

Patients' Hand Washing and Reducing Hospital-Acquired Infection

Stacy Haverstick, RN, BSN, PCCN
Cara Goodrich, MS, AGPCNP-BC
Regi Freeman, RN, MSN, ACNS-BC
Shandra James, RN, DNP
Rajkiran Kullar, MPH, CIC
Melissa Ahrens, MPH, CIC

BACKGROUND Hand hygiene is important to prevent hospital-acquired infections. Patients' hand hygiene is just as important as hospital workers' hand hygiene. Hospital-acquired infection rates remain a concern across health centers.

OBJECTIVES To improve patients' hand hygiene through the promotion and use of hand washing with soap and water, hand sanitizer, or both and improve patients' education to reduce hospital-acquired infections.

METHODS In August 2013, patients in a cardiothoracic postsurgical step-down unit were provided with individual bottles of hand sanitizer. Nurses and nursing technicians provided hand hygiene education to each patient. Patients completed a 6-question survey before the intervention, at hospital discharge and 1, 2, and 3 months after the intervention. Hospital-acquired infection data were tracked monthly by infection prevention staff.

RESULTS Significant correlations were found between hand hygiene and rates of infection with vancomycin-resistant enterococci ($P = .003$) and methicillin-resistant *Staphylococcus aureus* ($P = .01$) after the intervention. After the implementation of hand hygiene interventions, rates of both infections declined significantly and patients reported more staff offering opportunities for and encouraging hand hygiene.

CONCLUSION This quality improvement project demonstrates that increased hand hygiene compliance by patients can influence infection rates in an adult cardiothoracic step-down unit. The decreased infection rates and increased compliance with hand hygiene among the patients may be attributed to the implementation of patient education and the increased accessibility and use of hand sanitizer. (*Critical Care Nurse*. 2017;37[3]:e1-e8)

Hospital-acquired infections (HAIs) can lead to longer stays, higher health care costs, and greater mortality rates. According to Magill et al,¹ who conducted a multistate point-prevalence study of health care-associated infections, 1 in 25 patients in the acute care setting will develop a health care-associated infection during their hospital stay. In 2011, roughly 722 000 patients had a HAI and around 75 000 of those patients died.¹ Of those infections, pneumonia and surgical site infections had the highest rates.¹ Because a common mode of transmission is via contaminated hands, hand hygiene is

