

opportunities influences greatly the calculated overall rate of adherence.⁷

The high adherence rate reported for extraseries opportunities in our study is consistent with a high level of prevention of transmission of microorganisms from patients to others. An association between the rate of adherence to hand hygiene and the prevalence of methicillin-resistant *Staphylococcus aureus* has already been demonstrated in a French rehabilitation hospital.⁶ Conversely, because of the low rate of adherence to hand hygiene in intraseries opportunities in our study, there was a substantial risk of infection that corresponded to the potential transmission of organisms from colonized sites to sterile sites within the same patient.

In our study, rates of adherence to hand hygiene and gloving practices were closely related. The rate of adherence to hand hygiene after contact with gloves (61.9%) was higher than the corresponding rate of adherence recorded in medical wards (44.6%) and in intensive care units (53.3%) by Girou et al.⁵ The percentage of contacts with risk of exposure to body fluid but without glove use (ie, glove use indicated but not performed; 21.8%) reveals a marked risk of contamination of healthcare workers with pathogens from blood or other body fluids and was higher than the corresponding percentage in the study by Girou et al.⁵ (14.0% in medical wards and 6.4% in intensive care units).

Implementing an intervention program could help increase rates of adherence to hand hygiene among intraseries opportunities. For example, the introduction of a patient education model in an inpatient rehabilitation unit of an acute care university hospital in Pennsylvania raised the frequency of hand hygiene from 5 episodes per patient-day to 9 episodes per patient-day during the intervention and to 7 episodes per patient-day 3 months after the intervention.⁸

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REFERENCES

1. Pittet D. Compliance with hand disinfection and its impact on hospital-acquired infections. *J Hosp Infect* 2001;48(suppl A):540-546.
2. Pittet D, Mourouga P, Perneger TV. Compliance with handwashing in a teaching hospital. *Ann Intern Med* 1999;130:126-130.
3. Pan A, Domenighini F, Signorini L, et al. Adherence to hand hygiene in an Italian long-term care facility. *Am J Infect Control* 2008;36:495-497.
4. Saint S, Bartoloni A, Virgili G, et al. Marked variability in adherence to hand hygiene: a 5-unit observational study in Tuscany. *Am J Infect Control* 2009;37:306-310.
5. Girou E, Chai SHT, Oppein F, et al. Misuse of gloves: the foundation for poor compliance with hand hygiene and potential for microbial transmission. *J Hosp Infect* 2004;57:162-169.
6. Sax H, Allegranzi B, Uçkay I, Larson E, Boyce J, Pittet D. "My five moments for hand hygiene": a user-centred design approach to understand, train, monitor, and report hand hygiene. *J Hosp Infect* 2007;67:9-21.
7. Girou E, Legrand P, Soing-Altrach S, et al. Association between hand hygiene compliance and methicillin-resistant *Staphylococcus aureus* prevalence in a French rehabilitation hospital. *Infect Control Hosp Epidemiol* 2006;27:1128-1130.
8. McGuckin M, Taylor A, Martin V, Porten L, Salcido R. Evaluation of a patient education model for increasing hand hygiene compliance in an inpatient rehabilitation unit. *Am J Infect Control* 2004;32:235-238.

Prevention of Infection Caused by Gram-Positive Bacteria in the Bloodstream and Lungs

