

Issue # 2

The Emergence of Methicillin Resistant *Staphylococcal Aureus* (MRSA) in the Community

Framing the Issue

The increasing frequency of antimicrobial resistance among infectious organisms is of concern to both medical providers and the general public. Of particular concern is the possibility of spread of multi-drug resistant germs within a community. Since the first reported case of methicillin resistant *Staphylococcus aureus* (MRSA) infection in the United States in 1968, the proportion of *S. aureus* isolates resistant to methicillin causing infections in hospitalized patients has risen dramatically. For the first 20 years, infections with MRSA were primarily seen in patients in hospitals or long-term care facilities. During recent years, MRSA has spread into the community. In many regions of the United States, community acquired MRSA (CA-MRSA) now accounts for over 50% of all MRSA cases.

“MRSA, a bacterium that causes skin infections, boils and abscesses, is hitting the general public. The bug was previously confined to hospitals and nursing homes, but has now spread to prisons, sports teams and other germ environments.”

*Joanne Silberner on
NPR’s All Things Considered
August 16, 2006*

These infections appear to occur in otherwise healthy, non-hospitalized persons who have no contact with healthcare personnel or other colonized patients. Most CA-MRSA infections involve the skin and soft tissue, however severe, and sometimes fatal infections can occur. As CA-MRSA becomes more common in the community, treatment of common infections becomes much more difficult.

Impact on Patients and their Families

In response to the growing incidence of CA-MRSA infections an increasing number of news reports have focused on the effects that these infections have on individuals and their families. Search the internet for MRSA, and you will find links to online support groups and blogs devoted to the subject. There is understandable concern about a potentially severe bacterial infection that could be acquired from everyday activities such as taking your child to daycare or working out at the gym.

“The number of people contracting staph infections is growing in Minnesota and health department officials are worried about the surge because most of the cases are outside hospitals. Terry Knutson, 66, knows firsthand what it is like to cope with a staph infection. He contracted what is known as MRSA, or resistant staph infection, last summer. Doctors think Knutson may have gotten the bug from his grandson, who was earlier diagnosed with the disease.”

<http://wcco.com/topstories/Lifeline.staph.infections.2.356006.html>

“To then be hit by something like MRSA is a dreadful blow. That is why I am really pleased that people who have been through the experience have formed this support group, both to highlight the issue of MRSA itself and to provide information and advice - by patients for patients.”

<http://www.mrsasupport.pwp.blueyonder.co.uk/>

“It's turned my life upside down. I had to quit my job, traveling every weekend to our dog shows are non-existent because I can't run with the dogs to show them in the show ring, even simple tasks such as weekly grocery shopping is a huge struggle.”

<http://www.forum.mrsaresources.com/>

Hospital Infection Control

“MRSA has become a major focus of our department. Last year we had 100 MRSA infections and this year slightly over 800. 70% of the infections were community strains that manifested themselves in soft tissue infections and sepsis. \$15,000 is added to hospital costs for each infection.”

- Infection Control Practitioner at a large Twin Cities referral hospital

A prior infection with MRSA might put a “red flag” on a patient’s record. Some hospitals are proposing that isolation be mandatory for all patients admitted with a history of MRSA, and in some countries, certain occupations are considered high risk for MRSA carriage. For example, in the Netherlands, patients with a history of contact with pigs are considered to be MRSA carriers until proven otherwise. Many hospitals now must reevaluate how CA-MRSA will impact infection precautions and how they can effectively conduct surveillance for this emerging pathogen.

Pets and MRSA

“Pets, such as dogs and cats, can also get MRSA. Pets can have active infections or they can be carriers. If you keep getting MRSA infections, or if you see any signs of a skin infection on your pet, talk with your vet about testing your pet. Pets with MRSA can be treated. You do not need to get rid of your pet.”

- Washington State Department of Health

The potential for reverse zoonotic transmission of MRSA from infected humans to their animals may alter the way people interact with their pets. MRSA may emerge as a cause of disease in companion animals and colonized animals could become reservoirs of MRSA in the community. In an interview on National Public Radio, Shelley Rankin from the School of Veterinary Medicine at the University of Pennsylvania said that a recent study showed that displays of affection to pets by their owners can be harmful, if the human is sick.

