

Trends in Invasive Infection with MRSA

[Announcer] This program is presented by the Centers for Disease Control and Prevention.

[Christina Dzikowski] Hi, I'm Christina Dzikowski and today I'm speaking with Dr. James Hadler, Associate Professor of Epidemiology and Public Health at the Yale School of Public Health. Our conversation is based on his study about trends in invasive MRSA infection in Connecticut, which appears in CDC's journal, *Emerging Infectious Diseases*. Welcome, Dr. Hadler.

[James Hadler] Thank you, Christina. I'm pleased to have this opportunity to discuss MRSA and our findings from surveillance for invasive MRSA disease in Connecticut that we began in 2001.

[Christina Dzikowski] So the word "MRSA" has become very well known in the past few years. And if asked, most people would admit that they're concerned about it. But few people probably realize that it stands for methicillin-resistant *Staphylococcus aureus*. So what exactly is MRSA?

[James Hadler] Well, MRSA is nothing more or less than *Staphylococcus aureus*, with resistance to a specific class of antibiotics, penicillinase-resistant penicillins. The MR in MRSA stands for methicillin-resistant and the SA stands for *Staphylococcus aureus*. *Staphylococcus aureus* is the scientific name for the bacteria that cause "staph" infections. Staph infections most frequently are skin infections, such as boils. But they can cause deeper infections, getting into the bloodstream and spreading around the body to cause abscesses, meningitis, pneumonia, and septicemia. When this happens, staph infections can be life threatening.

Methicillin resistance by itself is not an added problem for the individual who has a staph infection. There are still other antibiotics available to treat MRSA infections. Thus, clinically, MRSA isn't particularly different than staph without methicillin resistance. However, MRSA is a concern to the medical and public health communities in general. It represents a marked increase in antibiotic resistance in staphylococci. It means that different antibiotics need to be used to treat and prevent it. Antibiotics, such as vancomycin, that are often more expensive, may have more side effects and, as their use is increased, may result in additional antibiotic resistance in staphylococci, potentially rendering them in the future very difficult to treat. Thus, reducing the number of staph infections caused by MRSA is important in the fight against antibiotic resistance.

[Christina Dzikowski] And how is it transmitted?

[James Hadler] Well, like other staphylococci, MRSA is mostly spread from person to person. It's important to know, though, that staph don't always cause infections. A person can have it in their throat or on their skin without having an infection and still transmit it to others. It can be spread directly by skin-to-skin contact or through intermediate objects that become contaminated from a staph carrier. Wrestling mats, towels, bathwater can be contaminated. There have been outbreaks among wrestlers and football players, among persons sharing jacuzzis, and among persons in crowded jail settings. Once a person has it on their skin, it can develop into a symptomatic infection when the skin becomes damaged or, in a hospital for example, when an

IV needle is placed through the skin. The potential for spreading the infection can be minimized by handwashing, washing surfaces, and not sharing potentially contaminated items. Infection potential can be minimized by promptly cleaning wounds and breaks in the skin. Appropriate handwashing and care of IV lines can minimize potential for infection in the hospital.

[Christina Dzikowski] Could you tell us a little about the different kinds of strains of MRSA?

[James Hadler] Well, MRSA developed from methicillin-susceptible staph because methicillin and its relatives, such as oxacillin, were widely used and selected for resistant strains. This selection process has happened at least several times in the last 10 to 30 years. It happened as early as the 1960s to staph strains that circulate in hospitals where lots of antibiotics are used, and it happened in the 1990s in non-hospital community settings. The resulting MRSA strains were a bit different. The original hospital MRSA strains were and still tend to be resistant to more antibiotics than the original community strains. But the community strains tend to produce more toxins, enabling them to cause skin infections and abscesses. The hospital strains don't nearly as readily cause skin infections. When they cause infections, they're more often bloodstream infections. Over time though, hospital strains have moved to the community where they can cause infections with no hospital exposure and community strains have been brought into the hospital. So the boundaries are no longer so distinct.

[Christina Dzikowski] And when was it discovered?

[James Hadler] Well MRSA were first reported in 1961 in England. It took only a few months from introduction of the first penicillinase-resistant antibiotic to recognition of infections from MRSA.

[Christina Dzikowski] So, how big of a problem has MRSA been in the United States?

