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A Behavior-Focused Hand Hygiene Quality Improvement Project

Stephanie Hill

University of Portland

Author Note

This quality improvement project received institutional review board (IRB) approval by the University of Portland IRB and quality improvement board approval was granted by the Veteran's Affairs Portland Health Care System.

Abstract

The purpose of this quality improvement (QI) project was to improve hand hygiene (HH) compliance rates among healthcare workers on a medical-surgical microsystem. Hand hygiene is globally recognized as the single best practice for reducing the spread of unwanted and harmful diseases. Despite its simplicity, literature indicates HH compliance as an endemic healthcare concern with observations that reflect insufficient or disregardable behavior. Understanding factors that contribute to poor compliance can inform education and training for healthcare workers. Hand hygiene practices are largely a behavioral practice, and recent literature supports ongoing training and education that facilitates behavior barrier identification and positive reinforcement. Standard practice HH observation tool reports for the facility reflect poor compliance rates specific to the microsystem. The CNL student conducted direct observation of healthcare workers' HH behaviors using a HH observation application on a handheld electronic device. Pre- and post-surveys were created and adapted from the World Health Organization (WHO) and Institute for Healthcare Improvement (IHI) questionnaires. Results from the pre-survey and direct observation were used to inform microsystem-specific education targeting HH practice barriers. Barriers to HH compliance were identified from direct observation and the pre-survey. Hand hygiene education was conducted to promote facility standards and recognize microsystem specific barriers and any alterations that transpired as a result of uncovered barriers. A post-survey was used to reflect any knowledge changes within the microsystem population. Continued direct observation after staff education reflected healthcare workers' improved HH behaviors and compliance.

A Behavior-Focused Hand Hygiene Quality Improvement Project

This hand hygiene (HH) project was selected with the assistance of the nursing ward leadership team at the graduate nursing student's host clinical site. The facility's routine HH observation data reflected room for improvement in HH practices in many hospital areas. Ward-specific data is reviewed by the nurse manager monthly, and can be compared with the rates of other wards as well as any occurrence of any healthcare associated infections (HAI). Fiscal year 2015 HH data for this particular ward averaged 70%. HH practices can be linked with HAI occurrences or prevalence (Ellingson, Haas, Aiello, Kusek, Maragakis, Olmsted, Perencevich,Polgreen, Schweizer, Trexler, VanAmringe, and Yokoe, 2014). Despite the infrequent occurrences of healthcare associated infections (HAI), there was a desire to improve staff compliance with HH to prevent future problems. HH practices are fundamental to the delivery of healthcare, and are known to be the single best practice for preventing the spread of germs and diseases (World Health Organization, 2009, p. 6).

The host clinical site is a 26-bed medical surgical (med-surg) microsystem within a 277 bed government operated macrosystem that serves the Portland metro area. This med-surg area is one of four for this facility, and commonly admits vascular surgery, genitourinary surgery, general surgery, and general medicine patients. Many patient rooms are semi-private, and there are two multiple occupancy rooms with four patients each. This reduces the barriers between many patients and increases the opportunities for hospital staff to unknowingly transfer germs to the bedside.

Literature Review

Considerable research and literature exist for the topic of HH, including the association with HAIs. The WHO took a firm stance on combating HAIs and other infections by

campaigning for better hand hygiene practices worldwide in 2011 (WHO, 2011). Literature consistently supports the importance of hand hygiene as a primary measure to avoid HAIs.

The practice of hand washing and hand rubbing (with an alcohol-based hand sanitizer) is done frequently by healthcare workers (HCW), and often performed without concentration on the task. Literature search using CINAHL uncovered articles supporting the behavioral aspects of HH compliance strategies. Poor hand hygiene compliance is often not due to a lack of resources, as can happen in developing countries with limited resources, but rather for behavioral reasons. Literature searches were limited to behavioral aspects of HH practices, compliance, and education.

A 2012 systematic review assessing behavioral aspects of HH efforts by HCW found that U.S. and European hand hygiene compliance rates were low, generally below 50% (Huis, van Achterberg, de Bruin, Grol, Schoonhoven, and Hulscher, 2012a). This research suggests that HAIs could be reduced by as much as 30% if HH rates among HCW were adequate. One means of improving compliance through education involves using more creativity in hand hygiene education. This was found to be more effective than simply providing fact-based education and offering sufficient access to hand hygiene products (Huis, et al., 2012a).

