DERMATOLOGY FOR ANIMALS
1-877-604-8366
www.dermatologyforanimals.com

MRSA

(Methicillin Resistant Staphylococcus aureus)

Staphylococcal bacteria (Staph) are normal inhabitants of the skin of people and animals in low numbers, but have the capacity to overgrow and create infections, especially in immunosuppressed individuals. In some cases, especially after exposure to multiple or subtherapeutic doses of antibiotics, the bacteria can become resistant to multiple antibiotics, and MRSA or methicillin resistant Staph aureus can develop. This species of Staph prefers to live on humans, but has the capacity to infect dogs and cats as well. In dogs, Staph intermedius is the usual bacterial species found on the skin, and this can also become methicillin-resistant and more difficult to treat. Staph intermedius has the potential to spread to humans, especially people who are immunosuppressed, young children, or the elderly. Pet owners of animals with MRSI (methicillin-resistant Staph intermedius) should wash their hands after handling their pets, and not let their pets lick or nuzzle them; they should also follow their veterinarian's instructions regarding appropriate antibiotic therapy and frequent antibacterial shampoos for their pet to treat the MRSI. Information about MRSA in people can be found at the Centers for Disease Control website: http://www.cdc.gov/mrsa/index.html. The British Small Animal Veterinary Association website (www.bsava.com) also has a good summary of measures to treat and minimize spread of MRSA in animals and veterinary hospitals, and the highlights are copied below:

BSAVA has recently reviewed its comprehensive guidelines on MRSA.

MRSA – Practice Guidelines

These comprehensive guidelines on how to manage MRSA in the practice were last updated October 2007.

Meticillin Resistant Staphylococcus aureus (MRSA)

Introduction

It is likely that veterinary practices will encounter animals that are colonised or infected with meticillin (formerly called methicillin) resistant Staphylococcus aureus (MRSA) or other meticillin-resistant Staphylococcus species. It is also possible that staff may act as a reservoir for such meticillin resistant infections. The animals most at risk include those that have been acutely ill in hospital. This particularly includes immunosuppressed patients, as well as those with intravenous catheters or undergoing surgery, especially with implants. Infected or colonised animals may also act as reservoirs for further transmission to humans. Animals are also known to act as 'innocent bystanders' carrying MRSA dispersed

from humans in their household who have acquired it in hospitals. There are also issues relating to the spread of MRSA in other healthcare settings such as nursing homes or where visiting pets are used as therapy animals.

These guidelines describe measures designed to prevent the establishment and dissemination of MRSA. The four key points are:

Scrupulous hand hygiene

A clean environment

Prudent antibiotic use

Compliance with ALL of the above

These guidelines represent the best working advice available to date. Please note that this is a dynamic field and BSAVA will endeavour to keep these guidelines as up to date as possible.

Throughout the guidelines drugs are referred to by their recommended international non-proprietary names (rINNs), which were adopted by the Department of Health to replace British Accepted Names (BANs) from 30th June 2004.

Routine measures to prevent the spread of MRSA

These comprise the following:

1.) Correctly performed hand hygiene and disinfection of surfaces and equipment between patients. It is important that methods used for hand decontamination and environmental disinfectants used are effective against MRSA. Antibacterial gels or hand rubs attached to uniforms and kennel doors are a visual cue for cleanliness and can be quickly used before and after handling an animal, and before touching pens, keyboards etc. Where hands are soiled then soap and water must be used. It is important to avoid using materials and equipment that can't be cleaned at hand touch sites, e.g. consider using waterproof keyboards, flat keyboards or keyboard covers.

2.) Wearing simple uniforms/coats (e.g. side-fastening coats or smock-type scrub suits) that can be laundered on site.

3.) Wearing of gloves and disposable aprons for direct contact with patients, body fluids, lesions and other contaminated materials. These must be changed between patients. Face and eye-protection should be worn if aerosols are likely to be generated.

4.) Cover existing wounds or skin lesions with waterproof dressings. Avoid invasive procedures if suffering from skin lesions on hands.

5.) Appropriate isolation of patients with, or suspected of having, a communicable infection.