“Pets make hospital rounds; bring 'therapeutic touch' to patients. Rainier the rehab dog has a station in the medical rehabilitation gym on the fourth floor at Harborview Medical Center.”

- Seattle Post Intelligencer, November 27, 2006

There is increasing recognition of the value of pet therapy animals in a variety of clinical settings. This practice may lead to the risk of pet therapy animals bringing CA-MRSA into health facilities or acquiring hospital associated pathogens during their interactions with hospitalized patients.

Risk Communication Challenges

“In many US cities, MRSA is now the most common pathogen isolated in the emergency department from patients with skin and soft tissue infections. Clinicians should consider obtaining cultures from patients...and modifying empirical therapy to provide MRSA coverage when antibiotics are indicated.”

- New England Journal of Medicine, 2006

CA-MRSA highlights issues in risk communication to both health professionals and their patients. There is not one standard means of notifying doctors of emerging infections or public health alerts. CA-MRSA also brings up issues in educating doctors on appropriate antibiotic use in both man and animals. From a client education standpoint, most CA-MRSA cases present to busy emergency rooms where client education may be less available. Veterinary practitioners may be unaware of this emerging pathogen as a cause of skin infections in their patients.

Emerging Hot Topics:

MRSA in Pigs

“Dr. Anderson at first couldn’t figure out why he was seeing patient after patient with MRSA in a small Indiana town. And then he began to wonder about all the hog farms outside of town. Could the pigs be incubating and spreading the disease?”

- The New York Times, March 11, 2009

MRSA has emerged in swine herds in Canada and Europe. Voss et al. reported that the prevalence of MRSA among pig farmers in the Netherlands was 760 times higher than the general population. This study demonstrates transmission of MRSA between an animal and human (pig and pig farmer), between family members (pig farmers and their families), and between a nurse and patient in the hospital. A recent pilot study in the Midwest indicated an overall MRSA prevalence of 49% (147/299) and 45% (9/20) in swine and swine farm workers respectively.

MRSA in Zoo Animals - African Elephant Calf

The growing prevalence of MRSA in some occupations and exposure groups is troubling, especially in light of evidence that MRSA moves freely between animals and humans.

- USDA/APHIS/VS/CEAH, December 2007

A March 6, 2009 report issued by the CDC describes the first reported case of CA-MRSA in an elephant (likely came from a colonized caretaker) as well as the first suspected transmission of the organism from an animal to human caretakers at a zoo. At least 20 zoo workers presented with MRSA skin lesions last year, but only after a caretaker infected an elephant calf that was being hand-raised. The CDC issued recommendations for preventing MRSA transmission in zoo settings.

MRSA in Meat

"My main concern is: if there's MRSA on the surface of a pork chop and someone's handling it and then they touch their nose, could they transmit it from the pork chop to their nose?"

- Dr. Scott Weese, Ontario Veterinary College in Guelph

Dr. Scott Weese reported in a presentation at the International Conference on Emerging Infectious Diseases in Atlanta that just under 10% of sampled pork chops and ground pork recently purchased in Canada tested positive for MRSA. The bacteria would be destroyed by proper cooking, so Staphylococcus food poisoning is not a major concern, said Weese. But, he wondered whether people handling meat with MRSA on its surface would end up inadvertently "colonizing" themselves. A recent publication in the Netherlands indicates MRSA has been isolated in variety of meat products, suggesting that although pigs have been a focus, they may not be the only potential problem out there.

Overall, scientists think that it is too soon to say whether the presence of MRSA on meat plays a significant role in transmission of the pathogen.

The Public Health Response to the Issue: Discussion Questions

The issue

- What are the essential elements of this issue?
- What public health problem does this issue raise?
- What are the psychosocial aspects of public health for this issue?
- What are the competing risks to be considered?
- What is the role of the public in this issue?

