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Brief report

A survey of environmental service workers' knowledge and opinions regarding environmental cleaning

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Environmental service workers play an important role in the prevention of health care-associated infections. Environmental service workers working at a Veterans Administration Medical Center completed the Environmental Service Workers' Knowledge and Opinions Regarding Environmental Cleaning Survey. The findings from this survey suggest the need for further education of environmental service workers regarding the different types of pathogens that are spread by contaminated environmental surfaces and which of these are killed with bleach.

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Health care-associated infections (HAIs) are the most common complication of hospital care, accounting for an estimated 1.7 million infections and 99,000 associated deaths annually.¹ The Centers of Disease Control and Prevention estimates that 1 out of every 20 hospitalized patients will contract an HAI.² HAIs are caused by a wide variety of common bacteria, fungi, and viruses acquired by patients while receiving treatment for other conditions. The estimated annual cost of HAIs in the United States is \$5-10 billion, a huge economic burden for both patients and US health care system.³

Environmental service workers play an important role in prevention of HAIs. Recent studies have demonstrated significant improvements in cleaning through interventions directed at environmental service workers.⁴⁻⁶ For optimal effectiveness, such interventions require that environmental service workers be knowledgeable about environmental disinfection and willing to receive constructive feedback on their cleaning performance. In the present study, we assessed environmental service workers' knowledge and opinions regarding environmental cleaning.

METHODS

Environmental service workers working on 9 patient care units at a Veteran's Administration Medical Center were asked to

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complete the Environmental Service Workers' Knowledge and Opinions Regarding Environmental Cleaning Survey. The survey, which took approximately 10 minutes to complete, was completed in person and was collected after completion. The results of the surveys were analyzed anonymously. The response rate to the survey was 81% (39 of 48 total possible environmental service workers who cleaned rooms on the designated 9 patient care units). The environmental service workers were assigned to specific units but rotated occasionally to other units. The 9 designated patient care units included 4 medical units, 1 surgical unit, 1 spinal cord/rehabilitation unit, and 3 long-term care units, each serving a diverse patient population. VA hospital data for 2010-2012 show rates of *C difficile* in the acute care units ranging from 11.59 cases per 10,000 patient bed-days of care to 20.61 cases per 10,000 patient bed-days (mean, 16.18 cases per 10,000 patient bed-days). *C difficile* infection rates on the long-term care units range from 4.1 cases per 10,000 patient bed-days to 10.5 cases per 10,000 patient-bed days (mean, 6.72 cases per 10,000 patient bed-days). The rates show fewer cases of *C difficile* on the long-term care units compared with the acute care units, possibly leading to the conclusion that those environmental service workers on the long-term care units may be less knowledgeable about multidrug-resistant organisms simply because they are not seen on these units.

The 8 survey questions were qualitative in nature, but the percentage of correct answers is presented quantitatively. One demographic question elicited years of experience as an environmental service worker. Knowledge questions covered pathogens, contamination, methicillin-resistant *Staphylococcus aureus*, and use of bleach. Opinion questions addressed the importance of environmental cleaning, education received about environmental

Table 1
Survey of environmental service workers' knowledge and opinions regarding environmental cleaning

Frequency	
1. Which pathogen is commonly spread by contaminated environmental surfaces?	
a. TB	1 (3%)
b. <i>C difficile</i> (correct answer)	4 (10%)
c. Flu	3 (8%)
d. All of the above	29 (74%)
e. None of the above	1 (3%)
f. No answer	1 (3%)
2. Health care workers' hands often become contaminated by bacteria after touching which of the following?	
a. Toilet seat	2 (5%)
b. Call button	3 (8%)
c. Patients' skin	2 (5%)
d. All of the above (correct answer)	32 (82%)
3. It is necessary to use bleach to kill which pathogen(s)?	
a. MRSA	3 (9%)
b. <i>C difficile</i> (correct answer)	6 (15%)
c. VRE	2 (5%)
d. All of the above	22 (56%)
e. None of the above	5 (13%)
f. No answer	1 (3%)
4. How long should a surface stay wet when using bleach?	
a. 5-10 seconds	10 (26%)
b. 1 minute	23 (59%)
c. 8-10 minutes (correct answer)	6 (15%)
5. How important do you think environmental cleaning is to prevent infections?	
a. Very important	36 (92%)
b. Somewhat important	2 (5%)
c. Not important	1 (3%)
6. How much education have you received on the importance of environmental cleaning to prevent infections?	
a. More than enough	21 (54%)
b. Just right amount	10 (26%)
c. Not enough	8 (21%)
d. None	0 (0%)
7. Which do you think are barriers to performing good housekeeping cleaning?	
a. Insufficient time to clean	12 (31%)
b. Poor communication regarding when rooms are ready for cleaning	17 (41%)
c. Inadequate cleaning supplies	6 (15%)
d. Inadequate education about cleaning	4 (10%)
8. How willing would you be to participate in a program in which your cleaning would routinely monitored and you would receive feedback on your cleaning performance? The information would not affect your work evaluations. Your individual cleaning results would be shared with you and your supervisors.	
a. Very willing	22 (56%)
b. Somewhat willing	12 (31%)
c. Not willing	3 (8%)
d. Unsure	1 (3%)
e. No answer	1 (3%)
Demographic variable: years of experience	
<5 years	16 (41%)
5-9 years	7 (18%)
>10 years	16 (41%)

cleaning, barriers to cleaning, and willingness to participate in a cleaning performance monitoring program. Frequencies and percentages of responses were calculated for each question in the survey.

