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Increasing Compliance of Personal Protective Equipment S election and Use for Isolation Precautions Among RNs & NAs on a Med-Surg Unit

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Abstract

Background: Due to the high potential of transferring infectious diseases and/or organisms among patients, themselves, and the community, healthcare workers (HCWs) must be knowledgeable and confident in selecting the appropriate type of personal protective equipment (PPE), and the use in technique when putting on (donning) and removing (doffing) PPE based on the level of isolation precautions required for the patient being cared for.

Project Purpose: The purpose of this project is to determine whether assessing the knowledge and actual practice with observing, and utilizing an innovative approach of video and educational tools to isolation precautions would improve the consistency of compliance with PPE selection and use among registered nurses (RNs) and nursing assistants (NAs) on a medical-surgical unit.

Methodology: The theoretical framework incorporated in the study was Schön's Theory of Reflective Practice. A pre-intervention questionnaire was distributed, and pre- and post-intervention observations were conducted to evaluate PPE selection and use by RNs and NAs.

Results: The pre-intervention data from both the knowledge questionnaire and the observations showed various inconsistencies in RNs' and NAs' PPE technique and selection choice. A comparison of the pre- and post-intervention observation data showed that there was significant increase in all four analyzed categories—hand hygiene (45% to 70%), selection of PPE (79% to 80%), sequence of putting on PPE (70% to 85%), and sequence of removing PPE (76% to 85%).

Recommendations: Future research studies should plan for a longer period of time to assess and collect pre- and post-intervention data, and include a larger sample. An expanded research project should also examine the correlation between HCWs' compliance rates with PPE and isolation precautions, and the incidence of healthcare-associated infections (HAIs).

Keywords: isolation precautions, personal protective equipment (PPE), compliance, Clinical Nurse Leader (CNL), healthcare-associated infections, infection control, patient care

Problem Statement

Healthcare-associated infections (HAIs) continue to be a significant complication in the healthcare system, specifically acute hospital settings, and have become a leading cause of death in the United States. It has been proven from previous studies conducted that effective evidence-based infection control measures can maintain a decrease in and the prevention of HAIs and promote patient and staff safety when healthcare workers (HCWs) abide to all recommendations and guidelines when caring for patients under isolation precautions requiring the use personal protective equipment (PPE) (Beam, Gibbs, Boulter, Beckerdite, & Smith, 2011).

Despite the in-depth healthcare staff educational and training programs initiated in healthcare facilities and the breakthroughs in medical technology, the compliance rates of HCWs with isolation precautions guidelines continues to be low, and in 2012 hospital-acquired HAIs contributed to over 100,000 deaths and financial burdens on the healthcare system (Cohen, Hyman, Rosenberg, & Larson, 2012). The Centers for Disease Control and Prevention (CDC) estimates that approximately 1.7 million HAIs occur in U.S. hospitals every year, which has lead about $40 billion in annual excess health care costs (U.S. Department of HHS, 2013).

The behaviors of HCWs while using PPE in patient care activities has been proven to pose as a major patient and staff safety issue, and it is crucial to account for the potential for transferring infectious diseases among patients and HCWs when designing and implementing intervention strategies that assesses and addresses adherence to infection control guidelines. The proper use and selection of personal protective equipment (PPE) is paramount when examining compliance with isolation precautions (Beam et al., 2011). PPE compliance is an important line of defense to protect HCWs, their patients, and the community from contracting such infectious diseases as Ebola virus disease (EVD) and many contagious respiratory viruses (CDC, 2014).

The strict use of PPE provides a safe barrier between the patient and HCW by actively preventing physical contact or filtering out infectious particles (Beam et al., 2011). The significant potential for errors in PPE technique has been noted in research and practice today, and it is key to train and educate HCWs to demonstrate their knowledge, comfort, and proficiency when donning (putting on) and doffing (removing) PPE (CDC, 2014).

Although infection control is recognized as a major patient safety issue, implementing interventions that allow HCWs to achieve the correct use and selection of PPE should be managed by observing, educating, and practicing the sequence and actions involved in each PPE step based on the level of isolation precautions ordered (Braun et al., 2012). The purpose of this project is to determine whether assessing the knowledge and actual practice with survey tools, and utilizing an innovative approach of combining visual aids and educational tools to isolation precautions would improve the consistency of compliance with PPE selection and use among RNs and NAs on a medical-surgical unit. The need for training materials and consistent observational audits with active feedback on PPE compliance and use was identified during the worldwide outbreak of SARS and the more recent 2014 EVD epidemic when observations of PPE use among healthcare personnel showed potentially unsafe practices when selecting, donning, using, and removing PPE (CDC, 2014).

Rationale

A needs assessment was used during an initial meeting with the unit manager to introduce the general overview of the project and get input from her on areas that need improvement from a manager's point of view. It was determined that this study would best fit the infection prevention and control needs on the unit to increase compliance and knowledge of the appropriate type of personal protective equipment (PPE) and correct sequence of putting on and

removing PPE based on the level isolation precautions required among registered nurses (RNs) and nursing assistants (NAs). The unit manager expressed concern for adherence to the current policies for contact, droplet, and airborne isolation precautions among the staff—airborne isolation patients are not admitted to this unit due to the inability to properly care and house the patient under the current policy's requirements. A need for an intervention to improve evaluation and training of RNs and NAs in the proper use of PPE when caring for patients in isolation was established from uncertainty from the RNs and NAs in the types of PPE to choose when caring for a patient on isolation precautions, and improper donning and removal of PPE in the incorrect sequence was consistently observed by management—feedback and collaboration on this topic involved the unit manager, unit Clinical Nurse Specialist (CNS), unit educator, unit Infection Prevention and Control nurse (IPC RN), and two clinical RNs who work on the unit.

Perception of the need for an innovative intervention based on this feedback gave insight for developing an innovative intervention that included creating and utilizing a demonstrational video and a simple educational handout, which would aim at increasing RNs' and NAs' compliance with type of PPE selected and the correct sequence and technique the PPE is put on and removed; the IPC RN noted that this combination of interventions would act as a "test" to determine whether this type of training is effective and successful to eventually widen the implementation of these interventions to include the entire hospital. It is important to implement a validated assessment tool to assess RNs' and NAs' knowledge and compliance with selecting and using the correct PPE according to the current isolation precautions policy.

Literature Review

Healthcare-associated infections (HAIs) are a major threat to patients and place an enormous burden on the nation's healthcare system; specifically hospital-acquired HAIs

contribute to significant morbidity, mortality, and economic strains in the U.S. (Nickel et al., 214). In a more recently published report, the Centers for Disease Control and Prevention (CDC) estimates that approximately 1.7 million HAIs occur per year in hospitals across the U.S.—using combined historical and contemporary hospital data (Magill et al., 2014). While at any given time one in twenty hospitalized patients have a HAI (U.S. Department of HHS, 2013). A 2014 CDC analysis found that about one in every twenty-five patients acquires an infection related to the care received in the hospital (Nickel et al., 2014). HAIs cause nearly 100,000 deaths annually in the U.S., resulting in excess health care expenditures (Cohen et al., 2012). Hospital-acquired HAIs alone are responsible for potentially preventable health care costs ranging from $28 billion to $45 billion annually (Scott II, 2009). Therefore, HAIs can have devastating medical, financial, and emotional consequences.

According to the U.S. Department of Health and Human Services' National Action Plan to Prevent Health Care-Associated Infections: Road Map to Elimination (2013) (HAI Action Plan), HAIs are defined as infections that patients acquire while they are in contact with the healthcare system—contact can include all procedures associated with diagnostic tests, surgery, treatment, and rehabilitation (U.S. Department of HHS, 2012). HAIs range from simple common colds to life threatening sepsis with multidrug resistant organisms (MDROs) (Allen & Cronin, 2012). The health care delivery spectrum in which HAIs may spread can involve acute inpatient hospitals (the majority of cases), ambulatory outpatient clinics, nursing homes, long-term care facilities, and general practice offices (Kolmos, 2012).

The more important sources of infection that relate to HAIs in the hospital environment may originate from the patient's own normal flora, or some may be acquired via horizontal transmission, which is caused by organisms from other patients, HCWs, and the hospital setting

(Kolmos, 2012). The most common hospital-acquired HAIs, in no particular order, include pneumonia, bloodstream, surgical site, and urinary tract infections (Mauger et al., 2014). Direct or indirect contact with HCWs whom care for many patients at the same time were found to be an important element of exposure to pathogens that cause HAIs in hospitalized patients (Cohen et al., 2012). Thus, HAIs can have serious impacts at the hospital level contrary to adverse events that are secluded to individual patients (Cohen et al., 2012).

Infection control and prevention guidelines and programs are well-established in hospitals' policies and are intended to promote improved isolation precautions practices that help health care institutions reduce transmission of microorganisms and the associated infections (Kang, Weber, Mark, & Rutala, 2014). The inability to follow guidelines and policies on personal protective equipment (PPE) and environmental needs for isolation precautions threatens patient safety (Vinski et al., 2014). Incorrect use and errors in technique of PPE leads to the spread of infectious agents and HAIs among HCWs and patients (Williams & Carnahan, 2013).

Previously researched and published studies have exposed compliance rates with isolation precautions among nurses is particularly low—previous observations have shown that adherence ranges from 43% to 89% (Braun et al., 2012). Specifically, this study determined that nurse compliance was found inadequate pertaining to hand hygiene guidelines, use of gloves and gown when exposure to body fluids was expected, respiratory (use of mask) and eye protection, and wearing an isolation gown when required (Efstathiou, Papstavrou, Raftopoulos, & Merkouris, 2011). A research study reported in 2011 that there are two important measures to help prevent and limit the transmission of HAIs—hand hygiene, and the proper use of PPE, including gowns, gloves, and the various forms of respiratory and eye protection such as a N95 respirator, surgical mask, goggles, or face shield with or without surgical-style mask (Beam et

al., 2011). This same study confirmed that RNs and NAs, among other HCWs, found that the selection of appropriate PPE for each level of isolation precautions, and demonstrations of donning (putting on) and doffing (removing) PPE was one of the objectives in the hospital facility's policy that was not being met from RNs and NAs (Beam et al., 2011). Other researchers suggested that high rates of HAIs are most likely due to HCWs' errors in technique and lack of knowledge of correct, necessary PPE, which reduced or destroyed any of its intended effects causing higher reported HAI cases (Williams & Carnahan, 2013). In another study, Hon et al. (2008) found that the average compliance before implementing an intervention for putting on PPE was 66%, and removing PPE was 48%. This same study found that post-intervention compliance from HCWs for putting on PPE increased to 87%, and removing improved to 68% compliance (Hon et al., 2008). Much of the current literature on PPE use and compliance has resulted from the SARS outbreak in 2003 and the 2009 H1N1 pandemic, which brought attention to the inconsistency and improper usage of PPE when putting on and removing (Hon et al., 2008; Beam et al., 2011).