6.) Rational use of antibiotics to minimise the development and spread of antibiotic resistance.

7.) High standards of aseptic technique for all invasive procedures. This includes: minimising theatre staff to necessary personnel only; use of sterile gowns, gloves, hats and masks; proper sterilisation of equipment and restricting use to a single patient; employing single use, disposable equipment where appropriate; effective disposal of contaminated material; and as stated above, hand hygiene and disinfection of surfaces between patients.

8.) High standards of ward cleaning are imperative:

Cages should be cleaned and bedding replaced at least once daily.

Cages should be cleaned and disinfected thoroughly between patients.

Soiled bedding must be disposed of or cleaned and disinfected as soon as possible. There must be no contact with clean bedding or other animals.

Cross reference to BVA SOPs for cleaning.

9.) Segregation of all waste, careful handling of clinical waste and its transport in a sealed bag of appropriate strength and colour. Sharps should be placed in an approved container promptly. Cross reference to hazardous waste regulations.

10.) Apply approved procedures for sterilisation and disinfection of instruments and equipment.

11.) Ensure that all staff are aware of, understand and adhere to infection control guidance. Designating specific staff to monitor and enforce infectious disease control measures, and undertake infection control audits would be advisable.

Managing patients with MRSA

1.) Detection of MRSA

The identity of staphylococci with meticillin (this is no longer produced so we now test for the equivalent antibiotic oxacillin) resistance should be confirmed by appropriate tests. Check with your local laboratory for advice on specimen type, collection and transport. A DEFRA/BSAVA working party is establishing best practice guidelines for sampling, isolation and identification of MRSA.

2.) Identification

2.1. Screening all cases prior to admission is not feasible, especially in first opinion clinics. The prevalence and risk factors for carriage of MRSA in healthy dogs and cats is as yet unknown and therefore asymptomatic carrier animals will be undetected. Current opinion is that the clinical risks of this are low, but a prospective case-controlled study is underway that may further inform patient risk- assessment.

2.2. At present, MRSA should be suspected in:

· Patients from known MRSA positive households or that belong to healthcare workers. A substantial proportion of cases have indirect or direct contact with human healthcare environments, although this has not been noted in the majority of cases reported recently.

· Patients with non-healing wounds.

· Patients with non-antibiotic responsive infections where previous cytology and/or culture indicates that staphylococci are involved.

· Nosocomial or secondary infections, especially in at-risk patients. These include immunocompromised animals, long-term hospitalised cases, patients with widespread skin and/or mucosal defects, and surgical cases, especially those undergoing invasive procedures and/or those with implants.

· Screening hospitalised 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.

· Animals dying of sepsis or other invasive infections.

2.3. Staff should be informed about known or suspected MRSA cases before admission. However, this may not be possible in first opinion practice who should be encouraged to culture suspected cases and inform referral practices of the result before referral.

2.4. Samples for bacterial culture should be submitted to a microbiology laboratory able to iden-tify 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.

3.) Admission

3.1. Known or suspected MRSA cases should be taken directly into a consultation room to avoid contamination and contagion in the waiting room. The floor, table and other contact surfaces should then be disinfected before they are used for other patients.

3.2. Movement of infected or suspected infected patients around the practice and procedures involving them should be kept to a minimum, and where possible scheduled for the end of the day. Discharging wounds should be covered with an impermeable dressing. Using a trolley will help minimise contamination of corridors and other rooms. Contact between MRSA positive patients and other animals and staff should be kept to a minimum. The trolley, and any potentially contaminated rooms or corridors should be disinfected before further use.

4.) Hospitalisation

4.1. Patients with MRSA should be isolated as far as possible from other patients.

4.2. Staff contact should be limited to what is essential.

4.3. In common with all infected animals, staff with major skin barrier defects (e.g. eczema, psoriasis, open wounds etc.) or who are immunosuppressed should not nurse MRSA positive animals. Where this is a concern occupational health advice should be sought.

4.4. Barrier nursing precautions include:

4.4.1. Wearing disposable gloves, gowns and face masks. Long hair should be tied back and protected with a disposable hat. Sleeves should be rolled up to the elbow. Eye protection may be necessary if there is a risk of splashing or aerosols.

