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In the Literature

Active Surveillance for Detection of Colonization with Methicillin-Resistant *Staphylococcus aureus* (MRSA)

Harbarth S, Fankhauser C, Schrenzel J, et al. Universal screening for methicillin-resistant *Staphylococcus aureus* at hospital admission and nosocomial infection in surgical patients. JAMA 2008;299:1149–57.

Jeyaratnam D, Whitty CJM, Phillips K, et al. Impact of rapid screening tests on acquisition of methicillin-resistant *Staphylococcus aureus:* cluster randomized crossover trial. BMJ 2008;336:927–30.

Robicsek A, Beaumont JL, Paule SM, et al. Universal surveillance for methicillin-resistant *Staphylococcus aureus* in 3 affiliated hospitals. Ann Intern Med 2008;148:409–18.

Harbarth and colleagues from Geneva, Switzerland, evaluated the effect of active surveillance of MRSA colonization in surgical units using a prospective crossover design. Patients who were assigned to the experimental groups were screened for colonization with use of PCR, with sampling of the anterior nares and perineum, as well as other sites, as clinically indicated. Both patients in the experimental arm and control patients were subjected to standard infection control procedures. Perioperative antibiotic prophylaxis was adjusted in response to the detection of MRSA carriage. The mean turnaround time to notification with PCR screening was 22.5 h, but notification could not be performed until after the operative procedure for 31% of the 386 MRSA-colonized patients who underwent surgery. MRSA was detected in 5.1% of patients. The incidence of nosocomial MRSA infection was 1.11 cases per 1000 patient-days during the intervention periods and 0.91 cases per 1000 patient-days during control periods (adjusted incidence rate ratio, 1.20); the difference was not statistically significant. Of the 93 patients in intervention wards who developed infection, 53 (57%) had been MRSA negative at the time of admission. Thus, overall, in this setting, where there was a moderate rate of MRSA colonization but a low baseline infection rate, active surveillance for MRSA colonization with PCR provided no benefits for patients in surgical units.

Robiscek and colleagues examined the incidence of MRSA infection at 3 affiliated midwestern hospitals during 3 consecutive periods: period 1 (the baseline period), during which routine, active surveillance for MRSA colonization was not performed; period 2 (the intensive care unit surveillance period), during which active surveillance for nasal colonization was performed in the intensive care units; and period 3 (the universal surveillance period), during which active nasal MRSA colonization surveillance was performed for all persons who were admitted to the hospital. Surveillance was performed using PCR; the mean turnaround time for results was 2.5 days during period 2 and only 0.67 days during period 3. During period 3, feedback and educational programs were provided, and it was recommended that MRSA-colonized patients be prescribed mupirocin nasal ointment and chlorhexidine washes, although this recommendation was implemented in only 62% and 55% of patients, respectively. Contact isolation was performed during all 3 periods. Periods 1 and 2 each lasted 12 months, whereas period 3 lasted 21 months, ending in the spring of 2006. The prevalence density of all MRSA infections decreased from 8.9 cases per 10,000 patient-days at the baseline period, to 7.4 cases per 10,000 patient-days during the ICU surveillance period, and to 3.9 cases per 10,000 patient-days during the universal surveillance period ($P < .001$, compared with the baseline and ICU surveillance periods). The prevalence density of MRSA bacteremia similarly decreased, from 2.14 to 1.99 to 1.09 cases per 10,000 patient-days during periods 1, 2, and 3, respectively; the prevalence density of methicillin-susceptible *S. aureus* (MSSA) bacteremia also decreased, from 2.14 to 1.93 to 1.60 cases per 10,000 patient-days, respectively. Although the absolute changes in prevalence from baseline were statistically significant for MRSA bacteremia ($P = .006$), this was not true for MSSA bacteremia ($P = .30$). Thus, the results of this nonrandomized study were consistent with the finding that a benefit accrues after the introduction of rapid universal PCR screening, together with additional measures, for MRSA colonization.

