

Hand hygiene compliance sustenance program among registered and enrolled nurses in a Hematology-Oncology unit

Clarice Tan, *Nurse Manager,*
National University Cancer Institute, Singapore
1E Kent Ridge Road, NUHS Tower Block, Level 7,
Singapore 119074
DID: (65) 6772 3018, Fax: (65) 67722958
<http://www.nuhs.edu.sg/>

Abstract

Background

Hand hygiene is widely regarded as the most effective means of preventing cross-transmission of microorganisms via health workers' hands thus reducing healthcare-associated infections (HAIs). The need to ensure consistent good hand hygiene compliance rates remains a challenge to many organizations. Hand hygiene compliance rates are frequently reported as overall compliance. An in-depth systematic analysis of the non-compliance to precise criteria is lacking and therefore prevents barriers to be specifically addressed.

National University Cancer Institute, Singapore (NCIS) is one of the two National Cancer Centers in Singapore and is located within NUHS, a 991-bed teaching hospital. NCIS comprises the ambulatory and inpatient units. From 2008-2010, the compliance rate of hand hygiene has increased from 31% to 71%. Although HAIs acquisition among the patients has been low, it has been observed that the rate is increasing. This therefore calls for a need to analyze the compliance rate and address barriers to the non-compliance systematically.

Aims

The overall aim of this project is to establish an effective multimodal approach to improve hand hygiene compliance and sustenance among oncology registered and enrolled nurses who work in inpatient and outpatient settings.

Methods

This project uses the JBI PACES (Practical Application of Clinical Evidence System) and GRIP (Getting Research Into Practice) which is an online resource data tool that helps health professionals conduct audits using evidence-based criteria, implement change, and audit their own results. JBI PACES simplifies the cycle of audit, feedback, and re-audit and promotes ownership of the practice change process among the stakeholders.

The audits utilized all the criteria recommended by the WHO Guidelines on Hand Hygiene in Healthcare and took place over six months from November 2010 to May 2011.

The project was conducted in the inpatient and ambulatory unit in the National University Cancer Institute involving a sample size of 130 registered and enrolled nurses. Direct observation method of monitoring hand hygiene compliance was used.

Results

The post-implementation audit findings showed a slight improvement in the criteria between 1 to 12% increments for each criterion.

Discussion

Focused interventions were conducted in a group setting and allowed the staff to relate and develop greater awareness in the area for improvement. The group setting promotes discussion and allows clarification to the hand hygiene principles. The discussion to clarify confusion and misconception in the hand hygiene practice generated thoughts in the team that a one-to-one feedback and discussion about missed opportunities with the relevant staff may be warranted although the staff had received basic hand hygiene education. The one-to-one feedback helps to bring awareness to the staff about their own hand hygiene practice. This prompts them to reflect upon their current practice and leads to customized interventions to the barriers that the staffs face.

Conclusion

The one-to-one engagement promotes long-term sustainability in good hand hygiene practice as the staffs are engaged personally in the reflection of their own practice and thus allows them to realign to recommended practice.

Keywords

Infection Control, Nursing, Oncology, Hematology, Evidence-based practice





Background

Healthcare-associated infection (HAI) is defined by the Centers for Disease Control and Prevention (CDC) (Horan, Andrus, & Dudeck, 2008) as a localized or systemic condition that results from an adverse reaction to the presence of an infectious agent(s) or its toxin(s). There must be no evidence that the infection was present or incubating at the time of admission to the acute care settings. HAIs have generally been implied to increase morbidity and mortality among patients, extend patients' average length of stay and increase healthcare costs. (Graves et al., 2007; Halcomb, Griffiths, & Fernandez, 2008; WHO, 2009b)

Studies have shown that factors that influence acquisition of HAIs include virulence of the organism, susceptibility of the host, and the environment that the host is in. (WHO, 2009b) Although the acquisition of HAIs is multi-factorial, the transmission of these organisms via the hands of healthcare workers has been documented. (Allegranzi & Pittet, 2009; Duckro, Blom, Lyle, Weinstein, & Hayden, 2005; WHO, 2009b) Apart from the transfer of organisms from touching patients, contact with the patients' surroundings can also result in hand contamination. (Duckro et al., 2005; Pittet et al., 2006) Numerous studies have suggested the effectiveness of good hand hygiene in reducing the transmission of healthcare-related pathogens and HAIs. (Laustsen et al., 2008; Pratt et al., 2007; Randle, Clarke, & Storr, 2006; Sax et al., 2007; WHO, 2009b)

