emergency medicine residents as a 6-session small-group seminar during regularly scheduled...
didactic time. UCSF clinical psychology faculty with formal training in contemplative science guide groups of learners through sessions that incorporate didactics, group discussion, personal reflection and meditation. Between monthly sessions, residents are encouraged to practice the self-reflection, attention and meditation practice they have learned during their clinical and nonclinical experience as well as participate in online modules designed to reinforce discussion topics. There is no formal evaluation of learners during this seminar, and course feedback is solicited periodically through surveys and in-person debriefing.

Conclusions: After completion of this curriculum, residents will have a framework for identifying and discussing personal burnout, empathy and core emotions, and practice techniques to mitigate burnout in their careers.

Study Objectives: The Residency Review Committee for Emergency Medicine (EM) requires that all residents a scholarly project prior to graduation. This curriculum is intended to provide EM residents with baseline knowledge and skills to design and conduct a research project and to provide protected time for residents to design the scholarly project that they will complete over the remainder of the tenure in residency.

Objectives: At the end of this rotation, the resident will be able to 1) demonstrate proficiency in basic research methodology and study design, 2) formulate a testable research question, 3) construct a study to answer that question, 4) perform a preliminary literature search on the research topic, 5) construct a one-page research proposal document

Methods: During the beginning of the second post-graduate year (PGY), three residents at a time are scheduled for the research rotation. The rotation takes place over five consecutive weekdays during which residents are free of all clinical duties. Residents use online modules in statistics, epidemiology and research design. They also participate in moderated small-group brainstorming sessions to scope their research question. Experiential learning includes attending a workshop run by medical librarians on searching the literature and using bibliography software and spending a half day enrolling patients in clinical trials with department research associates. Residents are provided with office space and computers and have access to departmental research coordinators. At the end of the curriculum, residents must submit a one-page research proposal document that is graded by departmental research faculty according to a rubric modified from the Society for Academic Emergency Medicine. The rubric includes assessment of the project’s clarity, applicability of methods and metrics, approach, feasibility, significance, innovation and presentation. Residents are also given the opportunity to evaluate the curriculum via an anonymous online survey.

Conclusions: Completing a research rotation during the beginning of PGY2 year allows residents time to scope a scholarly project by graduation. An intensive experience using mixed learning methods introduces tools that residents can reference throughout residency to aid in successful completion of the scholarly project. Residents find the sessions helpful and enjoyable, but the results of the grading rubric demonstrate that residents often develop research projects that are too large in scope to be completed during residency.

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The Emergency Medicine Research Rotation
Fant AL/Northwestern, Chicago, IL

Study Objectives: To determine which aspects of out-of-hospital care impact outcomes after pediatric cardiac arrest.

Methods: Pediatric cardiac arrest remains a major public health problem, with over 5000 cases per year in the United States alone. The chain of survival focuses on bystander intervention, high-quality CPR, and aggressive post-resuscitation care. In this study, the authors examine 5 years of consecutive data from their county emergency medical system (EMS), to identify predictors of good outcome, including return of spontaneous circulation (ROSC), survival to hospital admission (HA) and survival to hospital discharge (HD). Logistic regression models were performed using JMP 12.0 for Mac.

Results: From January 1, 2012 to December 31, 2016, a total of 133 children suffered cardiac arrest. The median age was 12 months, with an IQR of 3 to 24 months, and a range of 0 to 10 years. In 95% of cases, the arrest was determined by a bystander, rather than EMS. The cause of arrest was drowning (41%); respiratory (44%); trauma (8%); seizure (3%); cardiac dysrhythmia (2%); choking (2%). 58% were ventilated with either a non-rebreather mask (NRM) or a bag valve mask (BVM). 40% of children were intubated, either by ET TTT (predominantly), or a supraglottic airway (l-gel). There was ROSC in 29% of cases overall, with 26% making it to hospital admission, and 20% making it alive out of the hospital.

The interquartile range (IQR) for time to arrival was 16-47 min, with a range of 0-490 minutes. A shorter time from arrest to EMS arrival was significantly associated with ROSC, HA, and HD (all P<0.0001).

In 95% of cases, the arrest was determined by a bystander, rather than EMS. Chest compressions were performed by a bystander in 57% of cases, and by EMS personnel in 41% of cases. CPR by EMS personnel was significantly associated with ROSC, HA, and HD (all P<0.0001).

There was some form of treatment before EMS arrival in 54% of cases. Any treatment before EMS arrival was significantly associated with ROSC, HA, and HD (all P<0.0001).

An AED was placed 50% of the time, and 13% of the arrests were witnessed. Neither of these factors was statistically significant with regard to any of the outcomes.

Conclusions: Shorter EMS arrival times from time of arrest, performance of CPR prior to EMS arrival, and any treatment before EMS arrival resulted in significantly higher rates of return of spontaneous circulation, survival to hospital admission, and survival beyond hospital discharge.

Lifevac: A Novel Device for the Resuscitation of the Adolescent Choking Victim
Lih-Brody L, Singer M, Brody E Jr./ProHealth Care Associates, Rockville Centre, NY; Lifevac LLC, Springfield Gardens, NY

Study Objectives: Choking remains a leading cause of tragic death in children and adolescents. Currently there are no devices that assist in the resuscitation of an adolescent choking victim. Therefore we studied the Lifevac, a new apparatus that previously has been shown in a simulator model to successfully resuscitate an adult choking victim, in an adolescent simulator model.

Methods: The Laerdal choking adolescent simulator system was utilized and a hot dog piece was inserted one and one half inches into the airway. The Lifevac was then used per operating guidelines with the pediatric mask attached to attempt to remove the lodged object and the outcome was recorded.

Results: The Lifevac successfully removed the obstructing hot dog in 472 out of 500 attempts in one attempt, in 497 out of 500 in two attempts, and all obstructions were removed in three attempts. The 95% confidence intervals for the point estimate of the probability that the device will remove the obstruction (calling the point estimate ) shown for three scenarios depending on how you define success: success 1 attempt: 0.92 < p ≤ 0.96, success 2 attempts: 0.98 < p ≤ 1.0, success 3 attempts: 0.99 ≤ p ≤ 1.0. 95% confidence intervals for the point estimate of the probability that the device...
will remove the obstruction (call the point estimate “S”) shown for three scenarios depending on how you define success: success 1 attempt: 0.91 ≤ S ≤ 0.97, success 2 attempts: 0.98 ≤ S ≤ 1.0, success 3 attempts: 0.99 ≤ S ≤ 1.0.

Conclusions: The Lifevac is an apparatus that can successfully remove a hot dog, which is a food that commonly leads to choking, lodged in an adolescent choking victim’s airway in this simulator model. This apparatus deserves further study as there is potential to save lives if abdominal thrusts fail to resuscitate the choking victim.

**Easy as**

**Place**

**Push**

**Pull**

### 383 A Novel Technique for Improving Fluid Resuscitation in Septic Shock

Pleth M, Spangler H, Robertson G, Chenet K/WakeMed Health & Hospitals, Raleigh, NC; UNC Hospitals, Chapel Hill, NC; 410 Medical, Durham, NC

Study Objectives: Rapid fluid delivery is commonly required in sepsis and other conditions leading to shock and hypotension. Since gravity flow and infusion pumps are unable to deliver a fluid bolus rapidly, pressure bags are commonly used to increase flow rates. Disadvantages of this technique include progressive decrease in flow rate without continuous re-inflation of the bag, difficulty administering accurate doses, particularly with smaller volumes, and the risk of inadvertent air embolism. LifeFlow is an intuitive single-use device that provides rapid and controlled infusion, enabling a health care provider to administer a measured fluid bolus and quickly assess clinical response. This study will compare the LifeFlow to pressure bag in simulated out-of-hospital and hospital settings.

Methods: Registered nurses and paramedics participated in a simulated septic shock resuscitation and were randomly assigned to administer repeated fluid boluses with the LifeFlow or pressure bag. Training was provided if the participant was not familiar with either method. Participants were given a clinical sepsis scenario that required administration of three, 500 ml boluses (totaling 1500 ml) was not familiar with either method. Participants were given a clinical sepsis scenario that required administration of three, 500 ml boluses (totaling 1500 ml) through a 20G IV catheter into simulated patient. The scenario involved a variety of clinical tasks including a physical exam, vitals assessment, delivery of oxygen via nasal cannula, medication administration, manual charting, and fluid administration. Total scenario time and fluid infusion times were determined by video recording of the scenario. Fluid volume was measured by weight to determine the accuracy of each bolus. Variance was defined as difference between actual and desired fluid bolus volume.

Results: Fourteen providers (8 RNs, 6 Paramedics) delivered three 500 ml normal saline boluses during the septic shock scenario. Average time to completion of each bolus was 2.5 minutes for LifeFlow vs 7.6 minutes for pressure bag. Total infusion time for 1500 ml was almost 3 times as fast for LifeFlow vs pressure bag (7.8 vs 22.8 minutes). Total time to completion of the sepsis scenario was 1.8 times as fast for LifeFlow compared pressure bag (20 vs. 36.3 minutes). Total fluid amount variance, above or below 1500ml, was greater for pressure bag infusion (1500 + 39.1 to 184 ml, p=0.04).

Conclusions: When compared to pressure bag, use of the LifeFlow device resulted in significantly faster time to completion of the septic shock resuscitation scenario. Times to completion of each bolus, and infusion time for the total 1500 ml, were significantly faster. The LifeFlow also reduced variance in the size of fluid bolus administered, indicating that clinicians can more accurately deliver the correct fluid volume and avoid inadvertently providing more fluid than is needed. This technique may offer a faster and more efficient method of fluid resuscitation in sepsis and septic shock.

### 384 Delineating the Value-Added Inclusion of the Impedance Threshold Device During Head-Up CPR

Pepe PE, Debaty G, Yannopoulos D, Moore JC/The University of Texas Southwestern Medical Center, Dallas, TX; University of Grenoble Alps, Grenoble, France; University of Minnesota, Minneapolis, MN; The Hennepin County Medical Center, Minneapolis, MN

Study Objectives: Previous experimental studies have determined that a “head-up CPR” approach is capable of improving cerebral perfusion pressure (CerPP) and, in turn, blood brain flow. In those early studies, however, a whole-body tilt was performed and simultaneous application of automated CPR (using the LUCAS™ technique) and an impedance threshold device (ITD) were both used with the intent of further augmenting circulatory flow into and out of the heart and brain. Preclinical and clinical CPR studies have now indicated that the ITD can be very effective when used with high-quality CPR but ineffective when applied with suboptimal performance of CPR. Therefore, the purpose of the current study was to determine if the ITD maintains a specific value-added contributory effect in terms of helping to maintain systolic blood pressure (SBP), coronary perfusion pressure (CorPP), CerPP and end-tidal CO2 (ETCO2) during “head-up CPR” conditions.

Methods: Using additional data that were gathered (per routine) during implementation of a previously published swine study (Debaty et al. Resuscitation 2015; 87:38-43), SBP, CorPP, CerPP and ETCO2 values were determined for the +30° whole body tilt position (head-up) and those measurements taken when an ITD (ResQPOD-16™) was in place were compared to those taken when it was removed. In the study, female farm pigs (n = 8) each weighing ≥ 40 kg were anesthetized with isoflurane and instrumented to measure aortic (Ao), right atrial (RA), and intracranial (ICP) pressures. All subjects were treated with a LUCAS™ CPR device (100 compressions/min) and mechanically ventilated through an endotracheal tube at 10 breaths/min with a tidal volume of 10 ml/kg. After 6 minutes of untreated VF, all of the subjects were treated with 18 minutes of LUCAS™ + ITD at different tilt angles followed sequentially by LUCAS™ + ITD with whole body head-up tilt at +30° for 2 minutes and then LUCAS™ alone for 2 minutes in the same +30° position. Animals therefore served as their own controls and the measured results were combined for aggregate analysis. A Student’s t-test was used to compare the key hemodynamic variables during head-up CPR ± ITD and results were expressed as a mean ± SEM. The study was approved by the institutional animal care committee and conducted in compliance with applicable regulatory guidelines.

Results: Among the 8 subjects, calculated values (in mmHg) for both CorPP (decompression phase Ao minus RA pressure) and CerPP (Ao minus ICP) consistently showed a significant contribution from the ITD. When comparing the LUCAS™ combined with the ITD (at +30°) versus use of the LUCAS™ CPR device alone (at +30°), SBP fell significantly (78 ± 5 to 64 ± 5 mmHg; p < 0.001) as did CorPP (25 ± 2 to 23 ± 2; p=0.012); CerPP (29 ± 3 to 25 ± 2; p=0.001) and ETCO2 (33 ± 4 to 22 ± 3; p < 0.001).

Conclusions: Over a prolonged period of head-up CPR treatment in pigs, the combined application of LUCAS™ and an ITD provided significantly higher SBP.
CorPP, CorPP and ETCO₂ values than when using the LUCAS™ alone. Based on these data, the combined use of the LUCAS™ and ITD interventions would therefore be recommended as part of a bundled approach to obtain an optimal synergistic benefit when implementing a head-up CPR technique.

Patients with hyperperfusion and ESRD alone, CHF alone or both received 18.4, 10.4 and 11.7 cc/kg (NS). Conclusions: Sepsis patients with CHF and/or ESRD often do not receive the volume of IV resuscitation recommended by current guidelines. These patients frequently have evidence of objective fluid overload. Patients with evidence of fluid overload had longer hospital lengths of stay, and may have received less IVF in the ED and experience increased in-hospital mortality.

Methods: This is a descriptive analysis of resuscitation patterns and outcomes in patients with ESRD and/or CHF using a pre-existing sepsis database of patients from 2011-2015 based on ICD codes. The patients were seen within the Detroit Medical Center system, which is a large academic health system. Dual abstraction by two EM residents was performed to collect additional demographics, confirmatory data, objective evidence of fluid overload, resuscitation and additional clinical and outcome data. Descriptive statistics were reported including as well t-test and ANOVA.

Study Objectives: Aggressive fluid resuscitation is a cornerstone of sepsis management. Concerns about fluid overload specifically in patients with ESRD and CHF can be a barrier to compliance. The objective of this study was to describe the resuscitation pattern of sepsis patients with ESRD or CHF in the ED. Methods: This is a descriptive analysis of resuscitation patterns and outcomes in patients with ESRD and/or CHF using a pre-existing sepsis database of patients from 2011-2015 based on ICD codes. The patients were seen within the Detroit Medical Center system, which is a large academic health system. Dual-abstraction by two EM residents was performed to collect additional demographics, confirmatory data, objective evidence of fluid overload, resuscitation and additional clinical and outcome data. Descriptive statistics were reported including as well t-test and ANOVA.

Results: Seventy patients were identified who met the inclusion criteria including forty-two patients with ESRD alone, sixteen patients with CHF alone and twelve patients with both CHF and ESRD. The mean age was 61.4 ± 11.8 years, 66% were male. The mean admission SOFA score was 6.1 ± 2.6, the mean intravenous volume received was 15.4 ± 14.2 cc/kg while in the ED and overall in-hospital mortality was 4.2%. Thirty seven percent (26/70) patients had evidence of fluid overload in the ED. These patients were older (65.0 vs. 59.4; p = 0.049), had a higher qSOFA score at admission (1.73 vs. 1.25; p = 0.023), and had a longer hospital length of stay (13.6 vs. 8.6 days; 0.021) compared to patients without evidence of overload. Total cc/kg IV fluid administration (18.0 vs.13.9 cc/kg; p=0.234) and in-hospital mortality (19% vs 11%; p=0.371) were also higher in patients with overload. Twenty-seven of the patients (19 with ESRD alone, 2 with CHF alone, 6 both) demonstrated hyperperfusion requiring a 30cc/kg bolus based on either a lactate >4.0 mmol/dL or a SBP <90 mmHg. The mean lactate was 3.6 ± 2.2 mmol/dL and the mean SBP 88 ± 30 mmHg. Of the hyperperfusion patients, objective evidence of fluid overload was present in 26% (5/19) of patients with ESRD, 100% (2/2) of CHF patients and 33% (2/6) with both. Overall, 25.9% (7/26) patients received the required 30cc/kg bolus for evidence of hyperperfusion.

Study Objectives: The Centers for Medicare and Medicaid (CMS) sepsis management bundle (SEP-1) core measure requires that serum lactate levels be obtained and repeated within 6 hours if >2.0 mmol/L and evidence supports prognostic value of improvement in serum lactate values. We developed an order in our electronic health record (EHR) that includes a repeat lactate order if the initial lactate level is elevated. We hypothesize that implementation of a lactate order that includes triggers for repeat testing will increase compliance with repeat lactate measurement in patients with severe sepsis and septic shock.

