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## Do Mammalian Bites Require Antibiotic Prophylaxis?

**EBEM Commentator**  
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### SYSTEMATIC REVIEW SOURCE

This is a systematic review abstract, a regular feature of the *Annals'* Evidence-Based Emergency Medicine (EBEM) series. Each features an abstract of a systematic review from the Cochrane Database of Systematic Reviews and a commentary by an emergency physician knowledgeable in the subject area.

The source for this systematic review abstract is: Medeiros I, Saconato H. Antibiotic prophylaxis for mammalian bites (Cochrane Review). In: *The Cochrane Library*. Issue 1. Oxford, United Kingdom: Update Software; 2004.

The *Annals'* EBEM editors prepared the abstract of this Cochrane systematic review as well as the Evidence-Based Medicine Teaching Points.

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### OBJECTIVE

The objective of the systematic review was to assess the efficacy of antibiotic prophylaxis in preventing wound infections from mammalian bites.

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### DATA SOURCES

Searches were performed of MEDLINE, EMBASE, LILACS, and the Cochrane Controlled Trials Register, and the reference lists of articles and relevant sections of textbooks were checked for relevant studies. In addition, a hand search of randomized controlled trials presented at the Brazilian Infectious Diseases Meetings (1980 to 1995) was performed.

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### STUDY SELECTION

Published and unpublished manuscripts, letters, and abstracts were considered for inclusion. Studies were selected for randomized clinical trials or quasirandomized trials of antibiotics versus placebo or no intervention, started within 24 hours of injury with no clinical signs of infection. Included trials produced data including overall incidence of infection (presumed or microbiologically confirmed); some studies also included information on site of wound, aggressor species, and type of wound.

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### DATA EXTRACTION

Two investigators extracted data independently. Unpublished data of interest were requested from authors. All analyses were performed according to the intention-to-treat method. Data included title, year of publication, design, generation of allocation concealment, number of participants, age and sex of participants, patients with underlying diseases, severity of the injury, body part of the injury, species of aggressor mammal, antibiotics used, time to antibiotic use, duration of antibiotic use, side effects, assessment of patient compliance, infection rates in both groups of patients, assessment of the outcomes, local care (before and after the visit to emergency departments), suturing of the injury, time of follow-up, drop out, and cost analysis.

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### MAIN RESULTS

Nine studies met the inclusion criteria. Eight studies were analyzed because one study included bites from multiple species (cats, dogs, and rabbits) and did not report infection rates by species. The use of prophylactic antibiotics was associated with a statistically significant reduction in the rate of infection after bites by human beings. Prophylactic antibiotics did not appear to reduce the rate of infection after bites by cats or dogs. Wound type (eg, laceration or puncture) did not appear to influence the effectiveness of the prophylactic antibiotic. Prophylactic antibiotics were associated with a statistically significant reduction in the rate of infection in hand bites (odds ratio 0.10; 95% confidence interval [CI] 0.01 to 0.86); the number needed to treat was 4 (95% CI 2 to 50).

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## CONCLUSION

There is evidence that prophylactic antibiotics reduce the risk of infection after human bites, but confirmatory research is required. There is no evidence that the use of prophylactic antibiotics is effective for cat or dog bites. There is evidence that the use of prophylactic antibiotics after bites of the hand reduces infection, but confirmatory research is required.

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## COMMENTARY: CLINICAL IMPLICATION

Bites caused by mammals are a common problem seen in the emergency department and are a source of considerable controversy in terms of management. First, mammalian "attacks" can be a source of significant injury, especially to children, requiring attention to management of the patient's airway, breathing, and control of hemorrhage. In less serious bites, other concerns in management come to the forefront. Should bite wounds be closed with sutures immediately, or left open to permit drainage? Does wound location influence outcomes, given the greater blood supply to the face and scalp than the extremities? Because cat bites tend to be puncture wounds, are they possibly more susceptible to infection than the tearing lacerations of dog bites, and thus more deserving of antibiotic prophylaxis? Uncertainty regarding management results in a number of perplexing questions for many clinicians, all focused on a goal of achieving optimal cosmesis and avoiding complications.