Elimination of HAIs has been a national focus and priority of the U.S. Department of Health and Human Services (HHS), in collaboration with many other organizations, to coordinate HAI prevention efforts for the past thirty years. Considerable successes and accomplishments in the field of HAI prevention have been introduced, including increased investment in HAI research and the development of national and statewide multidisciplinary HAI prevention programs committed to improving the safety and quality of patient care (U.S. Department of HHS, 2013). The Department of HHS's 2013 HAI Action Plan provided an updated five-year path to achieve set goals and targets to reduce HAIs, and assess progress and adherence to recommended isolation precautions practices. Another example of infection control

and prevention initiatives is stated in the Joint Commission for Accreditation of Healthcare Organizations' (Joint Commission) identification of reducing the risk of HAIs and multidrug resistant organisms (MDROs) as one of the National Patient Safety Goals (NPSGs) for accredited hospitals (Allen & Cronin, 2012; Joint Commission, 2013). One of the key elements of performance and quality care highlighted in the 2014 NPSGs addresses the importance of compliance with implementing evidence-based practices and guidelines in hospital policies. The CDC recommends the use of transmission-based isolation precautions utilizing appropriate PPE—contact, droplet, and airborne/respiratory—to prevent the spread of HAIs and MDROs by HCWs (Allen & Cronin, 2012; Joint Commission, 2013).

In order to eliminate the role HCWs play in transmitting organisms from one patient to another or infecting themselves, there has been a nation wide effort, as previously mentioned, planned and put in action from national experts, stakeholder organizations, and more. Achieving an improvement in healthcare quality and patient safety at an affordable cost requires essential strategies to be implemented by providers, health care organizations, governments, the public health community, patients, and all of those stakeholders in between the lines to guide this mission in reducing the risk of HCWs as a cause for hospital-acquired HAIs (U.S. Department of HHS, 2013). Failure of HCWs to properly select, and perform the correct sequence for putting on and removing PPE when caring for a patient on isolation precautions is one of the two (hand hygiene) most important factors in transmission of hospital-acquired HAIs (Kolmos, 2012). Taking into account the strength of evidence for the importance of the appropriate use and selection of PPE among HCWs, it is remarkable to note that knowledge and adherence is still so low among these individuals (Braun et al., 2012).

Healthcare systems must find methods to decrease the spread of infection and the development of infection with the use of isolation precautions and PPE in an acute care setting. The precise process of PPE depends on the knowledge of infection control procedures along with a judgment in the types of PPE needed based on the level of isolation precautions required, and the order in which a HCW dons and doffs PPE. Many studies have been conducted to determine the best tool to adopt when measuring compliance rates; and while exceptional education and training courses have shown potential, currently there is no standard tool to evaluate the competencies required to enhance patient and HCW safety (Williams & Carnahan, 2013).

Allen and Cronin (2012) conducted a project that increased compliance with isolation precautions among nursing personnel through the implementation of a successful program incorporating a behavioral contract and educational intervention. Mauger et al. (2014) published a systematic review of studies that addresses quality improvement (QI) strategies to raise compliance to evidence-based preventative interventions to decrease the incidence of HAIs. Overall six studies in their review exhibited moderate strength of evidence to support improvement in HCWs' compliance measures and infection rates in hospital settings when incorporating organizational change and provider education, and observational audits and feedback (Mauger et al., 2014). The interventions used in these studies included an educational program, the formation of a multidisciplinary QI team, compliance monitoring using observational audits and feedback, and the signing of a contract specifying isolation precautions requirements (Allen & Cronin, 2012; Nickel et al., 2014).

The Joint Commission found that the traditional interventions that have previously been used to increase compliance from HCWs in correct use and selection of PPE for isolation precautions, such as educational training programs, may enhance knowledge but may not change

behavior. Studies that implemented multiple educational interventions reported the highest rates of success (Braun et al., 2012). The common denominator found in recently published reports revealed that elaborate approaches to isolation precautions interventions that combine new elements are more successful in sustaining compliance among HCWs (Braun et al., 2012). The following are various innovative interventions being explored and reported successful when combined: consistent voice messages, electronic video monitoring, observational analyses, demonstrational images and videos, online training and competency exams, and facility skill set check-offs to determine technique, knowledge, and understanding of use and selection of PPE based on the level of isolation precautions ordered (Hon et al., 2008; Braun et al., 2012). Also, it is crucial to continue these interventions as a bundled unique to the facility and repeat training and testing throughout the fiscal year (Beam et al., 2011).

Root Cause Analysis

The challenge of assessing and ensuring adherence with the requirement of adequate choice in PPE and putting on and removing PPE in the proper order is well-documented among healthcare literature and previously conducted studies. It is evident from many regulatory agencies' reports, such as the CDC and National Action Plan to Prevent HAIs, that there were clear gaps between "what is practiced" and "what is recommended" in HAIs preventative efforts and guidelines for isolation precautions (U.S. Department of HHS, 2013). A root cause analysis was performed (see Appendix A) on the unit to determine the components contributing to noncompliance to isolation precautions policies on type of PPE required and putting on and removing PPE in the correct order. The five major contributing factors included education and training, staff acuity and time, environment, communication, and individual (staff) factors.

The main factors contributing to education and training issues included RNs and NAs lacking confidence in knowledge and competencies with isolation precautions, unfamiliarity with hospital's isolation precautions policies, and training and teaching methods are not up-to-date with most current evidence-based practice (EBP). An analysis of the staff's patient assignments related to higher patient acuity needs revealed the contributing factors to be lack of time, high patient loads and/or high patient acuity in assignment, understaffing of RNs and NAs, and overcrowding of isolation patients on the unit. The factors found to contribute to environmental issues included the unit culture, the unit floor's layout, available materials, length of time to receive isolation cart from central supply department after ordered, and isolation precautions sign properly placed on the patient's door. The major communication factors involved included inconsistent compliance across all members of the patient's healthcare team, isolation precautions order in *EPIC*, failure to communicate and anticipate needs of patients among healthcare team, and several caretakers associated with loss of communication in between. Lastly, the crucial factors that play a role in individual staff causes included resistance to change and beliefs, lack of understanding of risk in acquiring infection from patients and transmitting to other patients, forgetfulness, and disagreement with recommendations of isolation precautions.

Project Overview

The purpose of this project was to determine whether utilizing an innovative approach to isolation precautions would increase compliance with use and selection of personal protective equipment (PPE) among RNs and NAs, and improve patient and hospital staff safety. A meeting with the hospital's Director of Transdisciplinary Research occurred on October 2, 2014, and the CNL Graduate Nursing Student (who will hereby be referred to as project manager) presented the project idea and obtained feedback. The application to the organization's Institutional

Review Boards (IRB) was submitted and permission to complete the project was granted by the Compliance Office on October 8, 2014 (see Appendix B). Discussion about the project's infrastructure and essential activities with the unit's floor nurse manager, Clinical Nurse Specialist (CNS), and the Infection Prevention and Control (IPC) RN responsible for the unit at separate times allowed for the project's goals to be identified.

The study plan conducted a pre-intervention knowledge questionnaire to assess the current understanding of PPE requirements and the sequence to don and doff PPE in order to identify the needs for educational and training improvements for isolation precautions. Also before interventions were implemented, the project manager performed observational audits on the unit. These surveys used a tool developed by the project manager that is unique to the unit and adapted from previous successful studies found in the literature review. These audits assessed compliance with the transmission-based isolation precautions policy, which is located in the facility's Infection Prevention and Control Department's Manual on the Intranet. It assessed and identified RNs' and NAs' selection and use of PPE based on the level of isolation precautions ordered for the patient each role was caring for during the shift—due to the unit's inability to accommodate patients requiring airborne isolation precautions (no negative pressure rooms), contact and droplet isolation were only observed and analyzed.

Once data was collected and examined, the observational survey and knowledge questionnaire results drove the focus of the project's interventions while also the project manager collaborated with the unit CNS and IPC RN. It was determined that a combination of a short instructional video to demonstrate the correct technique for putting on and removing PPE, and a laminated double-sided educational handout will be placed on or in each isolation cart, or posted in the area where donning and doffing of PPE is performed by RNs and NAs. This handout

provided RNs and NAs with the materials and images needed to guide them on protecting themselves and patients by correctly choosing the right PPE and how to safely put on and remove PPE based on the level of precautions required. This intervention was put in place by sending out an email to the unit's RNs and NAs from the CNS with instructions on what to do after completion of viewing both materials—all written and developed by the project manager. In order to achieve higher rates of involvement from the staff, the project manager attended day and night shift huddles to remind RNs and NAs the intent of the project and the proper measures to safely use and select PPE when caring for patients on isolation precautions. Also, during RNs' and NAs' breaks throughout their shift, the project manager administered the interventions to other RNs and NAs who were not able to partake in the email's viewing instructions.

Following the project intervention, observational surveys were conducted for the remainder of the project and rates of compliance of the pre- and post-intervention observational audit results were compared and evaluated. The monitoring of staff PPE compliance was solely conducted by the project manager in order to keep a consistent understanding of the necessary competencies to assess.

The primary goal of the "Increasing Compliance with PPE Selection and Use" project was to increase the safety of the healthcare work environment through improved use of PPE by healthcare personnel. The main project manager's objectives established for this project included assessing and providing information on the appropriate selection and use of PPE in acute healthcare settings, and demonstrating the proper technique on how to safely put on and remove PPE. The key learner (RNs and NAs) objectives gave them the ability, after the intervention was implemented, to identify the appropriate circumstances for which each type of PPE is indicated and correctly demonstrate how to don and doff PPE.

Clinical Leadership Theme

This project was determined to be a quality improvement (QI) project that would be conducted on a med-surg unit at an inpatient hospital setting with a focus on assessing, analyzing, critiquing, and improving current processes RNs and NAs incorporate in their nursing care practice to patients on isolation precautions. Thus, the clinical leadership themes this project initiative FOCUSES on under the Forces of Magnetism Framework are Force 6: Quality of Care and Force 7: Quality Improvement (QI) (ANCC, 2014).

Methodology

Compliance with selection and USE of personal protective equipment (PPE) based on the level of isolation precautions ordered has been studied by using a variety of methods, including questionnaire distribution and observational surveys (Clock, Cohen, Behta, Ross, & Larson, 2010; Efstathiou et al., 2011). While only a few studies have incorporated a theoretical framework or model most likely because these only evaluated one or few aspects of isolation precautions (Efstathiou et al., 2011). In order to understand the factors that influence one's adherence with certain recommendations and guidelines, it was important to realize that RNs and NAs behavior was most likely a consequence of lack of knowledge (Efstathiou et al., 2011). A study conducted in 2011 showed that Schön's Theory of Reflective Practice can be very beneficial to nursing and other caring professions because using video recording to teach a skill allows the audience it is intended for to repeat the task or skill until they do it correctly, as a reflective educational intervention (Beam et al., 2011).

