



## **METHICILLIN-RESISTANT *STAPHYLOCOCCUS AUREUS* (MRSA) AT-A-GLANCE BACKGROUNDER**

Healthcare-Associated Infections (HAIs) are infections that patients acquire while under the care of a healthcare institution. Methicillin-resistant *Staphylococcus aureus* (MRSA) is the most common HAI and is resistant to certain antibiotics, including methicillin and other more commonly used antibiotics (oxacillin, penicillin and amoxicillin).<sup>1</sup>

### **About MRSA**

- In 1972, MRSA accounted for only two percent of all *Staphylococcus aureus* HAIs reported to the Centers for Disease Control and Prevention (CDC) in the U.S. Today, MRSA accounts for more than 60 percent of *Staphylococcus aureus* infections.<sup>2</sup>
- MRSA infections and other HAIs can occur in wounds of the skin, burns or IV sites and other places where intravenous tubes enter the body, as well as in the eyes, bones, heart or blood.
- Most infections caused by MRSA are skin infections, but MRSA can also invade the blood and cause potentially serious complications such as blood stream infections, infections of the joints and pneumonia.<sup>3</sup> Organ failure and death may result from untreated MRSA infections.<sup>4</sup>
- There is a 23 percent mortality rate among patients with MRSA bacteremia (bacterial infections of the bloodstream).<sup>5</sup>
- According to the CDC, HAIs lead to more than \$4.5 billion in excess healthcare costs<sup>6</sup>, with MRSA being the leading microbe of all HAIs.<sup>7</sup>
- Incremental costs associated with treating a patient in the U.S. who has developed a MRSA bloodstream infection can range from \$9,275<sup>8</sup> - \$35,367<sup>9</sup>, with an average cost of \$27,083.<sup>10</sup>

### **MRSA Worldwide**

- In the UK in the early 1990s, two percent of *Staphylococcus aureus* bacteremias were due to MRSA; the mean figure is now about 45 percent.<sup>11,12</sup> UK levels of MRSA bloodstream infections are among the highest in Europe.
- Denmark and the Netherlands have maintained low infection rates, primarily due to an aggressive “search and destroy” policy to identify patients and healthcare workers

colonized with MRSA. In 2002, levels of MRSA as a proportion of all Staph infections in Denmark and Netherlands were as low as one percent.<sup>13</sup>

- Japan has one of the highest prevalences of MRSA in the world.<sup>14</sup> Among *Staphylococcus aureus* bloodstream isolates in 2001, nearly 70 percent were methicillin resistant.

### **MRSA Transmission and Infection**

- Surveillance studies indicate that some 7 percent of patients admitted to the hospital are carriers of MRSA.<sup>15</sup> Though they show no apparent signs of infection, these patients are susceptible to MRSA infections and could transmit MRSA to other patients.
- Exposure to contaminated healthcare workers' hands, environmental surfaces, patient-to-patient contact and catheter insertion and maintenance practices can lead to MRSA transmission.
- There is a one in five chance that a patient harboring MRSA at admission can go on to develop an infection if not identified and treated.<sup>16</sup>

### **MRSA Detection, Treatment and Prevention**

- Screening of patients by obtaining culture specimens from body sites such as the anterior nares (nasal passage) alone will identify 80 percent of those patients harboring MRSA, and screening from additional body sites will increase the sensitivity to 92 percent.<sup>17</sup>
- There is substantial evidence that active screening of high-risk patients, when combined with contact precautions, appropriate hand hygiene and education of personnel, can reduce transmission of MRSA, even in facilities where it is highly endemic.<sup>18</sup>
- Although MRSA is resistant to certain classes of antibiotics, other kinds of antibiotics remain effective against MRSA. Vancomycin is often the first drug used against MRSA. There are other options for available antibiotics that can also be used to treat the bacteria. However, antibiotic resistance is emerging with some of these medications.