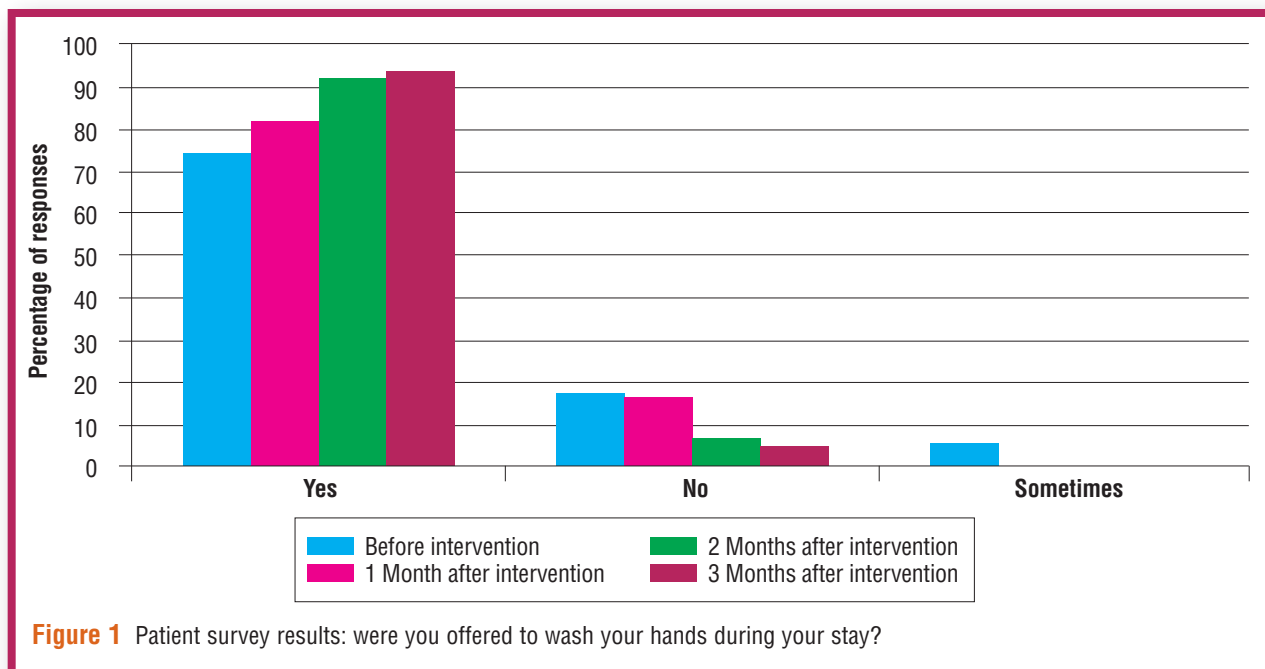


Figure 1 Patient survey results: were you offered to wash your hands during your stay?

the single best method to prevent the spread of infection. Staff hand hygiene is always important, but providing access and education to patients is equally important. Cross-contamination shows the relationship between the environment, patients, and staff. A majority of hospitals' efforts to prevent infection are focused on the attitudes and practices of staff members. After many interactions with patients on our cardiothoracic step-down unit, it became obvious that increased focus on patients' hand hygiene practices and attitudes about hand hygiene was needed.

Authors

Stacy Haverstick is a staff nurse on a cardiothoracic step-down unit at University of Michigan Health System, Ann Arbor, Michigan.

Cara Goodrich is a staff nurse on a cardiothoracic step-down unit at University of Michigan Health System.

Regi Freeman is a clinical nurse specialist in the cardiovascular intensive care unit University of Michigan Health System.

Shandra James is a clinical assistant professor at University of Michigan, School of Nursing, Ann Arbor, Michigan.

Rajkiran Kullar is an infection preventionist at University of Michigan Health System.

Melissa Ahrens is an infection preventionist at University of Toledo Medical Center, Toledo, Ohio.

Corresponding author: Stacy Haverstick, RN, BSN, PCCN, 4C Cardiac and Thoracic Surgery Unit, University of Michigan Health System, 1500 E. Medical Center Dr, Ann Arbor, MI 48109 (email: haversts@umich.edu).

To purchase electronic or print reprints, contact the American Association of Critical-Care Nurses, 101 Columbia, Aliso Viejo, CA 92656. Phone, (800) 899-1712 or (949) 362-2050 (ext 532); fax, (949) 362-2049; email, reprints@aacn.org.

Local Problem

While in the hospital, patients' ability to practice hand hygiene in the room is limited by accessibility to soap and water or to hand sanitizer. For example, in each patient's room there is a sink by the door and a bottle of hand sanitizer that is placed on the wall opposite the patient's bed. Many patients are unable to access either of these without assistance because of mobility issues or postsurgical intravenous catheters and drains. These barriers can lead to decreased hand hygiene compliance among patients.

Intended Improvement

Our focus was on providing tools for patients to protect themselves against HAI. Patients' experiences and survey data demonstrated that the patient's ability to practice hand hygiene in the hospital is limited and requires reinforcement by nursing staff. Before the intervention, 75% of patients reported that they had been encouraged to wash their hands (Figure 1). Increasing patients' hand washing by educating patients on the importance of hand hygiene, as well as providing patients with access to hand sanitizer, was proposed to reduce infection rates.