The WHO (2011) suggests that a strong organizational culture driving HH initiatives can result in higher compliance rates. Leadership structures, including formal and informal leaders, often reflect the culture within an organization, and within a microsystem. Huis, Schoonhoven, Grol, Donders, Hulscher, and van Achterberg (2012b) found that leadership, and established teams, contributed to better HH education results. While this project did not address organizational culture, the microsystem culture was assessed and recognized for the effects it

would have on the project. To maintain a microsystem focus additional and more specific ideas are needed.

Huis, et al. (2012a) found that concepts of social influence, such as having other HCW in close proximity, is a behavioral factor that benefits HH compliance. The article eluded that if HCW believed they may be observed or judged by peers, they were likely to be more thorough in their HH practices. Similar peer effect findings were supported in an article by Monsalve, Pemmaraju, Thomas, Herman, Segre, and Polgreen (2014). Other suggestions made by Huis, et al. (2012a) addressing social influence factors were to identify HCW attitudes toward HH, which may be determined through assessment of existing problems and barriers from the HCW perspective. Aside from attitude, inattention was another HH behavioral factor recognized by Huis, et al. (2012a). Literature reviews illuminated many components of behavior that can be a factor for HH compliance as well as identify methods for improving practice.

Huis, et al. (2012b) assert that a "hand hygiene improvement strategy should be multifaceted targeting existing barriers". This study, using a cluster randomized trial with team and leaders-directed hand hygiene practice improvements, had successful results utilizing these concepts. Both articles by Huis, et al. (2012a, b) contain concepts valid to this practice improvement project. Data and materials from WHO (2009), CDC (2014), and Institute for Healthcare Improvement (IHI) (n.d.) contributed towards understanding the complexities and developing this QI project. The aim of this project is to assess behavioral components that may contribute to low hand hygiene practice compliance, then use these findings in conjunction with concepts elicited from the literature to create an education strategy targeting behavioral aspects of HH practice among HCW.

Methods

Planning included understanding of the microsystem, such as the leadership team's desired goal, which lacked a target compliance rate but rather an improving trend increase from the average 70%. Discussions with the infection prevention nurses gave insight to their HH monitoring practices and policies, and any educational material already in circulation. Another resource specific to the microsystem is the unit-based council (UBC), which take on projects to improve patient care and staff satisfaction. Soliciting for support and participation of the UBC for this HH QI project can utilize available resources within the microsystem. Assessment of microsystem's resources provides the added benefit of identifying the microsystem culture.

The project plans were detailed and outlined for project approval from both the University of Portland (UP) institutional review board (IRB), and the Veterans Affairs Portland Health Care System (VAPORHCS) quality improvement board. The project was planned as follows:

- Direct observations by CNL student to increase HH observation data.
- Use of electronic device to record HH observations; minimize Hawthorne effect.
- Identify barriers (workflow, product availability) through direct observation and pre-survey
- Pre-survey to all microsystem staff (developed and adapted from WHO and IHI questionnaires) to identify knowledge and perceptions.
- Use pre-survey findings to inform and tailor microsystem-specific education.
- Deliver education to staff through staff meetings, email, and print material.
- Encourage leaders to practice desired behavior to enhance the influence of leaders.
- Post-survey to all 9C staff (also developed and adapted from WHO and IHI questionnaires).
- Ongoing HH monitoring by student as well as usual monitoring practices by manager/staff.
- Review HH data and survey results.

The project was implemented after IRB and QI project approval were received. Direct observations commenced using the student's cellular device with a HH observation application that allowed for automatic note of date and time with each observation. This application, iScrub Lite version 1.5.2, was developed by persons at the University of Iowa and its copyright grants permission for use without limitation or restriction (University of Iowa Computational Epidemiology Research, 2008). The application was customized to be synchronous with the facility's usual methods of observation assessments including into and out of room occurrence, type of personnel being observed, and options for additional notes including glove use or isolation precautions. The observations could be easily emailed from the application in a spreadsheet format and later input into the hospital's own HH data collection. Observations using a cellular device were thought to be more discreet compared with usual method using a preformatted form with written notation after observation. Discreet observation was ideal to reduce the chances of HCWs becoming aware of being watched, causing them to change their behavior (Hawthorne effect) (Monsalve, et al., 2014).