The study researched the effect of a demonstrational video and educational handout on RNs' and NAs' adherence to choosing the appropriate PPE with proper techniques for putting on and removing. Surveys were a crucial component in the methodology of this project in assessing

pre- and post-intervention data. A pre-intervention questionnaire was distributed to RNs and NAs on the unit to allow for an initial assessment of their knowledge in order to better focus the needs in the intervention. Also, pre- and post-intervention observational analyses were conducted to evaluate PPE selection and use by RNs and NAs, and those results were compared to determine if a significant change in compliance occurred.

The type of learning theory utilized in this project was discussed in Beam et al.'s (2011) study, which demonstrated that recording a patient care skill to illustrate staff competency and performance with active feedback is successful in finding a balance in the technicality and the evidence-based data to support the rationale of the skill, while also adding the ability to experience what is being taught (Beam et al., 2011). With extensive information on innovative ways to intervene using multiple strategies on RNs and NAs adherence to isolation precautions, a demonstrational video specific to the unit and an educational handout provided to the staff were developed as a result and implemented on the unit—the independent variable in this study.

An evaluation occurred once the end of the post-intervention observational surveys concluded. The sample of the project studied was the nursing staff— registered nurses (RNs) and nursing assistants (NAs)—on the 26-bed medical-surgical unit, with a specific focus on 10 patient beds because these were deemed as the private rooms or isolation precaution rooms. The pre-intervention questionnaire assessing knowledge was anonymously distributed to the RNs and NAs. This sample study consisted of randomly chosen patients' who were ordered to be on isolation precautions, which then provided the project manager to focus in on the assigned RN and NA to that patient for observational surveillance measures for that shift. Exclusion criteria for this project included any nursing staff who floated from another unit within the hospital. It

would be ideal for this project to occur over a year, but due to time restraints and student resources, this factor would not show a decrease in hospital-acquired HAIs on the unit.

Data Source

The RNs and NAs on the med-surg unit were given a pre-intervention, knowledge-based questionnaire (see Appendix C) to complete. This survey allowed the nursing staff to anonymously submit their answers in order to establish honest responses, limiting the chance for bias or resistance in engaging in the not-necessarily mandatory project. The knowledge survey was administered to both day and night shift nursing staff, and reminders to participate were provided by the project manager when on the unit and the resource nurse during staff huddle on each change of shift. A survey that assesses staff knowledge can be useful for learning what health care workers (HCWs) know and think, which can then be useful for uncovering why health care workers do or do not comply with the isolation precautions policy (Larson et al., 2009). The pre-intervention questionnaires were collected over a two-week period. Unfortunately due to time constraints, a post-intervention questionnaire was not administered because real time observations have shown to be of higher validity in assessing true knowledge and compliance with PPE and isolation precautions (Williams & Carnahan, 2013).

Over the same two-week time period, pre-intervention observational surveys were performed using a developed observational tool (See Appendix D) to examine and record the nursing staff's compliance with isolation precautions and the use of PPE. Numerous studies have demonstrated monitoring and observing PPE sequence and selection, and providing feedback and educational interventions have been more valid, successful means of increasing compliance among HCWs in regards to PPE and isolation precautions in hospital settings—determined to be the dependent variable (Beam et al., 2011). Both pre- and post-intervention surveillance audits

done on the unit used the same tool and criteria to assess and observe the RNs and NAs caring for patients on either contact or droplet isolation precautions. The observer in this study was the project manager who had the necessary expertise to competently evaluate all observations, and selected at least two patients on isolation precautions whose rooms could be viewed clearly and simultaneously. The same observer performed each survey and scoring for all participants to reduce variability, and aimed to achieve a goal of collecting data for at least 50 observation opportunities. An observation consisted of one occurrence of documenting if a RN or NA selected and put on or removed PPE either before entering the patient's room or when exiting. For example, if a NA was about to enter a room to provide care to a patient on droplet isolation precautions, he or she is required to choose the appropriate type of PPE to put on in the correct order in compliance with the isolation precautions policy—this observation would account for one occurrence. Both pre- and post-intervention observational tools were the same, and also evaluated the same elements, which were created specific to the unit and the hospital's current isolation precautions policy. Both pre- and post-intervention compliance rates were measured to determine whether nursing staff adhered to the entire bundle of compliance measures: (1) hand hygiene performed, (2) type of PPE selected and worn by the RN or NA entering or exiting patient room, (3) donning and doffing of each item of PPE, and (4) the sequence in which multiple items were put on and removed. Lastly, the pre- and post-intervention observational tool developed for this study allowed for the observer to also record the following isolation precautions policy requirements: date, observation session number, start and end time of staff entering/exiting room and of observation session, room, isolation status, isolation precautions order in *EPIC*, isolation signage on patient's door, isolation cart in front of room, and if staff closed the door or left it open after entering or exiting room. The scoring system used to evaluate

the performance and compliance rates of RNs and NAs is discussed under the "Results" section further down.

Once the pre-intervention data collection was completed, the implementation of the demonstrational video and educational handout was put into effect among the RNs and NAs on the med-surg unit. The video script (see Appendix E) was developed by the project manager based on the results of the pre-intervention knowledge questionnaire and observations. The educational handout (see Appendix F) was created based on the hospital's isolation precautions policy with a focus on demonstrating the correct techniques for putting on and removing PPE, and the proper PPE and environmental elements necessary for contact, droplet, and airborne precautions. The combination of both interventions implemented occurred as follows:

A. An email constructed by the project manager was sent to the unit CNS who then continued her support of the project by helping facilitate the successful implementation of the video and handout. In the email, the rationale for the project, the instructions on the steps to take once the nursing staff completed the intervention program (observing the video and reviewing the handout), nursing staff expectations with replying to the email, and a YouTube link (see Appendix G) and Google Drive file attaching the video and PDF file of the handout was explained.
B. The email originally sent only to the CNS also included the pre-intervention data results from both surveys—observational and knowledge-based.
C. The video was also available on the unit to be accessed by the nursing staff using an iPad and the laminated copies of the handouts were placed on or in each isolation cart on the unit for the nursing staff to refer to when caring for isolation patients.

After the implementation period of nine days passed and using the same observational tool (see Appendix D) as the pre-intervention observations, post-intervention observations were performed for eight days, with the goal of observing at least 20 observation occurrences.

Timeline

The project timeline (see Appendix H) consisted of approximately a one and a half month period with three distinct phases. In the first phase, the pre-intervention knowledge questionnaires were distributed, which addresses RNs' and NAs' compliance, knowledge, and understanding of the current isolation precautions policy in place relating to the correct use and selection of personal protective equipment (PPE). Also at that time, observational surveys began by the project manager on the unit to assess the actual compliance of PPE use, selection, and technique among RNs and NAs when caring for patient on isolation precautions. Data was collected and analyzed; then a compiling of results was gathered and presented to the unit CNS and IPC RN for their further evaluation of improvement methods following project completion, if necessary. A final evaluation of the project was then successfully performed to determine if there has been an increase in compliance with PPE and isolation precautions after the intervention was implemented—it should be noted that there was not be as many post-intervention observations planned/performed due to the short amount of time the project was given to be completed.

Results

The sample in this study was the nursing staff (N=58)—registered nurses (RNs) and nursing assistants (NAs)—and the total number of RNs who work on the unit is 48 and NAs total 10. The number of participants varied in the methods of measurement in this project due to non-mandatory participation in this study.

Pre-Intervention Knowledge Questionnaire

A survey was used in this project to collect reliable, valid, and unbiased data to assess the knowledge on isolation precautions from the sample of RNs and NAs on the medical-surgical unit. This survey was only conducted before the intervention was implemented and not after due to time constraints; although this method of measurement was specifically chosen to discover components of staff knowledge that observation measurement alone cannot measure (Larson et al., 2009). Thirty-two (n=32; 55% of total nursing staff population) isolation precautions knowledge-based questionnaires were completed by 27 RNs (47% of total RN population) and 5 NAs (50% of total NA population). These surveys regarding appropriate PPE, room environment protocol, and the order for putting on and removing proper PPE according to the hospital's policy were returned after the project manager spent twelve days administering it to increase validity of participation of the nursing staff on the unit. The survey totaled five questions—three questions asked about PPE and room requirements for each contact, droplet, and airborne isolation precautions; and the other two questions asked to number the sequence for putting on and removing PPE if all PPE were utilized.

These results (see Appendix I) demonstrated the percentage of nursing staff participants who answered correctly—to be considered correct, it was necessary to have chosen all (no more or less) of the appropriate PPE and/or environmental aspects. For contact isolation precautions (see Table I-1 and Figure I-1.1, I-1.2 and I-1.3), more participants answered correctly for appropriate selection of PPE (75%), while only 28% answered the room elements correctly for contact. For droplet isolation precautions (see Table I-2 and Figure I-2.1, I-2.2 and I-2.3), only 19% answered the appropriate PPE selection correctly and 22% answered the room elements section correctly. Although this medical-surgical unit does not care for patients requiring

airborne isolation precautions, it is still necessary for the nursing staff to be familiar and confident with the policy just in case they must float to another unit that does provide the necessary measures to care for these patients. For airborne isolation precautions (see Table I-3 and Figure I-3.1, I-3.2 and I-3.3), only 10% answered the appropriate PPE section correctly and 50% answered the room elements section correctly.

The fourth question on the survey evaluated the sequence of donning (putting on) PPE by asking the participant to place each step in order with numbering it one through six (see Table I-4 and Figure I-4). Only 13% numbered the sequence process entirely correct from start to finish of putting PPE on. The last question evaluated the sequence for doffing (removing) PPE by asking to place each step in order with numbers from one through four (see Table I-5 and Figure I-5). Only 38% of participants numbered the sequence process entirely correct from start to finish of removing PPE.

Observational Surveys

The project manager was the observer for each observation opportunity in the project and used the same observations tool (see Appendix D). Both pre- and post-intervention observations occurred on day shift and on night shift, on weekends and weekdays, and at varying times throughout the day in order to increase the validity and reliability in the results. The nursing staff was randomly observed, and this was based on the observation time and shift that the nursing staff was on the unit and the assigned patient in isolation precautions. The observation opportunities were classified into before patient contact and after patient contact in order to provide clear results of the sequence of PPE seen.