4.4.2. Strict washing of the hands and forearms before and after handling the patient. Watches, rings or other jewellery that could interfere with the efficacy of washing should be removed before handling the patient.

4.4.3. Pens/pencils, stethoscopes, thermometers and other equipment should be kept for use with the affected patient only and disposed of or disinfected after use.

4.4.4. Bedding should be disposed of. If re-use is essential it should be laundered at 60oC. Great care should be exercised to avoid contaminating other bedding during cleaning, but separate laundering isn't necessary.

4.4.5. The cage and immediate floor environment should be cleaned and disinfected thoroughly at least once daily. Faeces and urine should be collected and disposed of to avoid contamination. Any blood or bodily fluids should be cleaned immediately.

4.5. Bathing every 2-3 days with an effective antibacterial wash can reduce mucosal and cutaneous carriage, and the potential for contamination, but may be not be clinically or logistically possible and increases staff contact.

4.6. Before surgery, it may be possible to decontaminate the patient (see below). Bathing with an antibacterial shampoo, covering lesions with impermeable dressings, cleaning lesional and/or surgical sites with 70% alcohol, and, where indicated by intra-nasal cultures, intra-nasal anti-bacterials such as chlorhexidine, neomycin or mupirocin may also reduce the risk of colonising the surgical site.

4.7. Owners should not be discouraged from visiting hospitalised patients. However, they should be informed of the potential risks, wear protective clothing and thoroughly wash their hands as outlined above. Contact should be restricted to their animal.

5.) Treatment

5.1. The significance of MRSA colonisation or infection varies from case to case. Most strains are treatable readily with non beta lactam class (penicillins or cefalosporins) antibiotics. UK veterinary isolates are usually sensitive to routine antibiotics including potentiated sulfonamides, tetracyclines, fusidic acid and mupirocin, although these may not licensed for use in animals. The choice should be based on culture-based antimicrobial susceptibility tests.

5.2. Further treatment depends on the nature of the primary problem and may require specialist advice (e.g. removing implants, adding gentamicin impregnated beads, collagen sponges, activated silver dressings etc.).

6.) Deceased and discharged patients

6.1. 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. Cross-reference to safe burial and hazardous waste regulations.

6.2. MRSA-positive patients should be discharged from the hospital as soon clinically fit. They should be cultured prior to discharge to identify persistent colonisation. If the animal remains colonised the potential risks and precautions that should be taken must be discussed with the owner. They should sign an acknowledgement prior to discharge.

6.3. Animals with persistent mucosal colonisation can be treated with an antibacterial shampoo and intra-nasal antibacterials such as chlorhexidine, neomycin or mupirocin 2-3 times daily. Other topical or systemic antibiotics may be appropriate depending on the sensitivity pattern. Re-colonisation in the community may well require visits to the home to assess carriage by family members and possible MRSA dispersion, and examining the environment and pets for MRSA. (See Cookson, BD. Tonsillectomy and MRSA carriage. Journal of Hospital Infection 2005; 61: 176-177 and related references in the article.). Decolonisation should only be undertaken where necessary (e.g. if there is an immunosuppressed or otherwise vulnerable owner), with the full consultation and cooperation of medical healthcare services.

6.4. It is unfeasible to screen every in-patient prior to discharge, and it is therefore possible some animals that become persistent carriers during hospitalisation will be undetected. Pre-discharge screening, however, is only a measure of the colonisation rate in the practice and it is uncertain whether this is of much clinical importance in healthy individuals.

Screening staff and premises for MRSA

It is important to realise that routine screening of staff and the environment is not necessary in most circumstances. Screening is not a substitute for rigorous infectious disease control measures, particularly hand hygiene and cleaning.

1.) Screening of staff

1.1. It is important to differentiate transient carriage from colonisation and persistent carriage. Transient carriage is more common, accounts for the majority of MRSA cross infection and is most effectively controlled by hand decontamination and other hygienic measures.

