### MRSA (METHICILLIN-RESISTANT *Staphylococcus aureus*)

<table>
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<th>Animal Group(s) Affected</th>
<th>Transmission</th>
<th>Clinical Signs</th>
<th>Severity</th>
<th>Treatment</th>
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<th>Zoonotic</th>
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<tr>
<td>Mammals, Humans</td>
<td>Contact with contaminated surfaces</td>
<td>Minor to severe: skin redness, pustule red lesions, boils, rash fever, headache, malaise</td>
<td>Typically mild, but may be fatal in the immune compromised. No mortality rates are reported in animals, but disease increasingly common in ICU foals.</td>
<td>Wound care; susceptible antibiotics as determined by testing, when needed</td>
<td>Personal/environmental hygiene. Wear gloves when handling known infected animal and equipment</td>
<td>Yes</td>
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Fact Sheet compiled by: Tara M. Harrison  
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Fact Sheet reviewed by: Dalen Agnew, Christine Fiorello, Donald Janssen  

**Susceptible animal groups:** Mammals, avian (+/-)  
**Causative organism:** Methicillin-resistant *Staphylococcus aureus*, also Methicillin-resistant *Staphylococcus pseudointeritidis*  
**Zoonotic potential:** Yes  
**Distribution:** Crowded living conditions, group work and gyms, closely shared work and locker spaces, long-term care or rehabilitation facilities, hospitals.  
**Incubation period:** Generally, is requires 1-10 days. People (7%) in hospitals and in the community (2%) can have MRSA colonization with no clinical signs. It is thought that <10% to up to 90% of dogs and cats can be non-clinical carriers as well.  
**Clinical signs:** Healthy people and animals typically do not develop disease under normal circumstances.  
Humans: Skin redness, “pimple-like” red lesions, boils, rash, fever, headache, malaise  
Animals: Primarily skin infections or skin wounds although necrotizing pneumonia or other general infection may occur.  
**Post mortem, gross, or histologic findings:** This bacterium can produce a wide spectrum of clinical disease, particularly of the skin. In humans, these diseases including impetigo, folliculitis, furunculosis, cellulitis, abscesses and wound infections. Other diseases include necrotizing pneumonia, endocarditis, septic arthritis, osteomyelitis, meningitis, and septicemia.  
In animals, abscesses, dermatitis, fistulas have been reported; as well as pneumonia, rhinitis, bacteremia, septic arthritis, osteomyelitis, omphalophlebitis, metritis, and mastitis. Post-mortem lesions are similar to any other purulent bacterial infection and vary with the organ or tissue involved in the infection.  
**Diagnosis:** Bacterial culture and antibiotic susceptibility testing  
**Material required for laboratory analysis:** Culture swab or tissue sample of the affected area  
**Relevant diagnostic laboratories:** Any laboratory capable of bacteriologic culturing is capable of diagnosing MRSA.  
**Treatment:** Typically, it is resistant to all β-lactam agents, including cephalosporins and carbapenems. Hospital-associated MRSA isolates often are resistant to multiple commonly used antimicrobial agents, including erythromycin, clindamycin, and tetracycline, while community-associated MRSA isolates are often resistant only to β-lactam agents and erythromycin.
Treatment specifically depends on the specific MRSA isolate, and its antibiotic sensitivity profile. This will require sensitivity testing on ALL isolates and possibly repeated testing on isolates from a single case.

In humans: Vancomycin (if not resistant), linezolid, and daptomycin, quinupristin/dalfopristin, rifampin, tetracycline, and tigecycline are used for severe MRSA infections or MRSA infections resistant to vancomycin.

**Prevention and control:** Minimization of indiscriminate antibiotic use would help prevent the development of additional antibiotic-resistant strains. Follow all wound care procedures recommended by veterinarian or physician. Practice good hygiene; wash hands often. Keep cuts and scrapes clean and cover with bandages, avoid direct contact with cuts and scrapes, use gloves to treat wounds, replace and disinfect items in holding or exhibit frequently. Porous surfaces such as blankets need to be washed in hot water using bleach and a hot air dryer to help kill bacteria. Alcohol-based hand cleaners are effective when hands aren’t dirty.

Isolate the patient if possible to minimize staff contact and exposure. Animal enclosures should be clearly marked with the diagnosis and preventative measures required. Maintain infected animal in isolation or away from other animals until wound(s) are healed or cultures are negative. If treatment of the animal is not possible, humane euthanasia of infected animal may be warranted to minimize risk of infection to staff and other animals.

**Suggested disinfectant for housing facilities:** After cleaning gross contamination, 1 tablespoon of bleach to one quart of water, fresh daily, leave solution on to dry, or wipe dry after 10 minutes. Other disinfectants effective against *Staphylococcus aureus* or *Staph* are also most likely also effective against MRSA. Check the disinfectant product’s label on the back of the container to verify it is effective against it.

**Notification:** Public health officials may need to be notified if zoonotic transmission occurs, depending on the state. Notification to the state may be required if the person is admitted to an acute care ICU or person dies from MRSA or it is not associated with the following: been hospitalized, had surgery, had dialysis, been in long term care within the last year, has an indwelling catheter, or has a percutaneous medical device at the time of culture.

**Measures required under the Animal Disease Surveillance Plan:** Currently none

**Measures required for introducing animals to infected animal:** Maintain infected animal in a quarantine situation until the wound is healed. Do not introduce infected animal to an animal with a compromised immune system.

**Conditions for restoring disease-free status after an outbreak:** Clean infected environment with diluted bleach to the extent possible. Minimize contact of infected staff with animal.

**Experts who may be consulted:**
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**References:**