Methods: A retrospective observational study was performed at one academic and one university-affiliated community emergency department (ED) with a combined census of 70,500 annual visits. We compared the rate of repeat lactate measurement compliance for adult patients who were suspected of having severe sepsis and septic shock (serum lactate >2, hospital admission, and received antibiotics within 12 hours of admission) before and after implementation of the repeat lactate order. The repeat lactate order created initially contained a conditional serum lactate order to be released by the ED nurse if initial lactate was >2mmol/L. This conditional component was later replaced with an automatic, reflex repeat lactate order to be collected every two hours (that can be canceled by nursing if the initial lactate was ≤2mmol/L). Repeat lactate compliance rates following implementation of each iteration of the repeat lactate order were compared using the chi-square test statistic.

Results: Implementation of a conditional repeat lactate order for patients with suspected severe sepsis or septic shock significantly increased repeat lactate compliance (43.2% vs 65.5%; P<.001). Replacing the conditional repeat lactate order with an automatic, reflex repeat lactate order resulted in further improvement in repeat lactate compliance rates (65.3% vs 70.1%; P=.05).

Conclusions: The inclusion of a conditional repeat lactate order significantly improved compliance with the repeat lactate requirement of the CMS SEP-1 core measure with further improved compliance with a fully automated repeat lactate order. This automated approach is a promising alternative to relying on individual repeat serum lactate order entry.
**388 Sepsis Fun Facts: A Simple Way to Increase Sepsis Bundle Compliance**

Leon LN III/University of Central Florida/ HCA GME Emergency Medicine Residency Program of Greater Orlando, Kissimmee, FL

**Study Objectives:** To design a quality improvement project to improve sepsis bundle compliance in our emergency department.

**Methods:** This was a before and after study. Historical data on sepsis bundle compliance was obtained from our quality office. In our institution, the sepsis bundle consists of: 1) blood cultures before antibiotics, 2) antibiotics within 1 hr of recognition, 3) serum lactate level at presentation with 3hr repeat if elevated >2, and 4) crystalloid fluid resuscitation of 30cc/kg. Start date was determined by our department’s QI launch; we collected data for 30 consecutive days and compared sepsis bundle compliance rates before and after the intervention.

Descriptive statistics were compiled, and the z-test for proportions was used to calculate statistical significance.

The intervention was two-fold: 1) a bright yellow card with sepsis criteria was posted on all ED workstation computers; and 2) daily email blast for 1 month with “sepsis fun facts.” These email blasts were short pearls that highlighted the importance of recognizing and treating sepsis.

**Results:** The sepsis bundle compliance rates in the month prior to the intervention was 38%. In the month during the targeted intervention, the compliance rate increased to 56%. There was a statistically significant increase in bundle compliance rates during the intervention ($p=0.0399$).

We also administered a survey to the ED attendings and residents following the completion of the study to assess whether they perceived our intervention as helping them increase compliance with ordering the sepsis bundle. The response rate was 94%. To the question “Did you feel the SEPSIS cards placed on the workstations made you more likely to consider sepsis earlier in patients under your care in the emergency department?” 70% answered agree or strongly agree. To the question “Were you more likely to order the SEPSIS bundle after receiving the daily Sepsis ‘Fun Facts’?” 29% were neutral while 59% answered agree or strongly agree.

Finally, to the question “Did you feel the Sepsis Cards and ‘Fun Facts’ help you improve the care of Septic patients in the emergency department?” 76% answered agree or strongly agree.

**Conclusions:** Simple interventions such as sepsis criteria reminders and email blasts highlighting the importance of treating and recognizing sepsis can improve compliance with sepsis bundle ordering within the emergency department. A post-intervention survey suggests that such reminders do influence emergency physicians and increase their awareness of sepsis.

**Methods:** A rotating slide deck, termed the My Visit Board (MV), was created and displayed on a screen in each ED patient room. The slide content was created by a multidisciplinary group including physicians, residents and nurses, with assistance from the Department of Patient Education. Survey data was collected both before and after implementation of the intervention. Patients were asked to a 3-question paper survey, to assess the patient’s self-reported understanding using a Likert scale. Patients were eligible to receive a survey if they had a final disposition entered in the electronic medical record. Exclusion criteria were an inability to understand English, intoxication, and cognitive inability to a survey as judged by their ED provider or nurse. A convenience sample patients were surveyed both before and after the intervention. Survey data was also collected from ED staff in order to assess any negative impact on clinicians. All nurses, residents, and attending physicians in the ED were eligible to participate. Surveying was completed using a third party online survey business. The survey data was compared using Wilcoxon signed-rank tests.

**Results:** Thirty-seven patient surveys were collected before and after implementation. Results show significant improvement in how well patients knew the members of their care team (6.57 to 7.84; $p<0.018$). Patients also were aware of information on general health topics more frequently after the intervention (5.22 to 6.89; $p<0.016$). There was no significant difference in patient understanding of wait times (6.05 to 6.43; $p<0.560$). Providers felt that their patients had improved understanding of wait times (3.55 to 5.20; $p<0.001$) but there was no significant decrease in the level of patient/provider conflict (5.99 to 5.75; $p<0.430$). Providers felt that, overall, the My Visit Board significantly improved the patient/provider relationship (3.39 to 3.62; $p<0.015$).

**Conclusions:** This data reveals that the My Visit Board improved patient understanding of the care team and resulted in better communication of general health topics. Providers indicated that there was a positive impact on the patient-provider relationship. Use of a slide deck in ED exam rooms to convey information to patients is a viable communication tool. Further work is needed to improve communication of wait times and identify other topics that could be shared with patients via this medium.

**390 Pilot Study to Test and Refine an Emergency Department Trigger Tool**

Griffey RT, Schneider RM, Todorov AA/Washington University School of Medicine, Barnes-Jewish Hospital, St. Louis, MO; Ryan Schneider, Saint Louis, MO; Washington University School of Medicine, St. Louis, MO

**Study Objectives:** Quality and safety review methods used in many EDs are decades old, porous and inefficient for identifying adverse events (AEs). Trigger Tools (TTs) popularized by the Institute for Healthcare Improvement, use 2-level reviews: a 1st level (L1) nurse review searching for the presence of triggers (thought to increase the likelihood of an AE) and if present, in-depth review for an AE, followed by a 2nd level physician review (L2) for putative AEs. TTs have been developed for a variety of clinical specialties. Recently, we developed an ED Trigger tool (EDTT) using a multidisciplinary, multicenter modified delphi consensus process to generate an initial list of 104 candidate triggers specific to the ED, including 46 strong candidates. We present preliminary data to test and refine the EDTT in which we: 1) specify the full list of candidate triggers for a computerized query (to ultimately eliminate this part of the 1st level review) and 2) perform manual record reviews applying a rigorous quantitative approach for identifying triggers associated with AEs.

**Methods:** This study was performed at an urban academic emergency department with over 95,000 annual visits, using data from 10/1/2015 - 10/31/2016. We implemented the triggers from the EDTT in computerized queries, mapping individual triggers to structured fields in electronic medical records (EMR). In parallel, we provided extensive training for three RNs to act as first-level reviewers, and conducted dual L1 review and L2 review for all records (not just those with AEs identified on L1 review). AEs were assigned severity ratings using the National Coordinating Council Medication Error Reporting Program Index and to one of 4 AE categories (medication, medical care, procedural, other). Identification of triggers on manual review were compared to results of the query. In this derivation phase, we selected visits that were enriched in number and scope of triggers. We calculated interrater reliability for each trigger and present proportions with CIs and present descriptive and univariate data for patient
sociodemographics, AEs detected, types and trigger associations. Analyses were conducted using SAS 9.3 and Fisher’s exact test. We received approval for this study from the university IRB.

Results: We were able to specify 97 of the 104 triggers for automated extraction. These were trained on 112,038 ED visits yielding 79,953 visits with at least one trigger. The distribution of triggers per record ranged from 0 to 25. Among the 357 visits completely reviewed so far, 147 had at least one confirmed AE, with a total of 182 AE in this enriched sample. The dual L1 review had a sensitivity of 88% for detecting AEs. Of the AEs, 56% (95% CI: 49.1,63.4) were present on arrival to the ED, 78% (CI: 71.6,83.6) had severity scores of "temporary harm" or worse and 23% (CI:18.0,30.0) were acts of omission. Categories were medication (51%), medical care (37%), procedural (9.4%) and other 2%. In this preliminary subset, we found strong associations between presence and absence of AEs and a number of triggers (Table 1).

Conclusions: In this initial derivation phase of testing, we were able to specify triggers for detection by a computerized query and to identify triggers that are associated with the presence or absence of AEs. Further derivation work and subsequent validation are ongoing. An ED trigger tool is promising as a potential new approach for quality and safety review in emergency medicine.

<table>
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<td>0.5280</td>
<td>0.6319</td>
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</tr>
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</table>

391 Same Physician, Different Location: Variation in Press Ganey Scores Between Freestanding and Hospital-Based Emergency Departments

Simon EL, Engineer RS, Pedulsky SR, Burke RC, Salvator A, Griffin G, Smalley CM /Cleveland Clinic Akron General, Akron, OH; Cleveland Clinic, Cleveland, OH

Study Objectives: Patient satisfaction scores have become quality benchmarks for hospitals, are publicly reported, and are often tied to financial incentives. As a result, patient satisfaction scores have become an increasing priority for health systems. In spite of this, no published research has compared freestanding emergency departments (FED) to hospital-based emergency departments (HBED) in relation to patient satisfaction scores. Our objective was to determine whether patient satisfaction scores for individual emergency physicians varied according to the clinical setting in which the care was provided, comparing HBEDs versus FEDs.

Methods: We obtained Press Ganey patient satisfaction survey results from September 2014 to September 2016 for patients treated in our health system’s 9 HBEDs and 8 FEDs. Providers who had fewer than 10 surveys per facility type were excluded from the study. Survey questions assessed physicians’ courtesy, whether patients were informed about their treatment, concern for patient comfort, and listening ability. The response scale for these questions ranged from very poor (1) to very good (5). Provider scores for each question were averaged over their HBED responses and their FED responses. The difference in mean scores by location were calculated and tested for significance with a paired t-test. Mean score differences with 95% confidence intervals are presented. We also evaluated patient characteristics using Press Ganey data, which included sex and age, as well as mean arrival to seen by a provider time and total length of stay (LOS) for discharged patients.

Results: Forty-nine providers with 7,561 total surveys were analyzed: HBED (n=3,161) and FED (n=4,400). There were no statistically significant differences in patient sex or age between the HBED and FSED surveys. The satisfaction scores were higher for FED surveys for each survey measure: physician courtesy was 0.22 points higher (95% CI 0.18-0.27); listening ability was 0.26 points higher (95% CI 0.20-0.32); whether patients were informed about their treatment was 0.30 points higher (95% CI 0.25-0.36); and concern for patient comfort was 0.52 points higher (95% CI 0.27-0.38). The mean arrival to seen by a provider time at the FED was 29.2 minutes ± 34 minutes (95% CI) and at the HBED was 68.3 minutes ± 80.5 minutes (95% CI). The LOS at the FED was 113.4 minutes ± 63.8 minutes for targeted service recovery efforts prior to the official survey ratings. This study sought to assess if real-time ratings of patient experience are affected by projected disposition destination in the emergency department.

Conclusions: Individual physicians, who practice at both types of facilities, consistently received lower satisfaction ratings from patients at HBEDs compared to FEDs. Further research is needed to better understand the etiology of these differences.

392 Disposition Destination Does Not Affect Patient Experience Ratings in Real-Time in an Urban Academic Emergency Department

Polk R, Blackhurst D, Moschella P /University of South Carolina School of Medicine Greenville, Greenville, SC; Greenville Health System, Greenville, SC

Study Objectives: Patient experience surveys are becoming an increasing portion of merit-based incentive programs, alternative payment models and improved patient outcomes. As such, the ability to sustain "high" scores has gained prominence as many programs focus on broad initiatives to improve patient experience. These programs often lack specificity and use delayed survey results for assessment. The ability to target initiatives to patients in real time may provide a real innovation as timely discovery of patients at risk for low experience scores may allow for targeted service recovery efforts prior to the official survey ratings. This study sought to assess if real-time ratings of patient experience are affected by projected disposition destination in the emergency department.

Methods: This study is a subset analysis of a single center, IRB-approved, pilot study to evaluate if emergency physicians can predict actual patient satisfaction scores in real time in an urban academic ED. The goal was to assess for any differences in patient experience based on projected disposition in real time. During randomly assigned time blocks, a research assistant performed anonymous tablet-based patient experience surveys on both physicians and patients as they presented to an urban academic emergency department. The survey consisted of several questions directed at the treating physician including projected disposition of the patient (likely admit, likely discharge or unknown at this time) and 4 questions directed to the patient designed to assess their experience. The ability to target initiatives to patients in real time may provide a real innovation as timely discovery of patients at risk for low experience scores may allow for targeted service recovery efforts prior to the official survey ratings. This study sought to assess if real-time ratings of patient experience are affected by projected disposition destination in the emergency department.

Conclusions: This study is a first to assess patient experience, in real time, as stratified by projected disposition. While this small analysis showed no significant differences between mean satisfaction and "top box" scores across experience ratings, patients likely to be admitted did have slightly higher mean scores with respect to listening, while simultaneously rating physicians lower on keeping patients informed
and with respect to comfort for both mean and % "top box" scores. Expanding on this pilot study may provide insight into the needs and failings that prevent improvements in the patient experience in the emergency department.

### 393 Evaluating Clinical Decisionmaking Using Inferior Vena Cava Ultrasound for IV vs PO Rehydration in Pediatric Emergency Department Patients With Suspected Dehydration

Vázquez M, Haines E, Tay E, Tsung J/Icahn School of Medicine at Mount Sinai, Manhattan, NY; NYU School of Medicine, Manhattan, NY

**Study Objectives:** To evaluate clinical decisionmaking by emergency physicians using IVC US in children undergoing ED evaluation of dehydration from GI losses.

**Dehydration from gastroenteritis is a leading cause of death in children <5 years worldwide.** US assessment of the IVC may correlate with severity of dehydration and assist in clinical decision making.

**Methods:** We conducted a prospective cohort study of US imaging of the IVC in pediatric patients with suspected dehydration from vomiting and/or diarrhea. The IVC was imaged in the sagittal plane at the junction of the right atrium and along the length of the IVC extending into the liver, assessing for 100% collapse of the walls of the IVC with tidal breathing. Patients ≤ 21 yrs. presenting with vomiting requiring ondansetron or diarrhea with concern for dehydration were eligible for study inclusion. Patients enrolled from 10/2015-12/2016. Clinical dehydration scores, pre-test (before IVC US) and post-test (after IVC US) probabilities of dehydration requiring IV fluids were recorded by 5 treating sonologists that enrolled patients into the study. Primary outcomes assessed included: IV vs PO fluid rehydration, ED length of stay (LOS) and disposition (admission or discharge).

**Results:** One hundred twelve patients were enrolled, median age was 5 years (S.D +/- 6), and 49.1% were female. By clinical dehydration score, 61.6% (n/N=69/112; 95% CI: 51.9-70.6%), 36.6% (n/N=41/112; 95% CI: 27.7-46.2%), and 0.01% (n/N=2/112; 95% CI: 0.0-0.06%) were minimally, moderately and severely dehydrated respectively. The majority of patients received oral rehydration 79.4% (n/N=89/112; 95% CI: 70.8-86.5%) and 20.3% (n/N=23/112; 95% CI: 13.5-29.2%) received IV fluid rehydration. Only 4.4% (n/N=5/112; 95% CI: 0.1-8.3%) were admitted and no discharged patient returned to the ED for failure to rehydrate. The distribution of pre-test to post-test probabilities in children with suspected dehydration requiring IV fluids is presented in matrix Figure 1. Overall, IVC US altered pre-test probabilities for requiring IV fluid rehydration by decreasing in 51.8% (n/N=58/112; 95% CI: 42.1-61.3%), increasing in 25% (n/N=26/112; 95% CI: 17.3-34.1), and left unchanged in 23.2% (n/N=28/112; 95% CI: 15.8-32.1%). IVC US was attributed to changing management in 15.2% (n/N=17/112; 95% CI: 9.1-23.2%) patients; from PO to IV fluid rehydration in 6.3% (n/N=7/112) children and from IV to PO rehydration in 8.9% (n/N=10/112) patients. Conclusions: US changes post-test probabilities for requiring IV fluid rehydration in the majority of children with suspected dehydration, but in a population of mildly to moderately dehydrated children actual management change with respect to IV vs PO rehydration was infrequent.

**IVC US Changes in Pre-test to Post-test Probabilities for Requiring IV Rehydration N=112**

<table>
<thead>
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<th>Pre-Test Probabilities</th>
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<tr>
<td>&lt; 1%</td>
<td>7/8.8</td>
</tr>
<tr>
<td>1-25%</td>
<td>15/18.0</td>
</tr>
<tr>
<td>25-50%</td>
<td>24/26.4</td>
</tr>
<tr>
<td>50-75%</td>
<td>27/31.0</td>
</tr>
<tr>
<td>&gt; 75%</td>
<td>39/44.0</td>
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</tbody>
</table>

**Conclusion:** Point-of-care 3D US allowed rapid acquisition of brain images, with linear and volume measurements comparable to those obtained by radiology-performed 2D US and MRI, two reference standards. Future research will apply this technique to a larger series of patients to better determine the diagnostic characteristics of this new technique.

