Hospital Bath Basins are Frequently Contaminated with Multi-Drug Resistant Human Pathogens

School of Medicine

Dror Marchaim, MD; Odaliz Abreu-Lanfranco, MD; Alexis R. Taylor, MS; Suchitha Bheemreddy, MD; Bharath Sunkara, MD; Ashish Bhargava, MD; Palaniappan Manickam, MD, MPH; Judy Moshos, BS-MT; Thomas Chevalier, BS-MT; Connie G. Bohlinger, MS; Paula Robinson, BS-MT; Jacqueline I. Han, BS-MT; Beth Toftey, BS-MT; Kristin Rice, MPH; Beth Dziekan, MS; Lynn Semproch, BS-MT; Katherine Preney, BS-MT; Elaine Flanagan, MSA; Kayoko Hayakawa, MD, PhD; Teena Chopra, MD;, Jason M. Pogue, PharmD; Paul R. Lephart, PhD; Sorabh Dhar, MD; Keith S. Kaye, MD, MPH ■ Division of Infectious Diseases, Wayne State University, Detroit Medical Center, Detroit, MI

BACKGROUND

Hospital-acquired infections are the primary complication of hospital stay, accounting for an estimated 1.7 million infections and 99,000 associated deaths annually in the United States.[1] Environmental contamination of hospitals with nosocomial pathogens contributes to the transmission and spread of pathogens within the hospital setting.[2] Environmental surfaces are increasingly recognized as a potential source of nosocomial infection,[3] yet the role of bath basins as reservoirs for hospital-acquired pathogens has not been studied thoroughly.

Bath basins may be a reservoir for pathogens. Improper use of bath basins may contribute to the transmission of hospital-acquired infections (Figure 1).

Figure I: Bath Basin can be reservoir for pathogens

Support for this study was provided in part by Sage Products, Inc.

RESULTS

Overall, 1103 basins were sampled during the study period, and 62.2% were contaminated with 1 or more of the following: *Enterococcus* species, *Staphylococcus aureus*, or Gram-negative bacilli. A total of 385 (34.9%) basins from 80 (90.9%) hospitals were colonized with VRE, 36 (3.3%) basins from 28 (31.8%) hospitals were colonized with MRSA, and 495 (44.9%) basins from 86 (97.7%) hospitals were colonized with Gram-negative bacilli (Table I).

CONCLUSIONS

Bath basins frequently harbor pathogens associated with nosocomial infection. Multidrug-resistant organisms such as VRE and MRSA show a high rate of contamination of hospital bath basins. Hospital bath basins could be a potential source for the transmission of multidrug-resistant organisms.

PREVENTION STRATEGIES

The identification of bath basins as a reservoir of multidrug-resistant organisms warrants heightened safety precautions:

- Handle basins with gloves only.
- Avoid temporary storage of other medical equipment in basins.
- Store basins properly, in a uniform place in patient room.

Stringent methods to curb the incidence of hospital-acquired infections should also include:

- Basins should be perceived like carriers of multidrug-resistant organisms.
- Replacement of basin with disposable alternatives should be studied.[3,4]

REFERENCES

1. Fact Sheet: AHRQ's Efforts to Prevent and Reduce Healthcare-Associated Infections. http://www.ahrq.gov/qual/haiflyer.htm. Updated October 2010. Accessed March 2, 2011.
2. Weber DJ, Rutala WA, Miller MB, Huslage K, Sickbert-Bennett E. Role of hospital surfaces in the transmission of emerging health care-associated pathogens: norovirus, Clostridium difficile, and Acinetobacter species. *Am J Infect Control.* 2010;38(5 Suppl 1):S25–S33.
3. Johnson D, Lineweaver L, Maze LM. Patients' bath basins as potential sources of infection: a multicenter sampling study. *Am J Crit Care.* 2009;18(1):31–38, 41.
4. Larson EL, Ciliberti T, Chantler C, et al. Comparison of traditional and disposable bed baths in critically ill patients. *Am J Crit Care.* 2004;13(3):235–241.

21529

Reprints provided compliments of Sage Products, Inc.
800-323-2220 • www.sageproducts.com

STUDY AIM

To investigate the role of bath basins as potential reservoirs of common multidrug-resistant organisms associated with nosocomial outbreaks.

Common hospital-acquired pathogens include:

- *Staphylococcus aureus* including methicillin-resistant *S. aureus* (MRSA)
- *Enterococcus* species including vancomycin-resistant *Enterococcus* (VRE)
- Gram-negative bacteria, including *Acinetobacter baumannii, Pseudomonas aeruginosa, Klebsiella pneumoniae, Legionella pneumophila, Escherichia coli,* and other enteric pathogens

METHODS

A prospective, multicenter trial involving 88 hospitals from 25 states within the United States and 4 Canadian providences was conducted from July 2007 to February 2011. Local infection preventionists randomly cultured basins used in intensive care units and patient floors with the use of a standardized, uniform collecting method. An external central laboratory, blinded to the origin of the samples, conducted all microbiologic processing in accordance with Clinical and Laboratory Standards Institute criteria (Figure 2).

Figure 2: Microbiology Processing Flow Chart

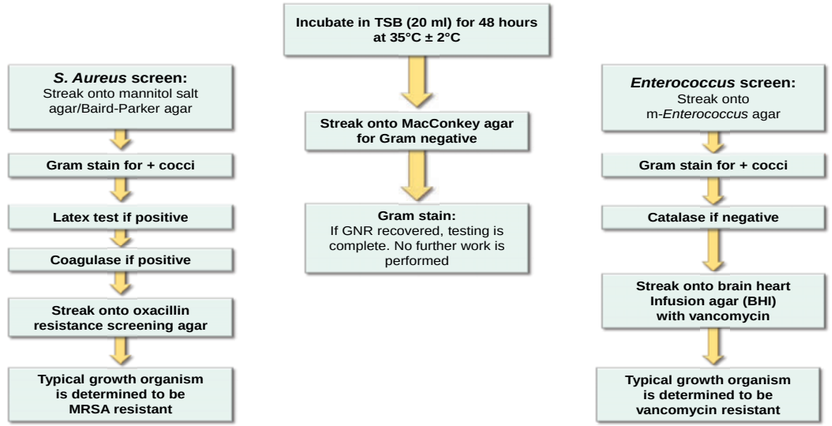

Table I: Pathogens cultured from bath basins in the United States and Canada (N = 1103)

Pathogen		No. of positive basins (N=1103)	No. of positive hospitals (N=88)
Staphylococcus aureus	Methicillin-susceptible *Staphylococcus aureus*	4 (0.4%)	4 (4.5%)
	Methicillin-resistant *Staphylococcus aureus*	36 (3.3%)	28 (31.8%)
***Enterococcus* species**	Vancomycin-susceptible *Enterococcus*	29 (2.7%)	14 (15.9%)
	Vancomycin-resistant *Enterococcus*	385 (34.9%)	80 (90.9%)
Gram-negative Bacilli		495 (44.9%)	86 (97.7%)
Any growth[A]		686 (62.2%)	88 (100%)

Data are presented as number (%) of the total number listed in column heading.

[A] Only growth of one of these 5 classes of bacteria was included: 1) *Enterococcus* species (not necessarily resistant to vancomycin); 2) S. *aureus* (not necessarily resistant to methicillin); or 3) Gram-negative bacilli.