

MRSA: The Super Bug in Daily Practice

by Anne Lambert, MS

Even though football stars and high school athletes with recurrent, sometimes fatal, methicillin-resistant staphylococcus aureus (MRSA) infections have been in the news, the general public is often unaware of MRSA or misinformed. As clinicians seeing patients in a wide range of settings, it's important to be informed, to know what to look for, and to know what part you play in the continuum of care.

Hospital-acquired MRSA

MRSA has been identified as the most common drug-resistant "bug" in North America, Europe, North Africa, the Middle East, and East Asia.¹ In the United States, one of the first outbreaks of MRSA was at Boston City Hospital from 1967 to 1968.² By 2002, 57% of ICU staph infections were caused by MRSA, and experts believe the incidence has now risen to 70%.³ Data from the Centers for Disease Control and Prevention (CDC) show that the prevalence rate for MRSA, as the cause of any staphylococcal infection, has increased from 2% in 1974 to 63% in 2004.⁴ In 2005, an estimated 94,360 people in the United States contracted an infection caused by MRSA, and 18,650 of them died—more than the number of deaths due to AIDS in that year.^{5,6}

The populations at risk for hospital-acquired MRSA (HA-MRSA) include patients who undergo invasive medical procedures or who have weakened immune systems and are being treated in hospitals and healthcare facilities such as nursing homes and dialysis centers. HA-MRSA commonly causes serious and potentially life-threatening infections, such as bloodstream infections, surgical site infections, or pneumonia.⁴ The general mode of transmission is through patients who already have a MRSA infection or who carry the bacteria on their bodies but do not have symptoms (colonized). Transmission to other patients is often through healthcare workers' hands.⁴ Of the 35 million patients admitted to 7,000 acute-care institutions in the United States, the incidence of hospital-acquired infections (HAIs) is more than 2 million cases per year.⁷ In a survey conducted by the National Nosocomial Infections Surveillance (NNIS) System of the CDC from October 1986 to April 1998, the highest rates of infection occurred in the burn ICU, the neonatal ICU, and the pediatric ICU.⁸

The currently approved resources for treating MRSA include the FDA-approved agents including linesolid, daptomycin, tigecycline, and vancomycin; the CDC recommendations for controlling and preventing HA-MRSA (http://www.cdc.gov/ncidod/dhqp/ar_mrsa_spotlight_2006.html); and a registry of mentor hospitals to teach other hospitals of similar size, population, and location how to prevent MRSA.⁹ Opinions on monitoring the presence and spread of MRSA lack consensus on active surveillance versus a population-based approach. In active surveillance, admitted patients are tested for MRSA and then isolated until there is a definitive result. If the patient is positive, isolation and treatment continue until the infection is cleared. This method has kept in-hospital MRSA rates very low in Europe, and has proven successful in some hospitals in the United States; in addition, four states (Pennsylvania, Illinois, California, and New Jersey) have mandated it for some admitted patients. It remains controversial for a variety of reasons, many of them based on cost-benefit.¹⁰

The opposing view says that hospitals are now dealing with so many highly resistant bugs (Acinetobacter, vancomycin-resistant enterococci, etc.), they would do better to begin an aggressive infection-control program that broadly targets a spectrum of HAIs. A population-based program would include such concrete elements as appropriate hand hygiene, use

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of chlorhexidine for skin preparation, and the removal of unnecessary central venous catheters, but would also include a commitment to safety, surveillance by trained personnel, and education. Aside from MRSA, they said, methicillin resistance is almost universal among coagulase-negative staphylococci; further, 30% of enterococci are resistant to vancomycin, 10% of *Candida* isolates are resistant to first-generation triazoles, and there is increasing resistance among other pathogens, including *Pseudomonas aeruginosa* and *Acinetobacter baumannii*.¹⁰

A multidisciplinary approach and closer collaboration among healthcare providers, especially hospitals, internists, pharmacists, and infectious disease specialists, could be helpful in the fight to prevent and control MRSA. Local hospitals and medical associations could work together to discuss and compare surveillance tactics versus a more population-based approach, create learning materials that bring the agreed upon approach into point-of-care settings with grand rounds, strategically place small laminated posters, conduct department meetings with short slide decks and handouts, and develop an overall educational package that raises MRSA awareness among the in-house and ancillary staff.