### 394 Brain Imaging Using a Novel Three-Dimensional Ultrasound System

Brodier JS, Jaffa EJ, Morgan MR, Herrickhoff CD, Smith BP, Peethummonggin E, Dahl JJ/Duke University, Durham, NC; Stanford University, Palo Alto, CA

**Study Objectives:** Diagnosis of hydrocephalus poses clinical challenges. Head computed tomography (CT) exposes the patient to carcinogenic ionizing radiation, at high cost. Magnetic resonance imaging (MRI) avoids ionizing radiation but has high cost, may require sedation, and requires reprogramming of electronic ventricular shunts affected by magnetic fields. In infants with open fontanelles, two dimensional (2D) ultrasound (US) is a radiation-free and low cost alternative to CT and MRI, but provides less visualization of the three-dimensional (3D) structure of brain and ventricles. We sought to determine the feasibility and accuracy of measurements of the brain and ventricles in an infant with hydrocephalus using a novel 3D US system, compared with conventional 2D US and MRI obtained during the clinical care of the patient.

**Methods:** A micro-electro-mechanical systems chip with a gyroscope and accelerometer was externally affixed to a standard 2D US probe, allowing recording of probe orientation during imaging. Software developed by the research team captured 2D US images and plotted these into 3D space using their associated orientation data to create a 3D image volume. A 7-month-old infant with stable un-shunted hydrocephalus was enrolled following parental informed consent, under a protocol approved by the local institutional review board. The research device was paired with a 2D US system (Sonosite M-Turbo, p21 phased array transducer). Four 3D US scans were performed by emergency physicians with 2D source image depth 13cm, screen pixel resolution 490 width by 330 depth. Research 3D US volumes were compared with 2D US and MRI routinely obtained during the patient’s clinical care. Two researchers independently measured the 2D US, MR, and 3D US images using multiplanar and 3D volume rendering in open source software (3D Slicer).

**Results:** For 3D US, mean source image acquisition time was 10.49 seconds (range 5.15-14.3). Mean 3D reconstruction time was 52.36 seconds (range 29.67-66.97). A mean of 365 2D US frames were captured to construct the 3D volume (range 184-484). 2D US obtained during the patient’s clinical care recorded 57 2D frames (26 coronal and 31 sagittal images) over 272 seconds. Clinical 2D US image depth and resolution varied. MRI produced 24 axial images and 20 sagittal images, each with 256 by 256 pixel resolution. Mean measurements of brain and ventricles by the two observers are shown in the table. Example images are shown in the figure. Differences in measurements may be due to growth in the patient in the interval from 2D US until 3D ultrasound. 2D US occurred 1 month after MRI, and 3D US occurred approximately 2 months after MRI.

**Conclusions:** Point-of-care 3D US allowed rapid acquisition of brain images, with linear and volume measurements comparable to those obtained by radiology-performed 2D US and MRI, two reference standards. Future research will apply this technique to a larger series of patients to better determine the diagnostic characteristics of this new technique.
Pediatric Emergency Medicine-Performed Point-of-Care Ultrasound (POCUS) for the Diagnosis of Intussusception

Trigilolas TE, Kelly JC, Hegenbarth MA, Kennedy C, Patel L, O’Rourke K/Children’s Mercy Hospital, Kansas City, MO; Truman Medical Center/University of Missouri-Kansas City, Kansas City, MO

Study Objectives: Intussusception is a pediatric abdominal emergency that requires prompt diagnosis, as delays can lower air enema reduction success rates. Point-of-care ultrasound (POCUS) performed by pediatric emergency medicine (PEM) physicians has emerged as a promising tool for diagnosing intussusception. The primary objective of this study was to evaluate the accuracy of PEM physician-performed POCUS in identifying ileocolic intussusception. The secondary objective was to identify factors that predict air enema failure.

Methods: This retrospective study included children who underwent POCUS for suspected ileocolic intussusception in a pediatric emergency department. Patients were included in the study if they presented between January 2001 and December 2015, and had POCUS performed by one of three PEM physicians. PEM physicians were trained in standard POCUS techniques/indications, and subsequently underwent brief additional education in identification of ileocolic intussusception. A pediatric radiologist confirmed POCUS scan interpretation by either direct over-read of the POCUS images, or by radiology department ultrasound. Data collected included demographic variables, duration of symptoms, location of intussusception, air enema success/failure, need for surgery, and recurrence of intussusception. Data analysis included descriptive statistics, sensitivity, specificity, and positive and negative predictive values of POCUS.

Results: 105 POCUS scans were performed on 104 patients. Mean age was 22 months (range 2 to 88 months) and 67/104 (64.4%) were male. There were 78 patients with intussusception; 7% were detected by POCUS (Figure 1). PEM physician-performed POCUS had a sensitivity of 96.2% (95% CI 91.9-99.2), specificity of 92.6% (95% CI 82.7-100), positive predictive value of 97.4% (95% CI 93.9-100), and negative predictive value of 89.3% (95% CI 77.8-100). Seventy-five children underwent air enema, 54 had successful reduction, and 21 required surgery. Three children had spontaneous resolution and did not require air enema. Intussusception distal to the splenic flexure was found to be associated with unsuccessful air enema (OR 11.48, 95% CI 3.26-40.13, p = 0.001). Sex, duration of symptoms, and history of recurrent intussusception were not found to be predictors of air enema failure.

Conclusions: PEM physician-performed POCUS accurately identified ileocolic intussusception when compared with radiologist interpretation. Intussusception located distal to the splenic flexure was a strong predictor of air enema failure. POCUS is a promising diagnostic modality in prompt diagnosis of intussusception, but needs further prospective study.

Ultrasound-Guided Resuscitation of Critically Ill Patients Presenting to the Emergency Department in a Resource-Limited Setting

Tafoya C, Tafoya M, Becker TK, Oteng R, Kessler R, Cranford J, Yakubu H, Opuni D, Clauw D, Theyyunni N, Osei-Ampofo M/University of Michigan, Ann Arbor, MI; University of Pittsburgh, Pittsburgh, PA; KATH, Kumasi, Ghana

Study Objectives: To examine the impact of cardiopulmonary ultrasonography (CPUS) on diagnostic accuracy and early clinical care of critically ill patients presenting to the emergency department (ED) at the Komfo Anokye Teaching Hospital in Kumasi, Ghana.

Methods: Select emergency physicians underwent training in CPUS. Adult patients presenting to the ED were enrolled if they exhibited signs or symptoms of hypoperfusion or hypoxia. Patients either received standard care plus CPUS-guided diagnosis and treatment during their initial resuscitation, or standard care alone depending on whether their treating emergency physician had been trained in CPUS. The primary outcome was diagnostic accuracy which was assessed by comparing the treating emergency physicians most likely diagnosis after the initial assessment with the final ED diagnosis. The ED diagnosis was obtained through blinded chart review performed by two board certified emergency physicians with experience working in resource-limited environments. Secondary outcomes were 24-hour mortality and use of IV fluids, diuretics, vasopressors and bronchodilators. Based on local historical data and previous diagnostic accuracy studies, we planned on enrolling 180 patients.

Results: The target sample size was met after 6 months, with 90 patients each in the intervention and control group. Diagnostic accuracy was 71.9% for patients in the intervention group versus 57.1% in the control group (p = 0.042). This effect was particularly pronounced for patients with a “cardiac” diagnosis (94.7% vs. 40.0%, p = 0.003) and those with a predicted mortality of 25-50% as estimated by Mortality Probability Model II (84.6% vs. 36.8%, p = 0.001). There was no significant difference between the two groups in terms of 24-hour mortality or use of IV fluids, diuretics, vasopressors, or bronchodilators.

Conclusions: When integrated into the initial assessment of critically ill ED patients in a low-resource environment, CPUS improved the diagnostic accuracy significantly.

Sonographic Measurement of Optic Nerve Sheath Diameter Compared With CT Scan for Detecting Elevated Intracranial Pressure of Head Injury Patients in Emergency Department

Ayyan SM, Rohan V, Suresh G/Pariyaram Medical College, KAN NUR, India

Study Objectives: Objective of this study was to determine whether a bedside ultrasonographic measurement of optic nerve sheath diameter (ONSD) can accurately predict the computed tomographic (CT) findings of elevated intracranial pressure (ICP) of adult head injury patients in the emergency department (ED) and to predict an optimal cut-off of ONSD in Indian population.

Methods: A prospective, analytical study on adult ED patients with suspected intracranial injury. Exclusion criteria were age younger than 18 years, obvious ocular trauma, and enrolment delaying or interfering with formal diagnostics or interventions. Using a 7.5-10MHz ultrasonographic probe on the closed eyelids, both horizontal and vertical optic nerve sheath diameter was measured 3 mm behind the globe in each eye. A mean binocular optic nerve sheath diameter greater than 5.00 mm was considered abnormal. Cranial CT findings of shift, edema, or effacement suggestive of elevated intracranial pressure were used to evaluate optic nerve sheath diameter accuracy.

Results: 255 patients were enrolled in the study. The average age was 40.5 years, and median Glasgow Coma Scale score was 13 (range 3 to 15). Optic nerve ultrasound had high sensitivity of 100%, negative predictive value was 100% specificity of 86.9%, with positive predictive value of 88.0% for detecting elevated intracranial pressure compared with CT when cut of ONSD was taken as 5.00mm. Kappa correlation coefficient value was 0.87 (P value <0.01). A receiver operating characteristic curve for elevated ICP was drawn to establish the optimal cut-off value of ONSD which
demonstrated an area under the curve of 0.982. Cut-off value of ≥5.2 mm yielded the best test characteristics and accurately predicted raised ICP with a sensitivity of 100%, specificity of 90.8%, positive predictive value of 91.2% and the negative predictive value of 100%.

Conclusions: Prediction of elevated intra cranial pressure by bedside ED optic nerve sheath diameter ultrasoundography is comparable with CT brain and carries a significant correlation in terms of accuracy, sensitivity, specificity and positive predictive value. Optimal cut-off of ONSD in Indian population is for detecting raised ICP with better sensitivity and specificity is 5.2mm.

Study Objectives: Out-of-hospital ultrasound is not yet widely implemented. Most studies report on convenience samples and trauma patients. We assessed the feasibility of paramedic performed out-of-hospital lung ultrasound in medical patients with respiratory distress.

Methods: Paramedics at two ambulance stations in the city of Pittsburgh, PA, USA underwent a 2-hour training session in out-of-hospital lung ultrasound using the SonoSite iViz, a handheld ultrasound device. Emergency medical services (EMS) physicians were instructed in the interpretation of lung ultrasound images. Paramedics enrolled patients presenting with signs and symptoms of respiratory distress over a 3-month period. The ultrasound exam included anterior and lateral views from both sides of the chest. Images were transmitted wirelessly using a mobile hotspot device and uploaded into an online image archiving system. Images were interpreted remotely by EMS physicians, and two expert sonographers provided an overread. We assessed agreement between EMS physicians and experts, as well as between chart review-derived ED diagnosis and expert interpretation. We defined 4 a priori hypotheses that would need to be met for the intervention to be considered "feasible."

Results: 34 out of 78 eligible patients had an ultrasound exam completed. Image transmission was successful in 25 cases. The primary reason for not enrolling an otherwise eligible patient was equipment failure (25%), followed by patient acuity and patient refusal (18.2% each). 58.8% of completed scans were deemed uninterpretable upon expert review. Agreement between EMS physicians and experts was low. The predetermined thresholds for feasibility were not met.

Conclusions: Paramedic-performed out-of-hospital lung ultrasound for patients with respiratory distress and remote interpretation by EMS physicians did not meet the predetermined thresholds to be considered "feasible" in a real-world environment.

Study Objectives: Community Action Programs Inter-City, Inc. (CAPIC) is a private, non-profit corporation founded in 1967 to eradicate the root causes of poverty and support families and individuals with complex social needs in the greater Boston area, specifically in the communities of Chelsea, Revere and Winthrop. The emergency department (ED) at the Massachusetts General Hospital (MGH) also serves these communities, and formed a collaborative academic-community partnership with CAPIC to provide analysis of ED visit data to help develop targeted, evidence-based interventions for a variety of health needs. CAPIC identified pediatric asthma as a key issue within the community-a condition that affects over 6 million people under 18 years of age, a disproportionate number of whom live in...
in urban, underserved areas such as Chelsea, Winthrop, and Revere. To support these efforts, we performed a geospatial analysis of pediatric asthma-related ED visits at MGH from within the CAPIC service area.

Methods: We analyzed de-identified patient record data extracted from MGH ED records of all patients who presented between July 1, 2012 and June 30, 2015. Self-reported home address, chief complaint, diagnosis on discharge from the emergency department, and basic demographics were extracted from the medical record of each visit during this time period and entered into a geospatial database. Pediatric asthma-related ED visits were defined as any visit by a patient age 2-12 years (CAPIC’s service definition) with a chief complaint or discharge diagnosis matching one of the following: “ASTHMA,” “WHEEZING,” or “REACTIVE AIRWAY DISEASE.” Home addresses were geocoded using the US Census Geocoder and aggregated at the census tract level. Choropleth maps were built in QGIS. This work was reviewed and approved by the MGH Institutional Review Board.

Results: There were 298 pediatric asthma-related visits to the MGH ED from the CAPIC catchment area during the study period. Figure 1A shows a choropleth map of pediatric asthma visits per census tract, and Figure 1B shows a choropleth map of pediatric asthma visits as a percent of all pediatric visits. Census Tract 160101 had the greatest number of asthma-related visits, with 40 visits; however, after adjusting for total number of ED visits by census tract, these accounted for only 8.0% of ED visits by this age group within this census tract. Census Tracts 170300 and 180400 had the highest proportion of ED visits related to asthma within this age group.

Conclusions: Our findings indicate that there are large differences in pediatric visits to the MGH ED for asthma among census tracts served by CAPIC. These communities have been accordingly targeted by CAPIC for intervention and further investigation has been initiated to explore lessons from high-performing communities also identified by our analysis. Vast swaths of data are available to and interpretable by health care researchers working in academic settings, but it is essential to partner with communities to guide priorities and ultimately drive impact. Our experience has also demonstrated the value of academic-community partnerships in accomplishing precisely this goal.

400 Using the Single-Item Screening Question to Assess Alcohol Use Severity in the Emergency Department
McCormack RP/NYU School of Medicine, New York, NY

Study Objectives: Despite the high prevalence of unhealthy alcohol use among emergency department (ED) patients, screening and intervention is rarely integrated into care. Streamlining assessment procedures could boost adoption as time and competing priorities are commonly cited barriers. A single-item screening question (SISQ) has been validated (Saitz et al., 2009, 2010); however, further assessment is then needed for risk stratification to inform the intervention. The 10-item Alcohol Use Identification Test (AUDIT) is often used but may not be practical for the ED. We hypothesized that use of categorical, instead of dichotomous, response options for the SISQ would provide information on drinking severity and eliminate the need for further assessment to guide intervention.

Methods: Using a non-targeted, systematic approach, we screened and assessed a purposive sample of English- or Spanish-speaking adults from an urban, public ED between the hours of 8am to 12am on each day of the week. We asked each participant the SISQ, “How many times in the past 12 months have you had [X] or more alcoholic drinks in a day?” (where X is 5 for men and 4 for women). Patients with positive responses (ie, any heavy use) were asked to select the closest frequency of use among the following categories: “less than monthly,” “monthly,” “weekly,” or “daily or almost daily,” followed by AUDIT. We tested our a priori hypothesis that heavy drinking frequency dichotomized to [less than or equal to monthly] vs. [weekly or more] could discriminate between patients with AUDIT scores of 0-15 (zones 1-2) and 16-40 (zones 3-4), to determine who should receive brief advice vs. brief intervention. We calculated the sensitivity, specificity, likelihood ratios, area under the receiver operating curve (AUROC), and performed k-fold cross-validation using k=5 folds.

Results: 1310 of 4281 patients (30.6%) screened positive for unhealthy drinking. Among those, 72.3% had an AUDIT score ≤ 15; 27.7% had a score >15. Figure 1 shows the positive relationship between AUDIT score and heavy drinking frequency. Using a frequency of weekly or more to identify patients with an AUDIT score of >15 had a sensitivity of 89.3%, specificity of 74.0%, positive likelihood ratio of 3.43, negative likelihood ratio of 0.14, AUROC of 0.90 (95% CI: 0.88-0.92), and cross-validation AUROC of 0.85 (95% CI: 0.82-0.87). These relationships held across age, sex, and race/ethnicity. When AUDIT scores of <15 were imputed for patients who screened negative on the SISQ, the AUROC and cross-validation AUROC rose to 0.98 (95% CI: 0.97-0.98) and 0.97 (95% CI: 0.96-0.97).

