

0.20 to 0.28 HZ-related hospital discharges per 10,000 population) among persons aged 10-19 and 16% (from 1.78 to 2.07 HZ-related hospital discharges per 10,000 population) among persons aged 45-64. Although we focused our discussion on persons within the HZ-vaccine-eligible group, it is important to note that we found 3 age cohorts that had a significant increase in the rate of HZ-related hospital discharges, with the majority of the change occurring during the final 4 years of the study period.

Finally, with regard to the economic implications of HZ-related hospital discharges, in our article<sup>2</sup> we acknowledge as a limitation that we could not disaggregate the incremental hospital charges attributable to HZ. We do not suggest that our data would be suitable for cost-benefit evaluation of the varicella vaccine program, and we are cautious in describing potential implications for the hospitalization component of HZ-vaccine cost-effectiveness analyses that have been conducted by other authors. Our economic findings serve as a reminder that HZ-related hospitalizations are expensive and that HZ occurs primarily in the age group for which there is now an effective vaccine available.

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#### REFERENCES

1. Harpaz R, Yawn BP. Trends in rates of herpes zoster-related hospitalizations: are they real, are they costly, and are they linked to varicella vaccination? *Infect Control Hosp Epidemiol* 2009; 5:495-496 (in this issue).
2. Patel MS, Gebremariam A, Davis MM. Herpes zoster-related hospitalizations and expenditures before and after introduction of the varicella vaccine in the United States. *Infect Control Hosp Epidemiol* 2008; 29:1157-1163.
3. Jackson LA, Reynolds MA, Harpaz R. Hospitalizations to treat herpes zoster in older adults: causes and validated rates. *Clin Infect Dis* 2008; 47: 754-759.
4. US Census Bureau, Administrative and Customer Services Division, Statistical Compendia Branch. Statistical abstract of the United States. Available at: [http://www.census.gov/compendia/statab/past\\_years.html](http://www.census.gov/compendia/statab/past_years.html). Accessed February 9, 2009.

## Why We Disagree With the Analysis of Wenzel et al.

*To the Editor*—Wenzel et al.<sup>1</sup> suggest that their hypothetical analysis and the nonrandomized 2006 study by Pronovost et al.<sup>2</sup> should convince us that preventing healthcare-associated infections (HAIs) due to all pathogens is better than preventing just HAIs due to methicillin-resistant *Staphylococcus aureus* (MRSA) and that infection control works best using a team approach. These things were already known. Wenzel et al.<sup>1</sup> state that some policy makers nonsensically propose that hospitals should focus on MRSA control only. We've seen several state laws requiring active detection and isolation (ADI) for MRSA, but none of these state laws implied ADI was necessary for MRSA control but that control of all other pathogens could be ignored. Therefore, it would enhance the credibility of this statement if Wenzel et al.<sup>1</sup> would cite the source document. Otherwise, some may suspect that the claim was created like a straw opponent in debate (ie, merely as an excuse to disparage ADI).

The approach proposed by Wenzel et al.<sup>1</sup> would permit the spread of MRSA and would allow too many HAIs due to MRSA, in the hospital and out,<sup>3</sup> and their analysis has more errors than we can address in a letter. For example, they state that all pathogens are associated with the same mortality rate, that different infection control measures have the same success rate, that the 2003 Society for Healthcare Epidemiology of America guideline didn't mention MRSA decolonization, that half of the deaths after primary bloodstream infection (BSI) were attributable to primary BSI, and that DiGiovine et al.<sup>4</sup> confirmed that half the crude mortality rate was attributable to primary BSI—DiGiovine et al.<sup>4</sup> actually found *no association* between primary BSI and death after adjusting for underlying severity of illness the day before BSI onset (like multiple other recent studies<sup>5</sup>).

