

# Do Topical Antibiotics Help Prevent Infection in Minor Traumatic Uncomplicated Soft Tissue Wounds?

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**Editor's Note:** *Emergency physicians must often make decisions about patient management without clear-cut data of sufficient quality to support clinical guidelines or evidence-based reviews. Topics in the Best Available Evidence section must be relevant to emergency physicians, are formally peer reviewed, and must have a sufficient literature base to draw a reasonable conclusion but not such a large literature base that a traditional "evidence-based" review, meta-analysis, or systematic review can be performed.*

## INTRODUCTION

Minor traumatic uncomplicated soft tissue wounds, including full- and partial-thickness abrasions and lacerations, are commonly encountered in the emergency department (ED). Although there is little debate about the need to keep these wounds clean and provide a moist environment for wound healing,<sup>1</sup> there is still controversy over the use of topical antibiotics, especially in wounds that have been repaired. Multiple authors make their own recommendations in review and summary articles; however, there seem to be very few studies that actually address this subject. We therefore reviewed the available evidence on this topic. Because the literature on topical antibiotics in minor wounds in the acute setting is so limited, we included all studies that looked at acute, traumatic, minor wounds, including lacerations and abrasions. We did not include surgical wounds because these are not traumatic and do not represent the wounds encountered in the acute care setting. In addition, we excluded burns and other complicated wounds such as bites or chronic nonhealing wounds because these are likely to require other medical or surgical interventions.

## SEARCH STRATEGY

A search for original published research articles from 1946 to present was performed with the MEDLINE, PubMed, Cochrane Library, and Web of Science databases. Key words used included "topical antibiotics" and "infection prevention" and "minor wounds"; "infection prevention" and "sutured lacerations"; "topical antibiotics and wound"; "infection prevention" and "laceration"; and "infection prevention" and "wound." This search strategy yielded more than 200 results.

These citations were reviewed by the authors, and only randomized, controlled clinical trials with a primary focus specifically addressing infection prevention with topical antibiotics in acute minor traumatic uncomplicated soft tissue wounds were included. Bibliographic references found in these articles were also examined to identify pertinent literature. We identified 4 randomized, controlled clinical trials that directly addressed our question.

## ARTICLE SUMMARIES

### Dire et al<sup>2</sup>

This was a prospective, randomized, double-blind, placebo-controlled study that evaluated the differences in infection rates of minor uncomplicated soft tissue wounds repaired in the ED and managed with topical antibiotic agents versus placebo. This study included only sutured lacerations. Exclusion criteria included history of immunocompromised state, including diabetes, as well as recent or current use of oral antibiotics. Standard wound care protocol was used, including cleansing and debridement of the wound, anesthesia with lidocaine without epinephrine, suture repair with interrupted sutures, and placement of a clean, dry dressing. Patients were administered standard, written wound care instructions and randomized into one of 4 different groups to receive either an antibiotic-free carrier ointment (petrolatum, control) or one of 3 popular topical antibiotics used in the ED: bacitracin zinc ointment; neomycin sulfate, bacitracin zinc, and polymyxin B sulfate combination ointment; and silver sulfadiazine cream. There was no significant difference in location, size, or depth of wounds between groups.

There were a total of 465 patients enrolled; 39 were excluded because of protocol violation. The study does not explicitly state how many wounds were included. Overall, there were 42 infections on follow-up (9.9%). Infection was ascertained by examination by study personnel at follow-up. Any subjective or objective sign or symptom of infection, including fever, erythema, edema, induration, tenderness, warmth, exudates, adenopathy, or lymphangitis, was noted. Patients were classified into one of 5 grades of infection with a previously validated scale of infection.<sup>3,4</sup> There were 25 grade 1 infections (simple stitch abscess), 14 grade 2 infections (cellulitis >1 cm), 3 grade

3 infections (lymphangitis or lymphadenitis), and no grade 4 (systemic symptoms) infections.

Wound infection rates for the treatment groups were significantly different: bacitracin zinc ointment, 6 of 109 (5.5%; 95% confidence interval [CI] 2.0% to 11.6%); neomycin sulfate, bacitracin zinc, and polymyxin B sulfate combination ointment, 5 of 110 (4.5%; 95% CI 1.5% to 10.3%); silver sulfadiazine cream, 12 of 99 (12.1%; 95% CI 6.4% to 20.2%); and petrolatum, 19 of 108 (17.6%; 95% CI 10.9% to 26.1%) ( $P=.003$ ). There was a significant difference in infection rates between the control group (petrolatum) compared with all 3 antibiotic groups ( $P=.002$ ). However, there was no difference in infection rate among the 3 antibiotic groups ( $P=.14$ ). There was 1 case of a hypersensitivity reaction in the neomycin group that resolved after the antibiotic was discontinued.

The authors concluded that the use of topical antibiotics after repair of minor, uncomplicated wounds in the ED resulted in significantly lower infection rates than with the use of petroleum control. Bacitracin zinc ointment and neomycin sulfate, bacitracin zinc, and polymyxin B sulfate combination ointment had the lowest infection rates.