Hand hygiene is broadly defined as the cleansing of hands with soap and water or with antiseptic hand wash, alcohol hand rub, or surgical hand antisepsis. (Boyce & Pittet, 2002) However, it has to be properly performed and at appropriate times so that the risk of cross-transmission can be effectively reduced. (Pittet, 2008; Pittet et al., 2006; Sax et al., 2007) Proper decontamination of hands involves use of appropriate cleansing agent, thorough cleansing of the hands (covering all surfaces of the hands) and complete drying of hands. (Pichansathian, 2004; Pittet et al., 2006; Sax et al., 2007) The indications for hand hygiene can be summarized with the 5 moments of hand hygiene, (Sax et al., 2007) which was

referred to by Pittet (Pittet, 2008, p. 958) as "a novel concept incorporating social marketing, human factors, and the science behind cross-transmission and hand hygiene." The concepts were established when it was realized that information and education regarding how and when hand hygiene was to be performed was inconsistent and the definitions were complicated. (Sax et al., 2007) This concept has also been adopted in the World Health Organization (WHO) Guidelines on Hand Hygiene in Healthcare. (WHO, 2009b)

The WHO Guidelines on Hand Hygiene in Healthcare provide a comprehensive review of scientific data on hand hygiene rationale and practices in healthcare so as to reduce transmission of organisms to patients and healthcare workers. (WHO, 2009b) In the National Cancer Institute, Singapore (NCIS), the recommended guidelines for hand hygiene practice are followed, and the compliance is evaluated monthly using a direct observation method by intra-ward hand hygiene auditors. The need to ensure consistent good hand hygiene compliance rates remains a challenge for many organizations. (Aboelela, Stone, & Larson, 2007; Allegranzi & Pittet, 2009; Halcomb et al., 2008; Pittet, 2008; Pittet et al., 2006; Randle et al., 2006; Sax et al., 2007; WHO, 2009b) Previous literature has highlighted the need for a multimodal approach to ensure successful sustenance of the program. (Aboelela et al., 2007; Pittet, 2008) This is due to the complexity of hand hygiene behavior and the various external factors that affect this behavior (Aboelela et al., 2007; Son et al.) The need to actively implement strategies that improve or sustain the compliance to good hand hygiene practice is similarly reflected in NCIS. NCIS is the second cancer center in Singapore and is part of the National University Health System (NUHS). It comprises the ambulatory cancer center and inpatient wards, and is located within the National University Hospital (NUH), which is a member of the NUHS. NUH is a 991-bed acute teaching hospital and is a Joint Commission International Accredited Institution since 2004. In 2004, the Joint Commission added an international patient safety goal that required institutions to adhere to approved hand hygiene guidelines and a system to be in place for the mea-

surement of adherence to the guidelines. (JCAHO, 2009) Located within NUH, NCIS adopted the hand hygiene program that NUH has in place so that the goals are aligned and interventions are more effective. (Aboelela et al., 2007) NUH has strived to achieve a target compliance rate of at least 75% for general ward setting and 85% for intensive care and high-dependency care units. In the first quarter of year 2011, the average compliance was 68.6%. Through an array of strategies that have already been in place since 2008, the hand hygiene compliance in NUH has been on an upward trend. However, inconsistencies in the percentage of compliance among departments have been observed. Furthermore, although an audit tool has already been in place in NUH to measure the compliance of good hand hygiene practice, an in-depth dissection of barrier/s that withhold a greater compliance to good hand hygiene practice among the nurses is lacking. WHO (WHO, 2009b) recommends understanding hand hygiene practices and the factors that prevent good practices among health-care workers so that the interventions planned will be of value.