Typically, HH observation data is collected on paper and later input electronically. In usual observation practice, the nurse manager gives an observation sheet to a staff person, usually a nurse or nurse assistant, to meet the minimum goal of ten observations (for that month) to be collected during a single shift. This data was improved during the project while the CNL student provided additional data beyond their usual observations. The CNL student's observation participation facilitated a greater number of observations recorded.

Usual employee observers do not receive HH observation training. Training informs observers about how to qualify and count an observed event to allow for consistent data collection. Training can cover issues such as whether or not to count an event in which the

individual performed incomplete HH that may have been far short of the 15 second minimum in the hospital policy. The CNL student collected data was potentially more consistent due to reviewing WHO and IHI HH practice improvement and training modules (World Health Organization, 2009; Institute for Healthcare Improvement, n.d.), and review of hospital HH practice policies and protocols. There is less observation variability from a single observer compared to multiple observers. There is reason for concern that the accuracy of data from usual collection method could be flawed due to a lack of observer education and training, or recent familiarity with hospital policy.

Approaching the UBC for assistance with this project could provide peer leaders from within the microsystem. The CNL student could not directly participate in a UBC meeting to propose the idea due to scheduling conflicts. An email to members of the UBC prior to their monthly meeting went unanswered. No participation or support was received by the UBC for this project.

A pre-survey, which had been developed from IHI and WHO questionnaires to be specific and brief, was sent to the microsystem's staff. The pre-survey was delivered via web-link provided in a disclosure email that informed participants of their option to participate, along with other appropriate disclosures regarding the project. The pre-survey email was resubmitted one week after its initial distribution in an effort to gain more respondents. The pre-survey elicited 28 of a possible 74 respondents.

Pre-survey findings were used to inform and tailor the education to be given at the clinical site. The education was delivered to staff in a power point presentation format during usual staff meetings for one week, emailed to all staff, and a print copy was placed in the staff break room. Staff meetings are not required, and attendance is not taken. Staff meetings occur

twice a day for four days to target as many participants possible on both day and night shifts. The presentation was narrated to allow another presenter to simply advance the slides. All staff meetings were attended by the nurse manager, CNL, and/or CNL student. Post education follow-up discussion among these leaders suggests that a very large percentage of the staff received the education through staff meetings, and possibly more through the emailed presentation. The nurse manager and CNL felt that it was a satisfactory number of education participants for their desired improvement.

A multi-faceted approach was used in the education. Rationale for HH practice was a starting point to refresh HCW on the importance of HH and its effects on HAIs. This included some discussion on how organisms can spread between surfaces and survive on a multitude of surfaces. A review of pre-survey findings were shared, including the barriers to HH practices. Barriers included the amount of effort HH requires, clear understanding of when HH is required, and skin irritation for some staff. Different components of the education were included to address these barriers. Hospital policy and products were reviewed to ensure staff had accurate detail of the HH expectations. Education also included a real-life story of a patient (provided with the permission of the family) that contracted an HAI that would have been transmitted from the unclean hands of a HCW, and eventually died from complications of HAI, was used to help staff see all phases of the effects of disease transmission. The presentation concluded with a video link to a short video that allowed for guided practice of handrub technique using alcohol-based handrub provided in the meeting room. In addition to the presentation, some static displays were used, particularly in staff bathrooms and break room. The education sought to inform, personalize to address microsystem-specific barriers, and include active participation.

The education incorporated multiple strategies to enhance learning. To measure the effects of the education strategies, a post-survey was employed. The post-survey was developed to be similar to the pre-survey and allow for direct comparison of some answers. Staff received the post-survey as a web-link in an email in the same fashion as the pre-survey. Staff feedback reported in the post-survey would reflect perceived relevance and value of the education. An outcome measurement from the post-survey was to identify if respondents felt that their awareness level of how they carry out their HH practices had increased. While this is subjective, it is one of the goals of delivering education.

Aside from the formal measures included in the project, staff were asked informally after receiving the education, which included guided practice of HH, how they felt about the education. Direct responses showed favor of the education for reminding staff that HH practices need to be 15-20 seconds of hand rubbing/washing to be considered effective. Staff indicated this education was going to help them be more mindful of how thorough their HH practices need to be. There is increased confidence for achieving improved awareness having used a multi-modal education strategy.

Results

Direct observations were taken by the CNL student in addition to usual staff observation for approximately two months after the education was presented. Initial HH compliance rates averaging 70% compliance at the beginning of this project also reflected as few as 10 observations per month, with several months of uncollected data. The CNL student collected more than the usual data during this project. Data collection by the CNL student was likely more accurate after having reviewed the WHO (2009) and IHI (n.d.) HH practices and methods for improvement, compared to usual staff who may have had little to no guidance for making direct

observations. The average HH compliance rates for the two months immediately following the education reflected slight improvement from 70% to 76%.

