study were indistinguishable by PFGE and were isolated from the same ward (one from a patient room and the other from the men's toilet in the obstetrics and gynecology department). However, there were no reported hospital infections or outbreaks attributable to this microorganism in this ward in the 3 months before and the 3 months after the study period.

During the study, it was observed that some of the staff responsible for cleaning the units did not wash the containers during replenishment of the soap, and they refilled the containers before they were totally empty. Infrequent replenishment of soap in particular units was also observed. There were some containers with open or spoiled lids, especially in the toilets, that seemed to be another route for extrinsic contamination. The head doctor, the directors, the supervisors, and the staff were informed about the rate and risks of contamination in our hospital, and the staff were re-educated to prevent any hospital infection due to soap contamination.

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 0899-823X/2010/3111-0019$15.00. DOI: 10.1086/657077

REFERENCES

1. Hegde PP, Andrade AT, Bhat K. Microbial contamination of "in use" bar soap in dental clinics. *Indian J Dent Res* 2006;17:70–73.
2. Afolabi BA, Oduyebo OO, Ogunsola FT. Bacterial flora of commonly used soaps in three hospitals in Nigeria. *East Afr Med J* 2007;84:489–495.
3. Brooks SE, Walczak MA, Malcolm S, Hameed R. Intrinsic *Klebsiella pneumoniae* contamination of liquid germicidal hand soap containing chlorhexidine. *Infect Control Hosp Epidemiol* 2004;25:883–885.
4. Archibald LK, Corl A, Shah B, et al. *Serratia marcescens* outbreak associated with extrinsic contamination of 1% chlorxylenol soap. *Infect Control Hosp Epidemiol* 1997;18:704–709.
5. McBride ME. Microbial flora of in-use soap products. *Appl Environ Microbiol* 1984;48:338–341.
6. Fanci R, Bartolozzi B, Sergi S, et al. Molecular epidemiological investigation of an outbreak of *Pseudomonas aeruginosa* infection in an SCT unit. *Bone Marrow Transplant* 2009;43:335–338.
7. Buffet-Bataillon S, Rabier V, Bétrémieux P, et al. Outbreak of *Serratia marcescens* in a neonatal intensive care unit: contaminated unmedicated liquid soap and risk factors. *J Hosp Infect* 2009;72:17–22.
8. Sartor C, Jacomo V, Duvivier C, Tissot-Dupont H, Sambuc R, Drancourt M. Nosocomial *Serratia marcescens* infections associated with extrinsic contamination of a liquid nonmedicated soap. *Infect Control Hosp Epidemiol* 2000;21:196–199.
9. Durmaz R, Otlu B, Köksal F, et al. The optimization of a rapid pulsed-field gel electrophoresis protocol for the typing of *Acinetobacter baumannii, Escherichia coli* and *Klebsiella* spp. *Jpn J Infect Dis* 2009;62:372–377.

Hydrogen Peroxide Vapor Is Not the Same as Aerosolized Hydrogen Peroxide

To the Editor—We read with interest the letter by Po and Carling[1] calling for additional investigation of room decontamination processes. In their critique of the study by Barbut et al,[2] Po and Carling state that "the average residual *[Clostridium] difficile* contamination rate of 2.6% in 3 studies of hydrogen peroxide vapor (HPV) published to date is essentially identical to the 1.8% residual contamination found by Eckstein and colleagues."[1, p776] However, it is important to note that the study by Boyce et al[3] was conducted using Bioquell hydrogen peroxide vapor (HPV), and the studies by Barbut and colleagues and by Shapey et al[4] were conducted using the Sterinis aerosolized hydrogen peroxide (aHP) system. The Bioquell HPV system generates a vapor from 30% w/w hydrogen peroxide solution, which is sporicidal, active against a wide range of hospital pathogens, and an Environmental Protection Agency (EPA)–registered sterilant.[3,5] The Bioquell process produces hydrogen peroxide vapor (gas) with a particle size of less than 1 micron in size. Therefore, HPV is considered a fumigant by the EPA.[6] The vapor from this system is completely dispersed throughout the room, and at the end of the process, the HPV is broken down catalytically to water vapor and oxygen.[7]

In contrast, the Sterinis aHP system produces a fine mist by aerosolizing a solution containing 5% w/w hydrogen peroxide, less than 50 ppm silver ions, less than 50 ppm phosphoric acid, less than 1 ppm arabica gum, and 95% bi-osmotic water.[2] Because the product is applied as an aerosol composed of charged particles ranging from 8 to 12 microns in diameter,[2,4,8] it is likely that the EPA would consider this process to be a fogging application rather than a fumigation process (Timothy Dole, EPA; personal communication, January 6, 2009). After exposure, the aerosol is left to decompose spontaneously.[2,4]