#### Hood et al<sup>5</sup>

This was a randomized, prospective, interventional pilot study to determine the difference in infection rates of uncomplicated soft tissue wounds between subjects treated with triple antibiotic ointment and mupirocin ointment after standard wound care and suturing. There were a total of 99 patients enrolled, including 3 patients with diabetes. Forty-six patients had full-thickness wounds requiring sutures; the remaining 53 had partial-thickness wounds. Standard wound care protocols were followed and patients were randomly assigned to receive either triple antibiotic ointment or mupirocin and instructed to apply it 3 times daily. There was no difference between groups in wound size, type, or depth. They were followed up at 7 days to look for signs of infection. Infection was defined using the same scale as Dire et al used.<sup>2</sup> Although the rate of wound infection overall in this study was lower than in previous reports, patients in the mupirocin group had greater rates of infection than the triple antibiotic ointment group (4% versus 0%). This difference was not statistically significant. Power calculations were not explicitly provided; however, this was intended to be a pilot study, not to detect differences in efficacy or adverse events between the groups. There were no adverse reactions in either group except for 1 patient in the triple antibiotic ointment group who reported paresthesias around the wound.

The authors concluded that there were similar rates of wound infections with topical triple antibiotic ointment and mupirocin ointment. This suggests that the less expensive and over-the-counter triple antibiotic ointment can be recommended for prophylaxis after uncomplicated soft tissue wounds; however, it would need to be confirmed in a larger trial.

#### Langford et al<sup>6</sup>

This was a randomized, double-blind, prospective study that compared the ability of a novel topical antibiotic ointment containing cetrimide, bacitracin, and polymyxin B sulfate (test preparation) compared with both a povidone iodine antiseptic cream and hydroxypropyl methylcellulose gel (placebo) to prevent infections in minor wounds in children aged 5 to 12 years old. Patients with a history of being immunocompromised were excluded. A total of 177 minor wounds were studied and 9 clinical infections were diagnosed. Minor wounds were defined as "a breach in the integrity of the skin not necessitating medical attention . . . including minor cuts, scratches, wounds, abrasions, insect bites and minor burns." Their Table 1 lists types of injuries, the most common of which were grazes and scrapes, scratches, and cuts. There were 4% insect bites, 3.5% punctures, and 2.3% skin tears. Clinical infection was ascertained by a medical practitioner participating in the study on day 3 of the treatment and was characterized by redness, tenderness, local pain or discomfort, and exudates. Bacterial infection was ascertained by culture of clinically infected wounds at day 3 of treatment.

There were 9 of 177 clinical infections (5% overall). The placebo group had an infection rate of 12.5%, the povidone iodine group had an infection rate of 3%, and the test preparation group had an infection rate of 1.6%. The difference in infection rates between the test preparation group and placebo group was statistically significant ( $P<.05$ ; 95% CI 0.011 to 0.207); however, the difference in infection rates between the test preparation group and povidone iodine cream group was not statistically significant. There were no adverse reactions in any treatment group.

The authors concluded that the test preparation antibiotic ointment containing cetrimide, bacitracin, and polymyxin B sulfate is suitable for topical first aid prophylaxis of minor wounds and abrasions. They acknowledged that their infection rate in the placebo group (12.5%) was higher than expected but offered no explanation.

#### Maddox et al<sup>7</sup>

This was a double-blind, prospective study that compared the effectiveness of a triple antibiotic ointment containing bacitracin, polymyxin, and neomycin with that of placebo ointment (not specified in the study) in the prevention of streptococcal skin infections in minor wounds of children in a rural day care setting. This study explicitly evaluated streptococcus to determine whether topical antibiotics decreased the rates of impetigo. A total of 59 children aged 2 to 5 years and with an unspecified number of wounds were enrolled. Cultures for streptococci were taken both from normal skin and minor wounds, including insect bites or other minor breaks in the skin. Streptococcal skin lesions developed in 19 of 59 children, an infection rate of 32%. Fifteen patients (47%) developed infection in the placebo group versus 4 (15%) in the triple antibiotic ointment group. The authors, however, did not report the number of clinically relevant infections of the

wounds, just presence of streptococci. The authors also did not report whether these results were statistically significant.

The authors concluded that topical antibiotic ointment used prophylactically at the time of minor trauma can prevent development of streptococcal pyoderma.

## THE BOTTOM LINE

On the basis of the available evidence, topical antibiotics do reduce the infection rate of acute, minor, uncomplicated soft tissue wounds, including those that are repaired. The available evidence is limited but includes 2 studies that evaluated repaired wounds and 2 that evaluated minor wounds in children. Despite evidence in the literature of contact hypersensitivity to topical antibiotics,<sup>8-11</sup> particularly to neomycin, the incidence in these studies was very low. There was only 1 reported adverse reaction of contact hypersensitivity to neomycin in the studies reviewed. Other adverse reactions in the literature included hearing loss with neomycin, skin staining and neutropenia with silver sulfadiazine, and delayed wound healing with silver sulfadiazine and povidone iodine. None of these effects were noted in the studies we reviewed.

The placebo control arms of these studies were actually associated with an infection rate above those reported in studies from general ED patient populations.<sup>12</sup> Thus, topical preparations that provide moisture without an antibiotic are associated with a higher infection rate than topical antibiotics and therefore should not be used.

Finally, our review examined only infection rates. Other considerations, such as rates of wound healing, should affect the decision about which agent to use but is not addressed here. There may also be a difference in the response to topical antibiotics for the different minor traumatic wound types reviewed. Although the studies are small, the best available evidence suggests that it is within the standard of care to use topical antibiotics for infection prophylaxis in acute, minor, uncomplicated, soft tissue wounds.

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