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## The Need for Additional Investigation of Room Decontamination Processes

*To the Editor*—Given the known effectiveness of bleach in killing spores of *Clostridium difficile*,<sup>1</sup> as well as the finding by Barbut et al<sup>2</sup> of a 3.5-log reduction in viable *C. difficile* spores after 5 minutes of exposure to 0.5% sodium hypochlorite solution, it is unfortunate that Barbut and colleagues were unable to more objectively evaluate the thoroughness of environmental hygiene practice before concluding that the clinical use of a hydrogen peroxide dry-mist disinfection system is “significantly more effective than 0.5% sodium hypochlorite solution at eradicating *C. difficile* spores.”<sup>2</sup> (p 507) Although the authors’ quick audit (not described further) of

compliance with disinfection procedures in 1 of the 2 study hospitals was found to be good, they specifically note that “the quality of the disinfecting process was not controlled during the study.”

We believe that Barbut and colleagues’ finding of a mere 50% decrease in spore contamination in bleach-treated rooms could have been the result of an “average” level of thoroughness of cleaning in the study hospitals rather than an intrinsic inferiority of the bleach system. We based this belief on published reports demonstrating that (1) suboptimal environmental hygiene is common in hospitals, as evidenced by the finding that only 48% and 44% of high-risk surfaces in 1,605 acute care hospital patient rooms and 100 intensive care unit rooms, respectively, were cleaned as part of routine terminal room disinfection in 2 independent studies;<sup>3,4</sup> and (2) application of a commercial cleaner disinfectant product containing 5,500 ppm sodium hypochlorite by research staff was very effective in eradicating *C. difficile* spores from commonly-touched environmental surfaces in the rooms of patients with *C. difficile* infection.<sup>5</sup> In fact, it is notable that the average residual *C. 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 ( $P>.99$ ) (Table 1).<sup>1,6,7</sup> Indeed, the fact that the latter study documented an overall reduction rate of 97% in environmental contamination, compared with an average of 89%, in the 3 studies of HPV raises the possibility that thorough environmental cleaning with a hypochlorite disinfectant may be at least as effective as HPV decontamination (Table 1).

Although innovative technologies may play a role in the environmental hygiene armamentarium, their logistical complexity as well as the equipment and personnel costs of these interventions make it imperative that independent or consortium-sponsored, objectively controlled studies be undertaken to clarify the true role of these technologies.<sup>8</sup> Such studies would be particularly important, given the evidence that improving routine hygienic practice can significantly decrease environmental contamination of “patient zone” surfaces<sup>4-10</sup> and reduce the transfer of healthcare-associated pathogens to susceptible patients.<sup>10</sup> Given the considerations above, we also believe that the conclusion by Otter et al<sup>8</sup> that HPV technology should be considered for routine use to

TABLE 1. The Impact of Hygienic Procedures on *Clostridium difficile* Environmental Cultures in Contaminated Patient Rooms

Variable	Study that used hydrogen peroxide vapor or dry mist for decontamination				Research staff application of cleaner disinfectant containing bleach <sup>a</sup>
	Boyce et al <sup>6</sup>	Shapey et al <sup>7</sup>	Barbut et al <sup>2</sup>	Total	
Before cleaning	11/43 (26)	48/203 (24)	34/180 (19)	93/409 (22)	30/54 (56)
After cleaning	0/37 (0)	7/203 (3.4)	4/180 (2.2)	11/420 (2.6) <sup>b</sup>	1/54 (1.8) <sup>b</sup>
Reduction in environmental contamination, %	100	86	88	89	97

NOTE. Data are proportion (%), unless otherwise indicated.

<sup>a</sup> Eckstein et al.<sup>5</sup>

<sup>b</sup>  $P>.99$ .

decontaminate patient rooms is premature, and we concur with Boyce et al<sup>6</sup> that additional investigation of room decontamination processes through well-designed studies is warranted.

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