Other data that was accounted for based on the hospital's current isolation precautions requirements other than PPE selection and sequence, but not analyzed, when conducting

observations included: date and time, room number, patient diagnosis, type of isolation required, presence of isolation sign on the door, availability of the isolation cart, isolation precautions order in *EPIC*, and whether the door was left open or closed upon participant entry and exit. Due to time constraints, these factors were not evaluated or included in the results.

Scoring. The scoring for the observations was adapted from a study conducted by Hon et al. (2008). The observation forms were scored four times, once for hand hygiene, once for PPE selection based on the level of isolation precautions required, once for the donning sequence, and once for the doffing sequence. While analyzing the data, the participant was given a "1 point, 1 task" score. In other words, one point was only given if the participant performed hand hygiene upon putting on PPE (before entering the patient room) and after removing PPE. Next, one point was only awarded if the participant was able to correctly select the appropriate PPE based on the level of isolation precautions required for the patient they are caring for. Then, one point was only given if the sequence of PPE based on the items they are putting on is done completely correct. Last, one point was awarded only if the participant was able to remove the PPE they had on in the correct sequence. There were no partial credit or deductions in this scoring method. If there were any errors in not performing hand hygiene before putting on PPE or before entering the room, not performing hand hygiene after PPE removal or if at any point contamination occurred in the removal process, and if the appropriate PPE was not all selected or if there were additional unnecessary PPE selected, 0 points were awarded to the scoring process depending on the section an error occurred. Thus, one nursing staff participant observed, there was a maximum score of four, which is the sum of each section described above (Hon et al., 2008).

Pre-intervention observations. The pre-intervention observational audit period occurred for twelve days. The total number of pre-intervention observation participants was 33 randomly

observed RNs and NAs (57% of total nursing staff population). There were eleven contact isolation precautions opportunities, and two droplet isolation precautions experiences to observe and analyze the techniques and selection choices done by RNs and NAs. The results (see Appendix J, Table J-1) of the pre-intervention observations indicated that before implementing an intervention, many nursing staff were observed struggling with compliance in performing hand hygiene (45%), and the type of PPE to select for droplet precautions (25%)—it was noted that many RNs and NAs chose to wear additional unnecessary PPE, which would then not allow them to receive a score of one for the appropriate PPE selection section in the scoring system.

The pre-intervention observations results showed that only 45% or 15 out of 33 participants performed hand hygiene entirely (either one or both were not done), 79% or 26 people chose only the appropriate (no more or less) PPE for the level of precautions required, 70% or 23 participants properly put on PPE, and 76% or 25 nursing staff participants removed PPE in the proper sequence.

Intervention. The video and handout intervention (see Appendices E and F) was implemented by sending out an email and the project manager sitting on the unit asking for nursing staff to watch and read it. The total amount of nursing staff who were confirmed to complete the intervention was twenty-five (43% of total nursing staff population). This value is relatively lower than preferred, but the amount of time the project had will not allow for any more time to spend on increasing this number.

Post-interventions observations. The post-intervention observations occurred after the implementation of the demonstrational video and educational handout. The post-intervention observations occurred over eight days on weekdays and weekends, and on both day and evening shifts (see Appendix K, Table K-1). The total number of participants observed was 28 (48% of

total nursing staff). Observations for compliance with contact isolation precautions after the intervention implementation increased significantly for hand hygiene from 45% to 75% and the sequence for properly removing PPE increased from 76% to 85%. Although, there was a decrease in compliance rates for selecting the appropriate PPE and no change in compliance rates for properly putting on PPE in the correct sequence for contact isolation precautions observations. For all post-intervention observations of droplet isolation precautions, there was a significant increase in compliance rates.

A comparison of both pre- and post-intervention observations was done (see Appendix L—Table L-1 and Figure L-1). There was an improvement in three of the analyzed sections of the observational surveys evaluation of compliance rates—hand hygiene performance increased from 45% to 75%; proper sequence for putting on PPE increased from 70% to 79%; and proper sequence for removing PPE increased from 76% to 86%. While there was no change in the nursing staff's appropriate selection of PPE seen from pre- to post-intervention observations—the percent of compliance stayed the same, 79%.

Nursing Relevance

Healthcare workers (HCWs) are required to don (put on) personal protective equipment (PPE) before entering the room or coming into close contact with a patient under a level of isolation precautions. This process can be repetitive and time consuming when coupled with the multiple visits that occur from nursing staff for patients under isolation precautions requiring many items of PPE to be put on and removed constantly throughout a shift. This project gave the nursing staff the knowledge to boost their confidence when putting on and removing PPE when taking care of patients under droplet and contact isolation precautions.

Compliance with PPE and isolation precautions is an important line of defense to protect HCWs, patients, and the community (Beam et al., 2011). It was evident from the worldwide outbreak of SARS and the more recent Ebola Virus Disease (EBD) there is a need for innovative interventions that include multiple components of training and teaching to enhance adult learning and healthcare personnel compliance and knowledge of PPE and isolation precautions (Hon et al., 2008). The implementation of a demonstrational video and educational handout readily available on isolation carts acts as the beginning steps toward increasing hospital knowledge and compliance with PPE, and could be duplicated to initiate at the hospital level. In addition to increasing compliance among HCWs, this project and the interventions utilized will increase patient and staff satisfaction, and provide better care to increase patient outcomes.

Summary Report

This project demonstrated that the use of multiple, innovative interventions, including a demonstrational video and educational handout available on the isolation cart, successfully increased compliance in selecting the proper type of PPE, and putting on and removing PPE in the correct sequence in regards to the current isolation precautions policy among RNs and NAs on a medical-surgical unit at an inpatient hospital facility. These results resemble those found in the literature review of previous studies (Allen & Cronin, 2012).

When this project was first proposed to the unit manager, unit Clinical Nurse Specialist (CNS), unit Infection Prevention and Control (IPC) nurse, and the IRB, all were very receptive to the project idea and looking forward to the project implementation. Although for a quality improvement project to be successful, it is crucial to have support from all levels of the microsystem. Specifically for this project and the time frame it was given to be completed, the leadership's support allowed for a success in increasing compliance rates.

Despite the lack of statistics from the hospital to get a baseline understanding of how many and often hospital-acquired healthcare-associated infections (HAIs) occur, the overall purpose of this project and successful implementation could predict for a potential decrease in this data for the hospital, as long as compliance rate continue to be upheld by the nursing staff. As previously discussed, the lack of knowledge and confidence in nursing staff and healthcare personnel with isolation precautions policies and PPE can be detrimental to staff and patient safety, and patient care outcomes.

Limitations

The project had several limitations. Unfortunately, the short duration (approximately two months) of the project's timeframe—specifically the post-intervention observation period—limits the ability to determine whether compliance rates would remain high over an extended period. Also, the small number of participants observed in this project may not represent the entirety of the nursing staff. Thus, the relatively small sample size of observations for both the pre- (33 participants) and post-intervention (28 participants) observation period may hinder the statistical significance in improvement of compliance rates among nursing personnel.

Another limitation was the inability to re-administer the knowledge-based survey after the intervention was implemented due to time constraints. This would have been helpful to gain an idea of whether knowledge among the nursing staff increased, which would then help estimate the compliance rates post-intervention, as well.

The last limitation or aspect of the project that should be taken into consideration for reliability and validity purposes is the possible confounding factor that occurred—after the EVD outbreak in the U.S., hospitals across the nation were forced to review and take action on PPE and isolation precautions. The unit IPC RN led a practicum with nurses and nursing assistants to

enforce the importance and have the staff give a return demonstration of putting on and removing PPE for two days after the intervention implementation period was completed. This may have positively influenced compliance rates among nursing personnel in the post-intervention observation period.

Despite such limitations, direct observation is still considered to be the best method for measuring and monitoring behavioral components that affect compliance rates because it provides essential information about how infection control practices are performed, the recommendations for proper performance measures, and how and when to implement these such protocols (Clock et al., 2010).

Recommendations

It would be advantageous for the organization's leadership to continue constant competency and performance checks—similar to the assessment performed utilizing the knowledge-based questionnaire and observational tool, while also staying on top of government officials' recommendations and evidence-based practice (EBP). Another recommendation would be for future projects to include larger samples for observation measurements and knowledge surveys for both pre- and post-intervention periods. Also, subsequent studies should investigate the correlation between compliance rates with PPE and isolation precautions, and incidence of hospital-acquired HAIs.

When considering future research in this topic area, it is recommended to determine in the reasons why nursing staff have high noncompliance rates with PPE and isolation precautions bundle according to the current policy. It could be beneficial to utilize a knowledge, beliefs, and attitudes survey to gain a better understanding of the true causes of noncompliance.

Another crucial aspect of isolation precautions is the transport of patients requiring these special care practices. There is much inconsistency among the guidelines to who should wear what type of PPE and other precautionary measures to take in this process. The Institute for Healthcare Improvement (IHI) recommends periodically assessing and monitoring the compliance rates of healthcare personnel with observation, which would guide management and leadership to customize the interventions needed to guide improvement efforts in adherence to PPE and isolation precautions, and in preventing hospital-acquired HAIs (Braun et al., 2012).

Conclusion

In conclusion, the overall results of this project revealed the implementation of an educational handout readily available for staff to use at the nurses' station and on the isolation carts where the PPE procedures are performed, and the demonstrational video proved to increase compliance rates with the proper techniques for putting on and removing PPE for isolation precautions patients. If long-term outcomes are positive, this combination of multiple interventions and this training model may be useful for quality improvement projects with isolation precautions could be professionally filmed and implemented throughout the entire hospital.