Within NCIS, the average compliance for hand hygiene has been hovering from 68% to 72% from 2008 to 2010. Although bloodstream infection (BSI) with a multi-drug-resistant (MDR) organism like vancomycin-resistant enterococci (VRE), extended spectrum beta-lactamases (ESBL), and methicillin-resistant staphylococcus aureus (MRSA) has been low, it has been observed that the rate is increasing, especially for organisms such as *Klebsiella pneumoniae*.

Due to the nature of the residing malignancies and the often resulting immunosuppression induced by the treatment, hematology-oncology patients often end up being susceptible hosts and in an environment that increases their risk; prolonged hospitalization, having invasive devices and procedures; antimicrobial therapy and ICU admissions. These factors have been shown to increase the risk of acquiring HAIs. (Wisplinghoff et al., 2004) The resulting effect of increasing use of antimicrobial therapy, thereby increasing cost, prolonged hospitalization, and



mortality further intensifies the need for an effective and successful hand hygiene program. (Wisplinghoff et al., 2004)

Aim

In order to enhance the existing program, the overall aim of this project was to establish an effective multimodal approach to improve hand hygiene compliance and sustenance among oncology-registered and enrolled nurses working in the inpatient and ambulatory units.

The specific aims of this project were:

- To audit compliance with best practice established criteria for hand hygiene and
- To utilize the audit, feedback, and re-audit cycle in an established program so as to continuously compare and evaluate audit compliance and implement strategies to target at specific barriers to achieve improved sustenance in compliance result.

Methods

This project used the Joanna Briggs Institute (JBI) Practical Application of Clinical Evidence System (PACES) and Getting Research Into Practice (GRIP), which is an online resource data tool that helps health professionals conduct audits using evidence-based criteria, implement change, and audit their own results. JBI PACES simplifies the cycle of audit, feedback, and re-audit and

promotes ownership of the practice change process as the stakeholders will be responsible for planning the change action and who will be involved in this process. (JBI, 2009) Based on the WHO (WHO, 2009b) Guidelines and evidence, the JBI has developed audit criteria that are intended to guide effective best practices in hand hygiene so as to minimize cross-transmission of microorganisms. (Wisplinghoff et al., 2004) A number of audit criteria were used in this project.

This project was implemented over a 6-month period from November 2010 to May 2011 and was carried out over 3 phases:

Phase 1: Preparation for audit **Identification of topic**

Hand hygiene compliance among registered and enrolled nurses working in the inpatient and ambulatory units in NCIS was selected as the topic of choice because HAIs, especially BSIs, were on an increasing trend in the center. Moreover, studies have suggested an inverse relationship between improved hand hygiene compliance rates and HAIs. (Laustsen et al., 2008; Pratt et al., 2007; Randle et al., 2006; Sax et al., 2007; WHO, 2009b) The profile of the patients in the unit deepened the need to scrutinize and break down the current barriers that prevented good hand hygiene practices.

Establishment of the project team

The members of the project team included a Nurse Manager who led the team, 3 Senior Staff Nurses, and 1 Staff Nurse. All had recently completed a 10-day infection control training course that was organized by the Asia Pacific Society of Infection Control. The topic was chosen unanimously, as the importance to correct the foundation of infection control was the priority on everyone's mind after the course, and hand hygiene has been considered to be the single most effective measure to prevent HAIs. (Randle et al., 2006; Scheithauer et al., 2010) As all the members were working in different units, each member readily took on the ownership of the audit process in their respective unit. The project was launched following the infection control training course. Historical data for the acquisition of MDR organisms and the overall hand hygiene compliance of both NUH and NCIS was searched via the organization's Infection Control Department website on the intranet. An electronic database search for best practices recommendations was commenced. Based on the data and information, the team drafted the focus and aims and planned the time frame of the project.

The Head of the Oncology Nursing Unit and a Senior Nurse Clinician who had participated in the JBI Evidence-Based Clinical Fellowship program guided the members regarding the use of JBI-PACES and JBI-GRIP. Open communication with all team members was maintained at all times via email and phone calls. The team was given budgeted time to convene once weekly in the first two weeks of the implementation of the project in order to confirm the details of the project.