Conclusions: In this sample of ED patients, the categorized frequency of heavy drinking reported in the single-item screening question was excellent at discriminating AUDIT scores at a cut-off of 15, and thus at determining intervention needs.
401 The Increasing Practice of Whole Body CT Scanning in Blunt Trauma Patients
Harrison N, Babcock C/Beaumont Health, Royal Oak, MI

Study Objectives: Whole body computed tomography (WBCT=CT head, chest, abdomen/pelvis), or “pan scanning”, is a rapid diagnostic strategy used in blunt trauma. Studies suggest that WBCT decreases emergency department (ED) length of stay and time to diagnosis when compared to a selective scanning (SS) strategy, but may increase radiation exposure, cost, and unnecessary investigations of incidental findings. As increased radiation exposure has substantial public health implications for future malignancy, understanding trends in utilization may be beneficial.

We sought to describe adult blunt trauma patients undergoing WBCT and SS, comparing 2009 to 2013.

Methods: We used data from the National Trauma Databank (NTDB) National Sample Program (NSP) and IRB considered study exempt. Data files were merged into single year databases using R statistical software. Patients with age < 18, mechanism other than blunt trauma, transfer in from outside hospital, and from facilities not reporting CT procedures were excluded. CTs of the head, thorax, and abdomen/pelvis, obtained in first 24 hours, were identified by procedure codes (87.03, 87.41, and 88.01, respectively). SS was defined by at least one, but not all three, of these scans done in first 24 hours. Data was stratified by ISS (1-15 vs. >15) and facility key. Patients receiving WBCT and SS were compared by age, sex, race, payer status, alcohol use, drug use, Glasgow Coma Scale (GCS), and ED disposition using the appropriate statistical tests to calculate p-values and confidence intervals.

Results: There were 35218 and 70589 patients meeting inclusion criteria in the 2009 and 2013 datasets, respectively. In 2009, 21.2% (7055/35218) trauma patients had WBCT and in 2013, 27.6% (19473/70589) had WBCT (p<0.0001). In 2009, 40.9% (13603/33218) trauma patients had SS, compared to 32.9% (23274/70589) in 2013 (p<0.0001). Rates of any CT scanning (ie, WBCT or SS) decreased slightly with 62.1% (20658/33218) receiving at least one scan in 2009 and 60.6% (42746/70589) in 2013 (p<0.001). For patients with ISS 1-15, WBCT increased with 15.7% (4099/26079) in 2009 and 23.7% (13463/56710) in 2013 got WBCT (p<0.001), but decreased for SS with 39.7% (10343/26079) in 2009 and 32.5% (18459/56710) in 2013, p<0.001.

Conclusions: Rates of adult blunt trauma patients receiving one or more CT scans remained stable or slightly decreased in 2013 compared to 2009, but in 2013 patients were more likely to get WBCT and less likely to get a SS approach. No RCT has shown mortality benefit from WBCT, and although WBCT includes potential increased future malignancy risk, the practice appears to be increasing. The use of WBCT in relatively minor trauma (ISS 1-15) seems to be decreasing as well, despite the American College of Surgeons identifying WBCT in minor trauma as “low-value care” in the Choosing Wisely campaign. Our study has several limitations including its retrospective design and the reporting bias inherent to database research. However, it seems much more likely that CT scans were underreported in the database, and so the rates of WBCT in minor trauma would be expected to be underestimate. Long-term consequences need further study. The projected increased malignancy risk per cost of scans has not been fully investigated, and may ultimately determine more harm than good from trauma practices that routinely order WBCT.

402 One-Year Mortality of Opioid Overdose Victims Who Received Naloxone by Emergency Medical Services
Weiner SG, Baker O, Bernson D, Schuur JD/Brigham and Women’s Hospital, Boston, MA; Massachusetts Department of Public Health, Boston, MA

Study Objectives: Despite the increased availability of naloxone, death rates from the opioid overdose epidemic continue to rise. The goal of this study is to use a novel linked dataset in Massachusetts to determine the one-year mortality of patients who received naloxone by emergency medical services (EMS) and initially survived. This information is important for patients who are treated for overdose in the ED and then are discharged.

Methods: Retrospective observational study of patients from three linked statewide datasets: EMS, all payer claims and death records. Patients were included who a) received at least one naloxone administration by EMS between 7/1/13 and 12/31/13 and b) did not receive naloxone between 1/1/13 and 6/30/13 (washout period). The primary outcome measure was death within 1 year of the first recorded naloxone administration. Death records were evaluated until 12/31/16. Descriptive statistics were generated.

Results: Between 7/1/13 and 12/31/13, there were 12,192 EMS naloxone administrations in the state, mean 406.4 per month. Death records indicated that 6.5% (n=787) died the same day as the documented naloxone administration, 9.3% (n=1,132) died within one year and 84.3% (n=10,273) were alive at one year. Excluding those who died the same day as naloxone administration, 9.9% (1,132/11,405) died within one year. The median age of people who died the same day was 46.0 (IQR 35-57) and 67.3% (n=530) were male. The median age of those who died within one year was 54.0 (IQR 38-68) years and 61.0% (n=691) were male. Opioid overdose was the listed cause of death for 49.8% (n=392) of those who died the same day and for 55.4% (n=401) of those who died within one year. Nearly all patients who died the same day (96.3%, n=758) died in the hospital, whereas 62.1% (n=703) of those who died within one year died in the hospital, likely indicating a large number of overdose deaths that occurred prior to medical attention.

Conclusions: The mortality of those who receive naloxone by EMS and survive is high. About 10% of these patients in our cohort died within one year, and more than half of these patients died out of hospital. Patients who survive opioid overdose should be considered extremely high risk and should receive interventions such as offering buprenorphine, counseling and referral to treatment prior to ED discharge.

403 Geriatric Visits to California Emergency Department from 2008 Through 2014
Brennan JJ, Chan TC, Vilke GM, Klineen JP, Hsia Ry, Castillo EM/University of California, San Diego, San Diego, CA; University of California, San Francisco, San Francisco, CA

Study Objectives: The aging population in the United States presents a significant challenge to the health care system in this country. Efforts are underway to better care for older patients including designating geriatric emergency departments (EDs) with specialty-trained staff, focused high risk screening during ED visits and developing acute care at home clinical pathways. The purpose of this study was to assess ED utilization patterns and trends among geriatric patients over time.

Methods: This was a retrospective longitudinal multi-facility study of emergency department visits from all licensed acute care hospitals serving the state of California from 2008 to 2014 using a non-public statewide database. Visits related to suicide and intentional self-inflicted injury, delirium, substance abuse and mental health were classified by primary and secondary diagnoses codes (ICD-9-CM) based on Clinical Classification Software coding. Among geriatric patients, the proportion of ED visits attributed to specific characteristics of ED visits were assessed yearly from 2008 to 2014. Rates per 1000 ED visits and percent change and differences from 2008 to 2014 with 95% confidence intervals (CIs) are reported.

Results: Overall, patient census for geriatric patients increased from 1.9 to 2.4 million (27.2%) from 2008 to 2014, compared to 10.8 to 13.4 million (24.2%) overall. Age groups with the smallest and largest increase during this time were <18 (2.5 to 2.9 million or 15.1% increase) and ages 45 to 64 (2.4 to 3.2 million or 31.1% increase). While proportion of geriatric visits increased over time, admissions among the elderly decreased by 18.7% from 431.9 to 351.3 per 1000 ED visits (diff = -80.6, 95% CI = -79.7, -81.5). The proportion of visits of geriatric visits increased over time, admissions among the elderly decreased by 18.7% from 431.9 to 351.3 per 1000 ED visits (diff = -80.6, 95% CI = -79.7, -81.5). The proportion of visits of geriatric visits increased over time, admissions among the elderly decreased by 18.7% from 431.9 to 351.3 per 1000 ED visits (diff = -80.6, 95% CI = -79.7, -81.5). The proportion of visits of geriatric visits increased over time, admissions among the elderly decreased by 18.7% from 431.9 to 351.3 per 1000 ED visits (diff = -80.6, 95% CI = -79.7, -81.5). The proportion of visits of geriatric visits increased over time, admissions among the elderly decreased by 18.7% from 431.9 to 351.3 per 1000 ED visits (diff = -80.6, 95% CI = -79.7, -81.5). The proportion of visits of geriatric visits increased over time, admissions among the elderly decreased by 18.7% from 431.9 to 351.3 per 1000 ED visits (diff = -80.6, 95% CI = -79.7, -81.5). The proportion of visits of geriatric visits increased over time, admissions among the elderly decreased by 18.7% from 431.9 to 351.3 per 1000 ED visits (diff = -80.6, 95% CI = -79.7, -81.5). The proportion of visits of geriatric visits increased over time, admissions among the elderly decreased by 18.7% from 431.9 to 351.3 per 1000 ED visits (diff = -80.6, 95% CI = -79.7, -81.5).
increased by 47.6% from 22.1 to 32.7 per 1000 ED visits (diff = 10.6, 95% CI = 10.5, 11.1); and, the proportion of ED visits with mood disorder increased by 42.0% from 58.5 to 83.1 per 1000 ED visits (diff = 24.6, 95% CI = 24.1, 25.1). However, the proportion of delirium and dementia-related visits only increased marginally by 3.8% from 109.2 to 113.3 per 1000 ED visits (diff = 4.1, 95% CI = 3.5, 4.7).

Conclusions: In this study of non-military licensed EDs in California, we reported general trends of geriatric ED utilization from 2008 through 2014. ED visits for suicide ideation, substance/alcohol-related disorder, and mood disorder increased significantly, while the proportion of visits resulting in an admission decreased.

**404** Withdrawn

**405** TF  Instructional Module for Reviewing Articles for Publication

Stehman CM, Indiana University School of Medicine, Indianapolis, IN

Study Objectives: The peer review process is essential for ensuring that high quality and well written research reports reach the general emergency physician and so are in place to affect the care provided patients and the way future emergency physicians are educated. Being part of the review process as a reviewer allows the reviewer to learn about the peer review process and what is expected (so he/she can create high quality reports), to practice writing and constructive criticism skills, and to contribute to his/her field of study. Unfortunately, despite some literature suggesting that younger and more junior faculty produce higher quality reviews, junior faculty often find it difficult to find an opportunity to review. Many journals have specific requirements selecting reviewers (such as a certain number of first author papers) and editors may rely on reviewers whose work they know to be high quality rather than taking a risk on someone unknown to them. In addition, junior faculty may find the review process difficult to understand both in the flow of the review and how to produce a quality review. The idea behind this module is to make the review process less daunting for novice reviewers (primarily junior faculty) by providing foundational knowledge and a walk-through of an actual article review.

After completing this module, learners should be able to (1) explain the roles and responsibilities of reviewers; (2) explain key terms in the review process; (3) critically examine a research article; and (4) create a review including a summary of findings, constructive criticism for the authors and a publication recommendation.

Methods: This module can be completed as either an instructor-led small group workshop or as a computer-based self-directed module. Each version includes three main sections: (1) roles, responsibilities and rewards of the reviewer; (2) understanding key terms in the review process; and (3) a walkthrough of an actual review of a paper considered for publication, giving the learner an opportunity to review a paper and make a publication recommendation and then compare his/her comments to the actual comments of experienced reviewers and editors. Knowledge gained in completing the first two sections will be assessed by multiple-choice definition and scenario-based questions embedded within the module. The learner will be asked to provide real-time comments during the review process and will be able to compare responses to those of experienced reviewers and editors. To assess the module itself, learners will be asked to rate their comfort with reviewing articles for publication as well as to rate the quality of any reviews they have previously finished. These questions will be asked both prior to and after completion of the module.

Conclusions: Participating in the peer-review process can be difficult for novices because of lack of understanding of the process, lack of feedback from editors and difficulty in creating a quality review. After completion of this module, learners will understand the process and be able to create a quality review with publication recommendation.

**406** TF A Curriclum Intervention to Address Medical Student Procedural Entrustability

Michael SH/Apert Medical School of Brown University, Providence, RI

Study Objectives: In 2014, the Association of American Medical Colleges released a list of Entrustable Professional Activities (EPAs), which identify a minimum level of independent practice for graduating medical students. One EPA relates to competency in several common procedures. While students have opportunities to practice and refine other EPA skills such as history-taking and physical examination during their training, they are given fewer opportunities to learn and practice procedural skills prior to internship. We hypothesize that a procedural skills curriculum tailored to the needs of junior medical students can improve their familiarity and confidence with procedural skills and may improve their clinical procedural expertise during medical school.

We developed a curriculum to introduce procedural skills to first- and second-year medical students. Using a focused needs assessment, we identified 11 procedures to include in a 10-week curriculum that would provide a foundation for procedural competence. We sought to utilize existing institutional resources, maximize the amount of practice time available for students, and provide students and residents with hands-on teaching experience.

Methods: Aspects of each procedure, informed consent, bag-valve-mask ventilation, direct laryngoscopy with endotracheal tube placement, suturing, lumbar puncture, arterial puncture, venipuncture, intravenous cannulation, bedside ultrasound, and splinting were introduced during the first eight sessions. The subsequent two sessions were dedicated to preparation for and administration of a final examination, respectively. The content for each session, provided to students via an online learning management system (LMS), included a high-yield introduction to each topic, instructive videos, and additional resources. Prior to scheduled class times, students were expected to a short comprehension quiz using the LMS to ensure adequate preparation. Residents from emergency medicine and other relevant specialties volunteered to teach sessions. Medical students familiar with the procedures served as teaching assistants. Department of Emergency Medicine faculty directed the course.

At the end of the course, students were assessed via LMS-delivered written examination and a 4-station practical exam proctored by faculty and residents. Students, teaching assistants, and course faculty provided feedback on the course. A cohort of students who participated in the course underwent 6-month follow-up testing to evaluate skill and knowledge retention. This cohort will also be surveyed over the course of their undergraduate training to determine the effect the course has had on their confidence level and ability to apply the skills in a clinical setting.

Conclusions: This course is a feasible model curriculum that provides a foundation of procedural skills to junior medical students in an efficient 10-week format and is one approach to help meet the goals set forth by the EPAs. An LMS is an effective tool for asynchronous content delivery and student assessment.

**407** TF Teaching Left Ventricular Assist Device Using Team-Based Learning in Emergency Medicine

Narajeeron K/University of California Irvine, Irvine, CA

Study Objectives: Left ventricular assist device (LVAD) is a mechanical circulatory support device that is normally placed in critically ill patients who have poor left ventricular function. After LVAD implantation, patients usually have improved in quality of life. The number of LVAD patients continues to rise. LVAD patients often present to emergency department (ED) with life-threatening conditions. Understanding about LVAD and its complications are necessary for emergency physicians. We created an LVAD teaching module using classing team-based learning (cTBL) theory. The target audience is EM residents, EM faculty, and medical students; although this topic is applicable to internal medicine and family medicine residents.
Upon completion of this cTBL module, the learner will be able to: 1) Properly assess LVAD patients’ circulatory status, 2) Appropriately resuscitate LVAD patients according to ACLS guideline, 3) Identify and treat most common LVAD complications, 4) Evaluate and appropriately manage patients with LVAD malfunctions.

Methods: The method for this didactic session is cTBL. Emergency residents completed pre-reading assignment 1 week before in-person class. During 1.5 hour in classroom, instructor starts the session with introduction of LVAD using PowerPoint presentation. Next, each learner completed individual Readiness Assessment Test (iRAD). Afterward, learners separated into small groups and completed Group Readiness Assessment Test (gRAT) with instructor assistance. The iRAT/gRAT questions 3 and 5 discuss indications for CPR and defibrillation on an LVAD patient. The fourth and sixth iRAT/gRAT questions cover common complications and how to assess circulation. Next, learners applied the knowledge during the Group Application Exercise (GAE) by developing a differential diagnosis for an unstable LVAD patient and determining how they would evaluate and manage the patient. The instructor summarized the key learning points after the GAE. Then, the learners played Kahoot! as a post-test evaluation for learner. We evaluated the retention of knowledge using an unstable LVAD case in simulation one month after this didactic session. Finally, learner evaluated the teaching module through Survey Monkey, an online evaluation form.

Conclusions: After completion of this module, EM residents, EM faculty, and intern will be able to manage LVAD patients in emergency department.

Study Objectives: This pilot project was undertaken to see if the learning techniques utilizing inquiry-based learning (IBL) and Team-Based Learning (TBL) could be effectively incorporated into the normal standing curriculum currently used at a single institution’s weekly core curriculum conference. This was a staged activity planned out over a 2-week period of time. The topic of the learning activity was infectious disease. The goals of this learning activity were to allow residents to effectively utilize recommended asynchronous learning materials to further independent scholarship; engage in independent critical thinking and online resource utilization; and to participate in team-driven discussion and learning.