References

Allen, S., & Cronin, S. N. (2012). Improving staff compliance with isolation precautions through use of an educational intervention and behavioral contract. *Dimensions of Critical Care Nursing, 31*(5). doi: 10.1097/DCC.0b013e31826199e8

ANCC. (2014). Forces of magnetism. *American Nurses Credentialing Center*. Retrieved from http://www.nursecredentialing.org/ForcesofMagnetism.aspx

Beam, E. L., Gibbs, S. G., Boulter, K. C., Beckerdite, M. E., & Smith, P. W. (2011). A method for evaluating health care workers' personal protective equipment technique. *American Journal of Infection Control, 39*, 415-420. doi: 10.1016/j.ajic.2010.07.009

Bolyard, E. A., Tablan, O. C., Williams, W. W., Pearson, M. L., Shapiro, C. N., & Deitchman, S. D. (1998). Guideline for infection control in health care personnel. *American Journal of Infection Control, 26*, 289-354. Retrieved from http://www.cdc.gov/hicpac/pdf/infectcontrol98.pdf

Braun, B., Riehle, A., Donofrio, K., Hafiz, H., Loeb, J. M., Miller, K. M., & Wyllie, C. (2012). Improving patient and worker safety: Opportunities for synergy, collaboration and innovation. *The Joint Commission*. Retrieved from http://www.jointcommission.org/improving_Patient_Worker_Safety/

CDC. (2014). Personal protective equipment (PPE) in healthcare settings. *Centers for Disease Control and Prevention*. Retrieved from http://www.cdc.gov/HAI/prevent/ppe_train.html

Clock, S. A., Cohen, B., Behta, M., Ross, B., & Larson, E. L. (2010). Contact precautions for multidrug-resistant organisms: Current recommendations and actual practice. *American Journal of Infection Control, 38*, 105-111. doi: 10.1016/j.ajic.2009.08.008

Cohen, B., Hyman, S., Rosenberg, L., & Larson, E. (2012). Frequency of patient contact with health care personnel and visitors: Implications for infection prevention. *The Joint Commission Journal on Quality and Patient Safety, 38*(12), 560-565. Retrieved from http://www.ncbi.nlm.nih.gov/pubmed/23240264

Efstathiou, G., Papastavrou, E., Raftopoulos, V., & Merkouris, A. (2011). Factors influencing nurses' compliance with standard precautions in order to avoid occupational exposure to microorganisms: A focus group study. *BiomMed Central Nursing, 10*(1), 1-12. doi: 10.1186/1472-6955-10-1

Hon, C. Y., Gamage, B., Bryce, E. A., LoChang, J., Yassi, A., Maultsaid, D., & Yu, S. (2008). Personal protective equipment in health care: Can online infection control courses transfer knowledge and improve proper selection and use? *American Journal of Infection Control, 36*(10), 33-37. doi: 10.1016/j.ajic.2008.07.007

Joint Commission. (2013). *National Patient Safety Goals Effective January 1, 2014* (Hospital Accreditation Program). Retrieved from http://www.jointcommission.org/assets/1/6/HAP_NPSG_Chapter_2014.pdf

Kang, J., Weber, D. J., Mark, B. A., & Rutala, W. A. (2014). Survey of North Carolina hospital policies regarding visitor use of personal protective equipment for entering the rooms of patients under isolation precautions. *Infection Control and Epidemiology, 35*(3), 259-264. doi: 10.1086/675293

Kolmos, H. J. (2012). Health care associated infections: Sources and routes of transmission. *Infection Control – Updates*. Retrieved from http://www.intechopen.com/books/infection-control-updates/sources-and-routes-of-infection

Larson, E., Goldmann, D., Pearson, M., Boyce, J. M., Rehm, S. J., Fauerbach, L. L., … Shapiro, E. (2009). Measuring hand hygiene adherence: Overcoming the challenges. *The Joint Commission Division of Quality Measurement and Research*. Retrieved from http://www.jointcommission.org/Measuring_Hand_Hygiene_Adherence_Overcoming_the_Challenges_/

Magill, S. S., Edwards., J. R., Bamberg, W., Beldavs, Z. G., Dumyati, G., Kainer, M. A., … Fridkin, S. K. (2014). Multistate point-prevalence survey of health care-associated infections. *The New England Journal of Medicine, 370*(13), 1198-1208. doi: 10.1056/NEJMoa1306801

Mauger, B., Marbella, A., Pines, E., Chopra, R., Black, E. R., & Aronson, N. (2014). Implementing quality improvement strategies to reduce healthcare-associated infections: A systematic review. *American Journal of Infection Control, 42*, 274-283. doi: 10.1016/j.ajic.2014.05.031

Nickel, W., Saint, S., Olmsted, R. N., Chu, E., Greene, L., Edson, B S., Flanders, S. A. (2014). The interdisciplinary academy for coaching and teamwork (I-ACT): A novel approach for training faculty experts in preventing healthcare-associated infection. *American Journal of Infection Control, 42*(10), 230-235. doi: 10.1016/j.ajic.2014.06.005

Scott II, R. D. (2009) The direct medical costs of healthcare-associated infections in U.S. hospitals and the benefits of prevention. *Division of Healthcare Quality Promotion* (CS200891-A). Retrieved from http://www.cdc.gov/hai/pdfs/hai/scott_costpaper.pdf

U.S. Department of Health and Human Services, U.S. Department of Defense, and U.S. Department of Veterans Affairs. (2013). National action plan to prevent health care-

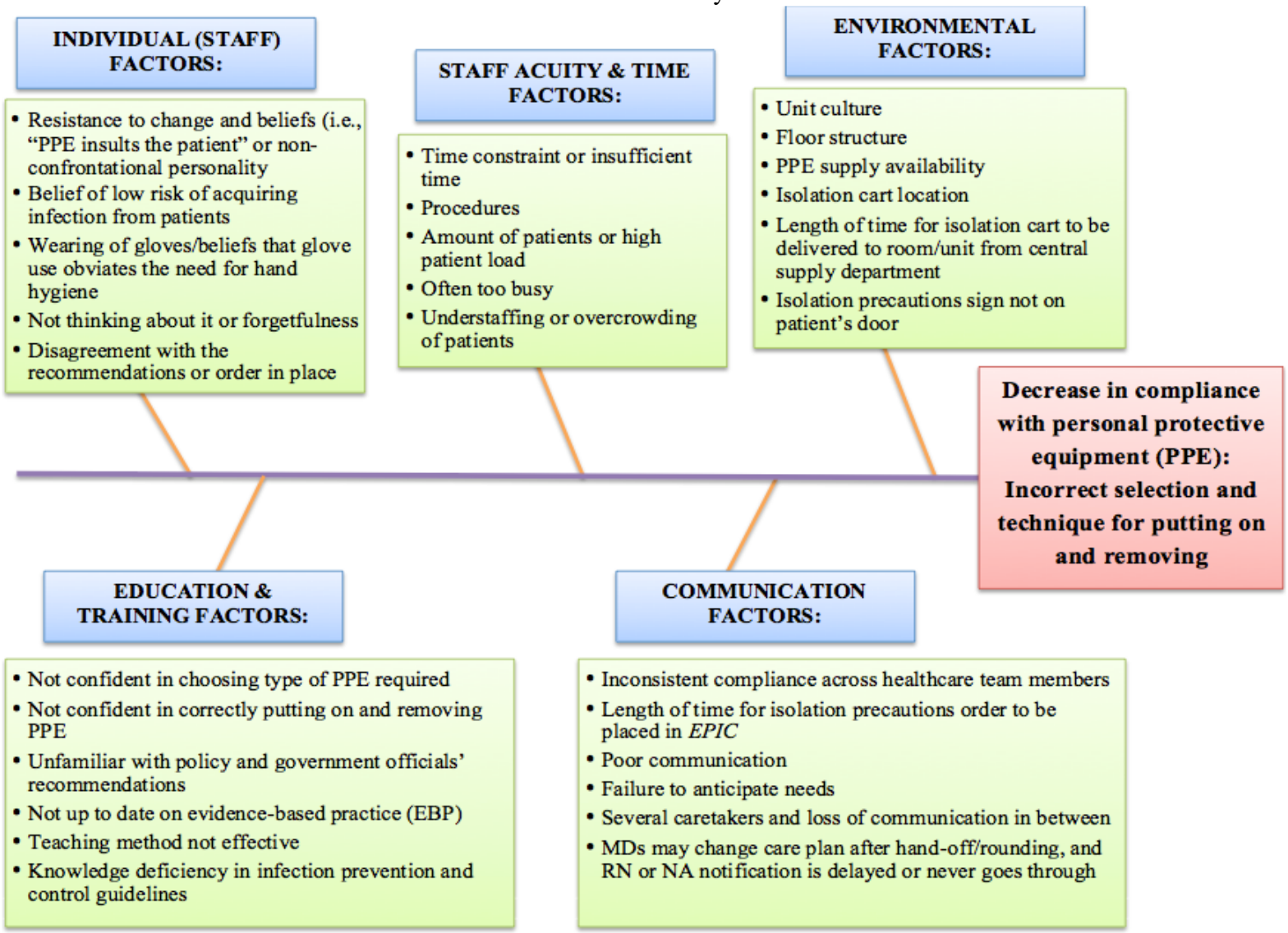
associated infections: Road map to elimination. Retrieved from http://www.hhs.gov/ash/initiatives/hai/index.html

Vinski, J., Bertin, M., Zhiyuan, S., Gordon, S. M., Bokar, D., Merlino, J., & Fraswer, T. G. (2014). Impact of isolation on hospital consumer assessment of healthcare providers and systems scores: Is isolation isolating? *Infection Control and Hospital Epidemiology, 33*(5), 513-516. doi: 10.1086/665314

Williams, C. K., & Carnahan, H. (2013). Development and validation of tools for assessing use of personal protective equipment in health care. *American Journal of Infection Control, 41*(1), 28-32. doi: 10.1016/j.ajic.2012.01.027

Appendix A

Root Cause Analysis



Appendix B

IRB Permission to Complete Project

Stanford University HRPP	**Notice of Determination of Human Subject Research**	NOT-H3 1/1

From: Sarah Clark-Worley, Sr IRB Coordination Manager
Phone: (650) 723-7583
Email: sarah.clark-worley@stanford.edu

Date: October 8, 2014

To: David Pickham, PhD

eProtocol number (if applicable): N/A

Study Title: ISOLATION PRECAUTIONS: INCREASING ADHERENCE AMONG RNs AND NAs ON A MED-SURG UNIT

The Stanford IRB has made the following determination about the activity described in the above referenced application based on OHRP and FDA regulations and guidance.

☒ **THIS PROJECT DOES NOT REQUIRE SUBMISSION TO THE STANFORD IRB, BECAUSE:**

☒ **This project does not meet the Federal definition of *research*** [DHHS 45 CFR 46.102(d)] **or *clinical investigation*** [FDA 21 CFR 50.3(c), 56.102(c)]. See Is My Project "Research"? [AID-H8].
This is a quality improvement project aimed at assessing and improving compliance with the current isolation precautions policy at SHC. This is not intended to develop or contribute to generalizable knowledge.

