# Decreasing MRSA Infections
## An End Met by Unclear Means

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INVASIVE INFECTIONS WITH METHICILLIN-RESISTANT *Staphylococcus aureus* (MRSA) have become a focus of national attention over the past several years due to their potentially lethal complications and reports indicating that their frequency is on the rise in most US hospitals. Hospitalizations with infections due to MRSA steadily increased between 2000 and 2005, nearly doubling in many areas of the country.[1] Klevens et al[2] estimated that up to 18 650 deaths in the United States in 2005 may have been associated with invasive MRSA infection. These statistics coupled with the increasing number of outbreaks of MRSA infections in community settings have helped ignite a contentious public debate about the best means of control, including calls for increased surveillance for MRSA infections, new prevention activities such as screening of all patients admitted to hospitals to detect colonization with MRSA (universal screening), and public reporting of hospital-acquired MRSA infections.

Now amidst this alarm, the report by Burton and colleagues[3] in this issue of *JAMA* documents decreases in the rate of MRSA-related central line–associated bloodstream infections (CLABSI) in hospitals participating in a voluntary surveillance network. This network was initially known as the National Nosocomial Infection Surveillance system (NNIS, 1997-2004) and later as the National Healthcare Safety Network (NHSN, 2006-2007). Facilities participating in NNIS/NSHN report to the Centers for Disease Control and Prevention (CDC) all health care–acquired infections detected during prospective surveillance in a variety of units.

The current report details the experience with MRSA CLABSI in intensive care units (ICUs) from 1997 to 2007 and demonstrates that despite an overall increase in the incidence of MRSA infections, the rate of MRSA CLABSI decreased 49.6% at NNIS/NSHN hospitals. Four types of ICUs (surgical, cardiothoracic, coronary, and medical/surgical without a major teaching affiliation) initially experienced an increase in MRSA CLABSI lasting until 2001, but this was followed by declining rates through 2007. All units, except pediatric ICUs, experienced an overall decline in infections from 2002-2007. Moreover, both the overall rate of CLABSI and methicillin-sensitive *S aureus* (MSSA) CLABSI showed steady declines from 1997 to 2007 among all types of ICUs.

Although the report by Burton et al[3] suggests ICUs are having increasing success limiting the spread of MRSA, the study is not without limitations. The first concern is the dynamic nature of NNIS/NHSN. Fewer than 6% of ICUs in the current study participated in the NNIS/NHSN for the entire 11-year study interval. A large number of hospitals entered the network for the first time in 2007 prompted by mandatory public reporting requirements in many states, highlighting the changing nature of the network and challenging its description as a voluntary, hospital-based reporting system. In addition, although the authors contend that voluntary self-reporting was most likely accurate, it has not been validated since 1998.[4] The accuracy of self-reporting may be an important issue in the upcoming era of mandatory public reporting and increased scrutiny of hospital-acquired infections by regulatory agencies.

The study also leaves the unsettling realization that the observed reductions in infection cannot be attributed to any particular intervention. Previous reports from NNIS-participating ICUs have demonstrated reductions in bloodstream infections, ventilator-associated pneumonias, and catheter-associated urinary tract infections.[5,6] These reports have led to the conclusion that prospective surveillance followed by careful local risk assessment and adoption of interventions that include best practices can be used to reduce hospital-acquired infection rates. It is likely that the reductions in infections reported by Burton et al[3] were related to a range of interventions that have been implemented during the last decade including better hand hygiene practices, adoption of standardized line insertion and care practices, proper barrier precautions, improved catheter technology, and shorter periods of indwelling catheter use in patients. Thus, it is impossible to determine which practices had the greatest effect or even which were implemented by participating ICUs. Can the end be justified by the means, when the means are unknown?

**See also p 727.**

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Some infection control practices may not have been related to the observed reduction in MRSA CLABSI. Since observed reductions in MRSA incidence were coupled with an overall reduction in CLABSI due to all organisms plus MSSA, it seems unlikely that practices specifically targeted at MRSA led to the decline. The authors were unable to confirm whether targeted MRSA interventions were in place among the participating NNIS/NHSN hospitals. However, most ICUs did not have universal screening programs for MRSA in place in 2001 when reductions in infections were first noted because published guidelines calling for wider implementation of universal screening were not released until 2003.[7] This observation is unlikely to sway proponents on either side of the contentious universal surveillance debate but should be considered as public pressure, state-mandated prevention initiatives, and industry all continue to push for expansion of screening efforts and adoption of newer, more expensive technologies such as polymerase chain reaction (PCR)–based MRSA screening.

Recent reports suggest that PCR may improve detection time for MRSA colonization without necessarily reducing MRSA transmission or infection rates.[8,9] As expenditures on MRSA prevention initiatives increase, it may be prudent to consider careful cost-benefit analysis to determine if these expenditures could be better used on prevention efforts aimed at a broader range of hospital-acquired infections.[10] CLABSI attributed to MRSA represent a minority of all reported CLABSI, comprising only 5.6% of infections. Prevention strategies designed to reduce all CLABSI could have a much wider effect on reducing hospital-acquired infections while also reducing MRSA infections.

The study by Burton et al[3] also focuses on the experience with MRSA CLABS in a subset of the hospital ICUs, which represents only a small subset of all invasive MRSA infections occurring in hospitals. It is unclear whether other invasive MRSA infections including ventilator-associated pneumonias, skin and soft tissue infections, and other bacteremias caused by MRSA have decreased among NNIS/NHSN participating hospitals.

The report by Burton et al[3] provides important lessons for the new patient safety climate. Clearly, ICUs participating in NNIS/NHSN have made substantial progress at reducing hospital-acquired infections, suggesting that real change is being made. Despite this progress, most ICUs are far from the goal of zero infections and many have not implemented suggested prevention strategies.[11] Better outcomes research is desirable as hospitals contemplate the variety of prevention strategies available to reduce infections. This type of research seems unlikely in an era of empiricism and as infection rates decrease, making meaningful research increasingly difficult due to the large size of comparative trials required.

Despite the lack of specific recommendations from the trend analysis of NNIS/NHSN reported by Burton et al,[3] hospitals should continue to implement well-researched prevention strategies with proven benefit. A joint task force of the Society for Healthcare Epidemiology of America and the Infectious Diseases Society of America Standards and Practice Guidelines Committee recently summarized these strategies.[12,13] Adoption of these prevention strategies, coupled with careful analysis of their effect, should allow most hospitals to justify the means to end hospital-acquired infections.

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