Community-acquired MRSA

MRSA infections that are acquired by persons who have not been recently hospitalized or had a medical procedure (such as dialysis, surgery, catheters) within the past year are known as community-acquired methicillin-resistant staphylococcus aureus (CA-MRSA) infections. CA-MRSA accounts for 78% of skin and soft tissue infections in emergency rooms.¹¹ Even though the vast majority of MRSA infections—85%—are still found in hospitals, clusters of community-associated MRSA (CA-MRSA) have been identified.¹²

Factors that have been associated with the spread of MRSA skin infections include close skin-to-skin contact, openings in the skin such as cuts or abrasions, contaminated items and surfaces, crowded living conditions, and poor hygiene.

Clinical features of CA-MRSA are most often skin or soft tissue infection such as a boil or abscess. Patients frequently recall a “spider bite.” The involved site is red, swollen, and painful, and may have pus or other drainage. Staph infections also can cause more serious infections, such as bloodstream infections or pneumonia, leading to symptoms of shortness of breath, fever, and chills.¹³ Children, athletes, prisoners, soldiers, selected ethnic populations, intravenous drug abusers (IVDA), men who have sex with men (MSM), human immunodeficiency virus-positive patients, and the homeless are at-risk groups for CA-MRSA.¹⁴ Local efforts for MRSA control and prevention need to reach out to less likely segments of the community of care, such as psychiatrists and counselors, who may see these at-risk groups more frequently.¹⁴

The CDC offers a wide array of physician, patient, and caregiver materials to meet the concerns and needs of each of these groups. The materials can in turn be shared with schools, daycare facilities, and athletic teams, among others. It is important for local healthcare providers to know about MRSA in their own area and to educate themselves and the public accordingly. Reminding healthcare providers about the overuse of antibiotics has proven helpful, along with patient education on basic behaviors like showering, laundry, and the cleaning of public equipment. There is a need for outreach along the continuum of care to create a wider dissemination of facts about MRSA and to improve patient outcomes.

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References

- 1 DeNoon DJ. Drug-resistant staph may get nastier: experts call for increased efforts to halt MRSA. Available at: <http://www.webmd.com/news/20060831/drug-resistant-staph-may-get-nastier>. 2008.
- 2 Barrett FF, McGehee RF, Jr., Finland M. Methicillin-resistant *Staphylococcus aureus* at Boston City Hospital. Bacteriologic and epidemiologic observations. *N Engl J Med* 1968;279:441-448.
- 3 Keiger D. Drugs vs. bugs. Available at: <http://www.jhu.edu/jhumag/0208web/drugbug.html>. 2008.
- 4 Centers for Disease Control and Prevention. MRSA in healthcare settings. Updated October 3, 2007. Available at: http://www.cdc.gov/ncidod/dhqp/ar_mrsa_spotlight_2006.html.
- 5 Klevens RM, Morrison MA, Nadle J, et al. Invasive methicillin-resistant *Staphylococcus aureus* infections in the United States. *JAMA* 2007;298:1763-1771.
- 6 Centers for Disease Control and Prevention. HIV/AIDS Surveillance Report. 2006;18:17-18. Available at: <http://www.cdc.gov/hiv/topics/surveillance/resources/reports/>.
- 7 Wenzel RP, Edmond MB. The impact of hospital-acquired bloodstream infections. *Emerg Infect Dis* 2001;7:174-177.
- 8 National Nosocomial Infections Surveillance System. National Nosocomial Infections Surveillance (NNIS) System report, data summary from October 1986–April 1998. *Am J Infect Control* 1998;26:522-533.
- 9 Institute for Healthcare Management. Mentor Hospital Registry: MRSA. Available at: http://www.ihl.org/IHI/Programs/Campaign/mentor_registry_mrsa.htm.
- 10 Wenzel RP, Bearman G, Edmond MB. Screening for MRSA: A Flawed Hospital Infection Control Intervention. *Infect Control Hosp Epidemiol* 2008;29:Epub ahead of print.
- 11 Moran GJ, Krishnadasan A, Gorwitz RJ, et al. Methicillin-resistant *S. aureus* infections among patients in the emergency department. *N Engl J Med* 2006;355:666-674.
- 12 Steckelberg J. MRSA: understand your risk and how to prevent infection. Available at: <http://www.mayoclinic.com/health/mrsa/ID00049>. 2008.
- 13 Centers for Disease Control and Prevention. Community-acquired methicillin resistant *Staphylococcus aureus* (CA-MRSA). Available at: http://www.cdc.gov/ncidod/dhqp/ar_mrsa_ca.html. 2008.
- 14 Stryjewski ME, Chambers HF. Skin and soft-tissue infections caused by community-acquired methicillin-resistant *Staphylococcus aureus*. *Clin Infect Dis* 2008;46 Suppl 5:S368-S377.