☐ **This research does not involve human subjects because:**

- ☐ It is not about living individuals
- ☐ You will not be intervening or interacting with study subjects
- ☐ You are not obtaining or receiving individually identifiable private information
- ☐ The data or specimens were collected for purposes other than the current research, the identifiers for the data or specimens have been replaced with a code, and you and your research team are prohibited from obtaining the key to the code

☐ **Although this project does meet the Federal definition of human subject research,** Stanford is not engaged in human subject research because:

[OHRP Guidance http://www.hhs.gov/ohrp/policy/engage08.html]
***Note:** This project is subject to review by _____*

☐ **THIS PROJECT IS HUMAN SUBJECT RESEARCH THAT REQUIRES REVIEW BY THE STANFORD IRB.**
SUBMIT A NEW EPROTOCOL APPLICATION AS INDICATED:

☐ Medical or ☐ Non-Medical

☐ Exempt - Paragraph ☐ Expedited - Paragraph ☐ Regular

Appendix C – Knowledge Questionnaire

ISOLATION PRECAUTIONS QUESTIONNAIRE #_____ Position (circle one): RN NA

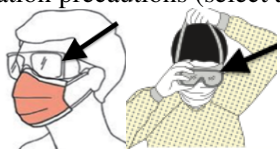
1) PPE/room precautions for **CONTACT** isolation precautions (select all that apply):

a.  Hand Hygiene

b.  Gown

c.  Gloves

d.  Surgical Mask

e.  Eye Protection (Glasses)

AND

 Surgical Mask with Face Shield

f.  N95 Respirator

g. Private room

h. Negative pressure room

i. Isolation sign on door—COLOR (circle):
   i. Pink ii. Purple iii. Blue

j.  Door closed

k. Isolation cart in front of room

l. May be cohorted with patient of like type of illness, condition, &/or same organism

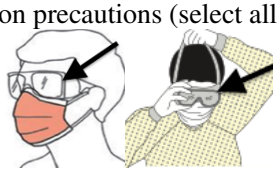
2) PPE/room precautions for **DROPLET** isolation precautions (select all that apply):

a.  Hand Hygiene

b.  Gown

c.  Gloves

d.  Surgical Mask

e.  Eye Protection (Glasses)

AND

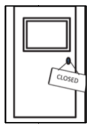
 Surgical Mask with Face Shield

f.  N95 Respirator

g. Private room

h. Negative pressure room

i. Isolation sign on door—COLOR (circle):
   i. Pink ii. Purple iii. Blue

j.  Door closed

k. Isolation cart in front of room

l. May be cohorted with patient of like type of illness, condition, &/or same organism

3) PPE/room precautions for **AIRBORNE** isolation precautions (select all that apply):

a.  Hand Hygiene

b.  Gown

c.  Gloves

d.  Surgical Mask

e.  Eye Protection (Glasses)

AND

 Surgical Mask with Face Shield

f.  N95 Respirator

g. Private room

h. Negative pressure room

i. Isolation sign on door—COLOR (circle):
   i. Pink ii. Purple iii. Blue

j.  Door closed

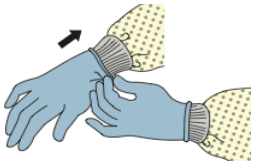
k. Isolation cart in front of room

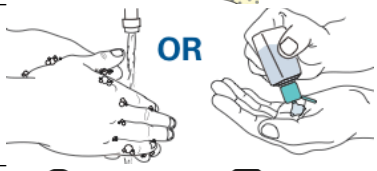
l. May be cohorted with patient of like type of illness, condition, &/or same organism

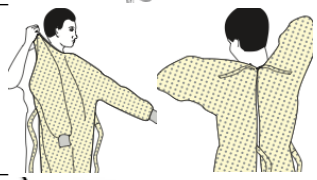
Appendix B Continued

4) Place the sequence for **PUTTING ON** PPE in order from start to finish (1–6).

a. ____ 

b. ____ 

c. ____ 

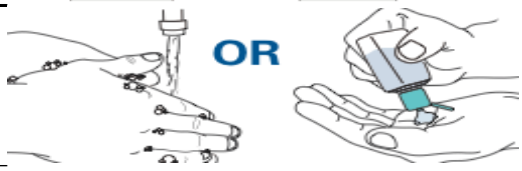
d. ____ 

e. ____  Remove hand jewelry & tie hair back

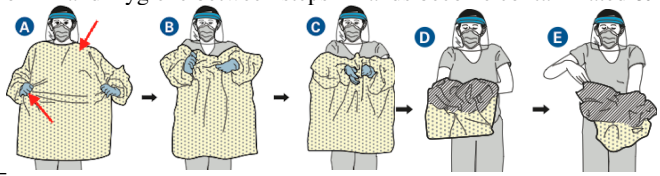
f. ____ 

5) Place the sequence for **REMOVING** PPE in order from start to finish (1–4).

a. ___ 

b. ___ 

**Perform Hand Hygiene between steps if hands become contaminated & immediately after removing all PPE

c. ___ 

d. ___ 

ANSWERS:

1) **CONTACT** isolation precautions (select all that apply):

A, B, C, G, I(ii), K, L

2) **DROPLET** isolation precautions (select all that apply):

A, D, E, G, I(i), K, L

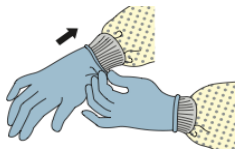
3) **AIRBORNE** isolation precautions (select all that apply):

A, F, G, H, I(iii), J, K, L

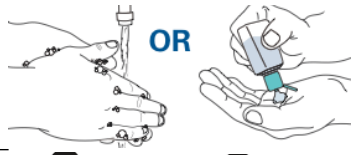
4) Place the sequence for **DONNING** PPE in order from start to finish (1–6).

a. 4

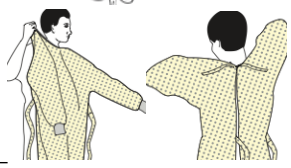
b. 6



c. 2



d. 3



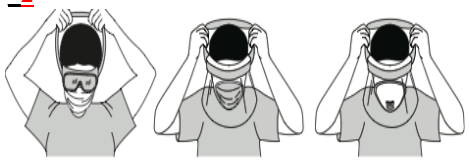
e. 1 Remove hand jewelry & tie hair back

f. 5

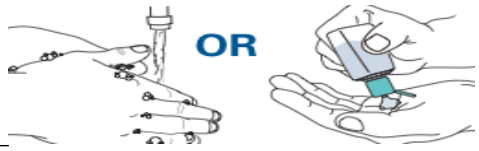
a. 4 b. 6 c. 2 d. 3 e. 1 f. 5

5) Place the sequence for **DOFFING (REMOVING)** PPE in order from start to finish (1–4).

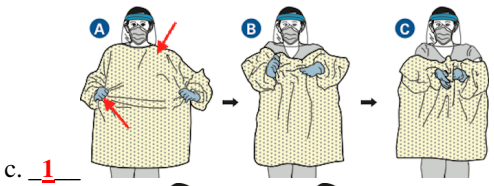
a. 2

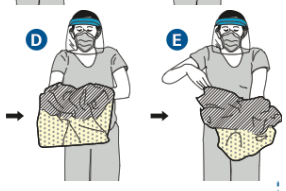


b. 4

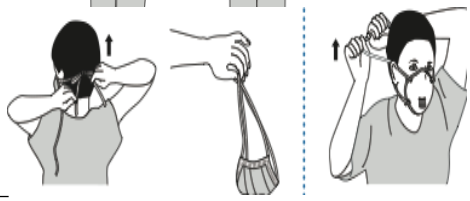


c. 1





d. 3



a. 2 b. 4 c. 1 d. 3

Appendix D

Pre- and Post-Intervention Observational Audit Tool

OBSERVATIONAL SURVEY

Level of Isolation Precautions Ordered: CONTACT DROPLET

Room #: Date: Session Start/End Time (hh:mm): Observer: Order in *EPIC*: Date Order Placed:

HCW: RN NA Private Room: IsoPrec Sign: Isolation Cart:

HCW	Time In	HH in	Gloves	Gown	Surgical Mask	Eye Wear	Goggles	Face Shield	HH out	Time Out	Door: "C" / "O"

Appendix E

Video Intervention Script

ISOLATION PRECAUTIONS VIDEO DEMONSTRATION FOR RNs & NAs:
SEQUENCE FOR PUTTING ON & REMOVING PERSONAL PROTECTIVE EQUIPMENT (PPE)

The type of personal protective equipment used will vary based on the level of precautions required, such as standard, and contact, droplet or airborne isolation precautions. For further information regarding the type of PPE required, refer to this video's corresponding educational handout, Stanford's current isolation precautions policy, and C3's unit educator. In this demonstrational video, I will focus on how to properly put on and safely remove PPE.

SEQUENCE FOR PUTTING ON PPE:

A helpful hint to remember the correct sequence for putting on PPE is to "Put PPE on starting from the bottom & going up the body." In this scenario, I will provide instructions on how to put on PPE in the correct sequence for a patient on contact & droplet isolation precautions.

1) First, remove **HAND JEWELRY** & **TIE HAIR BACK**
2) Second, perform **HAND HYGIENE**
3) Next, put on an isolation **GOWN**:
    a. Make sure the front & back of the gown are pulled down for complete coverage and the ties are secured at the waist.
4) The next step is respiratory protection. Put on either a **SURGICAL MASK** or **RESPIRATOR**:
    a. Place over your nose, mouth & below the chin. Position the ear-loops around the ears. Form the metal band over the bridge of the nose to minimize air leakage.
    b. If you had to float to another unit & had a patient on airborne precautions, this requires putting on a fitted N95 Respirator and performing a user seal check. For more information on putting on & removing respirators or Airborne Precautions PPE, please review Stanford's policy.
5) Another option for respiratory & eye protection is to put on a **SURGICAL-STYLE MASK with FACE SHIELD**:
    a. This is put on in a similar fashion as the mask—be sure it is placed over & covering the face & eyes
    b. Adjust to fit.
6) The following step is putting on eye **GLASSES** or **GOGGLES** for eye protection:
    a. Place over the face & eyes. Adjust to fit.
    b. Also at this time, putting on a **FACE SHIELD** completely covering the face & eyes may be required, if appropriate and available.
7) Last, put on **GLOVES**:
    a. Select the correct type & size
    b. Extend to cover the wrists of the isolation gown

**Now you are ready to enter the patient's room. Always perform hand hygiene before putting on & after removing gloves. Use safe work practices to protect yourself & limit the spread of

contamination. And remember, if your PPE becomes soiled or contaminated, you MUST change it.

Appendix E Continued

SEQUENCE FOR REMOVING PPE:

There are a variety of ways to safely remove PPE without contaminating your clothing, skin, or mucous membranes with potentially infectious materials. This demonstration indicates the proper order to remove PPE based on the recently revised isolation precautions policy—updated by Stanford's Infection Prevention & Control Department based on the CDC's most current recommendation.

Remove all PPE before exiting the patient's room at the doorway except a respirator, if worn. Remove the respirator after leaving the patient's room & closing the door.

