



Summary of recommendations for general practitioners based on the clinical consensus guidelines.

Recommendations for approaches to methicillin-resistant staphylococcal infections of small animals: diagnosis, therapeutic considerations, and preventative measures.

Morris DO, Loeffler A, Davis MF, Guardabassi L, Weese JS
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Aetiology

- *Staphylococcus pseudintermedius*, *S. schleiferi* (including the coagulase-negative variant), and *S. aureus* are the primary pathogens encountered in small animal dermatology practice.
- The term “methicillin-resistant” has persisted and has been used since the discovery of cephalosporins in the 1970s to indicate strains that are resistant to all beta-lactams except the newest generation of cephalosporins which were specifically developed for treatment of methicillin-resistant *S. aureus* (MRSA) infections.
- There is little evidence for a difference in outcome between MRS and methicillin susceptible *Staphylococcus* infections in animals, and the prognosis for MRS skin infections in pets is good, depending on the underlying cause and co-morbidities.

Diagnostic Considerations

- Antimicrobial susceptibility test reporting by microbiology laboratories should include complete speciation of staphylococci.
- Five situations which may indicate the likelihood of antimicrobial resistance and mandate bacterial culture of apparent superficial bacterial folliculitis, as follows: **(ISCAID guidelines 2014)**
 - i. Less than 50% reduction in the extent of lesions within 2 weeks of appropriate systemic antimicrobial therapy.
 - ii. Emergence of new lesions (papules, pustules, collarettes) 2 weeks or more after the initiation of appropriate antimicrobial therapy.
 - iii. Presence of residual superficial bacterial folliculitis lesions after 6 weeks of appropriate systemic antimicrobial therapy together with the presence of cocci on cytology (while a typical course of therapy may be 21–28 days, 16 several studies indicate that therapy for up to 6 weeks may be necessary to resolve the infection in some cases).
 - iv. Intracellular rod-shaped bacteria are detected on cytology.
 - v. A prior history of multidrug-resistant infection in the dog or in a pet from the same household as the affected dog.

Therapeutic Considerations

- **Topical therapy**
 - Topical therapy, using antibacterial agents with proven anti-staphylococcal efficacy, is the recommended treatment modality for any surface and superficial pyoderma, particularly those with localized lesions, whenever a pet and owner can be expected to be compliant.
 - Chlorhexidine and benzoyl peroxide shampoos resolved or substantially improved clinical signs within 3 weeks in the majority of dogs with superficial pyoderma.

- **Systemic therapy**

- Beta-lactam antibiotics should not be used to treat methicillin-resistant (MRS) infections, irrespective of the susceptibility report. Although third-generation cephalosporins have a broader spectrum of efficacy than first-generation cephalosporins, they do not have efficacy against MRS, as shown for ceftiofur and cefpodoxime.
- Where possible, empirical choice of fluoroquinolones should be avoided, particularly when an MRS is suspected.
- For the first-generation fluoroquinolones in particular, the disparity in resistance rates between methicillin susceptible *S. pseudintermedius* (MSSP) and MRSP is striking and fluoroquinolone use has been associated with increased rates of MRSA in human hospitals. However, where susceptibility to fluoroquinolones is confirmed in vitro for an MRS isolate, this risk needs to be balanced with the safety profiles of the other drugs available according to the antibiogram.
- Current published advice on the duration of treatment (3 weeks for superficial pyoderma or 1 week beyond clinical resolution and 4–6 weeks for deep pyoderma or 2 weeks beyond clinical resolution) remains the standard.
- If treatment regimens are prescribed for <3 weeks duration, the attending veterinarian should be confident that the patient will be presented for re-evaluation prior to discontinuation of therapy.

Zoonotic implications

- Once an MRS infection has clinically resolved, humans and animals can continue to carry MRS at the skin and mucosal sites. For MRSP, it was shown that carriage can persist on dogs for more than 1 year after clinically apparent infection had resolved.
- Transmission of MRS by infected pets to other individuals in the home or community is known to occur, but data to guide recommendations are incomplete.
- Within the community, households have shown the greatest potential, not just as a point of transmission of relevance in a clinical context for both people and pets but also as a potential intervention point.
- Transmission of staphylococci—particularly *S. aureus*— may occur in both directions between owners and their pets; pets typically carry *S. aureus* strains genetically similar to locally dominant human clones. Similar relatedness has been identified in pets and owners that are co-colonized with *S. pseudintermedius*.
- Routine cleaning and disinfection protocols are the cornerstone of hospital infection control. MRS are susceptible to commonly used disinfectants. Protocols should be designed to reduce or eliminate pathogenic burdens in the environment and on equipment.

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