Canine Pyoderma

RECOMMENDATIONS FOR TOPICAL & SYSTEMIC ANTIMICROBIAL TREATMENTS

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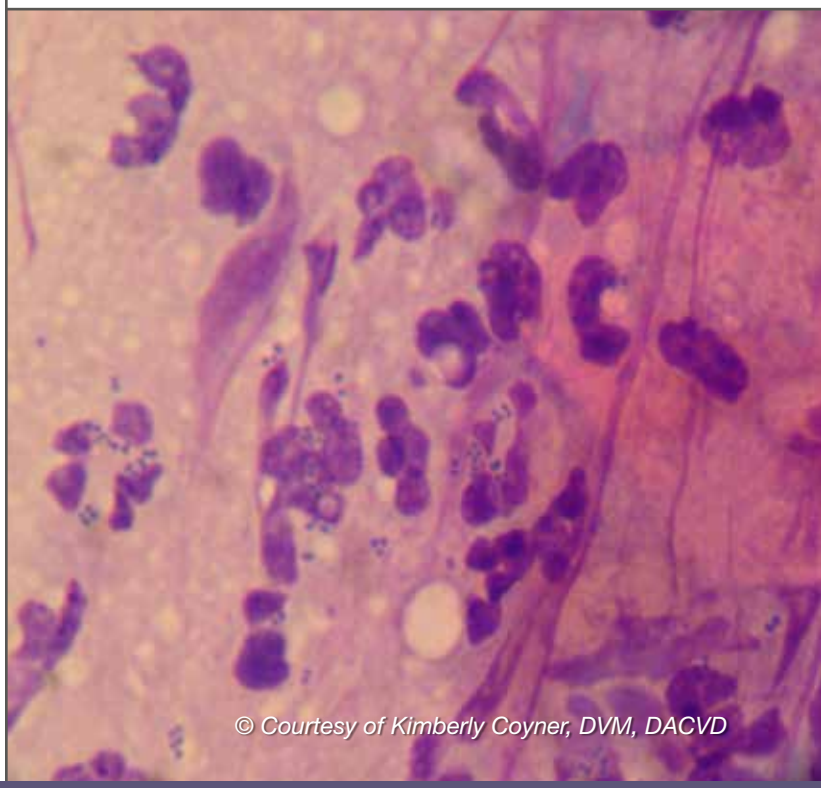
DEFINITIONS AND CLASSIFICATIONS

Canine bacterial pyoderma can be divided into two categories: superficial and deep pyoderma. Superficial pyoderma is defined as an infection that involves the superficial hair follicle and the epidermis, while deep pyoderma extends through the hair follicle, involving the dermis and subcutaneous tissues.[1] The most common cause of bacterial pyoderma is *Staphylococcus pseudintermedius*. Transient bacterial organisms, such as *E. coli, Pseudomonas* species, and other coagulase-positive and coagulase-negative staphylococci, can secondarily colonize the skin during an existing bacterial infection. Co-infections with *Malassezia* species are also common. Bacterial pyoderma usually occurs secondary to an underlying disease, such as allergy (food hypersensitivity, atopy, flea), parasite infestation (*eg*, demodicosis, fleas, lice, scabies), endocrinopathy (hyperadrenocorticism, hypothyroidism), autoimmune disease (*eg*, pemphigus complex), or keratinization disorders (*eg*, sebaceous adenitis).[1]

Current recommendations for the treatment of canine pyoderma include both topical and systemic antimicrobial medications. The use of topical therapies has increased in recent years because of the increased incidence of antibiotic resistant bacterial infections. While topical antibacterial agents should be used in all cases of pyoderma, they are currently recommended as the sole treatment for all superficial infections where good treatment compliance is anticipated.[3] If systemic antibiotic therapy is necessary, superficial infections should be treated for at least 3 to 4 weeks, while deep infections should be treated for at least 6 to 8 weeks. Treatment should be continued for one week past clinical cure in superficial infections and 2 to 3 weeks past clinical cure in deep infections. In all patients with deep pyoderma, or patients with recurrent superficial infections and infections that fail to resolve, bacterial culture and sensitivity is recommended to guide systemic antibiotic choices.[1-3]

TOPICAL THERAPY

Topical therapy is used to remove pathogens from the skin surface, and can act in conjunction with systemic antibiotics to resolve lesions more quickly and decrease the overall treatment duration.[2,4] Common topical formulations include shampoos, mousses, sprays, wipes, lotions, and ointments. Shampooing is commonly recommended twice weekly with 5 to 10 minute contact time before rinsing. Wipes, sprays, lotions, and ointments are usually applied every 12 to 24 hours between bathing. Mousse formulations are often used twice weekly between



baths, but can also be used daily on lesions.[1,2,4]

