

MRSA- What you need to know

STAPHYLOCOCCUS aureus is the commonest cause of hospital infections in human medicine, accounting for a third of all post-surgery infections.

Methicillin-resistant *Staphylococcus aureus* (MRSA) is the subject of headline articles in the media and politicians of all persuasions are pronouncing upon how they are going to solve all the problems it creates.

The so-called "superbug" can produce a wide range of toxins and may cause skin infections such as abscesses, impetigo and cellulitis and even more serious, life-threatening infections, especially in debilitated patients or those in intensive care units.

Though the organism has the potential to cause disease, 20 to 30 per cent of healthy individuals are nasal carriers.

In some respects, *S. aureus* is an opportunist pathogen, usually requiring some form of trauma, or predisposing illness, to cause disease.

Shortly after the introduction of penicillin in the 1940s, *S. aureus* acquired the penicillinase-enzyme to inactivate penicillin and, by the 1960s, most isolates were resistant. Likewise, following the introduction of methicillin, a penicillinase resistant beta-lactam antibiotic, methicillin-resistant isolates were reported in the UK in 1961. In the UK, the proportion of *S. aureus* that was MRSA remained around five per cent until the 1980s when new epidemic clones emerged. Subsequently, other MRSA clones emerged in 1990-91, and these clones now account for about 40

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explain what all veterinarians should know about methicillin-resistant *Staphylococcus aureus* as the issue continues to grow in prominence within the profession

per cent of the *S. aureus* isolates in the UK.

MRSA is primarily a hospital pathogen, though it has now begun to spread out in the community, either from discharged patients or from contact with healthcare personnel.

However, during the past four years, an increasing number of reports have indicated that MRSA clones are arising in the community, which are distinct from hospital MRSA, and differ in having faster growth rates, rapid spread and are relatively sensitive to antibacterials. Most of the above information is taken from the excellent review by Morrison (2005)¹. More recently, there have been a number of reports of MRSA in companion animals; where the isolates have been referred to reference laboratories, most belonged to the two common epidemic hospital clones, which suggests that the animals may have been infected from their owners. Risks of MRSA acquisition in animals may vary as to the occupation or health of the owner. A study² found that hospital staff were two to three times more likely to be carriers of MRSA than

out-patients, which suggests that pets owned by hospital personnel or patients recently discharged are at an increased risk of infection.

However, although companion animals are unlikely to be a major cause of transmission to humans, they may act as an important reservoir should they be infected.

Many isolates of coagulase positive *Staphylococci* from companion animals were previously considered to be *S. aureus*, but current taxonomy suggests that most belong to a separate species, *S. intermedius*, and antibiotic-resistant strains of this species have been described³.

This organism may colonise people in contact with dogs⁴ and may also develop resistance to methicillin⁵.

Cats are also carriers of *Staphylococci* and a survey⁶ isolated coagulase positive *Staphylococci* from the skin of 40 of the 148 cats examined (26 *S. intermedius* and 14 *S. aureus*).

Methicillin resistance was detected in eight of the 40 coagulase positive isolates, all of which were *S. intermedius*. Further information will be found in the review by Duquette and Nuttall (2004).



A Technician looks for traces of methicillin-resistant Staphylococcus aureas, which can produce a wide range of toxins and is growing in prominence in veterinary, as well as human, medicine.

Significance of MRSA for veterinary surgery

Staphylococci are usually transmitted from person to person by contaminated hands⁷ and contact transmission is the most frequent and important mode, though air currents and environmental contamination may transmit the organism.

Hand-washing is the most important measure to reduce the risk of transmission. Povidone-iodine detergent and 80 per cent ethyl alcohol have been shown to be almost completely effective at removing MRSA from contaminated fingertips⁸.

While gloves may play an important role in reducing the risk, their use does not eliminate the need for hand-washing because gloves may have small, inapparent defects or may become torn during use.