Setting up JBI-PACES

A fellow nurse clinician from the hospital's evidence-based nursing unit (EBNU) further guided the team on the use of JBI-PACES. The details of the audit were formulated into the JBI-PACES that included setting up the audit team, adding new teams, allocating team roles, setting the audit type and determining the sample size.

Identifying audit criteria

This project utilized all the audit criteria generated from the JBI-PACES. There

were 2 criteria that were not found in the JBI-PACES online tool when this project commenced, with baseline audit conducted in November 2010. As there was no baseline data for comparison, the criterion that stated "Hands are washed using an effective hand washing technique involving three stages" was initially excluded from the project. The criterion "Staff has received education about hand hygiene" was included as hand hygiene competency was a compulsory requirement for all staff of the organization and thus, education was considered as being received.

The criteria and scope are as follows:

Criterion 1: Alcohol-based hand rub is routinely used for hand hygiene unless hands are visibly soiled.

Scope: The criterion is considered met when a staff uses alcohol-based hand rub for hand cleansing, unless the staff has visibly soiled or potentially contaminated hands, e.g., after handling patients who are experiencing vomiting and/or diarrhea, direct hand contact with bodily fluids, infection with *Clostridium difficile*, an outbreak of Norovirus, or other diarrheal illnesses. In addition, alcohol hand rub is also contraindicated even if staffs are wearing gloves but meet the above-mentioned circumstances.

Criterion 2: Hands are decontaminated immediately after contact with individual patient and/or all inanimate objects, including equipment.

Scope: The criterion is met when hands are decontaminated using alcohol hand rub or washed.

Criterion 3: Hands are decontaminated immediately before each and every episode of direct patient contact or care and/or all inanimate objects, including equipment.

Scope: The criterion is met when hands are decontaminated before each and every episode of direct patient contact or care. Decontamination of hands before touching equipment is not taken into account, as according to the model of 5 moments of hand hygiene, (Pittet, 2008; Sax et al., 2007) the requirement for decontamination before touching equipment was not stated.

Criterion 4: Hands are decontaminated with an alcohol-based hand rub (unless visibly soiled) between different activities of care for the same patient.

Scope: The criterion is considered met when staff practices the principles of decontamination of hands when moving from a contaminated body site to a clean body site.

Criterion 5: Hands that are visibly soiled or potentially grossly contaminated with dirt or organic material are washed with liquid soap and water.

Scope: The superiority of decontamination of hands using antiseptic soap over a non-antiseptic one has not been conclusive (WHO, 2009b), so the criterion is considered met when any kind of liquid soap and water is used during hand washing.

Criterion 6: Staff has received education about hand hygiene.

Scope: For the baseline audit, all staffs were considered to have received education for hand hygiene. In the follow-up audit, the criterion for education was indicated when re-education was done. Re-education was indicated when staff were observed to have missed opportunities in meeting the criteria. This re-education entailed one-to-one engagement with the staff in question in order to discuss the missed opportunities.

Identifying the setting and sample size

In order to ensure a good representation of the registered and enrolled nurses working in the inpatient wards and ambulatory unit, the required sample size was determined using the template in PACES. The parameters required in PACES to determine the sample size were total population of staff, current compliance to the criteria (average of 60% compliance across all criteria), and the target compliance to achieve (100%). Considering the population size of the registered and enrolled nurses as 144, PACES indicated that 77 staff had to be audited for good representation. The team however decided to conduct the baseline audit on as many nurses that can be targeted within the 2 weeks the audit was targeted to run, as the team hopes that the

baseline hand hygiene practice of the staff can be captured so as to have a more effective follow-through on the staff's hand hygiene practice in the long run.

Conducting baseline audit

The baseline audit was conducted for 130 staff over a 2-week period from mid-November 2010, which accounted for 90% of the total population. The remaining staffs were away on leave, and there were no opportunities to conduct the baseline audit for them. All the team members had undergone the hand hygiene auditor training that was conducted by the institution's infection control team using the training film from the WHO multimodal hand hygiene improvement strategy. (WHO, 2009a) The team was also given time within their working hours to conduct the audits using direct observation method. On the first 2 days of data collection, the team conducted the audits from 8 am to 5 pm so as to maximize the inclusion number of staff, as the morning and evening shifts not only have the highest number of staff on duty, but they also involve the highest care activities and thus allow for more hand hygiene opportunities to be observed. For subsequent days, the team members took turns conducting the audits. The audits were conducted by direct observation, which is one of the standard methods in auditing hand hygiene compliance. (Haas & Larson, 2007) Staff members working on the shifts were shadowed and observed for at least one patient care activity. Data was documented on the spot on hard copies of the data collection tool that were printed from PACES, and then entered into online PACES by the team leader. The staffs that were being audited were simply instructed to proceed with their daily care and were unaware that they were being audited for hand hygiene, although most of them did realize it sometime during the audits.

