

Reporting Program. CDC will continue to provide tools for these patient safety efforts, and NHSN will evolve to help reduce the burden of data collection and inconsistencies between data collectors.

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REFERENCES

- Anderson DJ, Miller BA, Chen LF, et al. The network approach for prevention of healthcare-associated infections: long-term effect of participation in the duke infection control outreach network. *Infect Control Hosp Epidemiol* 2011;32(4):315-322.
- Burton DC, Edwards JR, Horan TC, Jernigan JA, Fridkin SK. Methicillin-resistant *Staphylococcus aureus* central line-associated bloodstream infections in US intensive care units, 1997-2007. *JAMA* 2009;301(7):727-736.
- Centers for Disease Control and Prevention. Reduction in central line-associated bloodstream infections among patients in intensive care units: Pennsylvania, April 2001-March 2005. *Morb Mortal Wkly Rep* 2005;54(40):1013-1016.
- Centers for Disease Control and Prevention. Vital signs: central line-associated blood stream infections: United States, 2001, 2008, and 2009. *Morb Mortal Wkly Rep* 2011;60(8):243-248.
- Centers for Medicare and Medicaid Services. *Hospital inpatient quality reporting program*. Centers for Medicare and Medicaid Services Web site. http://www.cms.gov/HospitalQualityInits/08_HospitalRHQDAPU.asp. Accessed May 3, 2011.
- Backman LA, Melchreit R, Rodriguez R. Validation of the surveillance and reporting of central line-associated bloodstream infection data to a state health department. *Am J Infect Control* 2010;38:832-838.
- Maryland Health Care Commission. *Central line-associated blood stream infections: data quality review and chart audit, June 2010*. Maryland Health Care Commission Web site. http://mhcc.maryland.gov/healthcare_associated_infections/hai/clabsi_final_rpt_20100618.pdf. Published 2010. Accessed May 19, 2011.
- New York State Department of Health. *Hospital-acquired infection reporting system pilot year: 2007*. New York State Department of Health Web site. http://www.health.ny.gov/statistics/facilities/hospital/hospital_acquired_infections/2007/docs/hospital-acquired_infection-full_report.pdf. Published June 30, 2008. Accessed May 19, 2011.
- Soe MM, Kainer MA. Sustainable, cost-effective internal data validation of healthcare associated infections surveillance reported to the National Healthcare Safety Network [NHSN]. In: *Final Program of the 5th Decennial International Conference on Healthcare-Associated Infections*. Atlanta, GA: March 18-22, 2010. Abstract 81.
- Kainer MA, Mitchell J, Frost BA, Soe MM. Validation of central line associated blood stream infection [CLABSI] data submitted to the National Healthcare Safety Network [NHSN]: a pilot study by the Tennessee Department of Health [TDH]. In: *Final Program of the 5th Decennial International Conference on Healthcare-Associated Infections*. Atlanta, GA: March 18-22, 2010. Abstract 456.
- US Department of Health and Human Services. *HHS action plan to prevent healthcare-associated infections*. US Department of Health and Human Services Web site. <http://www.hhs.gov/ash/initiatives/hai/actionplan/index.html>. Accessed May 3, 2011.
- Centers for Disease Control and Prevention. *NHSN training*. Centers for Disease Control and Prevention Web site. <http://www.cdc.gov/nhsn/training.html>. Published 2006. Accessed May 3, 2011.
- Centers for Disease Control and Prevention. *NHSN newsletters*. Centers for Disease Control and Prevention Web site. http://www.cdc.gov/nhsn/PDFs/Newsletters/NHSN_NL_OCT_2010SE_final.pdf. Accessed May 3, 2011.

