

Clinical Summary:

The effect of daily bathing with chlorhexidine on the acquisition of methicillin-resistant *Staphylococcus aureus*, vancomycin-resistant *Enterococcus*, and healthcare-associated bloodstream infections: results of a quasi-experimental multicenter trial

Climo MW, Sepkowitz KA, Zuccotti G, et al. Critical Care Medicine 2009 Jun; 37(6): 1858-1865.

Key Points

- Bloodstream infections (BSIs) are the leading cause of morbidity among intensive care unit (ICU) patients.
- Following the introduction of daily bathing with a 4% chlorhexidine solution, the acquisition of methicillin-resistant *Staphylococcus aureus* (MRSA) and vancomycin-resistant *Enterococcus* (VRE) decreased by 32% ($p = 0.046$) and 50% ($p = 0.008$), respectively.
- Bathing ICU patients with a 4% chlorhexidine solution was associated with a reduced risk of VRE bacteremia ($p = 0.035$), suggesting that reductions in colonization led to reductions in bloodstream infections.

Background

Up to 20% of patients admitted to ICUs develop a healthcare-associated infection (HAI) while in the hospital.¹ HAIs increase lengths of stay, healthcare costs, and patient morbidity and mortality.

The leading cause of morbidity among ICU patients is bloodstream infections (BSIs) These are most often associated with indwelling central venous catheters. There are several risk factors that can be addressed to help prevent catheter-associated infections.² For example, the risk of infection can be reduced with proper sterile technique³, which involves site preparation with an effective antimicrobial, such as chlorhexidine gluconate.

Bathing with chlorhexidine solution reduces residual skin organisms and inhibits their rebound growth. Chlorhexidine bathing has also been shown to reduce catheter-associated BSIs more effectively than other disinfectant products such as povidone and iodine.⁴⁻⁷ Chlorhexidine solution reduces colonization with pathogens such as MRSA and VRE, thus lowering the risk for horizontal transmission between healthcare workers and patients.

Objectives

This study sought to determine if the use of daily chlorhexidine bathing would decrease the incidence of colonization and BSIs due to MRSA and VRE among ICU patients.

Design

This was a multicenter, before-after interventional design completed in six ICUs at four major tertiary care referral hospitals (The Johns Hopkins Hospital, Baltimore, MD; Memorial Sloan-Kettering Cancer Center, New York, NY; Barnes-Jewish Hospital, St. Louis, MO; and Hunter Holmes McGuire Veteran Affairs Medical Center, Richmond, VA). The work was completed as part of a collaborative research project funded by the Centers for Disease Control and Prevention to investigate new strategies to prevent HAIs.

During a six month baseline period, patients were bathed routinely with non-medicated soap and water. During the six month intervention period, all admitted patients were bathed daily with 4% chlorhexidine gluconate solution and warm water from the neck down, avoiding contact with the face, all mucous membranes and wounds, as recommended by the manufacturer.

Changes in the incidences of MRSA and VRE colonization and BSI were evaluated by Poisson and segmented regression modeling.

Results

Over a 12 month study period, there were 5,293 admissions to the six study ICUs that included 5,043 patients.

Bathing patients with 4% chlorhexidine gluconate solution was associated with reductions in the acquisition of MRSA by 32% ($p = 0.046$) and of VRE by 50% ($p = 0.008$).

Analysis showed that bacteremias caused by VRE significantly decreased ($p = 0.02$) upon implementation of daily chlorhexidine bathing. Patients colonized with VRE that were bathed with chlorhexidine solution had a lower risk of developing VRE bacteremia ($p = 0.035$), suggesting that reductions in colonization led to reductions in BSIs.

Conclusion

Daily chlorhexidine bathing among ICU patients may reduce the acquisition of MRSA and VRE. The use of chlorhexidine gluconate solution is simple to implement and inexpensive, and it may be an important adjunctive intervention to barrier precautions to reduce the acquisition of MRSA and VRE, and the subsequent development of healthcare-associated BSIs.



References 1. Legras A, Malvy D, Quinioux AI, et al. *Intensive Care Med* 1998; 24: 1040-1046. 2. Raad I. *Lancet* 1998; 351:893-898. 3. Raad II, Hohn DC, Gilbreath BJ, et al. *Infect Control Hosp Epidemiol* 1994; 15:231-238. 4. Hospital Infection Control Practices Advisory Committee. *Am J Infect Control* 1996; 24:277-293. 5. Chaiyakunapruk N, Veenstra DL, Lipsky BA, et al. *Clin Infect Dis* 2003; 37:764-771. 6. Chaiyakunapruk N, Veenstra DL, Lipsky BA, et al. *Ann Intern Med* 2002; 136:792-801. 7. Crnich CJ, Maki DG. *Clin Infect Dis* 2002; 34:1232-1242.

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