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## Do topical antibiotics improve wound healing?

### EVIDENCE-BASED ANSWER

The use of topical triple-antibiotic ointments significantly decreases infection rates in minor contaminated wounds compared with a petrolatum control. Plain petrolatum ointment is equivalent to triple-antibiotic ointments for sterile wounds as a post-procedure wound dressing (strength of recommendation [SOR]: **A**, based on randomized controlled trials [RCTs]).

Mupirocin cream is as effective as oral cephalexin in the treatment of secondarily infected minor wounds and, because of better tolerability, is the treatment of choice for the prevention and treatment of *Staphylococcus aureus* and *Staphy-*

*lococcus pyogenes* infections. Emerging resistance, including methicillin-resistant *S aureus* (MRSA), makes it prudent to check for clinical response in 24 to 48 hours. Major contaminated wounds requiring parenteral antibiotics do not appear to additionally benefit from topical antibiotics (SOR: **A**, based on RCTs).

Topical antibiotics may also aid in the healing of chronic wounds (SOR: **B**, based on a systematic review of low-quality RCTs), as does the application of honey (SOR: **B**, based on a systematic review of cohort studies).

### CLINICAL COMMENTARY

#### It would be helpful to have objective criteria to properly classify skin wounds

These results are encouraging, but they do not fully account for variability in the diagnosis of skin wounds or in the practical use of topical agents. The evaluation of skin wounds is inherently subjective. In order to properly apply these findings to my practice, it would be helpful to have more objective diagnostic criteria to properly classify skin wounds.

Furthermore, how patients use topical agents varies considerably. Patients apply topical agents differently, due to individual preference or perhaps inconsistent recommendations from their physician. Used improperly, topical agents may not provide the same potential for clinical improvement.

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### ■ Evidence summary Topical antibiotics for prophylaxis

Numerous studies support the prophylactic application of topical antibiotics to wounds that are clean. Topical bacitra-

cin zinc (Bacitracin), a triple ointment of neomycin sulfate, bacitracin zinc, and polymyxin B sulfate (Neosporin), and silver sulfadiazine (Silvadene) were compared with petrolatum as a control in a well-conducted RCT of 426 patients with

uncomplicated wounds seen at a military community hospital. Wound infection rates were 17.6% (19/108) for petrolatum, 5.5% (6/109) for Bacitracin (number needed to treat [NNT]=8), 4.5% (5/110) for Neosporin (NNT=8), and 12.1% (12/99) for Silvadene (NNT=18).<sup>1</sup> Most (60%) of the infections were “stitch abscesses” and were treated with local care only. There was no difference in rates of more serious infections between groups. One patient (0.9%) developed a hypersensitivity reaction to Neosporin.

A clinical trial compared the efficacy of a cetrimide, bacitracin zinc, and polymyxin B sulfate gel (a combination not available in the US) with placebo and povidone-iodine cream in preventing infections in 177 minor wounds (cuts, grazes, scrapes, and scratches) among children. The antibiotic gel was found to be superior to placebo and equivalent to povidone-iodine, in that it reduced clinical infections from 12.5% to 1.6% (absolute risk reduction [ARR]=0.109; 95% confidence interval [CI], 0.011–0.207; NNT=11).<sup>2</sup>

A double-blind study of 59 patients found Neosporin superior to placebo ointment in the prevention of streptococcal pyoderma for children with minor wounds. Infection occurred in 47% of placebo-treated children compared with 15% treated with the triple-antibiotic ointment (NNT=32;  $P=.01$ ).<sup>3</sup>

A small randomized prospective trial of 99 patients, who self-reported compliance with wound care and dressing changes, compared Neosporin with mupirocin (Bactroban) in preventing infections in uncomplicated soft tissue wounds. The study found no statistical difference in infection rates, and the authors recommend the more cost-effective Neosporin, as well as a larger trial to confirm the results.<sup>4</sup>

Another randomized controlled trial of 933 outpatients—with a total of 1249 wounds from sterile dermatologic surgeries—compared white petrolatum with bacitracin zinc ointment prophylaxis. The study found no statistically

significant differences in post-procedure infection rates, though only 13 patients developed an infection (2% in petrolatum group vs. 0.9% in bacitracin zinc group; 95% CI for the difference, –0.4 to 2.7).<sup>5</sup>

### Topical antibiotics for treatment

Topical antimicrobials are appealing for the treatment of secondarily infected wounds for the sake of convenience and because they may reduce the risk of adverse effects.

An open randomized trial with 48 volunteers compared the effects of Neosporin with several antiseptics (3% hydrogen peroxide, 1% povidone-iodine, 0.25% acetic acid, 0.5% sodium hydrochloride) and a wound protectant (Johnson & Johnson First Aid Cream without antimicrobial agent) on blister wounds (6 blisters per volunteer) intentionally contaminated with *S aureus*. Only Neosporin eliminated the infection after 2 applications (at 16 and 24 hours). Both the antibiotic ointment and the wound protectant led to faster wound healing by about 4 days compared with the antiseptics or no treatment.<sup>6</sup>

Another study with 2 parallel, identical RCTs of a total of 706 patients found mupirocin cream (Bactroban) to be equivalent to oral cephalexin in the treatment of secondarily infected minor wounds, such as small lacerations, abrasions, or sutured wounds. Clinical success (95.1% for mupirocin and 95.3% for cephalexin), bacteriologic success (96.9% for mupirocin and 98.9% for cephalexin), as well as the intention-to-treat success rate of 83% at follow-up were equivalent in the 2 groups.<sup>7</sup>

