

# Half-time MRSA results surprise team

NINE months into an extensive national study of MRSA in cats and dogs, Anette Loeffler admits the number of cases is, frankly, surprising.

The Royal Veterinary College PhD research scholar presented half-time results for the 18-month DEFRA-funded case-control study, based on IDEXX Laboratory clinical samples, at the first international conference for MRSA in animals.

So far, IDEXX has reported 72 cases of MRSA and 64 cases of methicillin-susceptible *Staphylococcus aureus* (MSSA). The return rate of swabs for analysis has been good, but not perfect. Returns for MRSA swabs is 74 per cent, for MSSA 75 per cent.

Ms Loeffler commented: "In the MRSA cases we had a large proportion of vets compared with owners, so there were some owners that were either not involved because the veterinarian didn't want to involve the owner, or because they didn't want to participate."

Ethics aside, there were 86 dogs and 50 cats in the case (MRSA) or control (MSSA) group. There was no real age difference between the two groups.

Ms Loeffler reported: "There was nothing to differentiate MRSA cases by sight from any other staphylococcal infection. The clinical presentations for MRSA cases were mainly from wounds, post-operative problems or skin disease."

Data for MRSA nasal carriage in the human population is based on estimates, though extrapolation from US data shows that one third of the population potentially carries *S aureus* (MRSA or MSSA) in the nasal mucosa. Two small studies conducted in the UK indi-

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reports again from the conference on MRSA in animals, this time on the interim results of a national study to discover its prevalence

cate that carriage rate of MRSA in the community is less than two per cent, said Ms Loeffler.

"That's low compared with the MRSA percentages of bacteraemia cases we see in hospitals," she said. "But these are small studies – 200-250 people – compared with the population of the UK. What is known is that medical staff are predisposed to MRSA carriage. If we look at MRSA carriage among veterinary staff, the profession is being proactive in taking part in these screening programmes."

### Carriage rates

Data from the RVC revealed that 14 of their 78 staff (18 per cent) were carriers of MRSA – a lot higher than has been published on carriage rates in the general population. Ms Loeffler said that evidence from four separate studies showed that veterinary staff are predisposed in the same way as human medical staff.

"We'll have to act on that at some stage," she stated. "So far we've had 17 per cent carriage rates from vets that were attending MRSA cases. Five per cent of the vets attending MSSA cases were carrying MRSA."

"We also looked at probability. If we look at nasal carriage rates among vets, then an animal that has been attended by an MRSA-positive vet is at least six times more likely to be an MRSA case," she added.

The risk of probabilities for

veterinary staff and owners, though, are similar, said Ms Loeffler. What the study does not do is investigate the direction of transfer.

"To take transient transfer into account we looked at other factors relating to health and healthcare," she said. "We had to consider if vets were ill, had taken antibiotics recently, were hospitalised or had visited their GP or dentist. We found no significant association with any of these healthcare factors nor increased risk of infection."

"There was one significant connection though. If a vet lived with an NHS worker, then animals treated by those vets had a higher risk of being in the case group. Again, we don't know what that means, but we want to look at that again when we have higher numbers."

Ms Loeffler led the RVC study into rates of MRSA at the Queen Mother Hospital and presented them in 2005. The study showed that animals carrying *S aureus* did not have *Staphylococcus intermedius* – the dominant staphylococci in dogs and cats – concurrently at the same carrier sites.

"This suggested that a selection process had occurred in those animals favouring the acquisition of *S aureus* which is otherwise less well adapted to canine and feline mucosae."

The risk factors for animals are not as well documented as in

human medicine, where length of hospitalisation, invasive procedures, and overuse of antimicrobials are factors. This study was set up to investigate animal risk factors in detail. These include contact with human carriers and any association with the human healthcare sector. The animal's medical history is also taken into account – breed, age, sex and veterinary treatment.