Reasons why patients were not able to perform hand hygiene included that patients did not know how important hand hygiene was to preventing infection, that they did not usually wash their hands at home, and that they were unable to wash their hands because they rely on

Table 1 Staff questionnaire^a

Question	Responses
Did you offer an opportunity to your patient to enable them to wash/clean their hands?	Yes, no
Patients encouraged to carry out hand hygiene after going to the bathroom and before meals?	Always, often, sometimes, rarely, never
Patients who require assistance with hand washing are offered the opportunity?	Always, often, sometimes, rarely, never
I think hand hygiene is important to preventing infection in the hospital.	Strongly agree, agree, disagree, strongly disagree, unsure
I think staff feel their own hand hygiene is important part of preventing infection.	Strongly agree, agree, disagree, strongly disagree, unsure
I think staff feel patients' hand hygiene is an important part of preventing infection in the hospital.	Strongly agree, agree, disagree, strongly disagree, unsure
In your opinion, what more could be done in order for patients to clean their hands in the hospital?	Write your response...

^a Adapted from Burnett et al,³ with permission.

staff to offer the opportunity to do so.² The typical postsurgical patient was not readily able to get to the sink without help. With a fostering innovation grant provided by the University of Michigan, bed-bound patients received alcohol-based hand sanitizer, hand-sanitizer wipes, or both. Staff were educated and encouraged to be aware of patients' access to hand hygiene after any tasks that necessitated hand hygiene, including after using the restroom, before meals, before touching incisions or wounds, and before leaving their room and upon returning to the room.

Study Question

This study was done to determine if increased access to hand hygiene products and patient education could improve patients' hand hygiene and reduce the transmission of HAIs. In particular, rates of infection with methicillin-resistant *Staphylococcus aureus* (MRSA), vancomycin-resistant enterococci (VRE), and *Clostridium difficile* were assessed to determine if rates were decreased.

Methods

Ethical Issues

The project received exempt status from the hospital's institutional review board. Informed consent was waived because the project met criteria for a quality improvement project. No ethical concerns were noted for this project. A \$2350 fostering innovation grant was provided by the University of Michigan Health System and was used to purchase alcohol-based hand sanitizer as well as hand-sanitizing wipes.

Setting

The patient hand hygiene initiative was implemented in August 2013 on an adult 36-bed cardiothoracic surgical step-down unit at the University of Michigan Health System, a large academic medical center in the Midwest. The majority of patients were unable to get to the sink to wash their hands without assistance. Patients in the unit typically arrive from the intensive care unit or the postanesthesia care unit with chest tubes, nasogastric tubes, jejunostomy feeding tubes, epidurals, left ventricular assist devices, and intravenous fluids and medications. Patients are taught not to get up without assistance because of the increased risk of falling, so getting up freely to wash their hands is not easily accomplished. Unit staff nurses observed that patients need to have access to alcohol-based hand sanitizer, hand wipes, or soap and water at the bedside instead of relying on the hospital staff to give patients an opportunity to protect themselves from HAIs.

Planning the Intervention/Planning the Study of the Intervention

Before implementation of the patient hand-washing project, staff completed an anonymous 6-question survey (Table 1).³ Permission was granted to use a modified survey from the article, "Hand Hygiene: What About Our Patients?"³ Unit staff were asked to complete the questionnaire and return it within 1 week. We received a total of 33 staff responses. Upon discharge, patients also completed a 6-question survey (Table 2) before the intervention, as well as 1, 2, and 3 months after

Table 2 Patient questionnaire^a

Question	Responses
Were you offered to wash your hands during your stay?	Yes, no
Were you encouraged to carry out hand hygiene after going to the bathroom and before meals?	Always, often, sometimes, rarely, never
I think hand hygiene is important to preventing infection in the hospital.	Strongly agree, agree, disagree, strongly disagree, unsure
I think staff feel their own hand hygiene is important part of preventing infection.	Strongly agree, agree, disagree, strongly disagree, unsure
I think staff feel patients' hand hygiene is an important part of preventing infection in the hospital.	Strongly agree, agree, disagree, strongly disagree, unsure
In your opinion, what more could be done in order for patients to clean their hands in the hospital?	Write your response...