A small but well-designed study of 62 patients with major contaminated wounds failed to show any additional benefit when topical piperacillin/tazobactam (not available in US as a topical agent) was added to parenteral piperacillin/tazobactam (Zosyn) alone. Two of 31 patients on just

### FAST TRACK

**Triple-antibiotic ointments significantly decrease infection rates in minor contaminated wounds**

## FAST TRACK

## Topical antibiotics are effective for minor but not major wounds

parenteral antibiotics and 3 of 31 patients on both topical and parenteral antibiotics developed wound infections ( $P>.05$ ).<sup>8</sup>

Finally, topical antibiotics also appear to aid in the healing of chronic wounds. However, these findings are difficult to interpret in light of small sample size and other methodological problems. A systematic review of the treatment of chronic wounds, such as diabetic foot ulcers, found 30 trials, including 25 RCTs, mostly of low quality. Little evidence supports the routine use of systemic antibiotics for patients with chronic wounds; however, some topical antiseptic and antimicrobial agents may hasten the healing of these wounds. Topical preparations that may be helpful include dimethyl sulfoxide (Rimso-50), silver sulfadiazine (Silvadene), benzoyl peroxide (Benzac, Brevoxyl, Desquam, Triaz, ZoDerm), oxyquinoline (Trimo-san Vaginal Jelly), and gentamicin (Garamycin).<sup>9</sup>

Honey may also make an acceptable wound dressing for chronic wounds, as it has been repeatedly shown to suppress bacterial growth. Infection with *Clostridium* spores does not appear to be a concern when treating chronic wounds with honey.<sup>10,11</sup>

### Recommendations from others

Guidelines for antibiotic prophylaxis of surgical wounds uniformly recommend prophylaxis for all clean-contaminated, contaminated, and dirty procedures. Prophylaxis is considered optional for most clean procedures, although it may be indicated for certain at-risk patients and for clean procedures that fulfill specific risk criteria.<sup>12</sup>

The Infectious Diseases Society of America recommends mupirocin as the best topical agent for the treatment and prevention of *S aureus* and *S pyogenes* infections, followed by bacitracin zinc and neomycin, although resistance is emerging.<sup>13</sup> Expert and consensus opinion from the Canadian Chronic Wound Advisory Board and the International

Wound Bed Preparation Advisory Board for wound care management of infected chronic wounds recommend that since bacterial infection can develop gradually, good-quality wound cultures should be used in conjunction with clinical assessment. Iodine and silver-based dressings, topical antibiotics, and systemic antibiotics can be helpful.<sup>14</sup>

### REFERENCES

1. Dire DJ, Coppola M, Dwyer DA, Lorette JJ, Karr JL. Prospective evaluation of topical antibiotics for preventing infections in uncomplicated soft-tissue wounds repaired in the ED. *Acad Emerg Med* 1995; 2:4-10.
2. Langford JH, Artemi P, Benrimoj SI. Topical antimicrobial prophylaxis in minor wounds. *Ann Pharmacotherapy* 1997; 31:559-563.
3. Maddox JS, Ware JC, Dillon HC Jr. The natural history of streptococcal skin infection: prevention with topical antibiotics. *J Am Acad Derm* 1985; 13:207-212.
4. Hood R, Shermock KM, Emerman C. A prospective, randomized pilot evaluation of topical triple antibiotic versus mupirocin for the prevention of uncomplicated soft tissue wound infections. *Am J Emerg Med* 2005; 22:1-3.
5. Smack DP, Harrington AC, Dunn C, et al. Infection and allergic incidence in ambulatory surgery patients using white petrolatum vs bacitracin ointment. A randomized controlled trial. *JAMA* 1996; 276:972-977.
6. Leyden JJ, Bartelt NM. Comparison of topical antibiotic ointment, a wound protectant and antiseptic for the treatment of human blister wounds contaminated with *Staphylococcus aureus*. *J Fam Pract* 1987; 24:601-604.
7. Kraus SJ, Eron LJ, Bottenfield GW, Drehobl MA, Bushnell WD, Cupo MA. Mupirocin cream is as effective as oral cephalixin in the treatment of secondarily infected wounds. *J Fam Pract* 1998; 47:429-433.
8. Simons JP, Johnson JT, Yu VL, et al. The role of topical antimicrobial prophylaxis in patients undergoing contaminated head and neck surgery with flap reconstruction. *Laryngoscope* 2001; 111:329-335.
9. O'Meara SM, Cullum NA, Majid M, Sheldon TA. Systematic review of antimicrobial agents used for chronic wounds. *Br J Surg* 2001; 88:4-21.
10. Molan PC. The evidence supporting the use of honey as a wound dressing. *Int J Low Extrem Wounds* 2005; 5:40-54.
11. Molan PC. Potential of honey in the treatment of wounds and burns. *Am J Clin Dermatology* 2001; 2:13-19.
12. Woods RK, Dellinger EP. Current guidelines for antibiotic prophylaxis of surgical wounds. *Am Fam Physician* 1998; 57:2731-2740.
13. Stevens DL, Bisno AL, Chambers HF, et al; Infectious Diseases Society of America. Practice guidelines for the diagnosis and management of soft-tissue infections. *Clin Infect Dis* 2005; 41:1373-1406.
14. Frank C, Bayoumi I, Westendorp C. Approach to infected skin ulcers. *Can Fam Physician* 2005; 51:1352-1359.