Agents commonly used in sprays, wipes, shampoos, and mousses include chlorhexidine, benzoyl peroxide, and miconazole. There is evidence that both chlorhexidine and benzoyl peroxide shampoos can be successfully used to treat superficial bacterial infections, sometimes without concurrent systemic antibiotics.[5,6] Benzoyl peroxide, however, can be dehydrating, so it is recommended mainly for very oily patients, and the patient's treatment regimen should be re-evaluated after 10 to 14 days to prevent excessive skin drying.[1] Additionally, chlorhexidine and miconazole have been found to be synergistic in vitro for the treatment of staphylococcal infections and are commonly found together in multiple products, as in MiconaHex+Triz® shampoo, wipes, mousse and spray.[7] Another *in vitro* study has found that chlorhexidine, TrizEDTA™, and miconazole have ten days of residual anti-staphylococcal activity on hair without repeated dosing.[8]

Common recommended active ingredients in topical lotions, creams, and ointments include silver sulfadiazine, mupirocin, and fusidic acid (unavailable in the United States). Both fusidic acid and mupirocin have been found to be effective against strains of methicillin-resistant *Staphylococcus aureus* (MRSA) and multiresistant *S. pseudintermedius* (MRSP) *in vitro*, but resistant strains of these bacterial species exist and appear to be increasing in human and veterinary medicine.[9] Silver sulfadiazine (SSD) is a topical antimicrobial agent that has historically been used in the treatment of burns, but is also used to treat superficial pyodermas.[2,4]

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Household bleach (sodium hypochlorite) is a topical treatment that is both fungicidal and bactericidal. It has been used to treat pyoderma in children at a concentration of 0.005%, but there are limited data to suggest an ideal dilution in veterinary medicine.[10-13] These authors have had success in the treatment of drug resistant superficial pyoderma using a solution of 1 to 1.5 tablespoons of household bleach mixed with 1 quart water, applied once daily until resolution of infection.

Improving skin barrier function appears to play a role in minimizing future infections and promoting patient comfort, especially in atopic animals. Intercellular lipids play a key role in the skin barrier; application of ceramides and ceramide precursors (*eg*, phytosphingosine) can decrease skin inflammation, promote barrier repair, and improve the skin's natural antimicrobial components.[4,14-16] There are multiple products available, including topical spot-ons, mousses, and shampoos. At this time, there are limited studies available on these products' ability to improve the clinical signs in patients, though they have been shown to improve the skin's barrier functions.[16]

SYSTEMIC ANTIBACTERIAL THERAPY

Systemic antibacterial therapy should be guided by culture and susceptibility whenever possible. If empirical therapy is required, first line antibiotics include lincosamides, macrolides, first-generation cephalosporins and amoxicillin-clavulanate. Third generation cephalosporins (cefpodoxime, cefovecin) are also used as first tier antibiotics by some clinicians, and potentiated sulfonamides can be used if *S. pseudintermedius* species are generally regionally susceptible to this antibiotic. Antibiotics to which *Staphylococcus* species are intrinsically resistant should be avoided, including amoxicillin, ampicillin, and non-potentiated sulfonamides (*eg*, Albon).[1-3]

As *S. pseudintermedius* resistance increases, more attention must be paid to the susceptibility report to avoid accidentally prescribing an ineffective antibiotic. If culture results indicate that the organism is methicillin resistant, no beta-lactam antibiotics (penicillins and all generations of cephalosporins) should be used in treatment, regardless of susceptibility results. If the bacterial strain is resistant to erythromycin, clindamycin use should also be avoided unless additional testing is performed.[3]

Staphylococcus strains are commonly resistant to fluoroquinolones and tetracyclines. Therefore, the use of these antibiotics should be based on culture and sensitivity alone.[3] Chloramphenicol can also be used if the bacterial strain is susceptible, but it is critical to warn owners of the need to wear gloves and wash hands thoroughly after administration. This medication can cause aplastic anemia in rare human cases.[17] The use of aminoglycosides is discouraged unless no other options are available because of their potential for nephrotoxicity. If treatment with aminoglycosides is pursued, then weekly evaluation of a urinalysis and renal panel is required. Drugs such as linezolid, teicoplanin, and vancomycin are not recommended in veterinary medicine; they are typically reserved for the treatment of severe MRSA infections in humans.[2,4]

FOLLOW UP

Recheck appointments are recommended every 2 to 3 weeks to monitor response to treatment, including clinical evaluation and cytology. Appointments should be scheduled before medications are discontinued. If there is minimal improvement of infection, then repeated culturing is recommended to rule out developing bacterial resistance. Other common causes of treatment failure include inadequate antibiotic dosage, incorrect antibiotic administration, or inadequate therapy duration.[1,3] If pyodermas are recurrent following successful treatment, underlying causes should be evaluated and addressed to prevent future bacterial infections.

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