Intolerance of Chlorhexidine as a Skin Antiseptic in Patients Undergoing Hemodialysis

To the Editor—Bloodstream infections (BSIs) are an important problem among patients undergoing hemodialysis. Current estimates suggest that there were about 37,000 access-related BSIs among hemodialysis patients with central lines in 2008.¹ This number is similar to the estimated 41,000 central line-associated BSIs that occurred in all US hospital patients in 2009. In addition, rates of hospitalization for bacteremia/septicemia have increased 47% among hemodialysis patients from 1993 to 2008.² A number of interventions have been recommended to prevent access-related BSIs, particularly among patients who have central lines. One important recommendation is the use of chlorhexidine gluconate (>0.5%) with alcohol as the first-line skin antiseptic for routine care of central line insertion sites, on the basis of evidence that it is superior to alternative antiseptics.³ Further, 2% chlorhexidine with 70% alcohol is also recommended by the National Kidney Foundation's Kidney Disease Outcomes Quality Initiative as 1 of 3 options for skin antiseptics for subcutaneous arteriovenous (AV) access.⁴

Chlorhexidine appears to be generally well tolerated. There

TABLE 1. Median Percentage of Chlorhexidine-Intolerant Patients per Facility by Access Type and Percentage of Facilities with Chlorhexidine Intolerance in More Than 10% and 25% of Patients

Access type	No. of facilities reporting data	Median (range) patients per facility	Chlorhexidine-intolerant patients per facility		No. (%) of facilities with	
			Median (%)	Range (%)	>10% chlorhexidine-intolerant patients	>25% chlorhexidine-intolerant patients
Central line	18	16 (6–31)	0.5 (2)	0–8 (0–53)	7 (39)	4 (22)
AV fistula	10	14 (0–59)	3.5 (18)	0–21 (0–62)	7 (70)	2 (20)
AV graft	8	2 (0–10)	0.5 (15)	0–3 (0–50)	4 (50)	4 (50)

NOTE. AV, arteriovenous.

are rare reports of serious hypersensitivity reactions related to topical chlorhexidine use or following exposure to chlorhexidine-impregnated devices.^{5,6} Skin inflammation was reported in 15% and 27% of patients, respectively, who participated in 2 studies of chlorhexidine; however, neither study identified any local or systemic hypersensitivity reactions.^{7,8} Outside of research studies, it is unclear how the use of chlorhexidine is limited by reactions to this agent and how perceived intolerance to chlorhexidine varies between facilities. In order to better understand the prevalence of perceived chlorhexidine intolerance, we queried groups participating in the CDC Dialysis BSI Prevention Collaborative about their experience with this antiseptic.

We provided questionnaires to 5 groups in the collaboration who agreed to participate in this evaluation. The instrument consisted of 24 questions from the following domains: facility demographics, facility chlorhexidine use practices, and prevalence of chlorhexidine-intolerant patients. Intolerance to chlorhexidine was simply defined as a patient who was eligible to receive chlorhexidine for skin antisepsis but who was unable to use this antiseptic because of a perceived adverse reaction. The questionnaire was primarily designed to determine how many of a facility's active patients were unable to receive chlorhexidine for skin antisepsis on the basis of the facility's own criteria. We did not evaluate those criteria or impose uniform criteria on respondents. Analyses were stratified by vascular access type (ie, central line, AV graft, or AV fistula).

Five individuals were queried and responded from March 25, 2011 to April 26, 2011. They reported information from 18 facilities that cared for 586 patients. Overall, all 18 facilities used chlorhexidine for skin antisepsis for patients who had central lines (290 patients), 10 used chlorhexidine for patients who had AV fistulae (256 patients), and 10 used chlorhexidine for patients who had AV grafts; however, 2 facilities had no patients with AV grafts who were currently receiving chlorhexidine, and this reduced the evaluable number of facilities in that category to 8 (40 patients). For patients who had central lines, 1 facility used 2% aqueous chlorhexidine, 14 used 2% chlorhexidine with 70% alcohol, and 3 used 4% chlorhexidine with 4% alcohol. For patients who had AV fistulae, 7 facilities used 2% chlorhexidine with 70% alcohol and 3 used 3.15% chlorhexidine with 70% alcohol. For pa-

tients who had AV grafts, 6 facilities used 2% chlorhexidine with 70% alcohol and 2 used 3.15% chlorhexidine with 70% alcohol.