[James Hadler] Well, staph infections are a big problem and MRSA now accounts for a sizable percentage of them – more than 50 percent in some hospitals. As of the most recent estimates in 2005, the CDC estimated that about 95,000 persons had invasive infections that year, and 18,650 died while hospitalized. Of the 95,000 MRSA infections, 85 percent were associated with receiving healthcare. However, of those associated with healthcare, more than half occurred in the community, when persons were outpatients.

[Christina Dzikowski] So you tracked cases of MRSA in Connecticut from 2001 to 2010. What were the overall trends that you saw during that decade?

[James Hadler] We saw several competing trends during these 10 years. We saw that infections due to the community strain increased for most of this time – both in community and hospital settings. However, we also saw that the long-standing problem of MRSA in hospitals and MRSA associated with outpatient care decreased. And in fact, this decrease was larger than the increase, resulting in a net decrease in invasive MRSA of about 14 percent. Most of this decrease was in infections in the hospital and occurred between 2007 and 2010.

[Christina Dzikowski] Well it seems like 2007 was a pivotal year for MRSA infections in Connecticut. What happened?

[James Hadler] We can't say for sure, but we think what happened was much more attention being paid to prevention in the hospitals beginning as early as 2003-2004, but really coming of age in 2007 in Connecticut. As consumers nationwide took increasing notice of how much of a problem MRSA had become, the activists among them worked with legislators in states around the country to get laws passed to require monitoring and public reporting of MRSA and other hospital infection rates, and laws to require hospitals to develop and send their written MRSA control plans to state health departments. Such laws were passed in Connecticut in 2006, becoming effective in 2007. So suddenly, MRSA control became a priority.

[Christina Dzikowski] So how did the rates and types of MRSA infections change after 2007?

[James Hadler] Well from 2000 to 2006, the overall MRSA rate was unchanging, with a slow drift down of hospital infections, especially in the larger hospitals, countered by an increase in community infections. Beginning in 2007, the overall rate started to decrease 3 to 4 percent per year. Underlying it, rates not just in big hospitals, but also smaller ones, decreased. In addition, community infections, particularly those that were healthcare-associated began to decrease for the first time.

[Christina Dzikowski] So what do you think caused those changes?

[James Hadler] Well, we think the enhanced attention being paid to hospital infections in every hospital is likely the cause of the change. More attention to handwashing, more attention to how IV lines are managed, and, in some cases, new efforts at screening for MRSA and not putting patients with MRSA and those without it in the same rooms are all the likely causes. Fewer patients leave the hospital with MRSA on their skin and so there are fewer healthcare-associated infections in the community, as well.

[Christina Dzikowski] What might your findings mean for the future of MRSA prevention?

[James Hadler] Well, our findings are very encouraging. Many people used to think that MRSA had become so widespread there was no point in focusing on MRSA control – just on applying basic infection control principles. However, we find that, to some extent, focusing on MRSA, while intensifying the basic control principles needed to control it, has resulted in a decrease in MRSA and, likely other infections which are not as easy to monitor. The progress we've witnessed through monitoring MRSA bodes well for other efforts to reduce hospital and healthcare-associated infections. It's looking like a good and important investment.

[Christina Dzikowski] How can people protect themselves from MRSA?

[James Hadler] Well the progress in reducing healthcare-associated MRSA may be due to collective public vigilance and demands for better application of infection control standards. But at the personal level, there are things people can do to reduce their potential to get exposed to MRSA and to reduce their risk of serious infection if they unknowingly are carrying it. Most of

the steps are common sense. Washing hands or other body surfaces, especially after skin-to-skin contact with other people and with healthcare settings can reduce risk of exposure. People can avoid sharing towels, unwashed clothing, and such, particularly with persons who may have breaks in their skin, such as after football or wrestling practice. Cleaning and covering abrasions and cuts as soon as they occur as possible and seeking healthcare consultation at the first signs of possible infection can reduce the potential for severe infection.

[Christina Dzikowski] Thank you Dr. Hadler. I have been talking with Dr. James Hadler about his study, *Trends in Invasive Infection with Methicillin-Resistant Staphylococcus aureus, Connecticut, USA, 2001–2010*, which appears in the June 2012 issue of CDC's journal, *Emerging Infectious Diseases*. You can see the entire article online at www.cdc.gov/eid.

If you'd like to comment on this podcast, send an email to eideditor@cdc.gov. I'm Christina Dzikowski, for *Emerging Infectious Diseases*.

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