Phase 2: Implementation of best practice

Use of GRIP to document barriers, strategies and resources required

Following the completion of the baseline audit, the results were entered into PACES and a report and graph was generated. The team reconvened, and using the GRIP model within PACES, the baseline audit results were analyzed. The three steps of

GRIP--situational analysis, action planning, and action taking--were used to develop an action plan. Using GRIP, several barriers, namely, time pressure and the lack of knowledge among staff in recognizing opportunities for hand hygiene practice, were identified and documented.

Recommended strategies in literature to improve hand hygiene compliance were compared with the strategies that the institution already had in place. We discovered that the majority of the recommendations compiled in the WHO guidelines were already introduced in NUH. It has been recommended that alcohol hand rub be placed in close proximity to patients to encourage usage during patient care. (Randle et al., 2006; WHO, 2009b) Hospital-wide hand hygiene competency assessments were launched, posters and small token awards for good compliance to hand hygiene were given as motivation, and compliance rates for each unit were revealed to the respective departments. (IHI, 2006; Randle et al., 2006) The compliance rate reported was the overall compliance; the low compliance of specific criteria was not reported. In order to enhance the interventions that were already in place, a plan of action targeting specifically criteria of low compliance in the center was determined.

Conducting hand hygiene audits using observation methods has been reported to have advantages as well as disadvantages. (Gould, Drey, & Creedon, 2011) One such benefit is the auditor being able to observe firsthand the way in which staffs are complying with the audit criteria and barriers to the compliance. In this project, a surprise observation reported by the auditors was the poor compliance of thorough decontamination of hands. The organization has adopted the use of 6 steps of hand cleansing to ensure that all surfaces of the hands are fully decontaminated. Only 24.6% of the staffs were observed to have fully decontaminated their hands when they performed hand hygiene. The observations for complete decontamination of hands were not included in the initial audit criteria. This was because the assumption was made that the staffs were decontaminating their hands thoroughly because staffs had to undergo hand hygiene competencies which included the use of the 6 steps of

hand cleansing while adhering to the 5 moments of hand hygiene as part of their job skill assessment.

The disadvantage of the observation method was the likelihood of the presence of the Hawthorne effect, where staff modified their behavior as they were being observed and thus, their usual practice was not followed. (Kohli et al., 2009) It can be implied that due to the Hawthorne effect, the compliance rate would therefore be higher when staff are aware that they are being audited. However, the low compliance to the 6 steps of hand hygiene practice was a reason for concern, and the team decided to analyze the barriers resulting in the low compliance, although the initial plan was to exclude this criterion.

Strategies for improving compliance for each audit

A focus group of 10 members was called in January in order to gain a better understanding of the barriers that were faced by nurses in practice. The members of the focus group were provided several scenarios in which the highest non-compliance to hand hygiene practice had occurred, as a simulation to understand the barriers to practice hand hygiene. They were then asked to re-enact the scenarios in the classrooms, and permission was sought to have the scenarios recorded. The video was then played to the group, and the members were requested to highlight the missed opportunities; they were also asked to observe if the 6 steps of hand hygiene were performed. The group was then asked to share the barriers they encountered. Some of the barriers shared were time pressure, performing multiple cross-contamination activities for the same patients and being unsure of indications to perform hand hygiene. The barriers mentioned were the common challenges that many other healthcare organizations faced. (IHI, 2006; Randle et al., 2006)

Strategies are wide ranging but often do not sustain good hand hygiene practice. The different interpretations in the area of recognition of hand hygiene opportunities were observed as the staff engaged in discussion with each other and with the project members of the focus group. This again warranted the need to re-educate