IDEXX is able to identify *S aureus* infections from clinical samples, depending on its antimicrobial resistance pattern. For a case to be considered, the lab first contacts the submitting vet for permission, then Ms Loeffler's team contacts the veterinary surgeon to explain the study and ask for its participation.

Swabs are requested from two veterinary staff in attendance and two owners and are coded to ensure confidentiality. Participants are swabbed under supervision at the practice and owners were asked to fill in a questionnaire about links with the healthcare sector, individual health status and how their animal is kept.

### Infection isolates

Isolates of MRSA and MSSA from humans and animals – carrier isolates from humans, infection isolates from animals – are then analysed for type and to identify any genetic variations in a transfer from humans to animals.

So far, despite a number of exclusions (12 MRSA cases and 13 MSSA) from the study, only one was from a veterinarian who refused to tell the owner their animal had contracted MRSA, showing a high level of participation in the profession.

"The big question is 'why do animals get *S aureus* infection in the first place?' said Ms Loeffler. "*S intermedius* should be the main species involved in infections, so we need to do a case control study of *S intermedius* infection. We also need to know about MRSA carriage in companion animals."

"Dogs meet other dogs in the park and they lick other dogs in the park, and we really don't know what's happening there. If you have an animal with MRSA it could be exchanging its staphylococci with others. Transfer of resistance to *S intermedius* is also something to watch out for (MRSI). We know there's something going on but we need to investigate."

For the remaining nine months of the study, the team will evolve cases and examine animal medical records in detail for information on antimicrobial therapy, medical procedures and management. Resistance genes and toxins in both human and animal isolates will also be investigated.

There are a few surprises in the data so far that need to be explored further, said Ms Loeffler. Nasal carriage rates among owners are lower, which could be down to deficiencies in sampling. The fact that veterinary staff are predisposed to MRSA carriage also needs to be addressed.

"If we know why it's happening we can deal with it more effectively," she said. "It's currently recommended that veterinary practices screen if there's an outbreak, but we'd like to change that so MRSA screening happens on a routine basis, because of the high rates of



Anette Loeffler, research scholar at the RVC, presenting results of a nationwide study about MRSA in cats and dogs: "An animal that has been attended by an MRSA-positive vet is at least six times more likely to be an MRSA case."

carriage in our study." There is a species-specific bias too. Cats are one third less likely to be in the case group. Ms Loeffler said it could be because practices see more large breed dogs that need surgery. This will be looked at in more detail.

She concluded: "We can deal with staff screening and as practitioners we can do a lot to educate owners and raise awareness. Regarding treatment of clinical cases, we haven't had huge problems so far, but we may have to watch out for patterns particularly from continental Europe and America where there are reports of MRSI."

"These cases seem to be presenting much more difficult clinical scenarios than the MRSA cases we're seeing now."

# MRSA: invisible problem without cultures

SCOTT Weese is a quick hand in the theatre of operations when it comes to methicillin-resistant *Staphylococcus aureus* (MRSA) in animals.

A professor of veterinary clinical studies at the University of Guelph in Canada, his rapid delivery and media-friendly soundbites have been honed by hours of TV and radio appearances. Speaking at the University of Liverpool is a breeze in comparison.

On June 19, Liverpool's Leahurst campus hosted the foremost authorities on MRSA in animals from around the world. Canadian, Prof Weese, was there to present on MRSA transmission and infection and there was a snap in his curt, information-packed presentation that bore the hallmark of a man on a mission.

## ROBIN FEARON

Veterinary Times features editor

reports on a further presentation at the MRSA conference where the speaker was critical of the profession's infection control procedures

"We need to bring in pet owners, farmers and horse owners," he said. "We also need to make sure we're communicating well with the medical profession and get people back to the 'one medicine' concept. It's not a population of cats and dogs living among a population of people. We're a population of animals."

