

DERMATOLOGY PEARLS

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PEARL OF THE MONTH: UPDATES IN METHICILLIN RESISTANT INFECTIONS

Transmission of methicillin-resistant *Staphylococcus pseudintermedius* between infected dogs and cats and contact pets, humans and the environment in households and veterinary clinics van Duijkeren E, Kamphuis M, van der Mije IC et al.

Abstract: The objective of this study was to investigate the prevalence of methicillin-resistant *Staphylococcus pseudintermedius* (MRSP) in people, pets and the environment in households with a pet with a clinical MRSP-infection within the past year. Personnel and the environment at veterinary clinics were also screened. Nasal swabs (humans), nasal and perineal swabs (pets) and environmental wipes were examined using selective culturing. Twenty households were enrolled; 10/20 index cases still had clinical signs of infection at the start of the study and all were MRSP-positive. Of the remaining 10 index cases five were MRSP-positive in nasal and/or perineal samples. Five of 14 (36%) contact dogs and four of 13 (31%) contact cats were found MRSP-positive. In the households with an index case with clinical signs of infection 6/7 (86%) contact animals were MRSP-positive. MRSP was cultured from 2/45 (4%) human nasal samples. Domestic contamination was widespread as positive samples were found in 70% of the households and 44% of all environmental samples were MRSP-positive. In all but one of these MRSP-positive households the index case was still MRSP positive. Among the personnel in veterinary clinics 4/141 (3%) were MRSP-positive. MRSP was cultured from 31/200 environmental samples in 7/13 clinics at the first sampling and in 3/6 clinics the environment remained MRSP-positive after cleaning and disinfection indicating that current cleaning procedures often were unable to eliminate MRSP. These results show that transmission of MRSP between infected or colonized dogs and cats to healthy people does occur but is relatively uncommon, while transmission to contact pets occurs frequently, especially when the index case still has clinical signs of MRSP-infection.

This study emphasizes the need for effective environmental disinfection both at home and in the hospital in cases of MR infections in pets. Additionally, although not specifically studied, carriage of MRSP in asymptomatic in-contact pets may be a source for recolonization in treated MR infected pets. This demonstrates that normal animals with no predisposing causes for skin/ear infections such as allergy or endocrinopathy will not develop clinical disease after exposure to MRSP, but it may be prudent to bathe in-contact pets with antibacterial products (ie. Chlorhexidene shampoos/conditioners) to attempt to reduce colonization and reduce risk of reinfection of the treated pet with MRSP infection.

Dichotomous selection of high-level oxacillin resistance in *Staphylococcus aureus* by fluoroquinolones Dalhoff A, Schubert S.

Abstract: The objective of this study was to determine whether exposure of *Staphylococcus aureus* to ciprofloxacin or levofloxacin has differential potential as a mutator or selector for methicillin resistance. The potential of fluoroquinolones to act as mutators or selectors was studied in 24 strains each of healthcare-associated methicillin-susceptible *S. aureus* (MSSA) and methicillin-resistant *S. aureus* (MRSA) as well as 6 strains of community-acquired MRSA. Mutator or selector potential was studied first by exposing isolates to 0.5x the fluoroquinolone minimal inhibitory concentration (MIC) and screening for either single-step fluoroquinolone resistance or high-level oxacillin (methicillin) resistance; second, by exposing the heteroresistant MRSA P8 parent strain as well as fluoroquinolone-resistant subpopulations derived from strain P8 to constant fluoroquinolone concentrations ranging from 0.015 mg/L to 128 mg/L; and third, by exposing the heteroresistant MRSA population of strain P8 to fluctuating concentrations of ciprofloxacin and levofloxacin. Neither of the fluoroquinolones acted as a mutator, however both ciprofloxacin and levofloxacin selected for high level methicillin resistance. Exposure of the heteroresistant MRSA P8 parent strain to fluctuating amoxicillin/clavulanic acid, ciprofloxacin and levofloxacin concentrations caused a rapid selection of fluoroquinolone and methicillin resistance. In conclusion, fluoroquinolones do not act as mutators towards high level methicillin resistance. However, ciprofloxacin and levofloxacin are potent selectors of high level methicillin resistance. Thus, fluoroquinolones exert a dichotomous MRSA-selective potential in heteroresistant MRSA.

*This information is troubling, as the same mechanism of induction of high level methicillin resistance by fluoroquinolones likely also applies to methicillin-resistant *Staphylococcus pseudintermedius* in animals. This emphasizes the need to limit fluoroquinolone usage to a last resort in the treatment of infections in pets.*