Methods: In week 1, residents were given an introductory lecture on the topic and a short explanation session of what a combined IBL/TBL activity is. Over the next week, residents were required to use the online IBL portion of the exercise utilizing a newly designed learning management system. This consisted of a popular peer-reviewed online blog about malaria and a developed open-book 10-question quiz testing application of the malaria learning materials.

In week 2, the IBL quiz was reviewed. Residents were then broken into groups of mixed classes and given a short period of time to work through a second quiz based on broader infectious disease learning materials. At the end of week 2, participants participated in a competitive game using the online quiz program Kahoot!, then completed a brief survey on the effectiveness of the learning modality.

Results: Overall, the activity was very well received. Out of 43 total residents, 22 participated in both the IBL and TBL portions of the exercise. Based on survey results, 95% of residents enjoyed the learning activity, and 95% also stated they would prefer this activity to a standard lecture alone. 100% of participants stated they would be interested in performing this activity again. One of the minor evaluation points was whether the resident would now be more interested in using asynchronous learning materials, with 77% responding positively. The qualitative comments were largely positive towards the experience itself with the majority of participants highlighting the group activity portion. However, there were concerns raised that the TBL portion felt rushed, and they would have appreciated more time spent on discussion of correct answers for both the IBL and TBL quizzes.

Conclusions: This two-week pilot project yielded acceptable Kirkpatrick Level I reaction data and is an encouraging first step in understanding how to implement an IBL/TBL curricular intervention. Further iterations will seek to better understand any measurable impact on learning and behavior in our trainees, such as in material retention, in-training exam scores, or increased utilization of asynchronous learning materials.

Study Objectives: The organization, triage, and treatment of patients in mass casualty incidents (MCIs) remain important parts of emergency medicine (EM) training. However, teaching these skills to residents often requires plentiful resources, staff, money, and time. Consequently, EM residents have little opportunity to hone technical and non-technical skills in large scale, multi-patient scenarios aside from actual clinical practice. Simulation improves knowledge retention and procedure performance, increases protocol adherence, and reliably assesses teamwork and communication skills. Using a combination of simulation, interactive exercise, and lecture, this learning module helps to bridge the gaps between medical knowledge and clinical application in the treatment of patients in a MCI without extensive utilization of resources, staff, or significant cost.

After participation in this curriculum, learners will be able to appropriately triage patients using the START and JumpSTART protocols, understand the organization and division of roles in a MCI, effectively communicate with team members, and assess and treat multiple critically ill trauma patients received at a hospital facility. Learners will also be able to perform multiple life-saving interventions and procedures.

Methods: This module incorporates content on traumatic emergencies, orthopedic emergencies, critical procedures, and disaster medicine with EM core content review over five components. (1) A brief MCI introductory lecture is followed by (2) a tabletop exercise triaging incoming notecard MCI patients using the START and JumpSTART protocols and assigning disposition of current notecard ED patients with a debriefing afterwards. (3) Two 20-minute simulation scenarios involving critically ill category “red” trauma patients identified from the MCI patient notecards follow. (4) A category “yellow” station delivers image-based rapid, interactive review of common orthopedic injuries and their management. (5) Finally, all participants are debriefed as a large group.

Emergency medicine faculty facilitators (MCI station leads) evaluated learners with targeted checklists during triage, patient disposition, and trauma patient resuscitations. Checklists included case-specific critical actions, procedural technique items, achievement of closed-loop communication, and assignment of roles for each case. The observing faculty member also provided direct verbal feedback on medical knowledge, communication efficacy, and procedural skills. If available, an additional faculty evaluator assessed resident team leaders with the Ottawa Crisis Resource Management Global Rating Scale, which assesses competence in crisis management skills.

Conclusions: A simulation-based curriculum with integration of lecture and small group exercises is a low-cost, low-resource, and effective way to teach residents both technical (triage, disposition, procedural, resuscitation) and non-technical (communication, organization) skills necessary to treat patients in a MCI. This curriculum can be integrated into any emergency medicine training program to teach disaster, critical care, trauma, and orthopedic medicine. Finally, its structure allows for easy modification to meet specific learning objectives and can be expanded for inter-professional and inter-departmental hospital-based training.
A Novel Protocol Increases the Proportion of Pulmonary Embolism Patients Safely Discharged from the Emergency Department Without Hospital Admission

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Study Objectives: We tested the hypothesis that implementation of a protocol combining risk-stratification, treatment with the direct acting oral anticoagulant rivaroxaban, and defined follow-up would increase the number of PE patients discharged directly from the emergency department (ED) or ED observation unit (EDOU) after pulmonary embolism (PE) diagnosis, but would not be associated with increased mortality, major bleeding or hospital readmission among those discharged.

Methods: We performed a multicenter study (NCT02533287) of patients diagnosed with PE or DVT in the EDs of two large, urban teaching hospitals, for 16 months before and after implementing our outpatient PE treatment protocol in October 2015. Physicians were educated about the protocol, but decisions regarding outpatient treatment were at physician discretion. Subjects were identified using a combination of screening in the ED and review of medical records. PE and DVT were objectively confirmed by imaging. Outpatient treatment was defined as discharge from the ED or EDOU. We used Fisher’s Exact tests to compare proportions of patients with PE and DVT discharged before and after protocol implementation. We used the total number of patients diagnosed with DVT or PE as the denominator for our analyses. We performed pre-planned subgroup analyses according to: hospital, DVT and PE, and patients discharged directly from the ED (ie, not EDOU). We performed safety analyses analyzing the proportion of deaths, major bleeding events, and hospital readmission in the subgroup of discharged patients.

Results: We enrolled 2318 patients with PE or DVT; 1073 (46%) before and 1245 (54%) after protocol implementation. Mean age (59±17 vs. 60±17), the proportions of female (49% vs. 49%), white race (76% vs. 81%) and PE diagnosis (59% vs. 56%) were similar before and after. The proportion of PE patients discharged from the ED or EDOU increased after protocol implementation (66 [10.5%] vs. 104 [14.8%], p=0.02). At one hospital, the increase was more pronounced (40 [12.2%] vs. 70 [19.9%], p=0.007). The proportion of DVT patients discharged from the ED or EDOU did not change (223 [50.5%] vs. 283 [50.4%], p=0.54), but more DVT (136 [30.8%] vs. 200 [37.0%], p=0.04) and PE (34 [5.4%] vs. 57 [8.1%], p=0.05) were discharged directly from the ED after protocol implementation. Most patients (n=201 [58.9%]) were discharged on rivaroxaban after protocol implementation; a significant increase vs. before protocol implementation (n=32 [24.2%]), p<0.001. There was no change in 7-day mortality (0 [0%] vs. 1 [0.3%], p=1.00), major bleeding (0 [0%] vs. 1 [0.26%], p=1.00), or hospital readmissions (26 [9.0%] vs. 24 [6.2%], p=0.17) among discharged patients before and after protocol implementation.

Conclusions: Real-world implementation of an outpatient treatment protocol, combining risk stratification and rivaroxaban treatment, increases the proportion of PE patients who can safely be discharged from the ED.

D-Dimer Assay-Guided Moderation of Adjusted Risk Score: Improving the Specificity of the D-Dimer for Pulmonary Embolism in the Emergency Department

Glober NK, Tainter CR, Brennan J, Daroczi M, Klingmus M, Derksen B, Choi M, Rudolf F, Castillo E, Chan T/University of California at San Diego, San Diego, CA; University of Virginia, Charlottesville, VA

Study Objectives: We aimed to improve both the sensitivity and specificity of the D-dimer assay for detection of pulmonary embolism (PE).

Methods: In this multi-center retrospective review, we collected EMR data on emergency department (ED) patients 18 years or older on whom a high sensitivity D-dimer and imaging were ordered between June 4, 2012 and March 30, 2016. With repeat D-dimers, only the lowest value was used to be more conservative. Data collected included symptoms (dyspnea, unilateral leg swelling, hemoptysis), age, vital signs, medical history (cancer, recent surgery, medications, history of deep venous thrombosis or PE, COPD, smoking), laboratory values (quantitative D-dimer, platelets, and mean platelet volume (MPV)), and imaging results (CT, VQ, and duplex ultrasound) - mostly factors found to be significant in Wells, PERC, and Geneva.

Laboratory values were collected through automated query. All other factors were collected via a structured chart review by data collectors trained in uniform fashion. An independent collector reviewed 10% of the data to ensure reliability. The IRB approved this study.

D-dimer was categorized as either positive (>=240 ng/mL) or negative (<240 ng/mL) based on local lab reference standard. Bivariate and multiple regression analyses compared variables associated with PE or positive D-dimer.

First, a clinical prediction rule, the DAGMAR Score, was developed using age and platelet adjustment and factors significantly associated with PE or elevated D-dimer.

Next, we applied the rule to calculate sensitivity and specificity for the DAGMAR Score on a random 20% validation sample.

Results: 8486 visits were reviewed. Of those, 3523 were unique visits with imaging, yielding 2253 (26.5%) positive D-dimers. 3501 CT scans and 156 VQ scans were completed, detecting 198 PE.

The DAGMAR Score gives points to factors predictive of PE or elevated D-dimer. Some points were negative because they predicted an elevated d-dimer more than a PE. (Table 1)

We set a D-dimer cutoff of 280 ng/mL in those patients with platelets above 500 (1000/mm3) to maximize sensitivity based on ROC curves for D-dimer and platelets.

In our cohort, DAGMAR Score <=2 equated to overall PE risk 1.2%. Specificity improved without loss of sensitivity. (Table 2)

Use of the DAGMAR Score would lead to a reduction in CT scans from 2253 to 1556 over the four-year time period studied while simultaneously leading to fewer false negative results.

Conclusion: By generating a novel scoring system that includes both factors that affect D-dimer and also PE, we were able to demonstrate an improved specificity without losing sensitivity. In fact, there was a slight increase in sensitivity. Prospective evaluation and application to other databases should be pursued to confirm results.


Table 1. Points of the DAGMAR Score.

<table>
<thead>
<tr>
<th>DAGMAR Score</th>
<th>Points</th>
</tr>
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<tbody>
<tr>
<td>Age-adjusted Positive D-dimer</td>
<td>5</td>
</tr>
<tr>
<td>Shortness of Breath</td>
<td>1</td>
</tr>
<tr>
<td>History of PE/DVT</td>
<td>1</td>
</tr>
<tr>
<td>Surgery</td>
<td>-2</td>
</tr>
<tr>
<td>Fever</td>
<td>-1.5</td>
</tr>
<tr>
<td>Recent Cancer</td>
<td>-1</td>
</tr>
<tr>
<td>Initial Respiration Rate &gt;= 19</td>
<td>-0.5</td>
</tr>
</tbody>
</table>

Table 2. Sensitivity and specificity of the D-dimer assay with and without the DAGMAR Score.

<table>
<thead>
<tr>
<th>D-dimer without adjustment</th>
<th>D-dimer with DAGMAR Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sensitivity</td>
<td>94.45% (91-91)</td>
</tr>
<tr>
<td>Specificity</td>
<td>38.38% (36-40)</td>
</tr>
</tbody>
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*95% CI in parenthesis
412 Geographic and Treatment Analysis of Emerging Adult Asthmatic Patients Utilizing the City Emergency Medical Services System in a Large Impoverished Urban Area

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Study Objectives: The complaint of dyspnea in emerging adults, defined as ages 18-26, is largely made up of acute asthma exacerbations. In one large urban, underserved environment emergency medical services (EMS) statically deploys basic life support (BLS) and Advanced Life Support (ALS) ambulances for treatment and transport of patients. In this static deployment the closest ambulances go to call scenes. ALS ambulances can administer albuterol and prednisone and BLS do not, although BLS units may administer oxygen. Protocol for ALS ambulances is for administration of steroids if a second albuterol is administered. Our objective is to geographically identify areas of EMS runs for acute asthma exacerbation and to understand the medications given during transport.

Methods: Data was queried from the Detroit EMS electronic medical record (EMR), Safety Pad™. EMR records from the year 2016 were returned if the EMS provider primary impression was equal to asthma with exacerbation, patient’s medication list included albuterol, patient narrative contained the word “asthma,” or that the EMR classified the incident type as “breathing problems.” Patient records were identified by research personnel as asthma cases or not, with an emergency physician adjudicating any ill-defined cases. Data was geocoded to include latitude and longitude as well as spatially joined census tract and zip code level codification. Data analysis was performed using tableau, excel, and SPSS software.

Results: A total of 257 runs of 18-26 year olds with acute asthma exacerbation were recorded in the dataset. There were 148 (57.6%) BLS runs and 109 (42.4%) ALS runs. During the 109 ALS runs, 106 (97.2%) administered albuterol and of those patients, 47 (43.1%) received a second dose of albuterol. Additionally, 57 (52.3%) patients in the ALS runs were administered prednisone or methylprednisolone. For BLS runs, 156/148 (91.9%) of patients received oxygen. In the urban catchment studied, EMS transports for asthma exacerbations were unrelated to geographic location and numbers or transports were consistent with the population density.

Conclusions: While hotspots of asthma were not detected, geocoded data suggests that a targeted subset of the BLS runs could be outfitted with albuterol and steroids for an improvement in areas of higher population density for better control of asthmatics. On-scene initiation of treatment with steroids by both ALS and BLS has the potential to decrease emergency department length of stay and decrease observation placement and admission of asthmatic patients, as early treatment of asthmatics has been shown to have this effect in the setting of the emergency department. Our study has limitations as cases collected may have represented a diagnosis that was not related to asthma and been misrepresented in the adjudication process, leading to false elevations in numbers of cases. As well, if there had been refusal of transport, death at the scene, or death during transport, that was not collected. Future work could geocode areas smaller than zip codes may provide more detail and be able to detect geographic differences in this underserved area, potentially allowing for further tailoring of EMS.

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413 Incorporation of a Novel Asthma Action Plan to Improve Knowledge and Symptom Management in the Low Acuity Asthmatics Presenting to the Emergency Department

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Study Objectives: Low acuity asthmatics frequently present to the emergency department (ED) due to reasons including a lack of an understanding of their disease process and inability to comply with in-home medical treatments. Asthma action plans (AAPs) are well-established interventions in the primary care setting that demonstrate an ability to improve asthma knowledge and adherence with outpatient treatment instructions. We sought to assess ED patients’ attitudes towards the use of an educational module including AAPs and to evaluate changes in their knowledge about their asthma.

Methods: We conducted a prospective pre-post study to evaluate patient attitudes towards an AAP and retention of knowledge about asthma. The setting was an 80-bed ED located in an urban, tertiary care, safety-net hospital. Inclusion criteria were patients that presented with an asthma-related complaint and at least one other similar ED visit over the past 12 months. Exclusion criteria included hemodynamic instability, inability to comprehend English, lack of phone number and illicit drug use in the past 90-days. Eligible patients were prospectively enrolled and given a 10-question assessment to evaluate their baseline asthma knowledge. A working group of experts developed, piloted and revised the assessment using open and closed format questions. Subjects were then given a 10-minute standardized education module that included asthma disease process education and instruction on how to use an AAP. At one month, subjects were contacted and their attitudes towards the intervention and AAP were assessed utilizing a 5-point Likert scale. At 6 months, subjects were re-contacted and re-administered the same 10-question assessment to evaluate post-intervention asthma knowledge. Changes in assessment scores were compared using a paired student’s t-test.

Results: 71 patients were enrolled with 39 (55%) completing the 1-month follow-up and 21 (27%) completing the 6-month follow-up to date. Average age was 42 years old, 41/71 (57%) were male, 47/71 (66%) were Black, and 48/71 (68%) had completed high school. After 1 month 30/39 (77%) of patients reported positive feeling towards the educational intervention and AAP. 34/39 (87%) cited their knowledge of asthma improved and 37/39 (95%) acknowledged working to improve their self-management of asthma. Additionally, 37/39 (95%) reported commitment to utilizing the information from the intervention and AAP in their everyday lives. After 6-months 15/21 (71%) improved from pre-intervention assessment to post-intervention assessment with the average score increasing by 17.6% (p <.0001). Finally, 9/21 (43%) reported they were still using their AAP 6 months after the initial intervention. Data collection remains ongoing.

Conclusions: The use of an educational intervention coupled with an AAP in an urban, tertiary care, safety-net ED is well received by patients and improves their baseline knowledge of asthma. Although 6-month follow-up was limited, patients showed retention of knowledge and variable commitment to the use of the AAP to ameliorate their symptoms. Further study is needed to determine if ED education and implementation of an AAP reduces severity of symptoms and ultimately decreases ED utilization.

414 Correlation Between Procalcitonin and Severity Scoring Systems in Hospitalized Patients With Diagnosis of Community Acquired Pneumonia

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Study Objectives: Know the result of disease severity and clinical results in community-acquired pneumonia (CAP) are preconditions for treatment options and management for health care resources. Various scoring systems as CURB-65 and SMART-COP have been developed to facilitate these awareness. However, the scoring systems have strengths and weaknesses against each other. In this study, we aimed to investigate the relationship between these two scoring systems with

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procalcitonin level which is highly sensitive in the diagnosis of community-acquired pneumonia.