### One-way avenues

Prof Weese has big problems with models of MRSA transmission as transient, one-way avenues. It's a blind alley in his

opinion. Horses admitted to the equine hospital at Guelph are screened routinely and have been since 2002. "We isolated MRSA from 5.3 per cent of these horses, half at the time of admission," he stated.

"We have a reservoir of animals that is perpetually infectious coming into our hospital, so we think this is a useful programme for us to isolate those animals and identify community-associated versus hospital-associated cases. That's important to us in assessing our hospital control

programmes." Screening has helped the hospital – a tertiary referral centre – to understand the risks and make inroads to the epidemiological mysteries of MRSA. It uses target screening and target isolation on high-risk animals, from high-risk farms, and barrier precautions on those animals.

Neonatal care cases are an additional worry because of the amount of contact with farm hands and veterinary staff those foals receive before admission to Guelph's neonatal unit.

"In our clinic, a horse that's colonised has a higher risk of developing clinical infection," said Prof Weese. "We need to emphasise the importance of getting rid of MRSA to farm owners and why it's worth their time and money to eradicate

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it. A colonised animal can also transmit MRSA.

"If you think about how a human interacts with a horse, it has this big nose and the first thing it does when it sees someone is to go and smear its big nose across your face. People pet its nose, they touch their nose and there's obviously clear potential for transmission to horses, people and other species."

Guelph sees the usual optimistic staphylococcal infections – surgical site, invasive devices such as catheters, skin and soft tissue – as well as septic arthritis and occasionally pleuropneumo-

nia. One of the most important things in Prof Weese's litany is that MRSA is a treatable infection.

"It's not a death wish, though that is the perception of some people. If it's diagnosed and managed properly, then the majority of infections are treatable. Eighty three per cent of our cases were discharged. But hospitalisation was extended in 63 per cent of cases, which increases risks for further events and costs."

### Financial burden

Increased cost is a burden the profession finds hard to square

with tighter margins in companion animal practice. The equine centre at Guelph has changed its protocols, and change can be expensive.

It adopted alcohol-based gel pouches and emphasised hand hygiene to staff. A mandatory glove policy was instituted for high-risk contacts such as mucous membranes, faeces, wounds or infected sites.

Routine barriers such as gloves and gowns were used for colonised or infected animals, and all procedures were supported by cleaning, disinfection and prudent antimicrobial use.

"Screening horses at admission is expensive, but there's a definite benefit to it," said Prof Weese. "We do offer voluntary screening to staff and we can set up wider screening if there's a high risk from cases that are associated with personnel transmission.

"Nosocomial MRSA colonisation does not indicate poor veterinary practice. Ignoring it does. Practices are not setting up reasonable protocols to prevent and control infection, and we're not adequately informing staff and owners. If we're not installing basic control measures, that's malpractice in my mind."

Strong words spoken with authority. In 2000, the Guelph practice moved into an epidemic phase according to Prof Weese. It identified large numbers of infected and colonised animals and transmission of MRSA between horses and people, as well as community reservoirs.

There were no incidents in 2001, but by the end of 2002 it had identified MRSA in 79 horses and 29 horse personnel, including staff in the teaching hospital, veterinarians and agricultural assistants. Personnel on horse farms were also identified as carriers. Thirteen of the horses had clinical infections, but a lot of the carriers showed no signs of disease.

There was also one clinical zoonotic infection – a surgery resident with a tattoo-site infection – which responded to treatment. All of the MRSA isolates were classified as Canadian epidemic CMRSA-5, a recognised human epidemic type and a moderately drug resistant strain.

"We were seeing cases that were definitely associated with hospital transmission, but also community cases where there wasn't necessarily a link with either the human or veterinary healthcare system," said Prof Weese. "Horses were a source of infection and it was clear that some horses were infecting other horses and people."

Colonisation concerns Prof

Weese more than infection, because infected horses can be diagnosed and treated. It's also easier to instruct staff on how to handle an infected animal. In a community-based study, his research team found that 13 per cent of horse personnel were colonised. On every farm that had a colonised horse there was at least one person with an indistinguishable strain.