Primary treatment for wounds involves careful assessment of function and control of blood loss. Following this, detailed examination under local or regional anesthesia is warranted to determine the extent of the bite (complicated or uncomplicated). Wounds to the underlying tendons, neurovascular bundles, and/or joint must be identified at this stage. Complicated mammalian bites involving deep structures (eg, bone, joint, tendons) were not covered in this review, and all require antibiotic treatment. For uncomplicated mammalian bites, debridement and extensive irrigation are also recommended to decrease the incidence of infection.<sup>1,2</sup> Finally, once the closure technique (primary or secondary) has been selected, the role of antibiotics must be considered.

This systematic review examines the best available evidence concerning the use of antibiotics to provide prophylaxis against wound infection after mammal bites. With documented infection rates of up to 50%, the use of antibiotics seems rational to help prevent the morbidity that accompanies wound infections. Rates of carriage of potentially pathogenic organisms are high in the mammalian oropharynx, including such bacteria as *Pasteurella*, *Staphylococcus*, *Streptococcus*, and *Bacteroides*. Serious infections can result from animal or human bites, including cellulitis, septic arthritis, and osteomyelitis, with infections commonly being polymicrobial. Using data from 8 studies involving 674 patients, the authors of the review provide evidence that not all bites are the same. For example, rates of infection can be significantly influenced by wound location (hand>face), blood supply (anterior shin>>face), comorbidities (diabetes mellitus>non-diabetes mellitus), and by the mammalian species involved (human beings>cats>>dogs).

Antibiotics chosen by authors of the studies in this review included penicillin, oxacillin, dicloxacillin, co-trimoxazole, cephalexin, erythromycin, cefazolin, and cefaclor. This may reflect local availabilities, local preferences, or the date of the study (simple first-line agents were more commonly used in older studies). Despite the lack of evidence presented here, most authorities today would suggest the use of amoxicillin-clavulanate for nonallergic individuals, and either cefotaxime or ceftriaxone (for dog and cat bites) or clindamycin and trimethoprim-sulfamethoxazole (for human bites) for patients sensitive to penicillin, because of the sensitivity patterns of the most common organisms.<sup>3</sup> Some of the antibiotic choices in the studies included in the review might be less effective in controlling infection than these choices and thus could influence the efficacy of prophylaxis in those studies.

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## TAKE HOME MESSAGE

Surprisingly little clinical trial evidence exists with respect to therapies for mammalian bites. Emergency physicians should focus attention on the assessment and thorough cleansing of all such wounds, rather than relying exclusively on antibiotic prophylaxis. This review suggests that antibiotics are effective in preventing infection from bite wounds when used in certain clinical scenarios. Generalizing this therapy to all bite wounds is not justified by the evidence presented, and further research may help to define populations in whom this intervention will be most useful. Considering these data, in combination with recommendations, prophylaxis is indicated in all human bites and in selected cat and dog bite wounds (eg, bite on hand from

a cat or dog). Most clinicians would use antibiotic prophylaxis on cat bites because of their higher rate of infection.

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#### EBEM TEACHING POINTS

**Confidence interval (CI).** All continuous and dichotomous outcomes in Cochrane Reviews are reported with their 95% or 99% CI. The 95% CI is most commonly reported and represents the range within which the "true" value (ie, size of effect of an intervention) is expected to lie with a given degree of certainty (eg, 95%). CIs that cross 1.0 indicate a nonsignificant value. Narrow CIs suggest large sample sizes and/or precise measures (for continuous outcomes); however, wide CIs may signify small sample sizes and/or wide variation in measurement. CIs represent the probability of random errors, but not systematic errors (bias).

**Conflict of interest declaration (or competing interests declaration).** All Cochrane Reviews are required to contain a statement by each contributor reporting their personal, financial, or other interests that could have influenced the findings or their interpretation. The Cochrane Collaboration is a non-industry-funded network of researchers, clinicians, policymakers, and consumers dedicated to the production, dissemination, and update of systematic reviews. Conflicts of interest, whether perceived or real, are taken seriously by this organization, and tight adherence to their reporting is important to maintaining the validity and quality of the Cochrane databases. A recent extensive review of the declaration of conflict policies has been conducted across the Collaboration. Essentially, readers should be reassured that reviews are not influenced by industry sponsors (in this case, pharmaceutical companies that produce antibiotic agents used in mammalian bites).

#### REFERENCES

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2. Brown LL, Shelton HT, Bornside GH, et al. Evaluation of wound irrigation by pulsatile jet and conventional methods. *Ann Surg.* 1978;187:170-173.
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