

## **MRSA Information for Veterinarians**

### **What is MRSA?**

MRSA stands for methicillin resistant *Staphylococcus aureus*. It is a type of bacteria that is resistant to certain antibiotics, most commonly methicillin. However, isolates should also be considered to be resistant to all penicillins, carbapenems, cepheems, and  $\beta$ -lactam/  $\beta$ -lactamase inhibitors.

Hospital acquired MRSA (HA-MRSA) infections are considered nosocomial infections. MRSA infections that are acquired by individuals who have not been recently hospitalized (within the last year), or have not had any medical procedures completed are known as community acquired (CA-MRSA). In 2003, 63% of MRSA cases were hospital acquired; CA-MRSA is less common but can be more virulent. Over 1,400 MRSA isolates have been identified. The majority of these isolates comprise 11 clonal groups, five hospital acquired (HA) and six community acquired (CA).

### **How common is MRSA?**

Up to 30% of humans are colonized by *Staphylococcus aureus* but only a minority of these *S. aureus* strains are methicillin resistant. Most surveys estimate that less than 1% of the general population and up to 5-10% of healthcare workers carry MRSA. Recent reports suggest that up to 10% of veterinary staff members are colonized with MRSA.

The incidence in companion animals is largely unknown. Small scale, referral hospital based studies suggest that up to 10% of dogs may carry MRSA and approximately 3% of recent submissions to veterinary laboratories have had MRSA isolated. In contrast, other studies have identified methicillin resistance in staphylococci from 15% of healthy cats and 38% of dogs with recurrent pyoderma. Recent studies also have concluded that MRSA infections are an emerging problem in equine populations.

### **How is MRSA transmitted?**

The main mode of transmission for MRSA is via hands which may become contaminated by contact with a) colonized or infected individuals (or animals), b) colonized or infected body sites of other individuals, or c) contaminated devices, items or environmental surfaces.

### **Can MRSA be transmitted from animals to humans and from humans to animals?**

Yes. *Staphylococcus aureus* and other *Staphylococcus* bacteria can opportunistically cross species barriers under certain circumstances. These organisms do not necessarily cause disease when they are transmitted.

### **Who is at risk to acquire MRSA?**

Health care workers are at the highest risk of becoming colonized with MRSA. Approximately 63% of MRSA infections are categorized as HA-MRSA cases. The remaining cases are split between healthy individuals who acquire the bacteria through their everyday environment and individuals involved in the animal industry, most commonly those involved in the veterinary field. Individuals who are

immunocompromised, or those with skin and/or mucosal barrier defects are at a greater risk of colonization and infection. Animals at risk include those from known MRSA positive households or those animals that belong to healthcare workers. A substantial proportion of animal cases have indirect or direct contact with human healthcare environments, although this has not been noted in the majority of cases reported recently.

### **What are the clinical signs of MRSA infections?**

It is possible to have asymptomatic carriers. The prevalence as well as risk factors for carriage of MRSA in healthy dogs and cats is unknown.

At present, MRSA infections should be suspected in:

- Necrotic lesions of the skin and soft tissue
- Animals with non-healing wounds
- Animals with non-antibiotic responsive infections where previous cytology and/or culture indicates that staphylococci are involved
- Nosocomial or secondary infections, especially in at-risk animals. At-risk animals include immuno-compromised animals, long-term hospitalized cases, animals with widespread skin and/or mucosal defects, and surgical cases, especially those undergoing invasive procedures and/or those with implants
- Animals dying of sepsis or other invasive infections

### **How do I diagnose a suspected MRSA case?**

It is best to obtain a culture or biopsy from the infected site and submit the sample to a microbiology laboratory. Appropriate samples include:

- **Skin Infection:** Obtain either a small biopsy of skin or drainage from the infected site. A culture of a skin lesion is especially useful in recurrent or persistent cases of skin infection, in cases of antibiotic failure, and in cases that present with advanced or aggressive infections.
- **Pneumonia:** Obtain a sputum culture (expectorated purulent sputum, respiratory lavage, or bronchoscopy).
- **Bloodstream Infection:** Obtain blood cultures using aseptic techniques and blood culture bottles.
- **Urinary Infection:** Obtain urine cultures using aseptic techniques.