Published literature indicates a substantial difference in the microbiological impact of the 2 systems. For example, a study by Andersen et al[8] demonstrated that 13% of 146 *Bacillus atrophaeus* biological indicators remained viable after exposure to 3 Sterinis aHP cycles; all biological indicators grew if fewer than 3 cycles were used. In contrast, *Geobacillus stearothermophilus* biological indicators are completely inactivated by 1 Bioquell HPV cycle and are routinely used to verify cycle efficacy.[3] In studies of in vitro efficacy against *C. difficile* spores, the Bioquell HPV system resulted in a more than 6-

log reduction,[5] whereas the Sterinis aHP system resulted in an approximately 4-log reduction.[2] Similarly, in the studies cited by Po and Carling,[1] only the Bioquell HPV system resulted in complete inactivation of *C. difficile* from hospital surfaces.[3] In the studies of the Sterinis aHP system by Shapey et al[4] and Barbut et al,[2] *C. difficile* was cultured from 2.9% of 383 surfaces, with 1 or more positive culture results from 32% of the 25 rooms studied.[7] Therefore, because of the fundamental differences in the disinfecting solution, delivery method, and microbiological impact, we believe that it is inappropriate to group together data from the 2 systems or to refer to them both as "HPV."[1]

Po and Carling also state that "we also believe that the conclusion by Otter et al. that HPV technology should be considered for routine use to decontaminate patient rooms is premature,"[1, p 776–777] whereas our conclusion[9] from the study cited was that the use of HPV decontamination for selected patient rooms after patient discharge is feasible in a busy hospital. Currently, 3 studies have provided evidence that the use of HPV for selected patient rooms is associated with superior microbial efficacy over conventional cleaning and that it reduced acquisition of hospital pathogens. HPV was found to be associated with a significant reduction in *C. difficile* infection by Boyce et al[3] and with a significant reduction in the risk of acquiring vancomycin-resistant enterococci by Passaretti et al.[10] Most recently, Manian et al[11] reported statistically significant reductions in the year-on-year incidence of vancomycin-resistant enterococcal infection (a 50% reduction; $P < .001$) and *C. difficile* infection (a 42% reduction; $P < .001$) and large but not significant reductions in the incidence of methicillin-resistant *Staphylococcus aureus* infection (a 24% reduction; $P = .059$) and multidrug-resistant *Acinetobacter baumannii-calcoaceticus* infection (a 54% reduction; $P = .2$) associated with the implementation of HPV.

Therefore, we believe that the use of HPV decontamination for selected rooms should indeed be considered along with other innovative methods, such as other whole-room disinfection methods and methods to improve the conventional cleaning (eg, adeno triphosphate bioluminescence and the Dazo method devised by Dr Carling),[7] to improve hospital cleaning and disinfection. We echo the conclusion of Po and Carling[1] that additional investigation of room decontamination processes through well-designed—and, preferably, head-to-head—studies of microbiological and clinical impact is needed.

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 0899-823X/2010/3111-0020$15.00. DOI: 10.1086/657076

REFERENCES

1. Po JL, Carling PC. The need for additional investigation of room decontamination processes. *Infect Control Hosp Epidemiol* 2010;31:776–777.
2. Barbut F, Menuet D, Verachten M, Girou E. Comparison of the efficacy of a hydrogen peroxide dry-mist disinfection system and sodium hypochlorite solution for eradication of *Clostridium difficile* spores. *Infect Control Hosp Epidemiol* 2009;30:515–517.
3. Boyce JM, Havill NL, Otter JA, et al. Impact of hydrogen peroxide vapor room decontamination on *Clostridium difficile* environmental contamination and transmission in a healthcare setting. *Infect Control Hosp Epidemiol* 2008;29:723–729.
4. Shapey S, Machin K, Levi K, Boswell TC. Activity of a dry mist hydrogen peroxide system against environmental *Clostridium difficile* contamination in elderly care wards. *J Hosp Infect* 2008;70:136–141.
5. Otter JA, French GL. Survival of nosocomial bacteria and spores on surfaces and inactivation by hydrogen peroxide vapor. *J Clin Microbiol* 2009;47:205–207.
6. US Environmental Protection Agency. Compilation of available data on building decontamination alternatives. Office of Research and Development. Washington, DC: National Homeland Security Research Center; 2005.
7. Boyce JM. New approaches to decontamination of rooms after patients are discharged. *Infect Control Hosp Epidemiol* 2009;30:515–517.
8. Andersen BM, Rasch M, Hochlin K, Jensen FH, Wismar P, Fredriksen JE. Decontamination of rooms, medical equipment and ambulances using an aerosol of hydrogen peroxide disinfectant. *J Hosp Infect* 2006;62:149–155.
9. Otter JA, Puchowicz M, Ryan D, et al. Feasibility of routinely using hydrogen peroxide vapor to decontaminate rooms in a busy United States hospital. *Infect Control Hosp Epidemiol* 2009;30:574–577.
10. Passaretti CL, Otter JA, Lipsett P, et al. Adherence to hydrogen peroxide vapor (HPV) decontamination reduces VRE acquisition in high-risk units. In: *Program and abstracts of the 48th Annual Interscience Conference on Antimicrobial Agents and Chemotherapy and the Infectious Diseases Society of America.* ICAAC and IDSA, 2008. Abstract K4124b.
11. Manian FA. Manian F, Griesenauer S, Senkel D. Impact of an intensive terminal cleaning and disinfection (C/D) protocol involving selected hospital rooms on endemic nosocomial infection (NI) rates of common pathogens at a tertiary care medical center. In: *Program and abstracts of the 5th Decennial Meeting of the Society for Healthcare Epidemiology of America (SHEA).* Arlington, VA: SHEA, 2010. Abstract LB6.

High Clonal Diversity of *Staphylococcus aureus* Isolates in Nasal Swab Samples of Medical Students in Turkey

To the Editor—Hospital personnel who are colonized with