The pre-survey concluded with 28 respondents of a possible 74 (See appendix A). Of those, 82% indicated that they had received formal hand hygiene training in the last three years. Most respondents were knowledgeable of the importance of hand hygiene, routes of disease transmission, and felt that it required much effort to practice hand hygiene. Many respondents knew the ideal length of time to effectively use an alcohol-based handrub. Some respondents did indicate that they experience skin irritation. Thirty-eight percent of the staff responded to the pre-survey.

The primary goal of the post-survey was to recognize any knowledge gained or reported increase in awareness. The post-survey received poor participation with only nine respondents (See Appendix B). Participants were asked if the idea that they were being observed influenced their perceived HH practices. Likert style questions asked how much the education was helpful, and if they felt the HH monitoring and teaching efforts had increased their awareness. Both the survey respondents and the staff who attended the education presentation reported that the material was indeed beneficial for improving their personal awareness of practicing HH.

The demand for improved HH practices and reduction of HAIs throughout literature suggest that HH improvement efforts occur worldwide (World Health Organization, 2011). The variables for poor compliance may vary from site to site, complicating any single solution. The prevailing factors for this project were identified as being behavioral, and therefore the strategy was aimed at improving behavioral practices. Challenges incurred included difficulties with accurately recorded data of observations, limitations of participation, and microsystem culture. The best that can be hoped for with the data available is to trend the data for improvement or

decline. The data has reflected modest improvement within the microsystem. There has been no change in occurrence or trends of HAIs on the microsystem, which were low to begin with.

Discussion

This project addressed a behavior change. Behavior change is inherently challenging and time-intensive. To better facilitate the desired change, the project and education needed to be multifaceted, as suggested by Huis, et al. (2012a). In addition to the CNL student performing direct observations beyond the usual observations, pre and post-surveys were created for staff. The pre-survey would serve to elicit knowledge and perceptions regarding HH. With that information, the education could be adapted to address specific details or barriers of HH practice at the clinical site. Special consideration was given to making the education creative as it addressed different aspects of HH behavior in hopes it would have a lasting impact.

One of the most significant insights gained was that the formal HH observation process at the facility lacked training or guidance that would allow for consistency of data collection. Consequently, data could be unreliable. Observers are commonly nurses or nurse assistants, but could also be housekeepers and medical secretaries. Without formal observers, or training for personnel that may perform direct observations, interpretation of observations is subject to individual bias. This could be widely variable. While this project is not formal research, poor inter-rater reliability in data collection does not provide confidence in the data collected.

Interpreting the results, or success of the project, is difficult to assess through formal measures since the data collection process is imprecise. Subjective responses by staff support the desired effect of raising awareness of individual HH practices, and that more creative education is broadly and positively accepted. Review of policy and demonstration of desired outcomes can inform and clarify HCWs of their personal responsibilities in the healthcare setting. Behavior-

related job activities can have varying results depending on factors such as workflow, culture, social/peer influence, protocols, and personal bias. .

Establishing a team and/or leaders to participate and champion this effort proved to be more difficult than anticipated. The formal leadership team provided little participation, and supported the student-led project passively. The UBC was a likely group to provide additional participants and leaders for the QI project. The CNL student had scheduling limitations and conflicts that prevented participation in the monthly UBC meeting. There was limited support provided by the CNL preceptor, who maintains her own array of projects to manage concurrently. This project lacked the team directed approach that was desired and reflected in the Huis, et al. (2012b) article.

Participants could reflect on their education in two ways. Informally, staff that received the education presentation during a staff meeting could give immediate and direct feedback about the quality and applicability of the education material. Formally, staff could participate in the post-survey after they have had the education in either presentation, email, or print format. The post-survey would ask more specific questions that would not have been answerable immediately following the presentation such as "Has the fact of being observed made you pay more attention to your hand hygiene practices?" While the more formal post-survey would provide the most information to reflect on the success of the intervention, there was poor participation.