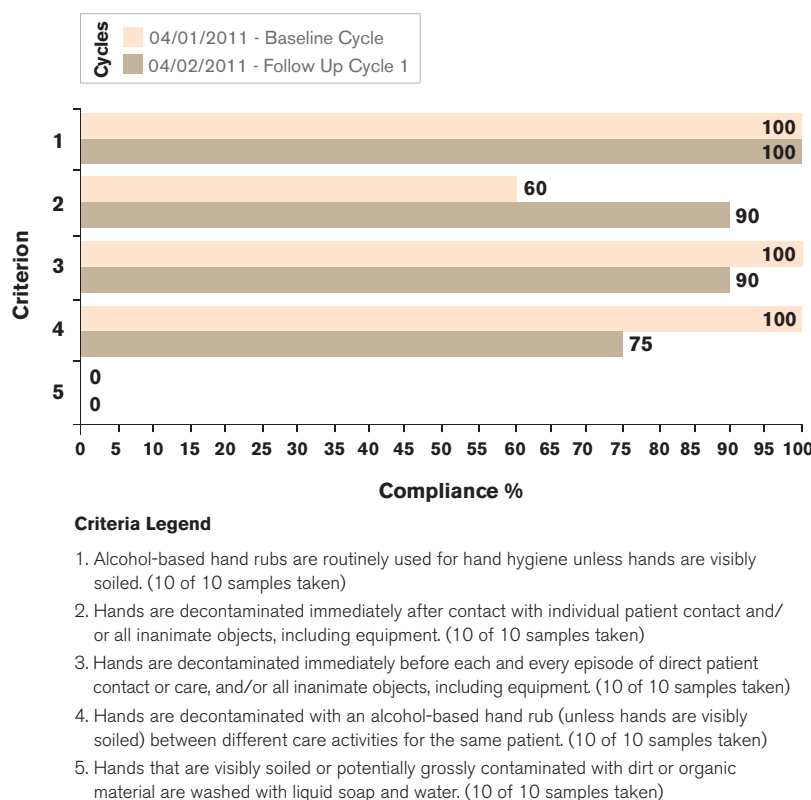
the staff. There was also a strong need to create an environment where staff could be constantly reminded of the importance of good hand hygiene practice and could receive direct performance feedback pertaining to their hand hygiene practice, as some were not aware that their interpretation was inadequate. Following the focus group meeting, the project members sought to observe the focus group members and provided performance feedback on a one-to-one basis as soon as an opportunity was missed.

An audit on the focus group participants was conducted in February to evaluate if re-education during the focus group meeting led to increased compliance in hand hygiene practice. It was observed that there was a slight improvement in compliance for some criteria, but there were also inconsistencies in other criteria. (Fig. 1) This highlighted the need for prominent reminders and performance feedback to be given to the staff regularly for reinforcement of knowledge and to encourage adherence to the value of good hand hygiene practice.

Nevertheless, the team made the decision to roll out the re-education, as the in-service was deemed to be a suitable platform to create awareness and remind the staff that proper hand hygiene practice has an impact on prevention of HAIs not only in patients but in staff as well. The in-service was conducted in March over a one-week period. The scenarios in the WHO hand hygiene training video were used to train the staff to identify correct and incorrect hand hygiene opportunities based on the 5 moments of hand hygiene. The importance of complete decontamination of hands using 6 steps was once again reinforced. The aim of the in-service was for the staff to relate to the scenarios and reflect on their own hand hygiene practice.

Following the in-service, a series of posters with "focus of the month" themes were created and posted on walls in prominent locations throughout the wards so as to remind the staff of good hand hygiene practice. The use of supportive marketing materials was found to be one of the successful strategies in improving hand hygiene compliance, as they not only served as reminders to the staff, but also created awareness

Figure 1. Focus Group



among the patients and caregivers. (WHO, 2009b) At the time of change of the poster every month, the team members engaged the staff in discussion after a short sharing of the theme of the month. The themes were selected based on the analysis of the data and from the focus group's feedback. This created a platform to allow clarification of staff's interpretation of good hand hygiene principles and aided in strengthening the concepts that had already been shared. This was another strategy to address the barrier to good hand hygiene practice, as the failure to recognize hand hygiene opportunities during patient care and lack of awareness of the risk and methods of microorganism cross-transmission were deemed as barriers to good hand hygiene practice. (Randle et al., 2006)