The analysis by Wenzel et al.<sup>1</sup> exaggerates what most hospitals must do to start an effective ADI program to control MRSA and the costs involved (eg, they state that all hospitals must start by screening all patients admitted to the hospital [and they cite as documentation a study that does not do that<sup>6</sup>], that MRSA screening is associated with an unacceptably high rate of false-positive results, and that a screening test must cost \$20–\$30). Of more than 100 studies reporting control of MRSA using ADI, the vast majority didn't screen all patients admitted to the hospital and used screening cultures; this approach resulted in rare false-positive results during almost 3 decades of ADI at the University of Virginia, where screening was estimated to cost \$6.57 for a negative result and \$9.97 for a positive result (which included material and personnel costs for collection and processing).<sup>7</sup> Because the vast majority of screening culture results are negative, the cost estimated by Wenzel et al.<sup>1</sup> is 3–4.5-fold higher than the

actual cost. A hospital laboratory needn't charge higher than cost to profit from quality improvement activities.

Wenzel et al.<sup>1</sup> suggest that primary BSI kills 21,875–43,750 patients annually in the United States (ie, more than AIDS). When Wenzel and Edmond made a similar claim in 1999,<sup>8</sup> Jordi Rello, a Spanish expert on HAI in intensive care units, said the claim was based on “myth,” not science.<sup>9</sup> At the University of Virginia, patients regularly died of AIDS but rarely of catheter-related bacteremia. Nobody died of catheter-related BSI during the observation of 24 case patients in 3 prospective studies at the University of Virginia, nor did anybody die during the observation of 90 case patients with catheter-related BSI in 2 larger studies.<sup>5</sup> Wenzel et al.<sup>1</sup> imply that primary BSI accounted for 76% of MRSA infections in a recent study<sup>10</sup> (apparently using this figure to suggest that their proposal targeting catheter-related BSI would easily control most HAIs due to MRSA), but a review of 5 years of hospitalwide surveillance data from the University of Virginia showed that only 9% of all HAIs due to MRSA were primary BSI (B. Farr, unpublished data).

The 5 measures used by Pronovost et al.<sup>2</sup> weren't new. All were discussed in the 1996 and 2002 Centers for Disease Control and Prevention (CDC) guidelines for preventing catheter-related BSI. Wenzel et al.<sup>1</sup> imply that there was something special about the “team-based” application of “evidence-based processes” that resulted in a 66% relative reduction of primary BSIs in the intervention by Pronovost et al.,<sup>2</sup> but earlier teams studying chlorhexidine antiseptics or maximal sterile barriers for the insertion of central venous catheters in randomized controlled trials had reported reductions as large or larger, and the other 3 measures Pronovost et al.<sup>2</sup> used were more logic based than evidence based, since they hadn't shown reductions in the rate of BSI when recommended by the CDC (2 of the measures hadn't been studied in randomized controlled trials). Huang et al.<sup>6</sup> found that 2 of the 5 measures didn't control MRSA BSI but ADI did.

The crux of our disagreement with the model designed by Wenzel et al.<sup>1</sup> is partly that HAI due to MRSA is almost totally preventable with the use of ADI, as their own data help demonstrate.<sup>11</sup> Over 100 studies and decades of data from multiple northern European countries and from the state of Western Australia now corroborate this (despite circulation of mecIV strains in these communities),<sup>12</sup> but it is fashionable for nihilists to say these studies were not randomized controlled trials while ignoring the lack of randomized controlled trials regarding isolation of all other pathogens as well as the fact that the recent randomized controlled trial of MRSA and vancomycin-resistant *Enterococcus* control was too poorly conducted to provide accurate data (eg, the study involved delays in specimen collection, processing, and isolation implementation). Wenzel et al.<sup>1</sup> state that mixed results make ADI controversial, citing 2 positive and 2 negative studies, as if equivalent numbers were available, but there are over 100 positive studies, compared with only a few negative studies.<sup>12</sup>

Another crucial disagreement is that we believe all morbidity and mortality from preventable HAI should be prevented. Wenzel et al.<sup>1</sup> imply that this isn't necessary, saying that 3 intensive care units at the Medical College of Virginia reduced MRSA infections by at least 48% without using ADI.<sup>1</sup> The airline industry has a starkly different philosophy—that all preventable airplane crashes must be avoided, perhaps influenced by the fact that pilots and stewardesses wouldn't work if the industry adopted the less rigorous approach of Wenzel et al.<sup>1</sup> (under which reducing preventable crashes by 48% would be enough).