Tackling the issue of poor HH compliance in healthcare settings can be successful, even if incremental, if given enough resources, time, and ongoing encouragement. First, accurate data can illuminate where problems exist and which resources may be needed. Identifying a team that will create a strategy, implement the project, provide resources, and foster ongoing improvement through lasting effort could provide positive energy for change. The use of surveys and creative

education is beneficial for allowing staff to envision the effects of their efforts. With limited resources or a limited environment, such as the case in this project, expectations for project outcomes can be more uncertain. Even modest HH QI projects can be progress towards influencing attitudes and behaviors for reducing the spread of dangerous germs.

Ethical consideration was made regarding the pre- and post-surveys used to collect information for assessment and to measure outcomes. The surveys were accessed via web-link within an email. The email indicated that the participation was voluntary, participants would be anonymous, what the collected information would be used for, who was leading the project, institution approval, and a point of contact. There were no disputes regarding this project or the collection and use of data. Data was maintained per facility standards and contained no identifying information of patients or staff.

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Appendix A

Pre-survey questions and results:

In general, what is the impact of a healthcare associated infection on a patient's clinical outcome?

	very low	low	high	very high	Total	Weighted Average
(no label)	0.00% 0	7.14% 2	21.43% 6	71.43% 20	28	3.64

What is the effectiveness of hand hygiene in preventing healthcare associated infection?

	very low	low	high	very high	Total	Weighted Average
(no label)	0.00% 0	0.00% 0	21.43% 6	78.57% 22	28	3.79

How do you rate the effort required by you to perform good hand hygiene when caring for or interacting with patients?

	no effort - 1	2	3	4	5	6	a big effort - 7	Total	Weighted Average
(no label)	3.57% 1	21.43% 6	7.14% 2	3.57% 1	14.29% 4	14.29% 4	35.71% 10	28	4.89

Which of the following is the main route of cross-transmission of potentially harmful germs between patients in a healthcare facility? (select one answer)

Answer Choices	Responses
a. Healthcare workers' hands when not clean	85.71% 24
b. Air circulating in the hospital	0.00% 0
c. Patients' exposure to colonized surfaces (i.e., beds, chairs, tables, floors)	14.29% 4
d. Sharing non-invasive objects (i.e., stethoscopes, pressure cuffs, etc.) between patients	0.00%

What is the most frequent source of germs responsible for healthcare associated infections?

Answer Choices	Responses
a. The hospital's water system	0.00% 0
b. The hospital air	0.00% 0
c. Germs already present on or within the patient	21.43% 6

Answer Choices	Responses
d. The hospital environment (surfaces)	78.57% 22
Total	28

How are antibiotic-resistant pathogens most frequently spread from one patient to another in health care settings?

a. Airborne spread resulting from patients coughing or sneezing	0.00% 0
b. Patients coming in contact with contaminated equipment	3.57% 1
c. From one patient to another via the contaminated hands of clinical staff	92.86% 26
d. Poor environmental maintenance	3.57% 1
Total	

On average, in what percentage of situations requiring hand hygiene do you actually perform hand hygiene, either by handrubbing or handwashing (between 0 and 100%)?

99
9/30/2015 6:59 PM
100
9/25/2015 3:29 AM
95
9/24/2015 6:08 AM
95%
9/23/2015 5:58 PM
100
9/22/2015 6:37 PM
100
9/21/2015 7:42 AM
90%
9/20/2015 2:43 PM
75
9/18/2015 9:03 PM
90
9/18/2015 1:07 PM
100
9/17/2015 10:43 PM
95
9/17/2015 6:31 PM
100
9/17/2015 1:48 PM
90
9/17/2015 1:17 PM
90%
9/17/2015 1:09 PM
90
9/17/2015 10:00 AM
100
9/17/2015 7:47 AM
98%
9/17/2015 2:51 AM

100
9/16/2015 10:31 PM
90%
9/16/2015 12:23 PM
90%
9/16/2015 10:19 AM
100
9/16/2015 9:56 AM
99.9
9/16/2015 5:57 AM
75
9/16/2015 4:39 AM
100
9/15/2015 9:28 PM
85
9/15/2015 6:57 PM
99
9/15/2015 6:47 PM
85%
9/15/2015 1:04 PM
95%
9/15/2015 12:52 PM

What is the minimal time needed for alcohol-based handrub to kill most germs on your hands?

Answer Choices	Responses
a. 20 seconds	67.86% 19
b. 3 seconds	3.57% 1
c. 1 minute	7.14% 2
d. 10 seconds	21.43% 6
Total	28

Do you experience any skin irritation/dermatitis as a result of frequent hand hygiene?