Methods: This study included hospitalized patients with diagnosis CAP to internal medicine service that had been admitted to the emergency department of Okmeydani Training and Research Hospital between 01.01.2015 -12.31.2015. CURB-65 and SMART-COP scores were calculated with data of patients in the study. We collected measured procalcitonin levels. As described previously during the study, patients who had 2 and over values for CURB-65 and who had values 3 or more for SMART-COP were classified as high risk and groupings were structured according to these values. IBM SPSS Statistics 22 (IBM SPSS, Turkey) programs were used to evaluate the results obtained in this study for statistical analysis.

Results: The study was conducted on a total of 124 cases, including 62 men (50%) and 62 women (50%). Their ages ranged from 21 to 93, average age of 73.81 ± 12.70 years. 72 of the cases (58.1%) had a CURB-65 score of 2 or more and 49 of the cases (39.5%) had a SMART-COP score of 3 or above. The cases’ procalcitonin levels which had 2 or above scores for CURB-65 had higher statistical significance than the cases that had 2 or less scores for CURB-65 (P=0.004; p<0.05). The cases’ procalcitonin levels that had 3 or above scores for SMART-COP had higher statistical significance than the cases which had 2 or less scores for SMART-COP (p=0.001; p<0.05).

Conclusions: High procalcitonin levels were associated with the patients who had high scores in both scoring systems, and had a relationship with the severity and course of the disease.

416 T2-Hour Returns With ICU Admission: A Better Trigger Tool for Error
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Study Objectives: Patients who return to the emergency department (ED) and require admission are often seen as a surrogate for quality and used for quality assurance efforts. Despite this, recent study has suggested that this is low yield for identifying errors. We hypothesize that patients who return and are admitted to the ICU are more likely to represent medically complex patients with opportunities for improvement on their first visit. The objective of this study was to identify the prevalence of error-deficient care in patients who return and require ICU admission, as well as the types and severity of harm in these patients.

Methods: Retrospective review of all patients who presented to an urban, university-affiliated ED between January 1, 2005-December 31, 2015 who were evaluated, discharged, and returned within 30 days requiring ICU admission. An emergency physician reviewer traced the care through a defined sequence of diagnostic steps. If an error was judged to have been present in any of these steps, the reviewer further classified the deviation in care and assigned a severity score.

Results: There were 1,016,606 ED visits during the 10-year study period, with 772 patients who were seen in the ED and then returned within 30 days requiring ICU admission (0.0076%). 341 of these patients were deemed to have a return visit related to the index visit. Of these, 110 cases (32.2%) were felt to represent a deviation from optimal care.

When a standard diagnostic process of care framework was applied to these 110 encounters, the majority of cases represented failures in the initial diagnostic pathway (60 cases, 54.5%), including a failure to obtain a history and conduct a physical exam (13 cases, 11.8%), failure of ongoing monitoring of clinical status (3 cases, 2.7%), failure to establish a differential diagnosis (20 cases, 18.2%) and failure to order the appropriate diagnostic test (24 cases, 21.8%). The remainder of the cases represented failures in completing testing and results processing (23 cases, 20.9%), and failures in follow-up and coordination (27 cases, 24.5%). When the National Patient Safety Foundation’s Error Severity Codes were applied to the 110 cases that represented deviations from optimal care, no harm in 16 (14.5%), 7 (6.4%) resulted in minor temporary harm, 72 (65.5%) in major temporary harm, 0 (0%) in minor permanent harm and 15 (13.6%) in major permanent harm. The most commonly missed diagnosis on initial visit where harm was attributed was an infectious disease diagnosis 72 (21.1%).

Conclusions: Standard screening methodology of ICU returns resulting in admission has a higher yield in identifying suboptimal care than 72-hour returns, with 32.2% of cases reviewed representing deviations from standard care. Of these, the vast majority represent cognitive errors in the diagnostic pathway. Future study should focus on understanding the yield of other departmental QA triggers such as safety reports and morbidity and mortality conferences.

417 Performance of an Automated Severe Sepsis Screening Tool in the Emergency Department
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Study Objectives: Patients with severe sepsis and septic shock benefit from early recognition and initiation of treatment. Electronic health records (EHRs) now allow for automated screening tools to assist with detection of severe sepsis/ septic shock. Our objective was to assess the performance and accuracy of an automated screen for severe sepsis and septic shock in the emergency department (ED).
Methods: An electronic screening system for severe sepsis was created in our EHR and implemented in our ED. A best practice advisory (BPA) notifies physicians and nurses of possible severe sepsis and prompts utilization of an order set when three criteria are met. These include: 2 or more modified SIRS criteria positive (Temp > 38°C, HR > 90, RR > 20, SBP < 90 or MAP < 65, and WBC > 12), evidence of end-organ dysfunction (hypotension or organ dysfunction lab values consistent with CMS measure definition) and suspected infection (either temperature > 38°C, antibiotics ordered for the indication of suspected infection, or documented physician suspicion of infection). We performed a retrospective manual chart review of all adult patient encounters with a triggered severe sepsis BPA over a 3-month period to determine whether the patient had potential or suspected severe sepsis at the time the BPA fired. A second reviewer reviewed the cases to determine agreement with a third used as a tiebreaker if disagreement. In addition, we reviewed patients over a 7-week period who received ICD-10 codes for severe sepsis or septic shock to determine if any cases were missed in the ED by our screening criteria.

Results: 301 ED patient encounters (2.01% of all adult ED patient encounters) triggered the severe sepsis BPA alert in the 3-month study period. 295 of the 301 encounters were determined via chart review to have suspected severe sepsis or septic shock at the time that the alert fired. The remaining 6 encounters were determined not to have suspected severe sepsis or septic shock at the time of BPA alert and included: alcohol withdrawal, salicylate toxicity, transfusion reaction, GI bleed, and prophylactic antibiotics ordered without appropriately indicating intent. The observed kappa for interrater reliability was 0.854. The positive predictive value of our BPA alert for suspected severe sepsis is 98% (295/301). Over a 7-week period, 86 patients ultimately received ICD-10 codes for severe sepsis or septic shock. 71 met criteria for severe sepsis during their ED evaluation with 70 caught by our automated screening criteria, resulting in a sensitivity of 98.59% (CI 92.4-99.96%). The single case not caught by our BPA logic was due to antibiotics not administered in the ED.

Conclusions: The development of an automated severe sepsis screen in the ED at our institution was found to have very high positive predictive value as well as high sensitivity for patients ultimately diagnosed with severe sepsis or septic shock.

418 Emergency Medicine Clinicians’ Views and Practices for Identifying Opioid Misuse in the Era of Prescription Drug Monitoring Programs

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Study Objectives: To describe emergency medicine (EM) clinician’s experience and application with prescription drug monitoring programs (PDMP) and to characterize their opinions on information believed to support opioid misuse behavior (OMB).

Methods: An institutional review board-approved 29-item survey instrument was designed, pilot tested, and revised 3 times prior to distribution. Emergency medicine providers of a national EM group and the Nevada chapter of ACEP were invited to anonymously participate voluntarily via email with a link to an online survey platform (Survey Monkey; Palo Alto, CA). Results were received, summarized, and analyzed using Excel (Microsoft Corporation; Redmond, WA). Our primary response outcome was to try and establish objective thresholds to assist in identifying patients at risk for opioid misuse using information from the PDMP report. Our secondary survey aim was to characterize EM clinicians’ current practices of OMB identification.

Results: 633 practicing emergency clinicians (67% physicians and 33% advanced practice professionals) representing 23 states completed the survey for a response rate of 26%. 94% of respondents practice in a hospital-based ED and 6% practice in freestanding ED or urgent care. Regarding respondents experience with the PDMP: 590 (93.5%; [95% CI 91.3, 95.2]) are registered, 553 (87.5%; [95% CI 84.7, 89.9]) access the PDMP at least 1 time per shift, 520 (83.5%; [95% CI 79.4, 85.3]) indicate the PDMP data is accurate, 576 (91.4%; [95% CI 89.0, 93.4]) indicate it assists in identifying OMB, and changed their opioid prescribing behavior. 321 (53.4%; [95% CI 29.9, 73.7]) surveyed have state laws requiring PDMP prescriber utilization. The majority, 379 (60.1%; [95% CI 56.0, 63.6]), indicated that the data obtained from the PDMP was “very important” for assessing for OMB. Graph 1 illustrates respondents’ opinions and level of consensus regarding patient characteristics, presentation, and PDMP report 12-month data points suggesting potential OMB. Although analysis of specific PDMP report 12-month data points varied between those surveyed, the majority, 398 (63.4%; [95% CI 59.5, 67.1]), indicated the following 12-month data point minimum thresholds suggest OMB: ≥ 4 prescriptions, ≥ 4 pharmacies, ≥ 6 prescriptions, ≥ 50 pills, 577 (91.1%; [95% CI 88.7, 93.3]) respondents indicated the combination of patient characteristics, presentation, and PDMP data report as being the factors most helpful in identifying patients with OMB. Once they had all this information, 564 (83.4%; [95% CI 86.7, 91.6]) survey participants said they refused to prescribe patients opioids if they suspected opioid misuse, while 436 (69.1%; [95% CI 65.4, 72.6]) tried to provide substance abuse treatment resources. Limitations included inability to target non-responders, limitations of survey methodology, and no agreed-upon definition of OMB leading to variability in responses.

Conclusions: EM clinicians frequently use a combination of subjective patient information and objective PDMP report data to identify opioid misuse behavior. Although analysis of PDMP data report varies, consensus for combined minimum thresholds suggesting aberrant opioid use behavior were identified.
Potentially pathogenic and life-threatening infections such as pseudomonas aeruginosa, VRE, and C. diffcile have also been isolated from various studies. Knowing that stethoscopes are vectors of such infections, we aimed to assess the stethoscope cleaning methodology used by health care providers before and after evaluating their patients in a fast-paced level 1 trauma center in Houston, Texas.

Methods: Patient-provider interactions were anonymously observed in the Emergency Center, Surgical ICU, and Labor and Delivery rooms. We assessed methods and duration of stethoscope disinfection as well as hand hygiene practices among providers before and after patient encounters. Data was objectively collected and summary statistic analysis was completed. To assess the difference in categorical variables, Wilcoxon-rank sum test and p-values were analyzed using Stata 12.0.

Results: A total of 400 interactions were observed. Stethoscope hygiene was only observed in 2% of patient encounters before the patient exam and 16.3% after the patient exam. Of the sanitized stethoscopes, 93.15% were cleaned using a sani-cloth wipe, with the remainder being cleaned using an alcohol pad. Cleaning duration lasted <15 seconds in 90.4% of cases and >15 seconds for the remainder. Hands were sanitized 36 times (9%) before and 80 times (20%) after. Gloves were used in 329 encounters (82.3%). Cleaning of stethoscopes was not practiced for any trauma patients before patient exams. However, 51% of the time, stethoscopes were cleaned after evaluation of trauma patients (p-value <0.05). For patients who were in the isolation unit, stethoscope cleaning was not observed in any of the encounters as there was a dedicated stethoscope provided in the patient room.

Conclusions: In a fast-paced and higher acuity setting, hand hygiene is commonly obtained by using gloves. In the ED, ICU, and Labor and Delivery units, only 2% of stethoscopes are cleaned before use. Except trauma resuscitations, after patient contact no stethoscope cleaning occurred in more than 20% of in ED, ICU, or Labor and Delivery patient encounters.

421 Patterns of Non-English Language Use for Patient Care in a Public Emergency Department
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Study Objectives: In public emergency departments (ED), many patients have limited English proficiency (LEP). Many EDs, however, report persistently low rates of language assistance use in the setting of a high volume of LEP patients. One possible explanation is that ED employees use their own non-English language (NEL) skills to supplement formal language assistance. The objective of this study is to describe employee use of NELs for patient care in a public ED.

Methods: Study Design: Prospective, anonymous survey questionnaire of ED employees. Setting: A public emergency department with an estimated 50,000 visits per year where the majority of patients are LEP and language assistance is available via videoconference and phone 24/7. Subjects: All ED staff with substantial patient contact including MDs, NPs, RNs, NAs, research assistants, radiology techs, registration workers and respiratory therapists. Measures and outcomes: ED role, native language, languages spoken with patients, comfort level and frequency of NEL use, formal coursework in the NEL, bilingual certification, frequency of interpreting for others and comfort with medical terminology in the NEL. Prior formal training in interpretation (assistance with spoken language) and translation (assistance with written language) was also considered. Analysis: Descriptive statistics were used for analysis.

Results: Of the 354 total ED employees, 261 were approached and 259 agreed to participate, which represents a 73% response rate (259/354). MDs comprised 88/259 (33.9%) of participants. The native language of employees was 161/259 (62.2%) English, followed by Spanish 50/259 (19%), Tagalog 23/259 (8.9%) and Armenian 14/259 (5.4%). When communicating with patients, 24/259 (9.2%) of employees speak only English, 194/259 (75%) use one non-English language (NEL) and 41/259 (15.8%) use two NELs. Frequency of NEL use was categorized as often to every day for 205/233 (88%) of participants. Only 49/233 (21%), however, were certified by the hospital system to use their NEL with patients. Of those using NELs, 151/234 (64.5%) had past formal coursework and 81/233 (54.8%) were uncomfortable with medical terminology. Although 196/235 (83.4%) of participants stated they speak Spanish with patients, only 135/235 (56.6%) stated they feel comfortable doing so. Further, only 7/228 (3%) had prior training in how to interpret and 5/229 (2%) had training in how to translate.

Conclusions: In this public ED, providers use their own NEL skills frequently in patient care, but without certification. Very few have training on how to interpret or translate. If the NEL skills of employees are to comprise part of the institutional plan for language assistance for LEP patients, certification and training must be implemented to assure that LEP patients receive the same high quality care as their English-speaking counterparts.

422 Surveying Maternal Experiences and Perceptions in Female Emergency Physicians
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Study Objectives: This study sought to explore the attitudes and experiences of female emergency (EM) physicians in regards to motherhood. An emphasis was placed on exploring breastfeeding practices as well as on identifying modifiable workplace factors for the decision to wean.

Methods: This was an observational study of female emergency physicians affiliated with Henry Ford Macomb and Henry Ford Wyandotte Hospitals. Eligible subjects were all EM female physicians (attendings and residents) employed at both facilities in May 2016. Female graduates from the hospitals’ respective emergency residency programs from 2011 to 2015 were included as well. A self-administered online questionnaire was developed to obtain information on demographics as well as pertinent information regarding breastfeeding experience, personal/colleague perceptions and policy awareness. We report data gathered from 59 physicians, of whom 20 were mothers.

Results: Consistent with previous physician studies we found high breastfeeding initiation rates among our participants. Breastfeeding continuation rates of mother participants at 6 and 12 months declined, however, to 54% and 25%, respectively. The average breastfeeding duration goal was 7.1 months ± 4.1. A statistically significant association between the breastfeeding duration goal and the weaning age was detected (P<0.001) with a strong correlation coefficient of r=0.85. Most frequently cited reasons for weaning were: return to work, lack of supply and lack of time. Our data showed a statistically significant association between lactation accessibility at work and weaning age. However, the significant association was opposite of what we expected, with an older mean weaning age in the mothers who did not have lactation accessibility. Exploring maternity perceptions, 95% of participants considered it acceptable to have a child in training and would rearrange their schedule to help a pregnant colleague. A breastfeeding policy was important to 92% of participants yet only 3% believed their affiliated hospital had one.

Conclusions: This study is amongst the first to specifically explore maternity experiences and attitudes amongst the emergency medicine community. The breastfeeding initiation rate amongst our participants was compliant with the Healthy People 2020 guidelines, but the rate at 6 and 12 months fell, similar to other studies. Our findings support implementing workplace strategies and policies to promote breastfeeding duration among physician mothers returning to work. Emergency medicine must attract and retain women physicians while concurrently addressing their unique needs in order to provide for the millions of patients who visit the nation’s emergency departments annually.

423 Association Between Physician Empathy and Patient Real-Time Satisfaction
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Study Objectives: Higher physician empathy has been associated with higher overall patient satisfaction. However, more evidence-based research is needed to elaborate on this association. We aim to evaluate the association between empathy and patient real-time satisfaction among emergency department (ED) health care providers with varying years of medical practice experience.

