Fact, Fiction, or No Data: What Does Surveillance for Methicillin-Resistant *Staphylococcus aureus* Prevent in the Intensive Care Unit?

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(See the article by McGinigle et al. on pages 1717–25)

The polarizing debate about how to control antimicrobial-resistant organisms in hospitals continues to focus on methicillin-resistant *Staphylococcus aureus* (MRSA) and the use of active surveillance cultures. In the United States, MRSA infection causes an estimated 18,650 deaths annually among hospitalized patients [1] and likely cost billions of dollars [2]. The National Nosocomial Infections Surveillance system of the Centers for Disease Control and Prevention reported that, by 2003, >60% of the *S. aureus* isolates causing nosocomial infections in US hospitals were methicillin resistant [3]. Compared with infections due to methicillin-susceptible strains of *S. aureus*, infections due to MRSA are associated with poorer clinical outcomes [4] and increased health care costs [5].

Because the prevalence of MRSA is increasing in hospitals, efforts to control MRSA are gaining more public attention. The control of MRSA in the intensive care unit (ICU) is supported by 2 principal epidemiologic findings: higher MRSA colonization rates increase the risk for MRSA transmission between hospitalized patients [6], and MRSA colonization is a significant risk factor for developing a subsequent MRSA infection [7–9]. An estimated 19% of patients who are colonized with MRSA at the time of admission to an ICU will develop MRSA infection, and 25% of those who acquire MRSA colonization while in the ICU may later develop MRSA infection [8]. Given the increased risk of infection in colonized patients, preventing transmission of MRSA between patients is predicted to reduce hospital-acquired MRSA colonization and subsequent infections.

Active surveillance cultures (ASCs) are a contentiously debated strategy for prevention of MRSA transmission in hospitals. ASCs incorporates screening patients at the time of admission to a hospital unit to identify MRSA carriers (prevalent carriers) followed by periodic screening in the unit to identify people who acquire MRSA colonization while in the ICU (incident cases). The premise of ASCs lies in detecting patients who are asymptptomatically colonized with multidrug-resistant bacteria, such as MRSA, and who can be isolated from other patients. The Society for Healthcare Epidemiology of America published guidelines in 2003 supporting ASCs, in combination with other basic infection control practices, to identify MRSA-colonized patients [10]. The Center for Disease Control and Prevention’s Healthcare Infection Control Practices Advisory Committee offered a more conservative recommendation of ASCs as a second tier for preventing transmission after baseline infection control measures fail [11].

Generally, a screening program targets a person at risk who can be offered an intervention to prevent a specific outcome. A fundamental principle of any screening program is often overlooked in discussions of ASCs: although we can identify asymptomatic carriers and place them in isolation, there is poor evidence that our interventions prevent infections. Is the goal of ASCs to reduce MRSA transmission or to reduce MRSA infection? In some studies, ASCs and isolation precautions reduce MRSA transmission [12–14], but in other studies, ASCs alone have not prevented MRSA transmission [15]. The ASC literature is plagued with a heterogeneous approach to who should be screened, how often they should be screened, and what the primary outcome is.

In a systematic literature review in this
colonization is unknown. Second, a clear was on reducing infections or reducing newly colonized and infected patients were icies, there was a 0.28% reduction in the ICUs with newly implemented ASC pol-
ducing MRSA infections. For example, the infections does not address the primary, dence that shows that ASCs lead to fewer ASCs reduce MRSA transmission with evi-
orable. Other studies compared MRSA infection rates. A number of studies cited in the impact of ASCs on MRSA control by comparing hospital-acquired MRSA in-
borization. Many papers included in the analysis combine ASCs and contact iso-
lation with active decolonization of MRSA carriers. So, although it is possible that ASCs and contact isolation reduced MRSA transmission, determining which inter-
vention reduced the proportion of colon-
zied patients who develop subsequent hospital-acquired MRSA infection is im-
possible. Alternatively, Nijssen et al. [15] performed ASCs on patients but did not report culture results and did not isolate MRSA carriers. A consistent definition of ASCs is needed to accurately pool data and determine which interventions reduce infec-
tion rates.

In general, the increased morbidity and mortality of hospital-acquired MRSA results from clinical infections, not acquired colonization. Huang et al. [17] showed a 47% reduction in ICU-associated MRSA transmission after implementing ASCs and a 75% reduction in the incidence density of MRSA bacteremia. This study used interrupted time-series analysis to compare pre- and postintervention periods, and the findings were supported by stable rates of methicillin-susceptible *S. aureus* bacteremia during time periods. We believe that this is the best study listed in the review to have identified an independent reduction in hospital-acquired MRSA infection rates. A number of studies cited in this review exemplify the confusion generated by ASC studies diverse in design and primary outcome. Three studies [12, 14, 18] provide data to support reductions in hospital-acquired MRSA colonization, not reductions in hospital-acquired MRSA infection. Two studies appear to incom-
pletely meet the author’s inclusion criteria, either by not including screening at the time of ICU admission or by including non-ICU patients [19, 20]. The study by Chaix et al. [21] evaluated the cost of MRSA control using a case-control study design. The authors projected that a 14% reduction would make ASCs cost-effec-
tive. Case-control studies are not designed to assess outcomes; they are intended to identify risk factors. Despite the limitations of the available data and some meth-
odological problems in this systematic re-
view, we agree with the conclusions of McGinigle and colleagues that “the overall quality of the evidence is poor; thus, de-
finitive, evidence-based clinical recom-
mandations cannot be made” [16, p. 1723]

to suggests that ASC reduce the incidence of MRSA infections.

Given the increased public awareness of MRSA, some states have introduced legis-
labile measures aimed at curbing antimicrobial-resistant organisms in health care facilities. Despite the evidence, proposed or enacted legislation mandates the use of ASCs to screen hospitalized patients for MRSA colonization. As shown in the review by McGinigle et al. [16], this legis-
lation is not based on evidence that ASCs will directly reduce the number of hos-

dual publication by the Society for Healthcare Epidemiology of America and the Association for Professionals in Infection Control and Epidemiology [22]. The decision to use ASCs should be left to individual hospitals that can best assess the need for ASCs as part of a comprehen-
sive MRSA control plan.

The future of ASCs in the ICU should be based on evidence from studies with precise outcome measures and sound methodology. The debate will rage until the scientific community demands increased funding for research to determine optimal and cost-effective strategies for MRSA control in the ICU and other high-risk areas that will justify or refute current legislative proposals. Given the impact of MRSA on hospitalized patients, control of MRSA is imperative. Although the inten-
tions of infection prevention and control professionals and legislators are good, a
rational and evidenced-based approach is in the best interest of the patients we are trying to protect.

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