The team

- Why does this issue call for a trans-disciplinary public health team?
- What knowledge, skills and experience do you bring to addressing this problem?
- What frames your perspective on this issue?
- What knowledge, skills and experience do you need to address this problem and where can you find that?
- What other perspectives might be useful in addressing this problem?
- What skills, knowledge, and experience do you think are at the table now?

Reading Assignment

In preparation for small group discussion, each student should review at least one additional resource that addresses this issue. The group should decide who will review each resource, so that there is not overlap. The resources may come from the list below or from an independent search. Bring a copy of your resource if possible.

References

- MRSA Resources: Index. Available: <http://www.forum.mrsaresources.com/> Accessed 4/20/2008.
- MRSA Support - HOME PAGE. Available: <http://www.mrsasupport.pwp.blueyonder.co.uk/> Accessed 4/20/2008.
- Pet Health : NPR. Available: <http://www.npr.org/templates/story/story.php?storyId=1136663> Accessed 4/20/2008.
- Douda, D. Resistant Staph Infections On The Rise. Available: <http://wcco.com/specialreports/Lifeline.staph.infections.2.356006.html> Accessed 4/20/2008.
- Our Pigs, Our Food, Our Health by Kristof N.D. in March 11, 2009 The New York Times. Available: <http://www.nytimes.com/2009/03/12/opinion/12kristof.html> Accessed 4/14/09.
- Fridkin, S.K. 2005, "Methicillin-Resistant *Staphylococcus aureus* Disease in Three Communities", New England Journal of Medicine, vol. 352, no. 14, pp. 1436.
- Lefebvre, S.L. 2006, "Prevalence of zoonotic agents in dogs visiting hospitalized people in Ontario: implications for infection control", The Journal of Hospital Infection, vol. 62, no. 4, pp. 458-466.
- Moran, G.J. 2006, "Methicillin-Resistant *S. aureus* Infections among Patients in the Emergency Department", New England Journal of Medicine, vol. 355, no. 7, pp. 666.
- Phinney, S. Pets make hospital rounds, bring 'therapeutic touch' to patients. Available: http://seattlepi.nwsource.com/health/293770_petttherapy27.html Accessed 4/20/2008.
- Pyrek, K. Stricter Precautions, Active Surveillance Can Beat MRSA and VRE. Available: http://www.infectioncontrolday.com/articles/403/403_351feat1.html Accessed 4/20/2008.
- van Loo, I.H. 2007, "Methicillin-resistant *Staphylococcus aureus* in meat products, the Netherlands", Emerging Infectious Diseases, vol. 13, no. 11, pp. 1753-1755.
- Voss A, Loeffen F, Bakker J, Klaassen C, Wulf M. 2005, Methicillin-resistant *Staphylococcus aureus* in pig farming. Emerging Infectious Diseases 11: 1965–1966.
- Smith T. C., Male M. J., Harper A. L., Kroeger J. S., Tinkler G. P., Moritz E. D., Capuano A.W., Herwaldt L. A., Diekema D. J. 2009, Methicillin-Resistant *Staphylococcus aureus* (MRSA) Strain ST398 is Present in Midwestern U.S. Swine and Swine Workers. PLoS ONE 4(1): e4258. doi:10.1371/journal.pone.0004258.
- CDC, 2009. Methicillin-resistant *Staphylococcus aureus* Skin Infections from an Elephant Calf – San Diego, California, 2008. MMWR weekly report 58 (08); 194-198.
- Boer Ed, Zwartkruis-Nahuis J.T.M, Wit B., Huijsdens X.W., Neeling A.J., de, Bosch T., van Oosterom R.A.A., Vila A. and Heuvelink A.E. 2008. Prevalence of methicillin-resistant *Staphylococcus aureus* in meat. International Journal of Food Microbiology.

Compiled by Katherine Waters, DVM, Center for Animal Health and Food Safety, April 2007.
Updated by Stephan L. Singleton, DVM, Center for Animal Health and Food Safety, April 2008
Updated by Girum S. Ejigu, DVM, Center for Animal Health and Food Safety, April 2009