^a Adapted from Burnett et al,³ with permission.

implementation to track progress of program participation. It was hypothesized that the unit results would mirror the results of Burnett et al,³ where the staff aimed on the positive side of the scale and patients had the majority of rarely or never responses when asked if they were encouraged to wash their hands.³ Patient surveys were

given and returned anonymously at discharge.

Each patient received an alcohol-based hand sanitizer or wipes.

Surveys were in paper form, with a varying response rate dependent on how many patients were discharged, as well as how many answered and returned the form. Patient survey responses included (1) 16 responses before the intervention, (2) 39 responses 1 month after the intervention, (3) 63 responses 2 months after the intervention, and (4) 54 responses 3 months after the intervention.

Upon admission to the unit, each patient received an alcohol-based hand sanitizer or wipes and “The Importance of Hand Hygiene” brochure created by the institution’s infection prevention department, which was reviewed with the patient by the nurse. Also included in the unit’s brochure was a section dedicated to the importance of hand hygiene for the patient that indicated when patients should wash their hands (after using the restroom, before meals, before touching incisions or wounds, before leaving their room, and upon return to the room). If the patient had a *C difficile* infection, they along with visitors were instructed to wash their hands with soap and water only. Additionally, per the institution’s policy, all

alcohol-based hand sanitizer was removed from the patient’s room. Patients with existing infections of MRSA, VRE, and *C difficile* were also taught not to use the nutrition or linen rooms shared with all staff and patients. It was expected that the nurse and nurse technicians would reinforce patients’ hand hygiene when appropriate.

During daily rounds, the unit host asked patients if they had received and were using the alcohol-based hand sanitizer or wipes that were provided on admission. If the patient did not receive or had misplaced the hand sanitizer, the host provided additional sanitizer. Unit leaders followed the trend in new cases of HAI from the infection prevention department’s monthly report, which was then used to evaluate the impact and effectiveness of the project.

Methods of Evaluation and Analysis

All patients admitted to the unit were included in the project. HAI rates were compared during a 19-month period before and a 19-month period after the intervention. Statistical analyses were conducted by using SPSS version 21. Rates of HAI (MRSA, VRE, and *C difficile*) were compared before and after the intervention. A non-parametric Wilcoxon rank sum test was used because of the small sample size and the underpowered study. Significance was set at the .05 level.

Results

Outcomes

Unit-specific infection control data showed that VRE infections decreased by 70% (n = 33 before and n = 10 after) in a 19-month period after the intervention.

Table 3 Overall outcomes for infection rates

Organism	Median infection rate		P
	Before intervention January 2012 (n=38)	After intervention February 2015 (n=38)	
<i>Clostridium difficile</i>	0.73	0.78	.86
Vancomycin-resistant enterococci	1.60	0.50	.003
Methicillin-resistant <i>Staphylococcus aureus</i>	0.82	0.50	.01

MRSA infections decreased by 63% (n = 19 before and n = 7 after) in a 19-month period after the intervention. A Wilcoxon rank sum test revealed no significant difference in the rates of *C difficile* infection before (median, 0.73) and after (median, 0.78) the intervention ($U = 175$, $z = -0.171$, $P = .86$, $r = 0.02$). Conversely, *C difficile* infections increased 31% in a 19-month period. A Wilcoxon rank sum test revealed a significant difference in the VRE infection rates from before (median, 1.6) and after (median, 0.50) the intervention ($U = 83.50$, $z = -2.975$, $P = .003$, $r = 0.48$). A Wilcoxon rank sum test revealed a significant difference in the MRSA rates before (median, 0.82) and after (median, 0.50) the intervention ($U = 102.500$, $z = -2.484$, $P = .01$, $r = 0.40$; Table 3).