1) First, remove your **GOWN** & **GLOVES**:
   a. The front & sleeves of the gown and the outside of the gloves are contaminated! Remember if your hands get contaminated during gown or glove removal, immediately perform proper hand hygiene.
   b. Grasp the gown in the front or insert your thumbs on each hip between the ties & gown, pull away from your body to break the ties—touching the outside of the gown only with gloved hands.
   c. While removing the gown, roll or fold it inside-out into a bundle down the body keeping fluids & contaminants contained.
   d. As you are removing the gown, peel off your gloves at the same time, only touching the inside of the gloves with your bare hands.
2) Next, remove **EYE PROTECTION** or **SURGICAL-STYLE MASK with FACE SHIELD**:
   a. Outside of glasses, goggles, or face shield (with or without surgical mask) are contaminated! Remember if your hands get contaminated during removal of your eye protection, immediately perform proper hand hygiene.
   b. Remove glasses from the back by lifting the frame near the ear without touching the front of the glasses or goggles.
   c. Remove the mask with face shield by grasping both elastic ear bands & remove away from the body without touching the front. Remove face shield from the back by lifting the headband over the head without touching the front.
3) Next, remove your respiratory protective equipment—**SURGICAL MASK** or **RESPIRATOR**:
   a. Front of the mask or respirator is contaminated—*DO NOT TOUCH!* Remember if your hands get contaminated during removal of your respiratory protection, immediately perform proper hand hygiene.
   b. Grasp both elastic ear bands & remove away from the body
   c. With a respirator, slowly lift the bottom strap up & over your head, while keeping it against your face
   d. Then lift off the top strap & carefully remove the respirator without touching the front
4) Last, perform **HAND HYGIENE**:
   a. Wash hands with soap and water or use an alcohol-based gel hand sanitizer

**Remember to perform hand hygiene between steps if hands become contaminated & immediately after removing all PPE.

Thank you for your participation in keeping our patients, staff, families, & community safe by implementing the proper type of PPE based on the level of precautions required and the correct order for putting on and removing PPE.
(CDC, 2014)

Appendix F: Educational Handout

ISOLATION PRECAUTIONS: PUTTING ON & REMOVING PERSONAL PROTECTIVE EQUIPMENT (PPE)

The type of PPE used will vary based on the level of precautions required: Standard, & Contact, Droplet, or Airborne Isolation

SEQUENCE FOR PUTTING ON PPE

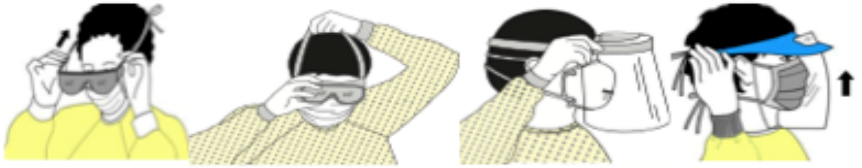
1. HAND JEWELRY removal & TIE HAIR BACK

2. HAND HYGIENE

3. GOWN

4. MASK or RESPIRATOR
   a. Surgical Mask
   b. Surgical-Style Mask with Face Shield
   c. Fitted N95 Respirator

5. GLASSES, GOGGLES or FACE SHIELD



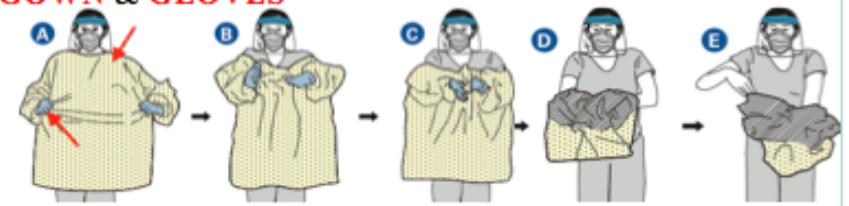
6. GLOVES

- ✓ Always perform HAND HYGIENE before putting on & after removing gloves
- ✓ Use SAFE work practices to protect yourself & limit the spread of contamination

Remove all PPE before exiting patient's room at doorway except a respirator, if worn. Remove the respirator after leaving the room & closing the door

SEQUENCE FOR REMOVING PPE

1. GOWN & GLOVES



2. GLASSES, GOGGLES or FACE SHIELD

3. MASK or RESPIRATOR
   a. Surgical Mask
   b. Surgical-Style Mask with Face Shield
   c. Fitted N95 Respirator

4. HAND HYGIENE

- ✓ Perform HAND HYGIENE BETWEEN steps if hands become contaminated & IMMEDIATELY AFTER removing all PPE**

Revised 11/02/14
(M. Alsmeyer, USF CNL Student)

Appendix E Continued

HOSPITAL QUICK REFERENCE GUIDE: ISOLATION PRECAUTIONS PPE & ROOM REQUIREMENTS

CONTACT ISOLATION PRECAUTIONS

PPE:

HAND HYGIENE

GOWN

GLOVES

ROOM REQUIREMENTS:

STOP Contact Precautions

- ✓ Private room
- ✓ **PURPLE** isolation sign on door
- ✓ Isolation cart in front of room
- ✓ Cohort patient in same room only if with another patient with the *same microorganism* of concern *(generally recommended only for MRSA or VRE)*

DROPLET ISOLATION PRECAUTIONS

PPE:

HAND HYGIENE

OR

SURGICAL MASK + EYE GLASSES or GOGGLES

SURGICAL-STYLE MASK with FACE SHIELD

ROOM REQUIREMENTS:

STOP Droplet Precautions

- ✓ Private room
- ✓ **PINK** isolation sign on door
- ✓ Isolation cart in front of room
- ✓ Cohort patient in same room with another patient with like type

AIRBORNE ISOLATION PRECAUTIONS

PPE:

HAND HYGIENE

FITTED N95 RESPIRATOR

VISITORS WEAR: SURGICAL MASK

ROOM REQUIREMENTS:

STOP Airborne Precautions

- ✓ Private room
- ✓ Negative pressure room
- ✓ **BLUE** isolation sign on door
- ✓ Door closed
- ✓ Isolation cart in front of room

Revised 11/02/14 (M. Alsmeyer, USF CNL Student)

Appendix G

Instructional Email to Nursing Staff: Demonstrational Video Intervention – YouTube Link

YouTube Video Link:
https://www.youtube.com/watch?v=Wuue6LRonQE&list=UUVnqHZPzDb2V_k2GJnBwFGw

Dear Unit CNS,
I am attaching the script I have created for the educational video I plan to film & send out (from your email) to the RNs and NAs on the med-surg unit. Also attached is the video I have created—a URL link is below as well because the file is very large and I was worried it wouldn't go through. The YouTube link is private and can only be accessed if given the url link. I will have the educational handout to you no later than Sunday night—so then you can send the entire intervention as a whole. If you an unable to send out the video using the file, please paste the YouTube link in the instructions as an alternative way to view it.

https://www.youtube.com/watch?v=Wuue6LRonQE&list=UUVnqHZPzDb2V_k2GJnBwFGw

I am also including the instructions below that I would appreciate you including in the email you send to the C3 staff—the instructional email will include the video, an educational hand out (the one I plan to laminate & place on/in the isolation carts), and what to do after watching the video. Feel free to edit as you see needed.

I will bring laminated handouts (x10) for the isolation carts and also, bring an original copy in color so I can make copies for the nurses' station to have for reference. I will also bring the video on my iPad to try to get staff to watch if they have a break. The email will go out, and I will be on the unit the next day to bring the handouts & try to get some of the staff to watch on the iPad.

Hi C3 Staff!

Healthcare-associated infections (HAIs) are a big concern in acute care hospitals settings—contributing to significant morbidity, mortality, and economic burden in the U.S. I am addressing compliance and knowledge of the type of PPE used, and the sequence for putting on/removing PPE based on the level of precautions required for my Clinical Nurse Leader (CNL) final project for school.

Attached is a *short* instructional demonstration video & educational handout to serve as resources for C3's staff (RNs & NAs). Both of these demonstrate the correct sequence for putting on and removing PPE, and the appropriate PPE for Contact, Droplet & Airborne Isolation.

DIRECTIONS:

- Please take about 5 minutes to ***VIEW*** both the video and the handout—once you have, please ***REPLY*** to the unit CNS's email indicating you have viewed them.
- After reviewing the material, please be sure to choose the appropriate ***type*** of PPE based on the level of isolation precautions required, and to practice how to safely ***put on*** and ***remove*** PPE.

The video and handout is intended to serve as a helpful reminder for staff and reinforce safe practices while caring for patients on isolation precautions. The handout demonstrates the sequence for putting on and removing PPE, and the type of PPE and room/environment elements required to be put in place according to Stanford's isolation precautions policy. It will be placed on or in each isolation cart on the unit; copies will be left at the nurses' station.

Thank you so much for the support and your participation!

Kindly,
Megan Alsmeyer
USF CNL Nursing Student & Project Manager

Appendix H

Timeline

Timeline/Task(s)		Start by:	Completed by:
Project Preparation	1) Literature review and evidence-based guideline search	10-02-2014	10-18-2014
	2) Development of: • Observational auditing survey as data collection tool • Complete/finalize pre-intervention knowledge questionnaire	10-06-2014	10-10-2014
IRB Application Process	3) Complete and submit IRB application form	10-02-2014	Project approved on: 10-08-2014
	4) Present project to hospital's Director of Transdisciplinary Research for feedback	10-02-2014	
Phase I: Pre-Intervention Assessment Phase	5) Pre-intervention knowledge questionnaire administered	10-13-2014	10-24-2014
	6) Observational survey data collection (goal of ≥50 total pre-intervention observations)	10-13-2014	10-24-2014
Phase II: Intervention Design & Implementation	7) Data analysis: • Pre-intervention knowledge questionnaire • Observational surveys (pre-intervention)	10-25-2014	10-26-2014
	8) Development of intervention method (focus based on knowledge questionnaire and observational survey results)	10-26-2014	10-31-2014
	9) Staff training session administered: • Demonstrational video and educational handout sent electronically via staff email • Laminated handout placed on the unit	11-03-2014	11-11-2014
Phase III: Post-Intervention Evaluation Phase	10) Observational survey data collection (goal of ≥20 total post-intervention observations)	11-11-2014	11-18-2014
	11) Data analysis: • Observational surveys (pre-intervention)	11-19-2014	11-21-2014
	12) Project evaluation and results	11-21-2014	11-25-2014
Complete CNL Project	13) CNL project writing/submission	10-08-2014	11-25-2014
	14) Present project poster to professional audience	12-10-2014	12-10-2014

