Letters to the Editor

Cost-Effectiveness of Perirectal Surveillance Cultures for Controlling Vancomycin-Resistant *Enterococcus*

To the Editor:

In the August 2002 issue of *Infection Control and Hospital Epidemiology,* the article by Muto et al.[1] and the accompanying editorial by Mayhall,[2] which claim that perirectal surveillance cultures for vancomycin-resistant enterococci (VRE) are cost-effective in controlling these pathogens, are misleading and merit further scrutiny.

First, it is important to point out that the Centers for Disease Control and Prevention (CDC) guidelines[3] do not recommend ongoing, routine surveillance cultures for VRE. Moreover, the CDC's current web site states that "the decision about who and when to screen for VRE is a facility-specific decision."[4]

A dogmatic approach to surveillance cultures with isolation of newly identified colonized patients is undermined by two important facts: (1) the low sensitivity of the perirectal swab for VRE (58% in a recent, well-done study)[5] results in many colonized patients remaining unrecognized, and (2) the periodicity of screening methodology (ie, weekly) dictates that newly colonized patients will remain unisolated until the next culture is obtained and the results are reported.

The most egregious error in the study of Muto et al. is the assumption that 29 VRE bacteremias would have occurred at the University of Virginia Hospital based on the finding of that number of bacteremias at the University of Maryland during the same time period. No two hospitals are alike; consider the myriad differences in antibiotic use, intensity and variety of services offered, populations served, rates of VRE colonization at referring facilities, effectiveness of environmental cleaning processes, and nurse-to-patient ratio. Importantly, the baseline rate of VRE colonization at Maryland was more than 50 times greater than that at Virginia. Thus, even if infection control procedures were identical at both hospitals, one would still expect more bacteremias to occur at Maryland. To claim that the difference in bacteremias observed is attributable only to the differences in infection control practices between the two hospitals is analogous to claiming that the difference in the rate of malaria cases in the United States (where the disease is not endemic) when compared with the rate in Kenya (where the disease is endemic) is somehow due only to current mosquito control practices in the United States.

Another difficulty with this study is the estimate of costs by Muto et al. Laboratory costs for 10,400 cultures totaled $49,504 ($4.76 per culture). However, most hospitals do not have an epidemiology laboratory with dedicated personnel and will thus need to use either their clinical laboratory or a reference laboratory. Thus, the analysis may be contingent on the charge rather than on the cost of the culture. At my hospital, the clinical laboratory charges $69 per culture, which would be discounted to $41 for the epidemiology unit. Because patients are not charged for these cultures, the cost would be billed directly to the epidemiology unit. Thus, the laboratory costs alone would exceed the current total budget of our epidemiology program. Moreover, how many infection control programs could add such a surveillance program without hiring additional personnel to obtain the cultures from patients?

Finally, I would question the ethics of isolating patients who refused a perirectal swab culture when the odds of a "high risk" patient being colonized with VRE are 1 in 250.

Hospitals are under enormous pressure to provide high-quality care in an era of diminishing resources. At safety-net hospitals, the isolation of patients has become increasingly difficult because bed occupancy rates are so high that internal gridlock limits the movement of patients for cohorting purposes. Furthermore, the cost of the marginal benefits gained by enhanced infection control activities (eg, routine surveillance cultures) must now be justified in light of the impact on other programs. For example, would the money spent on a VRE surveillance program be better spent in providing antihypertensive therapy for several hundred patients who would otherwise be untreated? Unfortunately, issues of distributive justice where programs with different goals (eg, decreasing nosocomial infections vs providing primary care) compete for funding are emerging in hospitals that are teetering on the brink of insolvency. Even within infection control, could the money be better spent on a campaign to increase compliance with hand hygiene?

Whether routine surveillance cultures for VRE are cost-effective in controlling VRE remains an unanswered question. Until this question is answered, I believe that the decision needs to be facility-specific and determined in light of the hospital's mission and resources. Most importantly, universal and meticulous attention to hand hygiene should remain our highest priority.

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The authors reply.