Answer Choices	Responses
yes	35.71% 10
no	64.29% 18
Total	28

Pre-survey answer key: 5. a; 6. d; 7. c; 9. a

Appendix B

Post-survey questions and results:

Which of the following is the main route of cross-transmission of potentially harmful germs between patients in a healthcare facility? (select one answer)

Answer Choices	Responses
a. Healthcare workers' hands when not clean	100.00% 9
b. Air circulating in the hospital	0.00% 0
c. Patients' exposure to colonized surfaces (i.e., beds, chairs, tables, floors)	0.00% 0
d. Sharing non-invasive objects (i.e., stethoscopes, pressure cuffs, etc.) between patients	0.00% 0
Total	9

What is the most frequent source of germs responsible for healthcare associated infections? (select one answer)

Answer Choices	Responses
a. The hospital's water system	0.00% 0
b. The hospital air	0.00% 0
c. Germs already present on or within the patient	33.33% 3
d. The hospital environment (surfaces)	66.67% 6
Total	9

How are antibiotic-resistant pathogens most frequently spread from one patient to another in health care settings? (select one answer)

Answer Choices	Responses
a. Airborne spread resulting from patients coughing or sneezing	0.00% 0

Answer Choices	Responses
b. Patients coming in contact with contaminated equipment	0.00% 0
c. From one patient to another via the contaminated hands of clinical staff	100.00% 9
d. Poor environmental maintenance	0.00% 0
Total	9

On average, in what percentage of situations requiring hand hygiene do you actually perform hand hygiene, either by handrubbing or handwashing (between 0 and 100%)?

90
12/15/2015 5:57 AM
~80%
12/9/2015 11:51 PM
90%
12/9/2015 9:08 AM
100%
12/2/2015 8:33 PM
90%
12/2/2015 5:55 PM
90%
12/1/2015 8:19 AM
98%
11/30/2015 11:22 PM
100
11/30/2015 11:16 PM
100
11/30/2015 2:37 PM

Did knowing the results of hand hygiene observation in your ward help you and your colleagues to improve your hand hygiene practices?

	Not at all	(no label)	(no label)	(no label)	(no label)	(no label)	Very much	Total	Weighted Average
Improved HH practice	0.00% 0	0.00% 0	11.11% 1	11.11% 1	11.11% 1	33.33% 3	33.33% 3	9	4.67

Has the fact of being observed made you pay more attention to your hand hygiene practices?

	Not at all	(no label)	(no label)	(no label)	(no label)	(no label)	Very much	Total	Weighted Average

	Not at all	(no label)	(no label)	(no label)	(no label)	(no label)	Very much	Total	Weighted Average
Attention to HH practice	0.00% 0	0.00% 0	22.22% 2	22.22% 2	0.00% 0	33.33% 3	22.22% 2	9	4.11

Were the educational activities that you participated in important to improve your hand hygiene practices?

	Not at all	(no label)	(no label)	(no label)	(no label)	(no label)	Very important	Total	Weighted Average
Importance of education	0.00% 0	11.11% 1	22.22% 2	0.00% 0	11.11% 1	11.11% 1	44.44% 4	9	4.22

Do you consider that the administrators in your institution are supporting hand hygiene improvement?

	Not at all	(no label)	(no label)	(no label)	(no label)	(no label)	Very much	Total	Weighted Average
Administration supports HH improvement	0.00% 0	0.00% 0	11.11% 1	33.33% 3	11.11% 1	22.22% 2	22.22% 2	9	4.11

Has the improvement of the safety climate (if actually improved in your institution as a result of the recent implementation of the hand hygiene promotion strategy) helped you personally to improve your hand hygiene practices?

	Not at all	(no label)	(no label)	(no label)	(no label)	(no label)	Very much	Total	Weighted Average
(no label)	0.00% 0	11.11% 1	11.11% 1	11.11% 1	11.11% 1	22.22% 2	33.33% 3	9	4.22

Has your awareness of your role in preventing health-care-associated infection by improving your hand hygiene practices increased during the current hand hygiene promotional campaign?

	Not at all	(no label)	(no label)	(no label)	(no label)	(no label)	Very much	Total	Weighted Average
Improved awareness	**0.00%** 0	**11.11%** 1	**11.11%** 1	**0.00%** 0	**11.11%** 1	**33.33%** 3	**33.33%** 3	9	4.44

Post-survey question answer key: 1. a; 2. d; 3. c