Check with your local laboratory for advice on specimen type, collection and transport if you are unsure. Samples for bacterial culture should be submitted to a microbiology laboratory able to identify MRSA as soon as possible. All samples and bodies sent for post-mortem examination should be packaged securely in a sealed container. A form outside the sealed container should state clearly that MRSA is suspected.

### **What is the treatment for MRSA?**

The significance of MRSA colonization or infection varies from case to case. Most MRSA strains are treatable readily with non beta lactam antibiotics. Treatment with penicillins or cephalosporins antibiotics is not appropriate. Veterinary isolates are usually sensitive to routine antibiotics including potentiated sulfonamides, tetracyclines, fusidic acid and mupirocin, although these may not be licensed for use in animals. The

choice of antimicrobials for treatment should be determined by culture-based antimicrobial susceptibility tests. Further treatment depends on the nature of the primary problem and may require specialist advice.

### **When is treatment for MRSA indicated in a pet?**

If the animal is diagnosed with MRSA infection (as described above), treatment may be warranted. If the animal is only colonized with MRSA, the need for treatment should be considered on a case-by-case basis. Some pets are colonized from contact with humans infected or colonized with MRSA and have been documented as clearing the colonization without treatment when separated from the household while the humans were being treated. For pet owners who are immunocompromised or those with skin and/or mucosal barrier defects are at a greater risk of colonization or infection due to exposure to a MRSA colonized pet; therefore treatment to clear MRSA colonization in these pets should be considered and discussed with a veterinary specialist. For more information on treatment of MRSA, please visit Centers for Disease Control & Prevention website on MRSA: <http://www.cdc.gov/mrsa>. While this website includes information on treatment of humans, due to the currently limited information on treatment of MRSA of animals, the algorithm of treatment of human MRSA cases may be helpful for veterinarians.

### **What measures of protection should be taken in the veterinary setting?**

Small and large animal veterinary personnel are a high-risk population for acquiring and transmitting MRSA. MRSA has been documented in dogs, cats, and horses, with MRSA cases also documented in small animal and equine veterinary staff. Screening hospitalized cases during their stay and/or prior to discharge may be necessary in an environment where MRSA is endemic and/or there is circumstantial evidence of transmission in the practice.

### **Veterinary clinic staff precautions when handling MRSA suspect animals:**

- Wash and disinfect hands between animals.
- Wear uniforms/coats that can be laundered/disposed of on site.
- Wear gloves and disposable aprons during direct contact with animals, body fluids, lesions and other contaminated materials. Face protection must be worn if there is potential for aerosols to form.
- Long hair should be tied back and covered with a disposable surgeon's cap.
- Staff with open lesions or who are immunocompromised should avoid handling an MRSA animal.

### **Hospitalization of a MRSA positive animal:**

- Isolation of animals with/suspect MRSA is necessary from admission to discharge.
- Movement of a MRSA infected animal around the practice and procedures involving animal should be kept to a minimum.
- Animals must be designated to isolation wards if possible, if not, as far removed from other animals as possible.
- MRSA infected wounds should be covered with impermeable dressing.

- All items used for the care of the animal must be designated to that animal for the duration of care. They must be disposed of, or sterilized between animals. (Examples include leashes, bowls, Elizabethan collars)
- Sterilization of all equipment, instruments, etc must be completed between animals.
- Bedding should be disposed of, or if not possible, laundered in hot bleach water and dried in the dryer on high in order to kill the bacteria
- Cage and immediate floor environment should be cleaned and disinfected at least one time daily.
- Designate specific staff per shift to be responsible and knowledgeable caretaker(s) of animal.
- Limit staff interaction with animal.
- Owners should be discouraged from visiting the hospitalized pet. It is essential that they are educated on the risks involved, and wear protective clothing.
- If surgery is necessary, it may be possible to decontaminate the animal by bathing with an antibacterial shampoo, covering lesions with impermeable dressings, and cleaning lesion and/or surgical sites with 70% alcohol. If the animal is MRSA positive on intra-nasal culture, intra-nasal antibacterials such as chlorhexidine, neomycin or mupirocin may also reduce the risk of colonizing the surgical site.