We thank Dr. Edmond for sharing his thoughts and allowing us to respond. He noted that although the 1995 Centers for Disease Control and Prevention (CDC) guidelines require contact precautions for all patients colonized with vancomycin-resistant enterococci (VRE) and suggest active surveillance cultures for "more efficient containment," they don't explicitly state that ongoing active surveillance cultures are required to detect VRE-colonized patients. We agree and believe that this has been a consistent weakness of CDC isolation guidelines for the past two decades, which, perhaps to avoid stating the obvious, have never explicitly stated that identification of the reservoir for spread of such pathogens using such cultures is necessary to control ongoing transmission.

Dr. Edmond insists that the reason the comparison hospital had 29-fold more bacteremias during a 2-year period was that it had a correspondingly higher prevalence of VRE colonization. We agree. We disagree, however, about the reason for this profound difference in the prevalence of VRE colonization. He suggested that this difference had nothing to do with the fact that one was using active surveillance cultures to detect and isolate all patients with detectable VRE colonization to prevent spread to other patients hospital-wide while the other was not. There appears to be an emerging consensus that patients becoming VRE positive almost always do so by having VRE spread to them[1] and many studies have shown that there is significantly less nosocomial spread of VRE using active surveillance cultures and contact precautions than there is when relying merely on hand hygiene between all patient contacts as required by standard precautions.[2] Consistency of evidence across many studies by different investigators in different populations is one of the criteria that have been used to suggest that an association is causal.[3] We are unaware of even one study showing the opposite, that relying on hand hygiene alone is more effective than using surveillance cultures and contact precautions for controlling VRE infections. Dr. Edmond suggested that our approach couldn't control infections because we only did surveillance cultures once weekly and because one recent study suggested that direct plating does not detect all carriers. It is true that lower density VRE fecal colonization (ie, < 4.5 logs per gram of stool) represents VRE quantities that are not readily detected by rectal swabs. However, colonization at this lower density has not been shown to significantly increase the transmission of VRE strains to the environment and therefore may not be as clinically important to detect.[4] This is supported by many studies that have successfully controlled VRE transmission using only VRE rectal or perirectal swab positivity as a trigger for contact isolation.[2] During the 2 months before implementing weekly active surveillance cultures and contact precautions for all colonized patients at our hospital, there were six infections including three primary bacteremias, one of which caused death. During 1995 and 1996, the 2 years following control of a VRE epidemic in late 1994, there were only 12 VRE infections including only one primary bacteremia secondary to *Enterococcus avium* (all other VRE infections were secondary to *E. faecium*) and no deaths due to VRE infection. The relative risk for infection after implementing these measures was 0.18 (95% confidence interval, 0.07 to 0.47). The probability that this reduction in VRE infections occurred by chance alone, as suggested by Dr. Edmond's argument, was 0.0022. Dr. Edmond said that his hospital laboratory's practice is to charge much more than a culture's actual cost and that this would make surveillance cultures impossibly expensive. Many hospital laboratories have charged higher fees to make money for the hospital, but charging itself such higher fees would obviously be counterproductive. Hospitals focusing on cost reduction can stipulate that such cultures are done in a hospital laboratory at cost, as in our hospitals.

Dr. Edmond questioned our hospital's ethics for isolating the rare patient (ie, fewer than 1 of 5,000) not wishing to have a surveillance culture, but apparently saw no ethical problem with failure to implement an effective program for preventing the spread of VRE infections and the genes for vancomycin resistance, which will make development of vancomycin-resistant *Staphylococcus aureus* more likely.

Dr. Edmond argued that our effort to control VRE infections hasn't been shown to be cost-effective and wastes money that could be put to better use treating something else, such as hypertension. Our analysis suggests that allowing VRE infections to rage out of control wastes even more money and therefore results in fewer dollars being available to treat hypertension. This result accords with those of multiple other cost-benefit analyses of the use of this approach for controlling methicillin-resistant *S. aureus* and VRE nosocomial infections.[2] We are unaware of any studies suggesting that it is cheaper to let such infections spread out of control. Dr. Edmond averred that hand hygiene is the cost-effective answer to controlling VRE infections. Because (1) virtually all studies have shown low, baseline compliance with hand hygiene and failure to achieve a pronounced or sustained increase in compliance, (2) VRE (and methicillin-resistant *S. aureus*) infections have continued to increase dramatically despite the fact that hand hygiene has been required after all patient contacts by standard precautions, and (3) there are no studies finding better effectiveness or cost-effectiveness of VRE using hand hygiene than using surveillance cultures and contact precautions, we are unclear how Dr. Edmond reached this conclusion.

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