Results

Phase 3: Post-implementation audit

The post-implementation audit was conducted in April, following a 3-month implementation. Data were collected using the criteria from the JBI-PACES program. A total of 130 staffs were audited. Staffs were now observed for a minimal of 5 opportunities for hand hygiene. The change

in the number of times a staff was to be observed was to merge the current project in line with the institution's strategies. As part of its strategies to improve hand hygiene compliance, the institution had requested that each clinical area have monthly audits on individual staff for hand hygiene compliance. Once again, the request for compliance rates was to be reported as overall compliance. The team also decided to include the criterion that stated, "Hands are washed using an effective hand washing technique involving three stages." (Criterion 7) However, the scope of this criterion is to observe if the staffs used the 6 steps of hand hygiene for the complete decontamination of their hands, regardless of whether alcoholic hand rub or hand wash is used. Although no data was entered into PACES for this criterion in the baseline audit, the team had already recorded the compliance separately during the baseline audit, once it was observed that the 6 steps of hand hygiene were not commonly performed. As such, the comparison of baseline and post-implementation audit was possible. The decision to include the criterion "hands are washed using an effective hand washing

technique involving three stages" (Criterion 7) in the post-implementation audit also stemmed from the team's decision to continue the use of JBI-PACES Program and GRIP to document the findings, as the program provided systematic methodology in the collation, analysis, and evaluation of intervention. Furthermore, the program was able to generate comparison of the data. (Randle et al., 2006)

Discussion

The post-implementation data showed improvement for some criteria (Fig. 2):

Criterion 1: Alcohol-based hand rub is routinely used for hand hygiene unless hands are visibly soiled.

A 1% increase was observed in the routine usage of alcohol-based hand rub bringing the routine usage to 90%.

Criterion 2: Hands are decontaminated immediately after contact with individual patient and/or all inanimate objects, including equipment.

There was a 12% increase in decontamination of hands immediately after contact with individual patient and/or all inanimate objects including equipment.

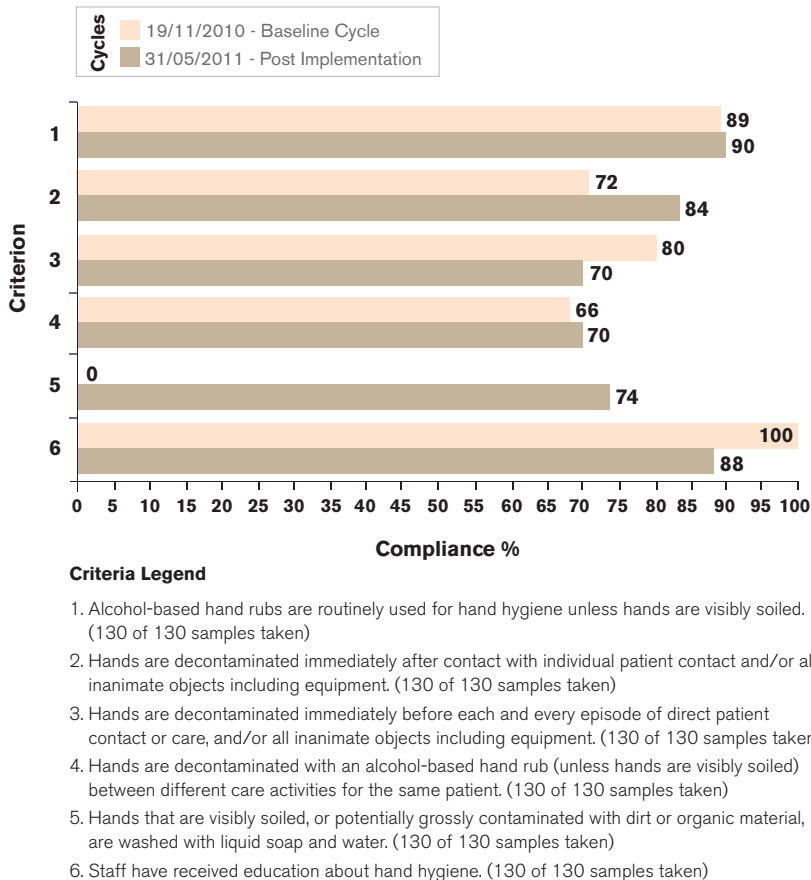
Criterion 3: Hands are decontaminated with an alcohol-based hand rub (unless visibly soiled) between different activities of care for the same patient.