Overall, 97 of 586 patients (17%) were unable to use chlorhexidine because of perceived intolerance. This included 35 (12%) of 290 patients with central lines, 53 (21%) of 256 patients with AV fistulae, and 9 (23%) of 40 patients with AV grafts (*P* for difference between 3 groups = .02). When stratified by access type, there was a high level of variability in the proportion of patients per facility who were unable to use chlorhexidine because of a perceived intolerance (Table 1). In addition, more than 25% of patients were intolerant to chlorhexidine in a sizable proportion of facilities (Table 1).

These data suggest that in the Centers for Disease Control and Prevention (CDC) Dialysis BSI Prevention Collaborative, perceived chlorhexidine intolerance is not uncommon and is found more commonly among patients with AV grafts and AV fistulae than among patients with central lines. In addition, the proportion of patients in each facility who had perceived chlorhexidine intolerance varied from 0 to about one-half of eligible patients. This level of heterogeneity suggests that variations in practices among facilities might explain some of the intolerance and implies that more standardized practices might improve chlorhexidine use. However, as we did not assess each facility's threshold for discontinuing chlorhexidine use, differences in those criteria might also explain some of the variability in chlorhexidine intolerance we observed.

As chlorhexidine is an important agent for skin antisepsis, further work is needed to clarify practices that will increase the number of patients who are able use this agent. This includes better defining what constitutes a significant adverse reaction. In this evaluation, we were unable to assess differences in adverse reactions between chlorhexidine products and we do not know whether the level of chlorhexidine intolerance was different than that observed for other skin antiseptics. Preliminary work in facilities in the CDC collaborative that followed this evaluation suggests that ensuring that the chlorhexidine had time to dry prior to covering it with an occlusive dressing and less vigorous scrubbing of the skin during chlorhexidine application were associated with a decrease in adverse reactions. A better understanding of the

issues surrounding perceived intolerance has the potential to lead to increased use of chlorhexidine and decreases in BSIs among patients receiving hemodialysis.

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REFERENCES

- Centers for Disease Control and Prevention. Vital signs: central line-associated blood stream infections: United States, 2001, 2008 and 2009. *MMWR Morb Mortal Wkly Rep* 2011;60:243–248.
- US Renal Data System. *USRDS 2010 Annual Data Report: Atlas of Chronic Kidney Disease and End-Stage Renal Disease in the United States*. Bethesda, MD: National Institutes of Health, National Institute of Diabetes and Digestive and Kidney Diseases; 2010.
- O'Grady NP, Alexander M, Burns LA, et al. Guidelines for the prevention of intravascular catheter-related infections. *Clin Infect Dis* 2011;52:e162–e193.
- National Kidney Foundation. *KDOQI clinical practice guidelines and clinical practice recommendations: 2006 updates: hemodialysis adequacy, peritoneal dialysis adequacy, vascular access*. New York: National Kidney Foundation; 2006. http://www.kidney.org/Professionals/kdoqi/guideline_upHD_PD_VA/index.htm. Accessed June 10, 2011.
- Food and Drug Administration. *FDA public notice: potential hypersensitivity reactions to chlorhexidine-impregnated medical devices*. <http://www.fda.gov/MedicalDevices/Safety/AlertsandNotices/PublicHealthNotifications/ucm062306.htm>. Accessed June 10, 2010.
- Garvey LH, Roed-Petersen J, Husum B. Anaphylactic reactions in anaesthetized patients: four cases of chlorhexidine allergy. *Acta Anaesthesiol Scand* 2001;45:1290–1294.
- Mimoz O, Villeminey S, Ragot S, et al. Chlorhexidine-based antiseptic solution vs alcohol-based povidone-iodine for central venous catheter care. *Arch Intern Med* 2007;167:2066–2072.
- Valles J, Fernandez I, Alcaraz D, et al. Prospective randomized trial of 3 antiseptic solutions for prevention of catheter colonization in an intensive care unit for adult patients. *Infect Control Hosp Epidemiol* 2008;29:847–853.