Methods: A prospective observational study was conducted in a tertiary hospital ED. The Jefferson Scale of Physician Empathy (JSPE) was used for the assessment of provider empathy levels. A patient real-time satisfaction survey, including an explicit question regarding patient satisfaction with ED providers, was conducted upon patient disposition. Patient real-time satisfaction was linked to provider data to evaluate the association between provider JSPE and patient satisfaction. Due to the nested nature of patients and providers, odds ratios (OR) and their corresponding 95% confidence limits (CL) were estimated using hierarchical logistic regression with clustered variance estimation.
Results: A total of 41 providers interacted with 1,308 patients across 1,572 encounters during the study period from July 1 to October 31, 2016. There was heterogeneity across provider experience level in terms of the distribution of JSPE, where emergency medicine (EM) residents had the lowest scores (median 111; interquartile range [IQR]: 107-122) and senior physicians had the highest scores (median 119.5; IQR: 111-129). The overall provider median JSPE was 114 (IQR: 109-121). Similarly, EM residents had the lowest percentage of “very satisfied” responses (65.5%) and senior physicians had the highest reported percentage of “very satisfied” responses (69.2%). The overall point estimate for the association between JSPE and real-time satisfaction for a one standard deviation increase in JSPE was 1.15 (95% CI: 1.02-1.31).

Conclusions: This study provides evidence of a positive association between ED provider empathy and patient real-time satisfaction. Overall higher empathy scores were associated with higher patient real-time satisfaction, though minor heterogeneity occurred between different provider characteristics.

424 Night Shift Preparation, Recovery, and Perception: Are There Differences Between Faculty, Residents, and Nurses?
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Study Objectives: To determine if differences exist between faculty, residents, and nurses regarding night shift preparation, recovery, and perception.

Methods: The study was performed during April 2017 at an urban university medical center ED with an accredited residency program in emergency medicine. Surveys with specific questions regarding night shift habits and opinions were distributed to subjects in paper form and collected after completion. Participation was voluntary, and anonymity of subjects was assured. chi-square, ANOVA, and Kruskal-Wallis tests were used to analyze differences between the 3 groups.

Results: A total of 45 faculty, 29 residents, and 90 nurses completed the survey.

The majority (> 70%) in all 3 groups reported having a night shift preparatory routine. There was no significant difference in proportion of use of earplugs, background “white” noise, ergonomic pillows, eye masks, and humidifiers between the 3 groups. However, faculty utilized blackout curtains more (80%; 95% CI: 75.1 - 84.0) than residents (67.9%; 95% CI: 63.2 - 72.7) and nurses (62.0%; 95% CI: 56.4 - 67.7). The use of pharmacologic sleep aids differed (P = 0.02) between the 3 groups, with 39 (86.7%; 95% CI: 73.2 - 94.9) faculty, 18 (62.1%; 95% CI: 42.3 - 79.3) residents, and 66 (73.3%; 95% CI: 62.9 - 82.1) nurses reporting non-use. Residents routinely used melatonin as a sleep aid at a higher proportion (31%; 95% CI: 15.3 - 50.8) than did faculty (4.4%; 95% CI: 0.5 - 15.2) and nurses (14.4%; 95% CI: 7.9 - 23.4; P = 0.006). All 3 groups most commonly reported prior use of diphenhydramine, melatonin, and alcohol, but they did not necessarily use these agents on a routine basis as sleep aids. Most faculty (n = 18, 40.0%; 95% CI: 25.7 - 55.7) did not eat prior to their night shift, whereas residents (n = 9, 31.0%; 95% CI: 15.3 - 50.8) and nurses (n = 33, 36.7%; 95% CI: 26.7 - 47.5) preferred to eat a small meal. The majority (> 70%) in all 3 groups drank coffee before their night shift, followed by energy drinks as second preference. The majority of all 3 groups reported feeling tired despite their routine, with 4:00 AM most commonly reported among all groups as the time at which their alertness reached a nadir. Faculty reported significantly (P = 0.05) higher rate (42.2%; 95% CI: 27.7 - 57.9) of falling asleep while driving home compared to Residents (13.8%; 95% CI: 3.9 - 31.7) and nurses (32.2%; 95% CI: 22.7 - 42.9), but the accident rate (3.4 - 6.7%) did not differ significantly between the 3 groups. All 3 groups had similar opinions regarding night shift-associated alteration of circadian rhythm, longevity, stress, ageing, depression, and drug/alcohol use. However, faculty reported lower level of satisfaction (median = 3, IQR: 1 - 5 Likert scale; IQR: 2 - 4) working night shifts than did residents (4; IQR: 2.5 - 4.5) and nurses (4; IQR: 2 - 5; P = 0.01).

Conclusions: Faculty, residents, and nurses share many characteristics regarding preparation, recovery and perception of night shift effects on mental and physical health. Most differences involved faculty, who tended to use blackout curtains, not use pharmacologic sleep aids, not eat prior to their night shift, fall asleep at a higher rate while driving home, and enjoy night shift work less compared to residents and nurses. Residents relied on melatonin as a routine sleep aid more than faculty and nurses.

425 Emergency Medicine Resident Perceptions About Physician Wellness Education
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Study Objectives: Emergency medicine ranks first among specialties in rates of burnout, and this emotional exhaustion, cynicism, and self doubt begin early in medical education. The ACGME recognizes that in the current health care environment, residents and faculty are at increased risk for burnout and depression. There are no studies in the emergency medicine literature that discuss the development of a wellness curriculum. We performed a needs analysis of emergency medicine resident perceptions concerning the incorporation of wellness education into residency.

Methods: In February 2017, we performed a multi-center study at five emergency medicine residencies. We administered a four-question survey to determine (1) How important residents believe it is to include information about wellness topics into residency training (2) How relevant the topic of wellness is to the resident physician (3) How comfortable the resident is with her/his knowledge of wellness principles (4) How valued the incorporation of wellness principles is to the maintenance of her/his career as a practicing emergency physician. Residents answered the question with single number on a 100-point Likert scale.

Results: A total of 163/186 residents completed the survey leading to an 88% response rate. The age of participants ranged from 25-41 with a median age of 29 (IQR: 28-31); 32% of respondents were in the postgraduate year (PGY) 1, 31% were PGY2; 31% were PGY3, and 6% were PGY4. The median response for question 1 was 80 (IQR 65-93.5); for question 2 was 90 (IQR: 75-100); for question 3 was 70 (IQR: 50-85); and for question 4 was 88.5 (IQR: 70.7-100). There was no statistically significant association between the answers to the wellness questions when compared to age, postgraduate year, sex, ethnicity, residency program, or burnout as measured by the Maslach Burnout Inventory.

Conclusions: In this multi-center survey study of emergency medicine residents, we determined that while residents believe that it is important to include information about wellness topics into residency training, that the topic is relevant to the resident, and is valued in their career, they are not as comfortable with their knowledge of wellness principles. These findings support the need to develop a formal wellness curriculum that can be incorporated into resident education.

426 A High-Impact Mindfulness in Emergency Medicine Curriculum for Medical Students
Chung AS, Felber R, Han E, Mathew T, Rebillot K, Likourezos A/Icahn School of Medicine at Mount Sinai, New York, NY; Maimonides Medical Center, New York, NY

Study Objectives: To implement an innovative mindfulness-based curriculum integrated into a standard EM clerkship to help students manage stress and reduce risk of burnout.

Despite evidence demonstrating the benefits of wellness programs, many medical schools still lag behind in implementation of curricula addressing stress, burnout, and work-life balance. Students planning a career in emergency medicine (EM) may benefit from mindfulness training, as EM has one of the highest rates of burnout of any US medical specialty. To the best of our knowledge, this is the first mindfulness-based educational intervention designed for EM clerkships.

Methods: Our curriculum included (1) four, once weekly, 60-minute classroom sessions, (2) pre-requisite reading assignments, (3) individual daily meditation practice and journaling, and (4) the development of a personalized wellness plan with the help of a mentor. The design is based on self-directed learning theory and focuses on building relatedness, competence, and autonomy to help cultivate mindfulness.

Results: We enrolled 30 students over three months. Each student completed surveys prior to, immediately after, and six months after participation in the curriculum. We excluded eight students from the final analysis for failure to complete all three surveys. Responses on the surveys included: 1—not at all/never, 2—a little/occasionally, 3—a lot/once at week, 4—very much/every day. We performed paired sample t-tests comparing means for analysis. We found significant changes in the behaviors and attitudes of the students immediately following participation in the curriculum. Students believed more strongly in the importance of wellness for...
students and residents (p = 0.005). They felt more confident that they could explain to another person how to meditate (p = 0.0001) and be mindful (p = 0.0001); more confident in their own ability to meditate (p = 0.0001) and be mindful (p = 0.0001); meditated more often (p = 0.0001) and practiced mindfulness more often (p = 0.0001); and were more likely to recommend meditation (p = 0.002) and mindfulness (p = 0.001) to another person. More importantly, however, many of these changes remained significantly sustained even up to six months later. Six months following their participation, the students still felt more confident that they could explain to another person how to meditate (p = 0.0001) and be mindful (p = 0.0001); more confident in their own ability to meditate (p = 0.006) and be mindful (p = 0.002); meditated more often (p = 0.015) and practiced mindfulness more often (p = 0.016); and were more likely to recommend meditation (p = 0.007) and mindfulness (p = 0.008) to another person when compared to prior to their participation in the curriculum.

Conclusions: Although the sample size was small, our pilot curriculum had a significantly sustained behavioral impact on our students. In the future, this intervention could easily be adapted for any four-week rotation during medical school to reduce burnout and increase physician wellness.

427 Music in Emergent Settings: A Randomized Controlled Trial

Study Objectives: To investigate the impact of live preferential music (LPM) on patients receiving care in a level 1 trauma center and academic emergency department and to determine if LPM can affect the need for and utilization of pain medication among emergency department patients.

Methods: From May to October 2015, a total of 855 subjects were enrolled in a double blind randomized controlled trial (423-control, 432-intervention) and were consented, enrolled, and randomly assigned to either an intervention group who listened to LPM or a control group who did not receive LPM. Both intervention and control groups included patients or their care surrogates. All participants were aged 18 years or older. Music interventions were administered by trained UF Health Arts in Medicine Musicians in Residence. Interventions were conducted on alternating days over a 20-week period. Musicians delivered interventions in pairs and all were either guitarists or vocalists with a very broad repertoire of musical styles. Outcome measures included changes in vital signs including systolic blood pressure (SBP), diastolic blood pressure (DBP), heart rate (HR), oxygen saturation (OS), and respiratory rate (RR). Patient satisfaction, Morphine equivalence, and length of stay were also considered as secondary outcomes. Vital sign measurements were recorded at four time points (baseline, 2 hours, 4 hours, and 6 hours after the intervention) on the same day of observation. Data analysis incorporated several methods, including two-tailed t-tests, one way and repeated measure analysis of variance (ANOVA), Tukey multiple comparisons, and Kruskal Wallis non-parametric testing, utilizing a 5% error rate.

Results: Among the control participants, 55.32% were female and 44.68% were male. Of the intervention participants, 56.71% were female and 43.29% were male. The mean SBP and DBP at baseline was 135.36 mmHg (SD±25.07), 78.50 mmHg (SD±16.60) for the control group and 139.12 mmHg (SD±26.87), 78.86 mmHg (SD±16.89) for the intervention group. Among the all intervention patients, a significant reduction of 9.03 mmHg in SBP (N(i)=623, N(c)=194) and 5.86 mmHg in DBP (N(i)=623, N(c)=194) was observed after two hours of intervention. For hypertensive patients (where presenting BP was clinically defined as stage 1 or above, N=77), there was a steep reduction of 19.70 mmHg (p = 0.001) in SBP after two hours of intervention. Both SBP and DBP continued to decline significantly four and six hours post intervention. Similar to SBP and DBP, there was a 7.24 bpm (p < 0.03) decline in HR among the intervention patients. A 32.8% average reduction in administration of morphine equivalents was found among intervention patients. We also observed a non-significant reduction in OS and RR.

Conclusions: Our findings indicate that LPM has the potential to reduce SBP, DBP, and HR within two hours of the initial intervention, may have a long-term effect on reduction in these indicators up to 6 hours post LPM exposure, and may reduce the need for analgesia in the emergency department environment.

428 Prevalence of Homelessness and Housing Insecurity in an Urban Emergency Department
Jackson TS, Moran T, Lin J, Sathi BA/Emory University, Atlanta, GA; Emory University, Atlanta, GA

Study Objectives: Homelessness is a substantial problem in the United States. Currently, the US Department of Housing and Urban Development estimates that over 560,000 people experience homelessness on any given night, and up to 1.5 million individuals experience homelessness over the course of a year. Homeless persons pose special challenges for the emergency provider. Prevalence of homelessness in the ED is primarily estimated from the ED component of the NHAMCS database, which estimates that homeless persons account for 0.5% of ED visits nationally. We hypothesized that this measure may underestimate the prevalence of homelessness and housing insecurity among ED patients as housing status is under-discussed in the acute care setting. The goal of this study is to determine the prevalence of homelessness and housing insecurity among ED patients in an urban safety net Atlanta hospital.

Methods: A cross-sectional survey of a convenience sample of patients presenting to the ED over a 3-month span was performed. A team of trained research assistants administered a structured survey instrument. Patients were surveyed in all areas of the ED and at all times of the day. Patients were 18 years old, English-speaking, not incarcerated, and able to provide informed consent.

Results: 923 ED patients (55.1% Male; Median Age = 44) completed the survey. The racial makeup of the sample was as follows: 71.3% Black, 16.7% White, 6.5% Hispanic, 1.6% Asian and 4% self-identified as “other.” Most patients had at least a High School education (42.1% high school/GED). 41.5% at least some college; 16.4% did not have High School and were unemployed (47.9% unemployed; 19.4% part-time; 32.7% full-time). 51.5% of surveyed ED patients reported some measure of housing insecurity in the past 12 months: moved in with others to save money (19.9%); lived with others but didn’t pay rent (30.2%); skipped mortgage or rent payment (12%); experienced eviction (8%); lived in a hotel or motel (21.2%); lived in a place not meant for human habitation (8.2%); slept in a shelter (14.2%); slept on the street (12.5%). 42% of homeless or housing-insecure women reported that they were also caring for children.

Conclusions: The rate of housing-insecure patients at our hospital is substantially greater than the national estimates. While this may be a result of selection bias in our safety-net setting, our results suggest that homelessness and housing insecurity may be under-recognized among ED patients. Given the well-documented association between homelessness, poor health and repeat ED visits our study may have far reaching implications in recognizing and treating these patients in the ED. More research is needed on homelessness and its implications for ED Patients.

429 Assessment of Access to Firearms in Suicidal Patients in the Emergency Department
Naganathan S, Kosco MK, Mueller K/Washington University School of Medicine and Barnes-Jewish Hospital, Saint Louis, MO; Washington University School of Medicine, Saint Louis, MO

Study Objectives: Suicide is the 10th leading cause of death in the United States. Suicidal ideation (SI) is a common chief complaint of patients presenting to the emergency department (ED). Nearly half of suicide deaths in the United States in 2014 were due to firearms. Despite these numbers, provider documentation on access to lethal means is lacking. Our primary objective was to quantify documentation of access to firearms in patients who presented to the ED with a chief complaint of SI.

Methods: We performed a retrospective chart review of consecutive patients who presented to the ED with a chief complaint or diagnosis of SI during July 2014. This study was performed at an urban, academic ED. Charts were queried from the electronic medical record. Primary outcomes assessed included whether the ED physician team documented: 1) patient access to firearms, 2) access to firearms in the home, and 3) assessment of storage methods. Assessment and documentation by psychiatry, when consulted, was compared to that of emergency physicians. Secondary outcomes included demographics, preexisting psychiatric diagnoses, substance use, disposition at time of visit, and disposition upon return visit for SI within 30 days.
Results: 100 patient charts were reviewed. 54% of this patient population was aged 30-49; 64% were male, 53% were Caucasian, and 54% were single. In this patient cohort, we found that only 3% of the 100 charts included documentation regarding access to firearms by the emergency physician. Psychiatry was consulted on 81 patients; of these, 78% included documentation of access to firearms. 36% of our patients were transferred to another psychiatric facility, 32% were admitted, and 32% were discharged home.

Conclusions: Emergency physicians rarely documented access to firearms in this patient cohort. Given the pivotal role emergency physicians play in caring for patients in suicidal crisis, there is a need for educational and quality improvement initiatives regarding counseling against lethal means in the ED. This study is limited in that not all verbal conversations regarding access to lethal means are later documented in the electronic medical record.

430 Characterizing Community Naloxone Programs and Opioid Overdose Trends in the United States
Bode AD/University of Miami Leonard M. Miller School of Medicine, Miami, FL

Study Objectives: To characterize the current state of opioid overdose (OOD) in the United States, as well as the community naloxone programs that exist to combat overdose; to identify variables that could be used to predict when increases in overdose would occur, and when high potency synthetic opioids (HPSO) are likely present.

Methods: A survey was sent to medical directors of emergency medical services (EMS), law enforcement, and emergency departments with regarding OOD patterns as well as community naloxone programs. Responses were divided into the five regions of the United States depending on the location of the agency. 2x2 tables for the following variables were created: region and OOD, region and HPSO presence, HPSO presence and OOD and, HPSO presence and naloxone dosing. A relative risk (RR) was calculated with a 95% confidence interval to report those that reached statistical significance (p<0.05).