MRSA has been linked to approximately 19,000 US deaths annually,<sup>10</sup> mostly from MRSA spread during health care. The model designed by Wenzel et al.<sup>1</sup> overlooks other important facts, like the 14 ADI cost-effectiveness studies that found savings,<sup>12</sup> the higher virulence of *S. aureus* compared with many other pathogens, the significantly higher mortality rate observed for MRSA BSI than for methicillin-susceptible *S. aureus* BSI in 2 meta-analyses,<sup>12</sup> and the 32-fold increase in the prevalence of MRSA infection according to CDC National Nosocomial Infections Surveillance data (1980–2003),<sup>12</sup> illustrating its selective advantage in health care—all reasons ADI is warranted for patient safety.

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#### REFERENCES

1. Wenzel RP, Bearman G, Edmond MB. Screening for MRSA: a flawed hospital infection control intervention. *Infect Control Hosp Epidemiol* 2008; 29:1012–1018.
2. Pronovost P, Needham D, Berenholtz S, et al. An intervention to decrease catheter-related bloodstream infections in the ICU. *N Engl J Med* 2006; 355:2725–2732.
3. Datta R, Huang SS. Risk of infection and death due to methicillin-resistant *Staphylococcus aureus* in long-term carriers. *Clin Infect Dis* 2008; 47:176–181.
4. DiGiovine B, Chenoweth C, Watts C, Higgins M. The attributable mortality and costs of primary nosocomial bloodstream infections in the intensive care unit. *Am J Respir Crit Care Med* 1999; 160:976–981.
5. Byers KE, Farr BM. The impact of catheter-related bloodstream infec-

- tions. In: O' Grady NP, Pittet D, eds. *Catheter-Related Infections in the Critically Ill*. Boston: Kluwer Academic Publishers; 2004:87–98.
6. Huang SS, Yokoe DS, Hinrichsen VL, et al. Impact of routine intensive care unit surveillance cultures and resultant barrier precautions on hospital-wide methicillin-resistant *Staphylococcus aureus* bacteremia. *Clin Infect Dis* 2006; 43:971–978.
  7. Karchmer TB, Durbin LJ, Simonton BM, Farr BM. Cost-effectiveness of active surveillance cultures and contact/droplet precautions for control of methicillin-resistant *Staphylococcus aureus*. *J Hosp Infect* 2002; 51:126–132.
  8. Wenzel RP, Edmond MB. The evolving technology of venous access. *N Engl J Med* 1999; 340:48–50.
  9. Rello J. Impact of nosocomial infections on outcome: myths and evidence. *Infect Control Hosp Epidemiol* 1999; 20:392–394.
  10. Klevens RM, Morrison MA, Nadle J, et al. Invasive methicillin-resistant *Staphylococcus aureus* infections in the United States. *JAMA* 2007; 298:1763–1771.
  11. Thompson RL, Cabezedo I, Wenzel RP. Epidemiology of nosocomial infections caused by methicillin-resistant *Staphylococcus aureus*. *Ann Intern Med* 1982; 97:309–317.
  12. Farr BM. Doing the right thing (and figuring out what that is). *Infect Control Hosp Epidemiol* 2006; 27:999–1003.

## Reply to Farr and Jarvis

*To the Editor*—We welcome the comments from Farr and Jarvis,<sup>1</sup> 2 prominent advocates for an approach to infection control that focuses on methicillin-resistant *Staphylococcus aureus* (MRSA). Herein, we elaborate on perspectives that we share and those we do not.