1.2. Isolation of MRSA from staff during or shortly after a period of duty can indicate transient contamination rather than genuine colonisation (see Cookson BD, Peters B, Webster M, Phillips I, Rahman M, Noble W. Staff carriage of epidemic methicillin resistant Staphylococcus aureus. Journal of Clinical Microbiology 1989 27 1471 1476).

1.3. Screening staff on or shortly after periods of duty must thus be avoided and is particularly important when repeat screening of positive staff is performed i.e. there should be no recent contact with positive patients.

1.4. Staff who have had close contact with patients infected with MRSA should be self-examine for hand and other skin lesions and report these. In continuing outbreaks after appropriate infection control measures have been introduced, then staff screening may be advised by infection control staff. The issues of consent, confidentiality and any further action must be carefully addressed.

1.5. Routine surveillance may become necessary if multiple infections occur within a practice suggesting that MRSA has become an endemic problem. Any resident animals (e.g. the practice cat) should also be screened.

1.6. If the epidemiology suggests staff to animal transmission that is not contained by infectious disease control measures, then staff associated with these patients should be encouraged to undergo screening.

1.7. Colonised staff members should be encouraged to be assessed by their GP for wider carriage and seek treatment. It is important that confidentiality is maintained and that no stigma are attached. Many nasally colonised humans, are not treated given that MRSA

is of no consequence to the majority of people, re-colonisation is common, antibiotic use encourages resistance and transmission can be controlled by other means, for instance good hand hygiene. Risk assessment by the GP including the type of staff, their duties, likely patient contact and what sites are affected will assess the need for antibiotics.

2.) Environmental screening

2.1. S. aureus and MRSA can survive up to 12 months in hospital dust, bedding and clothing. However, the role of the environment in the spread of MRSA in hospitals is still open to conjecture and routine sampling is not advised.

2.2. One study showed that of 82-91% of visually clean surfaces only 30-45% were microbiologically clean, so we cannot rely on this to monitor the environmental contribution to continuing outbreaks. An infection control team should be consulted to advise.

2.3. There are no microbiological standards for hospitals, but MRSA contamination rates decline where cleaners have been trained in microbiological cleanliness. Hand touch sites seem to be most important in contamination and transmission, but other sites could include floors, tables anaesthetic machines, taps, door handles, cages, clinical equipment (stethoscopes, otoscopes, endoscopes etc.), and computer mice and keyboards etc. Nevertheless, microbiological standards of cleanliness have not been established and it is therefore difficult to determine the clinical significance of positive cultures, particularly if they are non-quantitative.

2.4. There may be issues relating to the environment which arise as part of an ongoing investigation into transmission, but environmental sampling should be discussed with infection control experts and the laboratory.

2.5. Contaminated premises should be cleaned and disinfected thoroughly before further use. It is accepted, however, that closing wards is not practical in most practices.

Acknowledgements

These guidelines have been prepared by the BSAVA Scientific Committee in collaboration with Dr. Tim Nuttall of The University of Liverpool, Prof. Barry Cookson of the Health Protection Agency and Dr. Geoff Ridgeway of the Department of Health.

Further reading:

Health Protection Agency (HPA)

HPA MRSA advice & guidelines

Centers for disease control and prevention (USA)

CDC MRSA advice & guidelines

Association of Medical Microbiologists

Infection Control Nurses' Association

Brown DFJ, Edwards DI, Hawkey PM, Morrison D, Ridgway GL, Towner KJ, Wren MWD, on behalf of the Joint Working Party of the British Society for Antimicrobial Chemotherapy; Hospital Infection Society and Infection Control Nurses Association. Guidelines for the laboratory diagnosis and susceptibility testing of methicillin-resistant Staphylococcus aureus (MRSA). Journal of Antimicrobial Chemotherapy 2005 56 1000-1018 available online [accessed 16th November 2006]

Coia JE, Duckworth GJ, Edwards DI, Farrington M, Fry C, Humphreys H, Mallaghan C, Tucker DR. Guidelines for the control and prevention of meticillin-resistant Staphylococcus aureus (MRSA) in healthcare facilities. Journal of Hospital Infection 2006 63 s1-s44.
available online [accessed 16th November 2006]

Cookson, BD. Tonsillectomy and MRSA carriage. Journal of Hospital Infection 2005 61 176-177

Cookson BD, Peters B, Webster M, Phillips I, Rahman M, Noble W. Staff carriage of epidemic methicillin resistant Staphylococcus aureus. Journal of Clinical Microbiology 1989 27 1471 1476.

