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Brief Report

Disinfection of noncritical equipment on units with high hospital-onset *Clostridium difficile* infections

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A B S T R A C T

We assessed barriers and knowledge of disinfection of noncritical items (NCIs) between intensive care unit (ICU) and non-ICU staff members. General understanding of cleaning NCIs was low across all staff. Non-ICU staff had a better understanding of who is responsible for disinfecting and where to access information on storing cleaned NCIs. Opportunities exist for heightened disinfection of NCIs through improved point-of-care instructional information, improved cleaning supply access, and increased instrument storage space.

Clostridium difficile (*C diff*) is a growing concern in many health care facilities, because its ability to exist in a vegetative, spore state allows it to be transmitted exogenously.[1] Disinfection of noncritical items (NCIs) (items that come into contact with intact skin only) and proper hand hygiene are crucial, because pathogens such as *C diff* are transmitted from patient to patient via the hands of hospital personnel and NCIs.

METHODS

We employed an anonymous, voluntary, 18-question survey with Likert scale and multiple-choice questions. The Likert scale question responses included non-numerical text anchors. Likert scale responses were converted into binary categories for the analysis by considering the top 2 answers as "yes" and the bottom 2 or 3 answers, depending on the scale used, as "no." After institutional review board approval, paper surveys were distributed to nursing and environmental services (EVS) staff of the 2 intensive care units (ICUs) and 2 non-ICUs with the highest number of nosocomial *C diff* infections from January through June 2017. The surveyed ICUs included the medical respiratory ICU and the surgical trauma ICU; the surveyed non-ICUs were cardiology and acute care oncology units. After completed surveys were collected, responses between the ICUs and non-ICUs were compared using the Pearson χ^2 test via Microsoft Excel (Microsoft, Richmond, VA).

RESULTS

A total of 146 surveys were collected by convenience sample, 49% (71/146) of which were from ICU staff and 51% (75/146) of which were from non-ICU staff. The overall survey response rate was 54% (146/269). Respondent breakdown was as follows: 76% nurses (111/146), 8% certified nurse aides (12/146), and 1% EVS staff (1/146), with 15% (22/146) of respondents neglecting to specify provider type. No statistically significant difference in responses was observed among health care provider types. The survey is available from the authors upon request. Responses to survey items between ICU and non-ICU staff are summarized in Table 1. Non-ICU staff were significantly more knowledgeable about personnel responsible for disinfecting NCIs (73%, $P \leq .001$) and where to access information on storage of cleaned NCIs (54%, $P \leq .001$). In total, 99% (145/146) of respondents across health care provider types and units agreed that equipment should be disinfected between usage by different patients, and 99% (145/146) agreed that equipment should be disinfected before being stored in a clean utility room. Additionally, 96% (140/146) of respondents thought that high-touch surfaces should be cleaned at least once a day. However, 47% (68/146) of respondents did not know how to determine shelf life for disinfectants, and 12% (17/146) did not know

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Table 1
Comparison between ICU and non-ICU units using the Pearson χ^2

Knowledge of	ICU	Non-ICU	*P* value
Who is responsible for disinfecting NCIs	47% (33/70)	73% (55/75)	.001*
Where to access information on storage of cleaned NCIs	45% (32/70)	54% (39/75)	<.001*
Where to store cleaned NCIs	86% (59/68)	93% (70/75)	.186
The difference in cleaning, decontaminating, sterilizing, and disinfecting	80% (56/70)	66% (50/75)	.070
Which disinfectant to use to clean different kinds of NCIs	87% (61/70)	77% (58/75)	.123
Where different types of disinfectants are stored/where to get them	80% (56/70)	82% (61/74)	.708
Where to access information regarding who cleans NCIs	86% (59/69)	93% (70/75)	.186

ICU, intensive care unit; *NCI*, noncritical item.
*Significant difference.

how to use different disinfectants to clean hospital equipment. In addition, 27% (30/146) did not know the difference between cleaning, sterilizing, disinfecting, and decontaminating. Furthermore, only 6% (9/146) of total respondents could correctly identify an NCI, and 4% (6/146) did not agree with cleaning high-touch surfaces at least once a day. Regarding disinfection barriers, 41% (60/146) of respondents reported that the biggest challenge in storing disinfected equipment was lack of space. Respondents also reported that the greatest barriers to disinfecting hospital equipment were lack of time (54%, 79/146), lack of supplies (20%, 29/146), and none (24%, 35/146).

DISCUSSION

Based on an anonymous, voluntary convenience sample survey, we report that the general understanding of effective cleaning was low in staff across all 4 surveyed units. We determined that compared with ICU staff, non-ICU personnel could better identify responsible staff members for disinfecting specific NCIs. The non-ICU staff were also more knowledgeable about where to access policy information regarding the storage of cleaned hospital equipment. Additionally, fewer than 50% of respondents knew where to access information regarding personnel responsible for cleaning NCIs. These findings suggest a lack of educational material about NCI classification and barriers to the access of information regarding NCI disinfection responsibilities, specifically in ICUs. Inadequate education on proper cleaning techniques has been reported in existing literature, specifically regarding EVS staff.[2] Further research is needed to better determine differences between ICU and non-ICU staff members regarding effective disinfection of NCIs and cleaning responsibilities.

The most substantial barrier to disinfection of NCIs was perceived lack of time. This finding is consistent with reported literature, including a prior study that examined the amount of time needed for 100% hand hygiene compliance in ICUs.[3] Lack of supplies was also reported to be a significant barrier to disinfecting NCIs. To eliminate barriers in cleaning of NCIs for both ICU and non-ICU staff, easily accessible, point-of-care information should be provided on disinfection responsibilities and classification of NCIs. Furthermore, facilities must address structural barriers, such as the lack of disinfection supplies and storage capacity, to encourage NCI disinfection.

Additionally, all health care providers should disinfect high-contact surfaces and NCIs located in contact precaution patient rooms at least once a day. Previous reports suggest that small numbers of pathogens are frequently acquired on health care personnel hands after contact with environmental surfaces, even with indirect patient contact.[4] In addition to increased access to educational materials, performance feedback on disinfection practices is needed in health care facilities. Lack of feedback about completed work by EVS staff is supported by existing literature.[2] Previous studies have reported the effectiveness of performance feedback to EVS and nursing staff regarding critical procedures in hand hygiene.[5,6]

To our knowledge, this is the first study to compare knowledge and disinfection practices of NCIs across ICU and non-ICU staff. Weaknesses of this study include a single-center design and limited sample size (convenience sample), thereby restricting comparison across staff members. Study strengths include a structured survey tool and a high response rate from eligible staff.

CONCLUSIONS

In the hospital environment, NCIs may be a method of pathogen transmission considering that these items are used on multiple patients. Thus, it is imperative that staff disinfect these items not only regularly but also appropriately according to manufacturer recommendations. Readily available point-of-care NCI disinfection information coupled with adequate NCI cleaning supplies and storage space are needed to enhance reliability in practice. Assessing hospital cleaning processes for NCIs at the unit level allows hospital infection prevention programs to better understand the discrepancies in practice and maximize standardization of disinfection procedures.

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