Our fundamental position is that every infection control program should be built on a broad platform, one committed to the reduction of all infections.<sup>2</sup> The horizontal platform—all organisms, all anatomic sites, and all locations in the hospital—is one that must capture the principal investment and the political and administrative commitment of each hospital. No diversion of resources from the basic platform should occur for subsequent initiatives. Instead, new vertical programs (focusing on a single pathogen) that clearly add incremental value should be supported by new dollars.

MRSA is a serious pathogen and was the only important antibiotic-resistant organism in the early 1980s. In the past 25 years, those of us interested in preventing hospital-acquired bloodstream infection have witnessed many different pathogens emerge with associated high mortality rates and formidable antibiotic resistance patterns, including vancomycin-resistant enterococci, triazole-resistant *Candida*, imipenem-resistant *Pseudomonas*, and totally resistant *Acinetobacter*. Still more are waiting in the wings but making early appearances, such as community-associated MRSA, which is considered more virulent than most *S. aureus* strains and yet is found in the nares of less than 50% of the those infected. Well-intended proponents have advocated screening for several of these organisms. Our view, however, is that the first obligation of an effective infection control program is to pre-

pare for dynamic fluctuations in epidemiology, including the unexpected, by having a strong platform that has been shown repeatedly to reduce rates of infection caused by all pathogens.

Farr and Jarvis<sup>1</sup> are correct in making the analogy that the field of infection control lags behind that of the airline industry with respect to safety. Their analogy illustrates the flaw in their reasoning, however. The airline industry advocates for a broad horizontal platform aimed at reducing all untoward incidents. They do not primarily advocate for vertical programs, promoting safety only for some passengers, such as those traveling on airlines that screened for only 1 of 15 possible electrical hazards. Imagine the public outcry if the airline industry spokespeople went on the lecture circuit to advocate for such a vertical approach. Still more troubling, what if the spokespeople teamed up with influential politicians to develop statewide mandates for a vertical program before insisting on a broad (horizontal) safety program designed to reduce the hazards from all possible deficits in safety?

The 100 favorable studies referred to by Farr and Jarvis<sup>1</sup> do indeed add important data and perspectives on MRSA screening. But 100 uncontrolled studies do not define science. We, in fact, focused on a few recent studies because innovative epidemiologists—seeking evidence—have tried to introduce concurrent controls. Not all such concurrently controlled studies supported MRSA screening.<sup>3</sup> Recently, however, 2 historically controlled studies have reported reductions of 22%–70% in the infection rate for MRSA as a result of surveillance.<sup>4,5</sup> So even the statement by Farr and Jarvis<sup>1</sup> that hospital-acquired infections due to MRSA “are almost totally preventable” needs to be read with caution. Nevertheless, we eagerly anticipate that future, evidence-based studies will define the value of an incremental focus on MRSA infection, as well as its costs and impact on overall safety. In the meantime, we would note that none of the 100 studies Farr and Jarvis<sup>1</sup> referred to includes any data illustrating a substantial reduction in the total infection rate for all pathogens. To return to their analogy, it is hard to believe that the airline industry would survive if only 14% of hazards were reported (which is equivalent to the percentages of MRSA infections reported), with no information on the remaining 86%.

In our analysis, we focused on bloodstream infections because their crude mortality rate is high and death is obviously the worst outcome. We examined all bloodstream infections—primary and secondary (contrary to the misstatement by Farr and Jarvis<sup>1</sup>), just as we did in an earlier national estimate.<sup>6</sup> All deaths are the sum of the contributions of both the underlying illness and the bloodstream infection. In a confusing section of their letter, Farr and Jarvis<sup>1</sup> suggest that bloodstream infections have little or no attributable mortality. Recall that the epidemiological term “attributable mortality” is that portion of all deaths directly attributable to the infection, after correcting for the influence of the underlying disease processes. Importantly, attributable mortality also represents the portion of deaths maximally influenced by antibiotics, because antibiotics have no effect on the mortality of