Dunowska M, Morley PS, Hyatt DR. The effect of Virkon®S fogging on survival of Salmonella enterica and Staphylococcus aureus on surfaces in a veterinary teaching hospital. Veterinary Microbiology 2005 105 281-289.

Duquette, R.A. and Nuttall, T.J. (2004) Methicillin resistant Staphylococcus aureus in dogs and cats: an emerging problem? Journal of Small Animal Practice 45 591-597.

Enoch DA, Karas JA, Stater JD, Emery MM, Kearns AM, Farrington M. MRSA carriage in a pet therapy dog. Journal of Hospital Infection 2005 60 186-188.

Gemmell CG, Edwards DI, Fraise AP, Gould FK, Ridgway GL, Warren RE, on behalf of the Joint Working Party of the British Society for Antimicrobial Chemotherapy; Hospital Infection Society and Infection Control Nurses Association. Guidelines for the prophylaxis and treatment of methicillin-resistant Staphylococcus aureus (MRSA) infections in the UK. Journal of Antimicrobial Chemotherapy 2007 (advanced access publication)
available online [accessed 16th November 2006]

Middleton JR, Fales WH, Luby CD, Oaks JL, Sanchez S, Mnyon JM, Wu CC, Maddox CW, Welsh RD , Hartmann F. Surveillance of Staphylococcus aureus in veterinary teaching hospitals. Journal of Clinical Microbiology 2005 43 2916-2919.

Nicolle LE, Dyck B, Thompson G, Roman S, Kabani A, Plourde P, Fast M, Embil J. Regional dissemination and control of epidemic methicillin-resistant Staphylococcus aureus. Infection Control and Hospital Epidemiology 1999 20 202-205.

O'Mahony R, Abbott Y, Leonard FC, Markey BK, Quinn PJ, Pollock PJ, Fanning S, Rossney AS. Methicillin-resistant Staphylococcus aureus (MRSA) isolated from animals and veterinary personnel in Ireland. Veterinary Microbiology 2005 109 285-296.

Owen MR, Moores AP, Coe RJ. Management of MRSA septic arthritis in a dog using a gentamicin-impregnated collagen sponge. Journal of Small Animal Practice 2004 45 609-612.

Rich M. Staphylococci in animals: Prevalence, identification and antimicrobial susceptibility, with an emphasis on methicillin-resistant Staphylococcus aureus. British Journal of Biomedical Science 2005 62 98-105.

Tomlin J, Pead MJ, Lloyd DH, Howell S, Hartmann F, Jackson HA, Muir P. Methicillin-resistant Staphylococcus aureus infections in 11 dogs. Veterinary Record 1999 144 60-64.

van Duijkeren E, Box ATA, Heck MEOC, Wannet WJB, Fluit AC. Methicillin-resistant staphylococci isolated from animals. Veterinary Microbiology 2004 103 91-97.

Weese JS. Methicillin-resistant Staphylococcus aureus: an emerging pathogen in small animals. Journal of the American Animal Hospital Association 2005 41 150-157.

Weese JS, Rousseau J. Attempted eradication of methicillin-resistant Staphylococcus aureus colonisation in horses on two farms. Equine Veterinary Journal 2005 37 510-514.

Weese JS, DaCosta T , Button L, Goth K, Ethier M, Boehnke K. Isolation of methicillin-resistant Staphylococcus aureus from the environment in a veterinary teaching hospital. Journal of Veterinary Internal Medicine 2004 18 468-470.

Weese JS, Dick H, Willey BM, McGeer A, Kreiswirth BN, Innis B, Low DE. Suspected transmission of methicillin-resistant Staphylococcus aureus between domestic pets and humans in veterinary clinics and in the household. Veterinary Microbiology 2006 115 148-155.

Related web links

Health Protection Agency (HPA)

Centers for disease control and prevention (USA)