In 2004 Guelph's Foalwatch programme served up another surprise. The centre received a foal that was colonised. It later discovered that the same farm had sent eight colonised horses over a two-week period. Although barrier precautions were increased and contact was limited, three staff contracted clinical skin infections, and other anecdotal reports emerged of skin disease. In all, 8.3 per cent of the staff associated with the case were affected.

Prof Weese said that anecdotal reports of outbreaks outweigh published reports in North America. "It's one of the problems about a bug like MRSA, there is a stigma attached to it and people are reluctant to air their dirty laundry. We were upfront with our MRSA cases and got negative press about a rampant outbreak in Guelph that was going to kill everyone. There are a lot of outbreaks and cases that are going unreported."

Now Prof Weese wants to make a clean break from the past. The profession needs more research in hospitals and clinics, and more information is needed on community transmission. It needs large-scale population studies.

"We're putting together a multi-centre study using medical records," he said. "It's a retrospective study of clinical infections in four hospitals. So far, most infections have been in animals older than five years, but we've also seen them in foals younger than one year – and even in the nasal passages of foals that are 12-18 hours old."

"Whether they're getting that in the birth canal or they're getting that after being handled, we don't know. I suspect it's from intensive handling, but it's important to remember that these young foals can be infectious."

Three years ago, Prof Weese formed a veterinary infection control society to exchange information on protocols, infection problems and outbreak issues. The society encourages collaborative research on control and has other multi-centre studies in the pipeline.

"In hospitals, the potential for infection is high because you have a lot of different animals from different sources, with close contact between animals and compromised areas," said Prof Weese. "You've got veterinary staff touching the animals, often with poor hand hygiene, and a susceptible animal population.

"What we don't want in veterinary practices is a culture that says 'we've had 10 post-operative infections, do you think we have a problem?' We want to stop it before that happens."

Controlling MRSA means emphasising the risks and benefits to the general public and veterinarians. MRSA is not going away, said Prof Weese, but if the profession puts adequate time, commitment and finance into understanding it, it can be controlled at the clinical, household or farm level. There will still be cases, but the goal is to minimise risk. The traditional veterinary approach to infection control is you don't have a problem if you don't submit cultures," said Prof Weese.

"In equine hospitals if you never submit a faecal sample, you never have to tell anyone you have a *Salmonella* outbreak.

It's the same with MRSA. If you have at least 10 post-operative infections, but you don't culture it, you won't have an MRSA outbreak. Then you won't have to tell anyone or lie to them about whether you have an outbreak. We need to get beyond that."

In 2004, the Guelph equine hospital introduced draconian measures to working with farms in its area. It virtually eradicated the incidence of MRSA in the clinic. So much so that Prof Weese wondered if the MRSA outbreaks they'd seen before were just a chance event.

"Given what's happening in other places in North America, I don't think that's the case," stated Prof Weese. "There's a control effect here. "Horse farms are equivalent to a long-term healthcare facility. They have a lot of horses and they're moving between these facilities. That

means there's a lot of contact. There's also a lot of antimicrobial use. Staff are usually nursing animals on a routine basis and there's a lot of contact with the veterinary healthcare system. This is a high-risk group."

With the prevalence of colonisation on horse farms, Prof Weese's team treat staff in the same way as human healthcare clinics. They are offered voluntary screening and then referred to doctors for decolonisation therapy. No-one has refused yet, he said.

"We test the horses and separate out the MRSA cases. We also prevent contact between staff who work with infected horses and those who don't. If we can keep the animals from being reinfected they will eliminate the colonisation on their own after a few months. We retest them and if they show



Scott Weese.

two negatives they are moved out of isolation."

In this way MRSA is eradicated from a farm within two to six months, without the use of antimicrobials, said Prof Weese. That includes farms with colonisation at 50 per cent.