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<sup>1</sup> [www.cdc.gov/ncidod/dhqp/ar\\_mrsa.html](http://www.cdc.gov/ncidod/dhqp/ar_mrsa.html)

<sup>2</sup> [www.cdc.gov/od/oc/media/pressrel/r061019.htm](http://www.cdc.gov/od/oc/media/pressrel/r061019.htm)

<sup>3</sup> [www.bt.cdc.gov/disasters/hurricanes/katrina/pdf/katrina-mrsa.pdf](http://www.bt.cdc.gov/disasters/hurricanes/katrina/pdf/katrina-mrsa.pdf)

<sup>4</sup> [www.nlm.nih.gov/medlineplus/ency/article/007261.htm#Complications](http://www.nlm.nih.gov/medlineplus/ency/article/007261.htm#Complications)

<sup>5</sup> Blot, S.I., Vandewoude, K.H., Hoste, E.A., & Colardyn, F.A. (2002). Outcome and attributable mortality in critically ill patients with bacteremia involving methicillin-susceptible and methicillin-resistant *staphylococcus aureus*. *Archives of Internal Medicine*, 162, 2229-2235.

<sup>6</sup> [www.cdc.gov/ncidod/dhqp/healthDis.html](http://www.cdc.gov/ncidod/dhqp/healthDis.html)

<sup>7</sup> [www.cdc.gov/ncidod/dhqp/ppt/ICU\\_RESTrend1995-2004.ppt#1](http://www.cdc.gov/ncidod/dhqp/ppt/ICU_RESTrend1995-2004.ppt#1)

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<sup>8</sup> Clancy, M., Graepler, A., Wilson, M., Douglas, I., Johnson, J., & Price, C.S. (2006). Active screening in high-risk units is an effective and cost-avoidant method to reduce the rate of methicillin-resistant *staphylococcus aureus* infection in the hospital. *Infection Control and Hospital Epidemiology*, *27*(10), 1009-1017.

<sup>9</sup> Stone, P.W., Larson, E., & Kwar, L.N. (2002). A systematic audit of economic evidence linking nosocomial infections and infection control interventions: 1990-2000. *American Journal of Infection Control*, *30*(3), 145-152.

<sup>10</sup> Abramson, M.A., & Sexton, D.J. (1999). Nosocomial methicillin-resistant and methicillin-susceptible *staphylococcus aureus* primary bacteremia: At what costs? *Infection Control and Hospital Epidemiology*, *20*, 408-411.

<sup>11</sup> Boyce, J.M., Cookson, B., Christiansen, K., Hori, S., Vuopio-Varkila, J., Kocagöz S., et al. (2005) Methicillin-resistant *staphylococcus aureus*, *The Lancet Infectious Diseases*, *5* (10), 653-663.

<sup>12</sup> [www.rivm.nl/earss/Images/UK\\_tcm61-25456.pdf](http://www.rivm.nl/earss/Images/UK_tcm61-25456.pdf)

<sup>13</sup> [www.bbc.co.uk/dna/actionnetwork/A2836550](http://www.bbc.co.uk/dna/actionnetwork/A2836550)

<sup>14</sup> Boyce, J.M., Cookson, B., Christiansen, K., Hori, S., Vuopio-Varkila, J., Kocagöz, S., et al. (2005) Methicillin-resistant *staphylococcus aureus*, *The Lancet Infectious Diseases*, *5* (10), 653-663.

<sup>15</sup> Hidron, A.I., Kourbatova, E.V., Halvosa, J.S., Terrell, B.J., McDougal, L.K., Tenover, F.C., et al. (2005). Risk factors for colonization with methicillin-resistant *staphylococcus aureus* (mrsa) in patients admitted to an urban hospital: Emergence of community-associated mrsa nasal carriage. *Clinical Infectious Diseases*, *41*, 159-166.

<sup>16</sup> Davis, K.A., Stewart, J.J., Crouch, H.K., Florez, C.E., & Hospenthal, D.R. (2004). Methicillin-resistant *staphylococcus aureus* (mrsa) nares colonization at hospital admission and its effect on subsequent mrsa infection. *Clinical Infectious Diseases*, *39*, 776-782.

<sup>17</sup> Grundmann, H., Aires-de-Sousa, M., Boyce, J., & Tiemersma, E. (2006) Emergence and resurgence of methicillin-resistant *staphylococcus aureus* as a public-health threat. *The Lancet*, *368*, 874-85.

<sup>18</sup> Muto, C.A., Jernigan, J.A., Ostrowsky, B.E., Richet, H.M., Jarvis, W.R., Boyce, J.M., et al. (2003). SHEA guideline for preventing nosocomial transmission of multidrug-resistant strains of *staphylococcus aureus* and *enterococcus*. *Infection Control and Hospital Epidemiology*, *24*(5), 362-386.