#### **What is the appropriate way to discharge a MRSA positive animal?**

- At discharge, wounds should be covered with impermeable dressing.
- When possible, schedule discharge towards end of the day in order to decrease contact risk with other animals in the hospital
- Segregation of all waste and appropriate hazardous waste disposal within the veterinary clinic's standard operation procedures must be followed.
- The animal should be cultured prior to discharge to identify persistent colonization. If the animal remains colonized, the potential risks and precautions that should be taken must be discussed with the owner. They should sign an acknowledgement prior to discharge.
- It is important that the owner is informed of the risks. They should wear gloves when changing bandages or cleaning wounds and always wash their hands or use alcohol sanitizers after coming into contact with their pet. Anyone who is sick or immunocompromised in the home should not have contact with the pet. The area where the animal is kept should be cleaned with a 10% solution of bleach water.

#### **What if a MRSA positive animal dies?**

If an MRSA positive animal dies, all lesions and body orifices should be covered. The body should be placed in a sealed, impervious bag as soon as possible and be disposed of by cremation.

#### **Zoonotic potential in the Veterinary Work Place:**

Because veterinary practices are environments in which humans and ill animals are in close contact, the risk of zoonotic transmission is elevated. The Veterinary Infection Control Committee (VICC) of the National Association of State Public Health Veterinarians has developed a compendium as a resource for veterinary practices to refer

to when controlling the risk of zoonotic disease transmission or just reviewing their internal infection control plan. The compendium [www.nasphv.org](http://www.nasphv.org) provides:

- Practical, science-based guidance that will reduce transmission from recognized and unrecognized sources of infection.
- Outline sensible infection control practices.
- Provide a model infection control plan for use by individual veterinary practices.

For further information on MRSA, please visit:

- Arizona Department of Health Services website on MRSA: [http://azdhs.gov/phs/oids/epi/disease/mrsa/mrsa\\_g.htm](http://azdhs.gov/phs/oids/epi/disease/mrsa/mrsa_g.htm)
- Centers for Disease Control & Prevention website on MRSA: <http://www.cdc.gov/mrsa>

References:

1. [www.NASPHV.org](http://www.NASPHV.org)
2. [www.bsava.com](http://www.bsava.com)
3. O'Mahony R, Abbott Y, Leonard FC, et al. Methicillin-resistant *Staphylococcus aureus* (MRSA) isolated from animals and veterinary personnel in Ireland. *Vet Microbiol* 2005;109:285-296.
4. Rich, M., Roberts, L., 2006. MRSA in companion animals. *The Veterinary Record*, 535-536.
5. Jones, R.D., Kania, S.A., Rohrbach, et al, 2007. Prevalence of oxacillin- and multidrug-resistant staphylococci in clinical samples from dogs: 1,772 samples (2001-2005). *J Am Vet Med Assoc.* 230, 221-227.
6. Loeffler, Anette, Boag, et al. 2005. Prevalence of methicillin-resistant *Staphylococcus aureus* among staff and pets in a small animal referral hospital in the UK. *Journal of Antimicrobial Chemotherapy* 56, 692-697.
7. Weese, JS, Archambault M, Willey BM, et al. 2005. Methicillin-resistant *Staphylococcus aureus* in horses and horse personnel, 2000-2002. *Emerg Infect Dis* 3, 430-5.
8. Arizona Department of Health Services webpage on MRSA: [http://azdhs.gov/phs/oids/epi/disease/mrsa/mrsa\\_g.htm](http://azdhs.gov/phs/oids/epi/disease/mrsa/mrsa_g.htm)

Q & A sheets on MRSA in pets:

- 1) Ohio State University, College of Veterinary Medicine, Veterinary Teaching Hospital and the Veterinary Public Health Program:
- 2) University of Minnesota, College of Veterinary Medicine: <http://www.cvm.umn.edu/img/assets/8961/MRSA09-26-2007.pdf>
- 3) Iowa State University, College of Veterinary Medicine, Center for Security and Public Health: <http://www.cfsph.iastate.edu/Factsheets/pdfs/mrsa.pdf>