In a study designed to determine whether rapid screening methods were superior to conventional culture for detection of MRSA colonization, Jeyaratnam and colleagues performed an open, cluster-randomized crossover trial that involved 10 patient units over a period of 14 months at a 1200-bed teaching hospital in London, United Kingdom. Patients were screened for the presence of MRSA on the nares, axillae, groin, skin breaks, and other clinically indicated sites. Conventional culture methods were used for control patients, whereas a PCR method was used for patients in the experimental groups; the turnaround times for results were 46 h and 22 h, respectively. Patients who were found to be MRSA positive were placed in contact isolation and were prescribed chlorhexidine bathing and mupirocin nasal ointment, and MRSA-colonized wounds were treated with antibacterial compounds. Patients who were determined to have a high risk of MRSA colonization underwent preemptive isolation at the time of hospital admission but were removed from isolation if they proved to be MRSA negative. Although, compared with conventional culture, the use of the rapid PCR test was associated with a reduction in the number of days of preemptive isolation, there was no significant effect on MRSA acquisition

during hospitalization or on rates of MRSA transmission, wound infection, or bacteremia.

In summary, one study concluded that active surveillance of admissions for MRSA colonization with PCR leads to a reduction in the number of MRSA infections, a second study indicates that it does not, and a third indicates that the use of PCR provides no benefit over conventional culture. Differences in the adequacy of study design provide an insight into these differences.

The study by Robiscek and colleagues, which concluded that there was a benefit for rapid screening at the time of all hospital admissions, suffers greatly from its quasi-experimental design. The study occurred over a 45-month period, during which it is quite likely that a number of practice changes occurred in addition to those recounted by the authors; this makes it impossible to confidently ascribe a significant benefit to PCR screening. In contrast, the crossover design used in the other 2 studies largely obviated the problem of changes in practice. Although the lack of a statistically significant change in the prevalence density of MSSA bacteremia in the study by Robicsek and colleagues may be considered evidence of the lack of nonspecific effects resulting from changing clinical practice, the number of MSSA infections did numerically decrease. In fact, I wonder whether the absolute decrease in prevalence density of MRSA bacteremia (−1.09 cases per 10,000 patient-days) would remain statistically significant if one subtracted the absolute decrease in the prevalence of MSSA bacteremia (−0.54 cases per 10,000 patient-days) from this value as an attempt to eliminate the nonspecific effect of changes in practice over time. It is also interesting that the use of a rapid screening test, which was central to the study by Robiscek and colleagues, could not be demonstrated to provide benefit greater than that of routine culture surveillance methods in the study by Jeyaratnam and colleagues.

The Centers for Disease Control and Prevention, Society for Healthcare and Epidemiology of American, and Association for Professionals in Infection Control currently state that there is insufficient evidence to warrant routine or mandated use of active surveillance testing for detection of MRSA and recommend against implementation of such procedures at this time. These statements take into account the fact that there are downsides to the use of active surveillance testing [1]. Furthermore, MRSA infections account for <10% of hospital-acquired infections in the United States. Given the fact that resources for infection control are not unlimited, money will inevitably be taken from other, better-validated practices, with resultant potential injury to patients who do not have the "privileged infection."

A recent systematic review of the use of active surveillance testing in adult intensive care units concluded that definitive recommendations regarding use could not be made, because of the poor quality of the evidence [2]. The lack of quality evidence in this subject has largely been the consequence of the usual problem with most published studies in this field—the nonexperimental or quasi-experimental study design, with a concomitant inability to control for multiple changes in practice over time. There is, nonetheless, a tsunami of mandates coming from various organizations and politicians demanding and requiring implementation of active surveillance testing in all institutions. It is clear that the rational approach to the problem is 2-fold. First, there must be full funding of studies with acceptable experimental design, allowing definitive answers to the questions discussed here. Second, administrative and financial support for the funding of infection control programs must be provided for the implementation of those methods proven to be effective. It must also be recognized that "one size does not fit all" with regard to optimal practices for individual health care settings. I wholeheartedly agree with Milstone and Perl, who recently wrote that a "rational and evidenced-based approach is in the best interest of the patients we are trying to protect" [3, p. 1728].

References

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DOI: 10.1086/592046