There was a 4% increase in decontamination of hands in between patient care activities. This result was encouraging, as it has been reported that this indication is often not recognized by healthcare workers and was not reported in the compliance data. (Pittet et al., 2006)

Criterion 5: Hands that are visibly soiled or potentially grossly contaminated with dirt or organic material are washed with liquid soap and water.

This criterion needs to be further assessed in future audits, as the number of the sample who met the baseline audit was too small to make a significant comparison although the compliance rate of 74% was encouraging.

Figure 2. Post-Implementation Data



Criterion 6: Staff has received education about hand hygiene.

For using Criterion 6 as an indicator for performance feedback, there should be a continual decrease in the percentage for this criterion as the staffs become well versed in the principles of good hand hygiene practice.

Criterion 7: Hands are washed using an effective hand washing technique involving three stages.

The percentage of staff who performed the 6 steps of hand hygiene increased by 5.6% from 26.4% to 32%.

Criterion 8: Hands are decontaminated immediately before each and every episode of direct patient contact or care and/or all inanimate objects, including equipment.

This was the only criterion that showed a decrease of 10%. The result for Criterion 3 serves as a reminder that the battle to improve hand hygiene compliance is a long-

term one and needs strong support from all levels of staff. The team needs to be objective yet relevant in implementing the interventions. The time frame for intervention also needs to be taken into consideration, as a frequent switch in game plan may lead to confusion.

Sharing results

The results of the pre- and post-implementation audit were shared at each inpatient and ambulatory area using graphs. The graphs were posted on the walls of the area, detailing the percentage of compliance to good hygiene practice (5 moments, 6 steps). Following the need for monthly audits, the monthly results would be posted on the charts, and using GRIP, barriers and interventions would be recorded and generated. The charts would then serve as a visual communication for the progress of the unit.

Conclusion and future recommendation

For behavioral changes to take place, a multi-pronged approach has to be

employed. (Aboelela et al., 2007; Randle et al., 2006) The multimodal approach recommended by WHO includes an education program, compliance monitoring and performance feedback, formation of a multidisciplinary team, and documented commitment from the staff. This multimodal approach is translated to the unit level. The monthly audit would allow compliance to be monitored. Rather than having performance feedback given at the end of the month and reported as an overall compliance, it is proposed that performance feedback regarding hand hygiene practice be given as soon as an opportunity is missed. The one-to-one feedback and engagement helps to bring awareness among the staff about their own hand hygiene practice. This prompts them to reflect upon their current practice and can lead to customized interventions to the barriers that the staffs face. The education program would persist with the performance feedback, as it will also be used as a platform to discuss good practice with the staff, and also where misconceptions could be clarified.

In order to further encourage the staffs to continue putting in their efforts to improve their own practice of good hand hygiene and to remind their colleagues to do the same, a custom-designed pull reel with NCIS hand hygiene logo would be provided to staff who were able to maintain a compliance rate of at least 85% for a consecutive three months. The wearing of the pull reel would signify the staff's commitment to good hand hygiene practice. Other team players who are slowly coming on board are patients and caregivers, who are encouraged to remind the healthcare workers to perform hand hygiene before commencing care. The uptake among patients and caregivers, however, is slow. (WHO, 2009b) The one-to-one engagement promotes long-term sustainability in good hand hygiene practice, as the staffs are engaged personally in the reflection of their own practice, which thus allows them to realign to recommended practice.

Ethical consideration

Ethics approval was not sought for this project, as it is considered as a quality improvement project and not research. The principles of confidentiality and anonymity of the staffs that had been audited were kept and adhered to throughout the project.

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