

A 3D-rendered illustration of numerous spherical MRSA bacteria. The bacteria are shown in various sizes and colors, ranging from light yellow to dark orange, against a textured, reddish-orange background that resembles a biological surface. The bacteria are arranged in several distinct clusters of varying sizes, with some individual cells scattered throughout.

MANAGEMENT STRATEGIES

MRSA in the Veterinary Clinic: Management of Pets and People

Malia Ireland, DVM, MPH, Leslie Kollmann, BS, CVT, AAS, Joni Scheftel, DVM, MPH, DACVPM

Staphylococcus aureus is a human-host adapted, Gram-positive bacteria commonly found on the skin and in the nasal passages of people. Often considered a commensal organism, it is also an opportunistic pathogen, causing skin and invasive infections. Methicillin-resistant *S. aureus* (MRSA) was first reported in the early 1960s, shortly after the introduction of methicillin. In the late 1970s, MRSA infection rates increased dramatically, mainly occurring in hospitalized patients. In the 1990s, another significant change occurred when MRSA infections acquired in the community among previously healthy individuals were recognized.¹ These two sources of MRSA are now referred to as HA-MRSA (health care-associated) and CA-MRSA (community-associated).

In contrast, *S. aureus* is not host-adapted to dogs or cats. For this reason, when a pet is colonized with *S. aureus*, including both methicillin-resistant and methicillin-susceptible strains, the bacteria does not generally persist in the pet for more than a few weeks.^{2,3} The most frequent commensal *Staphylococcus* in dogs and cats is *S. pseudintermedius*, which can also be methicillin-resistant (MRSP). While *S. pseudintermedius* or MRSP can transiently colonize people, infections are rare.^{4,5} MRSA and MRSP can be thought of as mirror images, host-adapted to people or pets

respectively, but with rare occurrences of colonizing or infecting the other group. Though the focus here is MRSA, infection control recommendations apply equally to minimizing transmission of MRSP within a clinic, and to staff and owners.

It is important to understand the difference between colonization (carrier) and infection. Both animals and people can be colonized with MRSA, meaning the bacteria is present on skin or in nasal passages, but is not causing infection or disease.⁶ However, MRSA is also capable of causing infections in people and animals. In people, MRSA most often causes skin and soft tissue infections, sometimes with serious complications¹. In dogs and cats, MRSA is most often associated with skin, wound or surgical site infections, otitis, or urinary tract infections.^{1,7}

MRSA in dogs and cats is generally acquired *from* people. The strains found in pets closely match those found in people in that geographic region.⁷ Colonization rates of MRSA in cats and dogs normally range from 0-4%; however, colonization rates in specific populations may be as high as 7-9%.¹ Primary risk factors for MRSA colonization in pets are contact with an MRSA-infected person, repeated courses of antimicrobials, visiting a veterinary facility, surgery, or hospitalization for several days.^{7,8}

Similarly, veterinary personnel have a higher risk of MRSA colonization than the general population.^{1,7} Current studies have shown a prevalence ranging from 4-18% in veterinary personnel compared to 1-3% in the general population,¹ underscoring the importance of good hand hygiene and appropriate use of gloves in the veterinary setting.

Q AND A:

A member of a client's household has been diagnosed with a MRSA infection. Are the household pets at risk?

- Yes, the pets are at risk for colonization with MRSA, but the risk is very low. The risk of infection in pets is even lower.
- It is recommended to limit the infected person's contact with household pets until the person is cleared of the infection. This includes no kissing, no close cuddling, no co-sleeping, and not allowing pets to lick skin or wounds.
- Encourage your clients to follow their human home health-care instructions carefully to minimize transmission of MRSA to other family members and pets.
- Handwashing frequency and duration for the infected person and family members providing care should be increased, and especially performed before and after contact with the pets.
- Increase routine cleaning of clothing, the environment (paying close attention to hand contact areas), and human and pet bedding during treatment.

Should I test the pets if a human household member is infected with MRSA?

- No, in the case of a human MRSA infection, the household pets do not need to be tested.
 - If a test were positive, it would likely reflect transient colonization of the pet and no treatment would be needed.^{1,2,9}
 - If a single test were negative, it would not rule out colonization.

A pet owner who is a health care provider is colonized with MRSA. Previous decolonization attempts have failed. Should we consider the household pets as a possible source?

- Yes, this an appropriate situation in which to consider testing the pets. The goal in these situations is to prevent on-going MRSA transmission between humans and between human and animal household members so that colonization can be eradicated in the health care provider.
 - Veterinarians and health care providers should coordinate concurrent testing of all human and animal household members.
 - Two negative cultures (performed a minimum of 7 days apart) are needed to call an animal negative. (Please see screening recommendations below.)
 - If animals test positive, they should be isolated or temporarily removed from the home for 3-4 weeks to eliminate ongoing exchange.
 - Positive animals do not need to be treated for MRSA, as colonization is transient and will likely resolve within approximately 3 weeks.²
 - Temporary caretakers should wash their hands before and after contact with the pet and avoid kissing and cuddling; however, the risk of infection is low.

An animal patient had MRSA cultured from a surgical wound or deep skin infection. What precautions should the owners take?