Before the survey was administered in this study, it was piloted to 5 environmental service workers at the medical center, all with more than 5 years experience. These workers provided feedback about the survey, which prompted some revisions. Using a convenient sampling approach, these 5 workers were asked to review the original survey. In the original survey, some of the questions were of the "fill in the blank" type. The 5 workers all agreed that the multiple-choice questions would be a more acceptable and less

time-consuming format. Thus, the questions on the final survey were formatted as multiple-choice questions.

The survey has not yet been evaluated for test-retest reliability, but it has face validity. The questions can be reasonably expected to elicit information on the participant's knowledge and opinions about environmental cleaning. This study was approved by the Institutional Review Board at the Cleveland Veterans Medical Center.

RESULTS

Table 1 summarizes the survey results. Of the 39 environmental service workers who responded, 35 (90%) had 3 or more years of work experience. Four workers (10%) correctly answered the question about what pathogen is commonly spread by contaminated environmental surfaces. Thirty-two workers (82%) correctly answered the question about health care workers' hands and contamination by bacteria after touching objects. Six workers (15%) identified *C difficile* as the pathogen that is killed with bleach, and 6 (15%) knew how long a surface should remain wet when using bleach. Thirty-six workers (92%) believed that environmental disinfection is very important for infection prevention, and 21 (54%) felt that they had received more than enough education about the importance of environmental cleaning. Identified barriers to good environmental cleaning included poor communication regarding when rooms are ready for cleaning (n = 17; 41%), insufficient time for cleaning (n = 12; 31%), inadequate cleaning supplies (n = 6; 15%), and inadequate education about cleaning (n = 4; 10%). Thirty-four of the respondents (87%) were either very willing or somewhat willing to participate in a cleaning performance monitoring program.

A correlation analysis found no correlation ($R^2 = 0.0081$) between a worker's years of experience and total correct answers to the survey's knowledge questions. This finding suggests that all environmental service workers need to be educated about environmental cleaning regardless of their years of experience.

DISCUSSION

At the Cleveland Veterans Administration Medical Center, the environmental service workers receive mandatory training in infection control on a yearly basis, which covers such topics as standard precautions, transmission-based precautions, cleaning techniques, and discharge cleaning. In collaboration with the Infection Prevention and Control Committee, the Environmental Program Director is responsible for establishing effective cleaning methods, maintaining written policies and procedures, and selecting appropriate cleaning agents and equipment. The findings from this survey suggest the need for improved education of environmental service workers regarding the different types of pathogens that are spread by contaminated environmental surfaces and which of these are killed with bleach. This education should cover appropriate application of bleach and assessment of the adequacy of the time allotted for room cleaning. Video presentations and interactive demonstrations may be helpful educational strategies. The environmental service workers surveyed generally felt that they received more than enough education regarding the importance of environmental cleaning; however, they were willing to participate in an educational intervention to improve cleaning. This educational intervention needs to be implemented on a long-term basis, with continuous feedback to workers to promote best practices in environmental cleaning. Nursing staff and environmental service supervisors need to provide clear instructions on which rooms are ready to be cleaned and when rooms need to be cleaned. An enhanced communication pager system may help environmental service workers respond more promptly to requests

for room cleaning. Previous studies have illustrated that surface contamination with pathogens results from inadequate cleaning by environmental service workers, and that educational interventions aimed at these workers can result in improved environmental cleaning.⁷⁻⁹

Based on the findings of our survey, a monitoring performance program is currently underway to monitor environmental cleaning of environmental service workers on all of the 9 patient care units included in the study. The program entails placing fluorescent dye on high-touch surfaces via a cotton applicator in each room. After the room is cleaned, an ultraviolet flashlight is used to illuminate any remaining dye, indicating substandard cleaning, and results are recorded. Room numbers are used to track the cleaning periods throughout the 6-month study period, allowing identification of the environmental service workers assigned to the specific units. Results from this monitoring performance program will be reported to the Environmental Service Manager and environmental service workers for quality improvement purposes.

This study was limited by the small environmental service staff sample at one of the participating Veterans Administration Medical Centers. Including more environmental service workers from other sites would have strengthened the generalizability of our findings. Voluntary response bias is an issue for this study, given that the sample comprised selected volunteers, possibly leading to overrepresentation of individuals with strong opinions about environmental cleaning. The use of random sampling and a larger sample of environmental service workers would decrease the voluntary bias in this study. Notwithstanding these limitations, our data from

this survey contribute to the continuing discussion on how to better educate environmental service workers about environmental cleaning and about the different types of pathogens spread through contaminated environmental surfaces.

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