Staff Survey

At the time of the preintervention survey, nursing staff believed that they encouraged patients to complete hand hygiene 97% of the time. Ideas that staff listed to help with patients' hand hygiene were as follows: having preprinted signs for alerting patients to wash their hands before leaving room and when returning, giving patients a personal sanitizer at the bedside, a sign in patients' restrooms stating: "Did you remember to wash your hands?", increased patient education, increased prompting of patients to wash their hands, infection control pamphlets on admission, patient contracts, hand wipes at the bedside for those unable to stand to wash, visual reminders for patients on the wall, having doors that open without touching them, and having automatic sinks and toilets.

Patient Survey

Results of the patient survey querying: "Were you offered to wash your hands during your stay?" (Table 2) indicated that the data improved from 75% before the intervention to 94% by 3 months after the intervention.

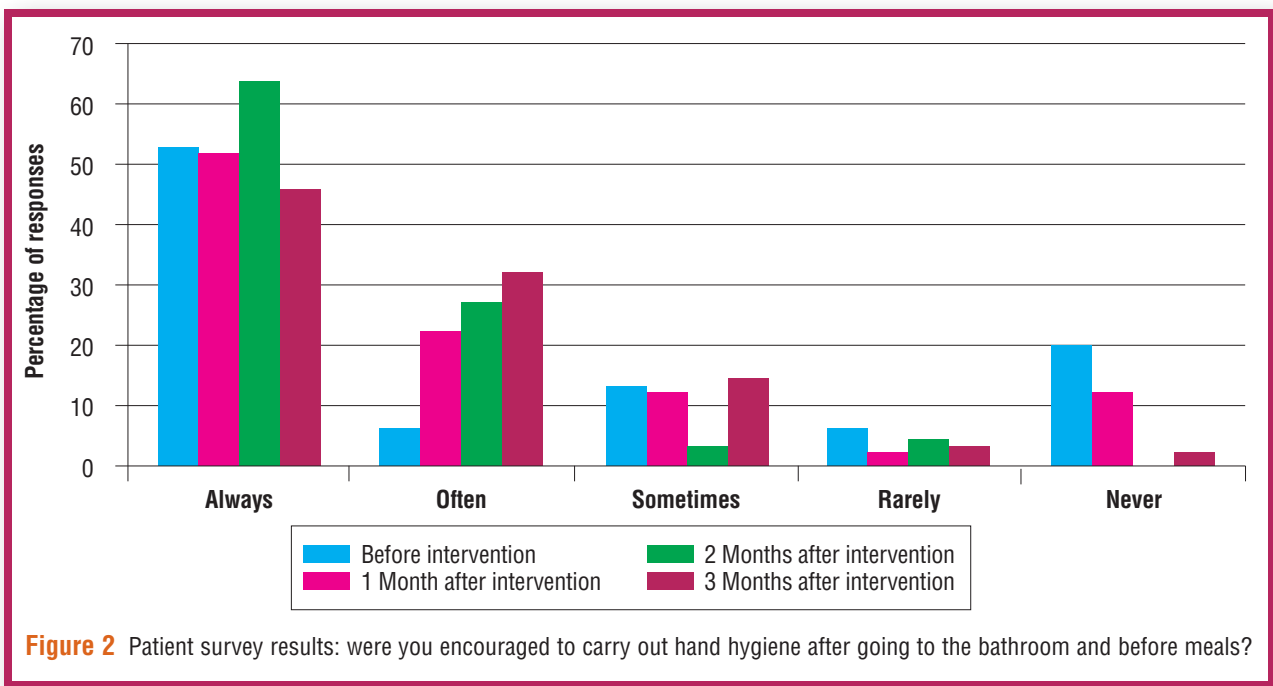
Patients' suggestions to increase patient hand hygiene included the following: having staff encourage all patients to perform hand hygiene, giving each patient his or her own hand sanitizer, recognizing that patients would be more apt to use hand sanitizer than hand wipes, having hand wipes at the bedside, explaining that the wipes provided with meals are for sanitizing, placing a small container on the side of the tray table with individual hand sanitizer wipes. Comments from patients collected on the survey indicated: "Well, I think you guys are doing a good job with hand hygiene, very good staff," "Every need for hygiene is provided," "Staff is really good about washing their hands."