Results: 104 survey respondents from 63 cities comprised a national coverage of 64% (32/50). National RR for increased naloxone dosing and HPSO presence was 3.87 (95% CI: 1.75-8.5; p=0.0008). RR for increase in OOD and HPSO presence was 1.46 (1.03-2.08; p=0.036). RR for increased OOD in the Midwest was 1.36 (1.12-1.65; p=0.0018), and was 1.31 for HPSO presence (1.04-1.64; p=0.0196). RR for increased OOD in the Southwest was 0.44 (0.19-0.96; p=0.041). RR for HPSO presence in the West was 0.72 (0.41-1.2; p=0.0255).

Overall, 86% (79/92) of agencies had a community naloxone program in place; 72 (16/22), 100 (15/15), 100 (31/31), 82 (9/11), and 66% (8/12) for the Southwest, Northeast, Midwest, Southwest, and West, respectively. EMS administered naloxone most frequently (91%; 69/72), and bystanders least frequently (47%; 36/76). The most common route and dose was Intranasal at a dosage of 2mg (79%; 59/75, and 16/22), 100 (15/15), 100 (31/31), 82 (9/11), and 66% (8/12) for the Southwest, Northeast, Midwest, Southwest, and West, respectively.

Conclusions: The Midwest seems to be the epicenter of the opioid epidemic. Community naloxone programs are common but limited in their use of personnel beyond EMS. Policy to outfit more bystanders with naloxone may help reduce overdose mortality. Increased naloxone dosing and OOD can potentially be used as surrogate markers for the increased risk of HPSO presence. These markers can help inform public health officials who can modify their interventions accordingly. Public health policy should continue to expand funding for community naloxone programs and harm reduction strategies.

431 Facilitating an Emergency Department Take-Home Naloxone Program Through Involvement of Community-Based Harm Reductionists
Barbour K, McQuade M, Somasundaram S, Chakravarthy B/UC Irvine School of Medicine, Irvine, CA; UC Irvine, Irvine, CA

Study Objectives: Opioid overdose is a significant cause of morbidity and mortality in the United States. For decades, peer-led harm reduction organizations have prevented overdoses through provision of naloxone, an opioid antagonist, directly to those at highest risk of overdose after training them in overdose emergency response. More recently, some emergency departments (EDs) have started similar programs, but take-home naloxone from EDs has yet to become widespread. Common barriers to implementation include limited clinician time, lack of exposure to harm reduction, and uncertainty about liability.

In this study we implemented a take-home naloxone program in a moderate-volume, suburban ED in which volunteer naloxone-certified medical students, who were experienced staff members at a local needle exchange, provided overdose prevention education to patients identified as being potentially high-risk for opioid overdose. The program aimed to determine whether involvement of community harm reductionists could initiate overdose prevention and naloxone distribution practices with minimal change or impact to ED throughput.

Methods: Patients were screened by emergency physicians and needle exchange staff for risk of opioid overdose on the basis of their chief complaint, tachy- and bradycardia, and emergency physician impression. Those who met screening criteria were approached by needle exchange staff, who explained the program and inquired about opioid use. Eligible and consenting patients were then trained by the needle exchange staff in the recognition of opioid overdoses, basic emergency response, and naloxone usage. Upon completion of training, the treating physician prescribed naloxone which could be filled by the patient after discharge. Multiple attempts to contact patients were made at 7 months after discharge to identify any barriers to obtaining or using the prescribed naloxone.

Results: 71 patients met screening criteria. Of those, 24 (34%) were trained and prescribed naloxone. For the remaining 47 (66%), 17 (36%) denied opioid use, 11 (23%) declined participation, 2 (4%) already possessed naloxone, 1 (2%) clinically deteriorated, and 16 (34%) met enrollment criteria but the treating clinician refused to prescribe naloxone. All enrolled patients completed training without issues. At 3-month follow-up, 7 (29%) of patients given naloxone were successfully contacted. Of these, only 2 (29%) chose to fill their prescription. No patients reported obstacles to obtaining naloxone.

Conclusions: Partnering with community harm reduction organizations can facilitate implementation of ED-based take-home naloxone programs. As this approach has minimal impact on the ED, this may be a useful low-threshold step towards incorporating more robust harm reduction practices in the ED. Obstacles include overcoming physician resistance to prescribing naloxone and inability to directly provide naloxone to patients on discharge. Future programs should consider engaging with physician concerns early and frequently to encourage participation in the program and discuss with pharmacy staff methods to provide patients with naloxone before discharge.

432 Characteristics and Predictors of Tramadol Misuse Results from the 2015 National Survey on Drug Use and Health
Règè SV, Holstege CP/University of Virginia, Charlottesville, VA

Study Objectives: The non-medical use of prescription medications, especially opioids, continues to be a serious public health concern impacting emergency departments, with the death rate from synthetic opioids increasing by 72.2% from 2014-2015. Tramadol prescriptions have increased substantially over the last decade, including by emergency physicians. The objective of the current study is to determine the predictors of tramadol misuse by utilizing the nationally representative National Survey of Drug Use and Health (NSDUH) data.

Methods: NSDUH, managed by Substance Abuse and Mental Health Services Administration (SAMHSA), is the annual public use self-report based dataset collecting information on the nature and extent of substance use and misuse in the US. The 2015 NSDUH data files were analyzed for this study using a cross-sectional study design. The respondents were classified into two groups, past year tramadol users, and non-users, based on the screening questions assessing past year use and misuse of tramadol products. The prevalence of selected demographic, clinical factors and substance use and abuse, including prescription medications, was assessed descriptively for the two population groups using cross-tabulated frequencies and chi-sq tests. Logistic regression methods were used to outline the predictors of tramadol abuse adjusting for the selected covariates. Odds ratios (OR) and corresponding 95% confidence intervals (CI) were reported.

Results: Overall, the 2015 NSDUH survey comprised of 57,146 respondents, of which 3,211 respondents (5.6%) reported using tramadol products over the last year. Among the total tramadol users, 439 (13.7%) respondents reported missing these products in the previous year. The prevalence of tramadol misuse in the total 2015 NSDUH sample was 0.8%. The proportion of males (40.3% vs 32.7%, p=0.001), unmarried (75.9% vs 61.3%, p<0.001), non-Hispanic whites (69% vs 65%, p=0.01), and Hispanics (14.9% vs 9.3%, p<0.0001) was higher in past year
The Relationship Between Medication Knowledge, Perceived Importance, and Medication Adherence

Coyne CJ, Ence T, Smyres C, Brennan J, Castillo E, Vilke GM/UC San Diego, San Diego, CA

Study Objectives: Lack of medication adherence is a common problem that leads to increased health care utilization. Frequently, patients seek care in the emergency department (ED), because they fail to take critical medications, leading to health deterioration and significant illness. It is unclear how ED patient insight and attitude towards their medications affect adherence. Furthermore, it is unclear how perceived medication importance differs between patients and emergency physicians. The objective of this study is to investigate these questions, in an effort to better understand the relationships between medication knowledge, perceived importance, and medication adherence.

Methods: We conducted a cross sectional study among a convenience sample of patients presenting to 2 academic emergency departments from April 2015 to October 2016. We included all English-speaking patients ≥18 years of age who were taking at least 2 medications. We excluded those patients who were critically ill, in police custody, or were unable to consent due to acute psychiatric illness. Demographic data were collected and questions were asked regarding knowledge of medications, perceived importance of these medications, and medication adherence. We also compared perceived importance between patients and two physician raters. Descriptive statistics are reported and categorical data were compared using chi-squared analysis.

Results: Over the course of our enrollment period we identified 1268 patients, representing 4634 individual medications. Our study population was 50.2% male, with a median age range of 55-59 and a median income of <$20,000 dollars/year. Study participants were 52.4% White, 15.8% Black, 16.4% Hispanic, and 3.9% Asian/Pacific Islander, followed by other races. We identified a statistically significant association between knowledge of medications and perceived importance (p<.001), with patients being twice as likely to rank a medication as “very important” if they had even a general understanding of what the medication was for. Secondly, importance level was highly associated with medication adherence, with 95% usage of “very important” medications versus 55% usage of “not important” medications (p<.001). When ranking those medications that were considered “least” and “most” important among each patient’s medication list, doctors were found to agree with patients only 34.1% and 37% of the time, respectively, as opposed to 62% and 62.8% agreement among the two blinded MD raters.

Conclusions: These data suggest that there is a difference in perceived medication importance between emergency physicians and ED patients. Knowledge of a medication’s purpose appears to be linked to perceived importance, while this importance appears to be significantly associated with medication compliance. These results suggest that emergency physicians and staff should make a concerted effort to educate patients on the utility and importance of their medications, to improve adherence and reduce adherence-related complications.

Table 1 - Insurance Coverage Rates (%) of Surveyed RI Cambodians compared with RI and US Data

<table>
<thead>
<tr>
<th>Survey Group</th>
<th>Provider Group</th>
<th>Non Provider Group</th>
</tr>
</thead>
<tbody>
<tr>
<td>RI Data*</td>
<td>88</td>
<td>50</td>
</tr>
<tr>
<td>US Data**</td>
<td>136</td>
<td>83.3</td>
</tr>
</tbody>
</table>

*RI data from the Rhode Island Health Information Survey (RI HIS) - November 2015. **National data from the National Health Interview Survey (NHIS) - 2015.
Conclusions: Our study did not demonstrate a significant difference in the outcomes between patients who received an NRK in the ED following a heroin overdose. Interpretation of these results may be limited due to our small sample size and number of patients who reached the composite endpoint. While this pilot study is limited due to its scale, it may provide information integral to the design and application of future investigations.

EMF 2

The Acute Otitis Media Decision Aid: Pathway to Shared Decisionmaking


Study Objective: To describe the process used to develop a decision aid (DA) to facilitate shared decision making in parents of children with acute otitis media (AOM). Methods: We developed the Ear Pain Choice decision aid through active collaboration with parents, physicians and designers using observations of clinical encounters, parental and physician surveys, and literature review. Insights from these processes informed the iterative creation of prototypes that were reviewed and field tested in patient encounters. Results: We identified the 2015 Cochrane review on antibiotics for acute otitis media in children as the latest evidence regarding AOM treatment. Parental surveys revealed fever and fussiness were the top drivers for seeking care for the child. Parents indicated most a diagnosis (63%), followed by pain control (25%) for their child from the visit. Physician surveys revealed that pain control was the driving factor in whether physicians recommended antibiotics. Conclusions: Ear Pain Choice is a pragmatic, patient-centered decision aid that involved parents, clinician and shared decisionmaking experts in its development. Our next step is to use it in a randomized study of shared decision-making with parents of children diagnosed with acute otitis media.
Methods: As part of a national survey of ACOs we asked ACOs to prioritize 6 strategies to address acute unscheduled care (eg, emergency department [ED], urgent care), including 4 types of care redesign, and 2 types of measures or incentives, which are listed below. Prioritization was done using a 5-point Likert scale from "very high priority" (5) to "very low priority" (1). For analysis, we collapsed responses into 3 categories: high, medium, and low priority. Additional ACO characteristics we analyzed included: ACO structure, region, number of covered lives, risk sharing in Medicare, Medicaid, and commercial insurance. We report proportions and chi-square p-values.

Results: The national ACO survey achieved a response rate of 26% (242/923).

The proportion of ACOs ranking the strategies as "high priority" were: Primary care redesign 58.7% (142/242), creating alternative sites to the ED for acute unscheduled care (eg, urgent care) 51.7% (125/242), expanding care coordination from the ED (eg, expanded care coordination) 49.2% (119/242), expanding alternatives to inpatient hospitalization for ED patients (eg, observation units) 40.0% (97/242), measures or incentives for primary care providers to reduce ED visits 46.3% (112/242), measures or incentives for ED providers to reduce inpatient hospitalizations 33.9% (82/242).

ACOs that ranked creating alternatives to the ED highly were more likely to be: not in the Midwest, and have a larger number of covered lives. ACOs that ranked expanding alternatives to inpatient hospitalization for ED patients highly were more likely to be: in the Northeast, with a larger number of covered lives. ACOs engaged in any risk sharing were more likely to place high priority on every care redesign strategy than those ACOs not taking risk.

Conclusions: ACOs appear to place lower priority on care redesign strategies to reduce inpatient admissions from the ED than those that reduce ED visits. This is in contradiction to the greater costs associated with inpatient admissions. There is opportunity for increased engagement between ACO and emergency medicine leaders to increase the prioritization of emergency department care redesign to reduce hospital admission.

EMF

A Qualitative Investigation of Emergency Department Provider Perspectives on Benzodiazepine-Opioid Co-Prescribing

Kim HS, McCarthy DM, Hoppe JA, Courney DM, Lambert BL/Northern Colorado University, Chicago, IL; University of Colorado, Aurora, CO

Study Objectives: Benzodiazepines and opioids are prescribed simultaneously (ie, co-prescribed) in many clinical settings, despite guidelines advising against this practice and mounting evidence that concomitant use of both medications increases the risk of overdose. This study sought to qualitatively characterize the contexts in which benzodiazepine-opioid co-prescribing occurs and identify effective strategies for reducing the incidence of this practice.

Methods: We conducted six one-hour focus group discussions with ED providers (resident and attending physicians, advanced practice providers, and pharmacists; total n = 36) from two academic emergency medicine programs (Chicago, IL, and Denver, CO) using semi-structured interviews to elicit perspectives on benzodiazepine-opioid co-prescribing. Discussions were audio-recorded and professionally transcribed. Transcripts were content analyzed using a consensual qualitative research approach employing the constant comparative method until thematic saturation was reached.

Results: The following major themes emerged: (1) Participants acknowledged co-prescribing rarely and reluctantly, and noted that they provide specific discharge instructions when co-prescribing. (2) The decision to co-prescribe is multifactorial, often isolated to specific clinical and situational contexts (eg, low back pain, failed solitary opioid therapy) and strongly influenced by a provider’s beliefs about the efficacy of combination therapy. These beliefs were shaped by clinical training, local hospital culture, and personal experience. (3) The decision to co-prescribe is further influenced by a self-imposed pressure to escalate therapy or avoid hospital admission, which often outweighed self-acknowledged risks of combination benzodiazepine-opioid therapy. When considering potential interventions to reduce the incidence of co-prescribing, participants opposed computerized order entry alerts but were supportive of pharmacist-assisted interventions at the point of prescribing. Many providers found the process of participating in discussions on opioid prescribing habits with their peers to be intrinsically beneficial.

Conclusions: In this qualitative study of ED providers, we found that benzodiazepine-opioid co-prescribing occurs in specific clinical and situational contexts, such as the treatment of low back pain or failed solitary opioid therapy. The decision to co-prescribe is strongly influenced by a provider’s beliefs about the efficacy of combination therapy and by self-imposed pressure to escalate care or avoid admission. Providers were supportive of ED clinical pharmacist involvement in potential interventions to reduce co-prescribing.
The American College of Emergency Physicians’ 2018 Research Forum is dedicated to the presentation of original research related to emergency medicine by investigators in clinical and basic science.

Abstract Review Process
Abstracts will be peer reviewed in a blinded manner for presentation at the 2018 Research Forum. Abstracts that are judged to be scientifically valid with important information that has potential to directly impact patient care will be scored more favorably.

Notification letters will be emailed on or before July 1, 2018. We regret that we cannot give notification by information by telephone.

Accepted Abstracts
All accepted abstracts will be presented electronically in Power Point (or equivalent) format. The top 15 abstracts will be presented during daily plenary sessions; all others will be given during themed e-poster sessions.

Awards
Presenters will be evaluated in real time by members of the ACEP Research Committee. Based on presentation quality, research methodology, and potential clinical impact, recipients of the following will be selected:

1. Best Abstract Award
2. Best Young Investigator Award
   Assistant professor or instructor level within first five years of faculty appointment
3. Best Resident Research Award
4. Best Medical Student Research Award

Awards will be presented at the 2019 ACEP Research Forum. The Emergency Medicine Foundation will also present an award to the outstanding established researcher and a special award to an outstanding young investigator.

Abstract Submission Requirements
Abstracts must meet the following submission criteria:

1. Abstracts should represent original research that has not been published or presented in manuscript or abstract form. Case reports or subject reviews are not considered original research.

2. Abstracts submission instructions will be available on ACEP’s Web site beginning in March, 2018. Abstracts must be submitted electronically by 4:00pm Central Time, Thursday, May 31, 2018.

3. Abstracts must adhere to the Annals of Emergency Medicine format with the following subheadings: title, study objectives, methods, results, and conclusion.

4. Abstracts are limited to 3000 characters not including spaces. Accepted abstracts will be published as received; no copy editing will be performed.

5. A small table or figure will be accepted. Figures must be black and white with at least 300 dpi and counts as the 3000 character limit.

6. Authors should not be identified in any way on the page containing the abstract.

*Presentation at the ACEP18 by EMF grant recipients does not constitute previous presentation at a national meeting.