To the Editor—We read with interest the article by Munoz-Price et al.¹ concerning a reduction in cases of bloodstream infection that was associated with the daily use of chlorhexidine baths for patients at a long-term acute care hospital in the greater Chicago area. We have a long-term acute care hospital in Tampa, Florida, with a similar size and patient mix as the one in the study by Munoz-Price et al.¹ In 1995, we published an article² showing a significant reduction in cases of methicillin-resistant *Staphylococcus aureus* (MRSA) ventilator-associated pneumonia (VAP) that was associated with the use of an infection prevention protocol similar to the one described in the study by Munoz-Price et al.¹ We gave our patients twice-weekly chlorhexidine baths and applied a topical mupirocin ointment to their anterior nares. After the use of this protocol, we found a similar decrease in the bloodstream infection rate: from more than 10 cases per 1,000 ventilator-days to less than 2 cases per 1,000 ventilator-days. To date, this rate has been maintained because we have continued to use our infection prevention protocol. We suggest that a study comparing the use of twice-weekly chlorhexidine baths and topical mupirocin ointment to the anterior nares of patients with the use of daily chlorhexidine baths be performed to determine whether daily washes are necessary and whether the rate of MRSA VAP is reduced. Daily washes with chlorhexidine are expensive and a lot of

work for healthcare workers, and the patient's skin may not be able to take the daily exposure to chlorhexidine.

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REFERENCES

1. Munos-Price L, Hota B, Stermer A, Weinstein RA. Prevention of bloodstream infections by use of daily chlorhexidine baths for patients at a long-term acute care hospital. *Infect Control Hosp Epidemiol* 2009;30(11):1031-1035.
2. Rumbak MJ, Cancio MR. Significant reduction in methicillin-resistant *Staphylococcus aureus* ventilator-associated pneumonia associated with the institution of a prevention protocol. *Crit Care Med* 1995;23(7):1200-1203.

Reply to Rumbak and Cancio

To the Editor—We would like to thank Rumbak and Cancio¹ for their comments. In our recently published study,² we found that bathing patients with chlorhexidine did not have an impact on the incidence of ventilator-associated pneumonia (VAP), and this finding might be due to the type of underlying organisms causing VAP at our institution.

On January 1, 2007, a VAP prevention bundle was implemented at our institution that consisted of healthcare workers making daily multidisciplinary rounds, which consisted of checking for elevation of the head of the bed at 30°–45°, oral care every 4 hours, and the use of proton-pump inhibitors. After the institution of this bundle, the VAP rates significantly decreased from 6.16 to 0.52 cases of VAP per 1,000 ventilator-days (rate ratio, 0.8; $P = .02$). Furthermore, during the 20-month period of our observations, 15 (94%) of 16 cases of

VAP at our long-term acute care hospital were caused by gram-negative rods, especially *Acinetobacter baumannii*. Only 1 case of VAP (7%) was due to methicillin-resistant *Staphylococcus aureus*. Moreover, during the 4-year period of surveillance for colonization at our long-term acute care hospital, the rate of nasal colonization with methicillin-resistant *S. aureus* (6%) was lower than the rate of stool colonization with other multidrug-resistant organisms (rate of stool colonization with vancomycin-resistant enterococci, 38%; rate of stool colonization with extended-spectrum β -lactamase-producing strains of gram-negative rods, 9%).

Furthermore, Vernon et al³ found that the skin condition of patients improved when they were bathed with cloths saturated with 2% chlorhexidine, compared with patients who were bathed with regular soap and water. Because patients in acute care settings require daily cleaning, we favor the use of chlorhexidine-saturated cloths for daily disinfection.

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REFERENCES

1. Rumbak M, Cancio M. Prevention of infection caused by gram-positive bacteria in the bloodstream and lungs. *Infect Control Hosp Epidemiol* 2010;31(8):879-880 (in this issue).
2. Munoz-Price LS, Hota B, Stermer A, Weinstein RA. Prevention of bloodstream infections by use of daily chlorhexidine baths for patients at a long-term acute care hospital. *Infect Control Hosp Epidemiol* 2009;30(11):1031-1035.
3. Vernon MO, Hayden MK, Trick WE, Hayes RA, Blom DW, Weinstein RA; Chicago Antimicrobial Resistance Project (CARP). Chlorhexidine gluconate to cleanse patients in a medical intensive care unit: the effectiveness of source control to reduce bioburden of vancomycin-resistant enterococci. *Arch Intern Med* 2006;166(3):306-312.