Other survey questions included, "Were you encouraged to carry out hand hygiene after going to the bathroom and before meals?" (Figure 2). Before the intervention, 53% of patients responded "always" but that percentage had decreased to 46% by 3 months after the intervention. When talking with staff, patients said that they thought that when working with an adult population, nurses should not have to remind patients to wash their hands. Another barrier was that

the nurse **MRSA and VRE infection rates declined significantly.** and/or technician was

not always with the patient during activities that would necessitate hand hygiene. In the unit brochure and the hand-washing brochure, the importance of hand hygiene after using the bathroom and before meals was outlined and encouraged.

The patient survey also asked patients about their level of agreement with the statement, "I think hand hygiene is important to preventing infection in the hospital." Before the intervention, 93% strongly agreed and 6% agreed. One month after the intervention, 90% strongly agreed and 9% agreed. Two months after the



intervention, opinion decreased to 84% strongly agreed and 15% agreed. Three months after the intervention, 93% strongly agreed and 6% agreed. An evaluation of these results indicated that we needed to improve our patient education.

The patient survey also queried patients' level of agreement with the statement, "I think staff feel their own hand hygiene is an important part of preventing infection." Before the intervention, 100% of patients strongly agreed. One month after the intervention, 93% strongly agreed, 4% agreed, and 1% disagreed. Two months after the intervention, 79% strongly agreed and 20% agreed. Three months after the intervention, 94% strongly agreed and 5% agreed.

Another survey statement was, "I think staff feel patient hand hygiene is an important part of preventing infection in the hospital." Before the intervention, 68% of patients strongly agreed, 25% agreed, and 6% were unsure. One month after the intervention, the percentages had increased to 81% strongly agreed and 18% agreed. Two months after the intervention, 84% strongly agreed, 14% agreed, and 1% were unsure. Three months after the intervention, 93% strongly agreed and 6% agreed.

Discussion

After the intervention, patients' knowledge about the importance of hand hygiene and the availability of hand hygiene supplies increased. Patients' responses indicated

that they were offered the opportunity to wash their hands before meals and after using the restroom with increasing frequency in the months following the intervention. Therefore, compliance with patient hand hygiene would have increased. Patients' perspective of staff hand hygiene being important to prevent infection showed a slight decline during the months of the study. This decrease could be related to the increasing knowledge and attention to hand hygiene that patients experienced after implementation of these interventions.

In a review of our facilities' HAIs, unit-specific infection control data indicated that VRE infections decreased by 70% and MRSA infections decreased by 63% in a 19-month period. These decreased infection rates could be affected by several factors, including increased awareness of and knowledge about hand hygiene that resulted in improved hand hygiene practices among both patients and staff. As noted earlier, *C difficile* infections increased 31% in a 19-month period. Associated factors may have included the use of alcohol-based hand sanitizer and sanitizer wipes, as hand hygiene with soap and water is recommended for use to prevent the spread of *C difficile* infections.

Relation to Other Evidence

Survey findings were consistent with outcomes reported by Ward.² Patients did not perform hand hygiene for a multitude of reasons such as lack of

knowledge, not routinely washing hands at home, inability to access supplies for hand hygiene, lack of encouragement by staff, and staff being too busy to be bothered. Before these interventions, it was surmised that hand hygiene was simply overlooked by nursing staff, as reported by Fox et al.⁴ The essential times for hand hygiene used in this project were corroborated by Sunkesula et al⁵ as being before meals, after using the restroom, before contact with incisions or wounds, and before leaving and after returning to the hospital room.