- Limit contact with the pet while the pet is being treated. This means no kissing, no close cuddling, no co-sleeping, and not allowing pets to lick human skin or wounds.
- Increase frequency of handwashing in the house, including before and after contact with the pet, their bedding, and any item with which the pet has contact.
- People with skin wounds, infections, recent surgery, or who are immunocompromised should not care for the pet during this time.
- Wash hands and wear gloves for wound care and dispose of used bandage material immediately. Change gloves before handling clean bandage material. Thoroughly wash hands after removing gloves.
- Increase routine cleaning of the environment, paying close attention to hand contact areas, such as door knobs and light switches. Hand contact areas and pet water/food bowls should be cleaned at least once a day. Pet bedding should be laundered daily.
- Keep pets isolated to an easily cleaned area of the house. Keep pets off beds and pillows used by people and away from carpeted and upholstered surfaces.

- Pet owners who are also health care providers or veterinary personnel should take extra care at work to perform good hand hygiene and use gloves appropriately.
- Continue all precautions until the patient's infection has healed, antibiotics have been discontinued and the patient has had two consecutive negative cultures (see screening recommendations below).
- If family members are immunocompromised, or at higher risk (eg, HIV/AIDS, cancer or transplant patients), consider temporary removal of the pet from the home until cleared of the infection. Note that if a pet's infection is caused by MRSP, implementing these recommendations with special attention to the pet areas will help prevent colonization of other household pets, which could become prolonged carriers.¹⁰

An animal patient had MRSA cultured from a surgical wound or deep skin infection. What precautions should my veterinary staff take?

- Bring patients directly into an exam room when presenting for an appointment and do not allow them to mingle with other clients and their animals.
- House hospitalized animals with known MRSA infections in an isolation suite or away from other patients with their own dedicated equipment and materials.
- All staff should wear gloves and gowns when handling and caring for the patient until the animal is cleared of MRSA infection.
- When performing bandage changes, keep the dirty bandage materials separate from the clean bandage materials. Gloves should be changed in between handling the dirty and clean materials.
 - To prevent cross-contamination, any equipment or unused bandage materials should be discarded or sterilized prior to next use. (Do not return unused or partial rolls of bandage materials to the drawer or cabinet without first autoclaving.)
- Clean and disinfect (according to disinfectant manufacturer's instructions) the table, floor and other hand contact areas (door knobs, cabinet handles, faucet handles) in the area where any procedures are performed and/or where the patient was housed during their visit.
- Hands should be thoroughly washed when interaction with the patient is complete.



REDUCE TRANSMISSION

A person with a MRSA infection should limit contact with their pets until the infection has cleared. This means avoiding kissing, close cuddling, co-sleeping, and allowing pets to lick skin or wounds.

- Staff with skin wounds or who are immunocompromised should not clean patient's wounds.
- All precautions (gowns, gloves, prevention of comingling, and isolation in hospital) should be taken until the patient's infection has healed, antibiotics have been discontinued and the patient has had two negative consecutive cultures (see screening recommendations below).
- These infection control recommendations should be followed for patients with MRSP infections as well.

How do I screen a patient for MRSA if needed?

- Use sterile cotton swabs to sample at least two areas on each patient. The pharynx, perineum and corner of the mouth are the most sensitive sites,^{11,12} but others have sampled just the nares and perineum.
- Swabs can be pooled and submitted as one sample.
- Order a culture and sensitivity and let the laboratory know that you are specifically screening for MRSA.
- Repeat, if applicable, a minimum of 7 days later.

What precautions should I use for all wounds?

- Culture infections prior to administering antibiotics to identify resistant infections and treat them accordingly.
- Use standard precautions:¹⁴ proper hand hygiene, gloves, and protective outerwear (lab coat or smock).
- Wear gowns and use gloves when caring for seeping or infected wounds.
- Cover wounds whenever possible.
- Sterilize partial rolls of bandage material before re-using or discard them.

What is the mechanism of methicillin resistance in MRSA and MRSP?

- Resistance to methicillin is conferred by the *mecA* gene [or a homologue identified in 2011, designated *mecC*¹⁵], which codes for an altered version of a

protein that binds penicillin. The antibiotic binds poorly to the altered protein, making the bacteria more resistant to the penicillins and all β -lactam antibiotics. The *mecA* gene is located on a mobile genetic element which has been introduced into the *S. aureus* genome on many different occasions, leading to identifiable types and subtypes⁷. Methicillin resistance does not create multi-drug resistance; however, some strains acquire resistance to multiple antibiotics.¹ **TVP**

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Malia Ireland

Malia graduated from the University of Minnesota College of Veterinary Medicine in 2004 and practiced small animal medicine for 10 years, with an interest in preventive medicine and nutrition. She earned an MPH in Epidemiology from the University of Minnesota School of Public Health in 2016, and currently works as an epidemiologist in the Zoonotic Diseases Unit at the Minnesota Department of Health. Her disease focus is fungal infections in humans and animals.



Leslie Kollmann

Leslie, a Certified Veterinary Technician since 2002, currently works at the Minnesota Department of Health in the Zoonotic Disease Unit. Leslie was the Infection Control and Safety Technician at the University of Minnesota Veterinary Medical Center for nearly 8 years and has experience in infection control and occupational health specific to the veterinary field. She has also been a member of Association for Professionals in Infection Control and Epidemiology (APIC) since 2008.



Joni Scheftel

Joni graduated from the University of Minnesota College of Veterinary Medicine in 1982 and joined a mixed animal practice in Watertown, Minnesota. In 2001, she earned an MPH in Environmental Microbiology from the University of Minnesota School of Public Health. Dr. Scheftel currently serves as State Public Health Veterinarian and supervisor of the Zoonotic Diseases Unit at the Minnesota Department of Health.