Veterinary surgeons should take the

opportunity to advise pet owners to attain and maintain good hygiene standards when handling pets, especially in high-risk households. Likewise, veterinary surgeons need to maintain the high standards of infection control policies.

Many years of experience in the poultry industry has taught us that although surfaces may appear clean, it does not follow that they are free of pathogenic bacteria and, on many occasions, swabbing these surfaces has revealed the presence of Salmonella. We would suggest that in the operating suite, similar considerations apply and it is necessary to monitor the environment at regular intervals to determine the efficacy of cleaning and disinfection, and to avoid the build-up of infection.

The practice also needs to have control policies in place to prevent infection in its patients, and the

wider dispersal of MRSA should they be present.

In the March 2005 edition of RCVS News it is stated: "All practices should be aware that MRSA infections, though not common, are a factor in veterinary practice. Many members of the public have been exposed to the infection and some are carriers of the bacteria. In the case of veterinary practice, it should be expected that MRSA will be present in staff in the same, if not higher, proportions as the general populous.

"The basis of controlling MRSA in practice is first to be aware of the issue. Practices should have written protocols regarding hygiene and cleanliness of clinical staff and premises, which should be rigorously adhered to.

"Premises should be regularly and thoroughly tested and, if pockets of, or trends in, infections are seen through clinical governance processes, steps should also be considered regarding the testing of staff.

"All practices should remain vigilant towards cases that present with non-healing wounds and intransigent infections.

"In such cases, MRSA testing should be considered to ensure not only that proper treatment is carried out, but also that proper advice be given to the owner regarding on-going requirements in dealing with the situation."

Bacteriological considerations

Despite the ever-increasing complexities of the taxonomy of Staphylococci there is a good correlation between coagulase production and pathogenicity, and all coagulase positive isolates should be tested for their anti-bacterial sensitivity.

The differentiation of *S. aureus* from *S. intermedius* is not easy. *Disease* **7**: 225-227.

Detection

Nasal carriage in man of MRSA may readily be detected by the use of conventional swabs. Environmental swabs can be taken to ensure that operating theatre or other areas are not contaminated with MRSA and the swabs sent to the laboratory under chilled conditions.

Such swabs can also be used to assess the degree of bacterial contamination in the operating theatre.

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1. Morrison, D. (2005). MRSA- from hospital superbug to community threat. *The Bulletin of the Royal College of Pathologists* **129**: 14-16.

2. Cesur, S. and Cocka, F. (2004). Nasal carriage of methicillin-resistant *Staphylococcus aureus* among hospital staff and outpatients. *Infection Control Hospital Epidemiology* **25**: 169-171.

3. Noble, W. C. and Kent, L. E. (1992). Antibiotic resistance in *Staphylococcus intermedius* isolated from cases of pyoderma in the dog. *Veterinary Dermatology* **3**: 71-74.

4. Harvey, R. G. et al. (1994). Nasal carriage of *Staphylococcus inter-medius* in humans in contact with dogs. *Microbial Ecology in Health and*

5. Piriz, S. et al. (1995). Comparative in vitro activity of 11 β -Lactam antibiotics against 91 *Staphylococcus intermedius* strains isolated from staphylococcal dermatitis in dog. *Journal of Veterinary Medicine* **42**: 293-200.

6. Lilenbaum, W. et al. (1998). Prevalence and antimicrobial susceptibility of *Staphylococci* isolated from the skin surface of clinically normal cats. *Letters in Applied Microbiology*. **27**: 224-228.

7. Mulligan, M. E. et al. (1993). Methicillin-resistant *Staphylococcus aureus*: a consensus review of the microbiology, pathogenesis and epidemiology with implications for prevention and management. *American Journal of Medicine* **94**: 318-328.

8. Huang, Y. et al. (1994). Comparative effectiveness of hand cleansing agents for removing methicillin-resistant *Staphylococcus aureus* from experimentally contaminated fingertips. *American Journal of Infection Control* **22**: 224-227.