Limitations

This quality improvement project had some limitations. Primarily, this study was conducted on 1 unit in 1 medical center, which limits the generalizability of the findings to other settings. Plans to expand these practices to other units within the facility are ongoing. Results were compared with results for a group of patients from before the intervention instead of with results from a randomized control group, and the demographics of the 2 groups were not evaluated. Patients' learning was assessed upon admission; however, education of patients about hand washing was done via verbal instruction and printed brochure. This method may not have taken into consideration the learning needs and health literacy of the patients.

Staff members on this unit were engaged to do this work and to assist patients to complete hand hygiene even though the unit is very busy and fast paced. This arrangement may limit the applicability of our results to other units or areas where engagement is not high and change is difficult. Some costs were associated with obtaining supplies to assist with enabling patients to perform hand hygiene, which may limit the implementation of this project in other areas or facilities. Factors associated with the methods, including the use of surveys, may have led to lower response rates than if other methods of data collection had been used. Thus an additional limitation of this quality improvement study is the small sample size.

Survey responses from the patients and staff may have exhibited bias because of interaction with the nursing staff conducting this quality improvement work. Many factors come into play when considering infection rates; thus it is difficult to generalize that infection rates decreased exclusively as a result of the patient hand hygiene interventions implemented. During this time,

no other interventions specifically related to prevention of HAIs were implemented on the unit, in an effort to determine the impact of the interventions related to patients' hand hygiene.

Interpretation

As is well documented in the literature, hand hygiene is the single best method to prevent the spread of infection. Education of staff and patients is essential to engage stakeholders in hand hygiene. Survey results indicated that patients were not well informed about the importance of hand hygiene and were not given the opportunity to perform hand hygiene. Informing the nursing staff of these findings and engaging the staff to empower the patient to complete hand hygiene and provide the patient with resources were essential to the success of this quality improvement project. Even though this study had a small sample size, it indicated a reduction in HAIs on the cardiothoracic step-down unit, which could in turn potentially lead to a decreased length of stay, lower health care costs, and a decrease in mortality.

Conclusions

Further studies should be focused on observations of patients' hand hygiene before and after interventions are implemented. Observations of patients' hand hygiene practices should occur at the most essential times, including after the patient uses the restroom, before meals, before touching incisions or wounds, before leaving the room, and upon return to the room. This specific type of surveillance would assist with providing knowledge about where nursing staff should focus their efforts to engage patients to complete hand hygiene. The practices of other multidisciplinary team members relative to hand hygiene and empowerment of patients to complete hand hygiene could be studied to assist in further integrating patients' hand hygiene practices. **CCN**

Acknowledgments

The authors thank the staff of 4C at University of Michigan Health System.

Financial Disclosures

This project was funded by a fostering innovation grant for \$2350 that was provided by the University of Michigan Health System.



Now that you've read the article, create or contribute to an online discussion about this topic using eLetters. Just visit www.ccnonline.org and select the article you want to comment on. In the full-text or PDF view of the article, click "Responses" in the middle column and then "Submit a response."

References

1. Magill S, Edwards J, Bamberg W, et al. Multistate point-prevalence survey of health care-associated infections. *N Engl J Med*. 2014;370:1198-1208.
2. Ward D. Improving patient hand hygiene. *Nurs Stand*. 2003;17(35):39-42.
3. Burnett E, Lee K, Kydd P. Hand hygiene: what about our patients? *Br J Infect Control*. 2008;9(1):19-24.
4. Fox C, Wavra T, Drake D, et al. Use of a patient hand hygiene protocol to reduce hospital-acquired infections and improve nurses' hand washing. *Am J Crit Care*. 2015;24(3):216-224.
5. Sunkesula V, Knighton S, Zabarsky T, et al. Four moments for patient hand hygiene: a patient-centered, provider-facilitated model to improve patient hand hygiene. *Infect Control Hosp Epidemiol*. 2015;36(8):986-989.

Copyright of Critical Care Nurse is the property of American Association of Critical-Care Nurses and its content may not be copied or emailed to multiple sites or posted to a listserv without the copyright holder's express written permission. However, users may print, download, or email articles for individual use.