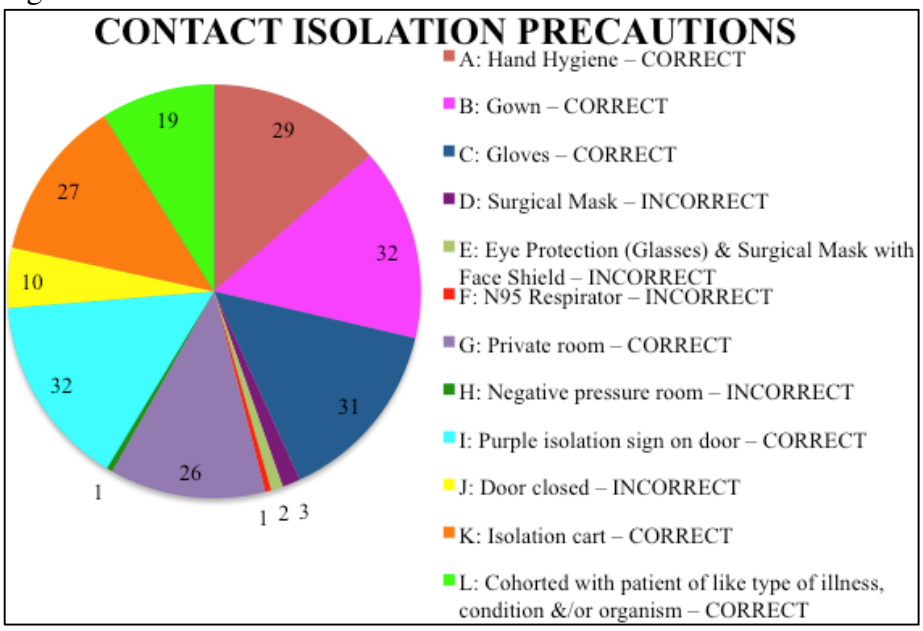
Appendix I

Pre-Intervention Knowledge Survey Results

Table I-1

Question 1: PPE/room precautions for CONTACT isolation precautions (select all that apply)	
Answer Choice	**# of Participants** *(who chose answer choice)*
A: Hand Hygiene – **CORRECT**	29
B: Gown – **CORRECT**	32
C: Gloves – **CORRECT**	31
D: Surgical Mask – **INCORRECT**	3
E: Eye Protection (Glasses) & Surgical Mask with Face Shield – **INCORRECT**	2
F: N95 Respirator – **INCORRECT**	1
G: Private room – **CORRECT**	26
H: Negative pressure room – **INCORRECT**	1
I: Purple isolation sign on door – **CORRECT**	32
J: Door closed – **INCORRECT**	10
K: Isolation cart – **CORRECT**	27
L: Cohorted with patient of like type of illness, condition &/or organism – **CORRECT**	19

Figure I-1.1



Appendix I Continued

Figure I-1.2

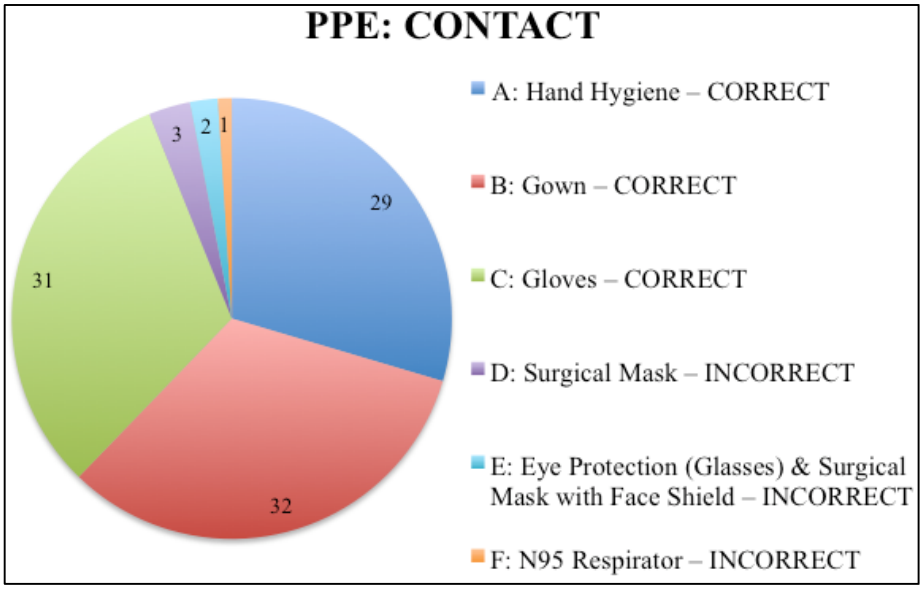
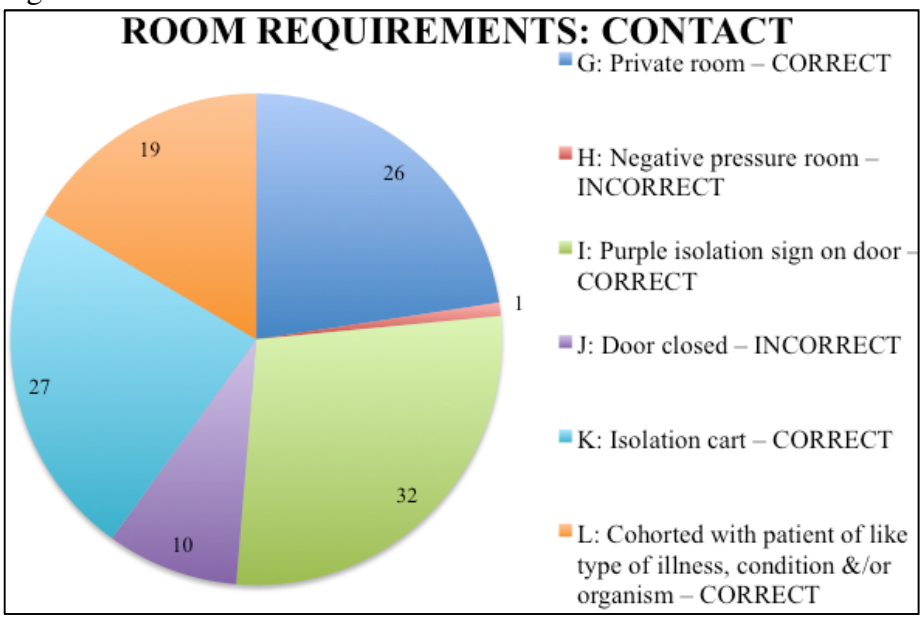


Figure I-1.3

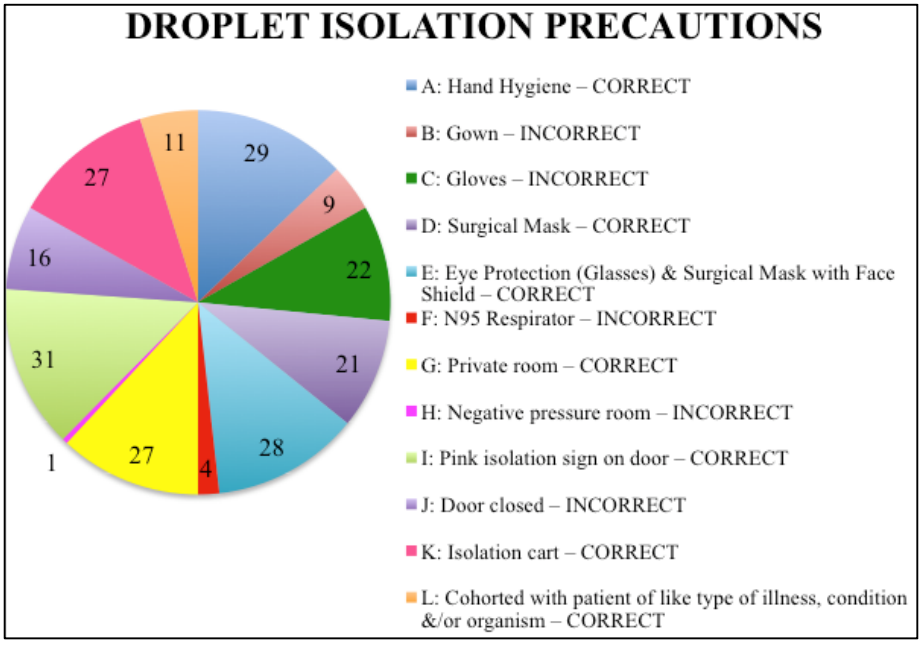


Appendix I Continued

Table I-2

Question 2: PPE/room precautions for DROPLET isolation precautions (select all that apply)	
Answer Choice	**# of Participants** *(who chose answer choice)*
A: Hand Hygiene – **CORRECT**	29
B: Gown – **INCORRECT**	9
C: Gloves – **INCORRECT**	22
D: Surgical Mask – **CORRECT**	21
E: Eye Protection (Glasses) & Surgical Mask with Face Shield – **CORRECT**	28
F: N95 Respirator – **INCORRECT**	4
G: Private room – **CORRECT**	27
H: Negative pressure room – **INCORRECT**	1
I: Pink isolation sign on door – **CORRECT**	31
J: Door closed – **INCORRECT**	16
K: Isolation cart – **CORRECT**	27
L: Cohorted with patient of like type of illness, condition &/or organism – **CORRECT**	11

Figure I-2.1



Appendix I Continued

Figure I-2.2

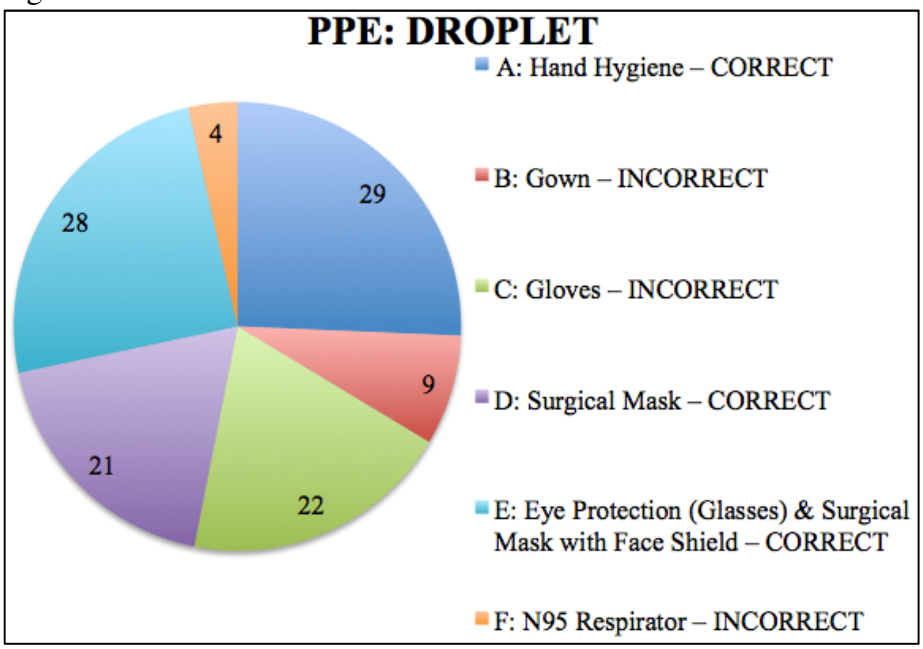
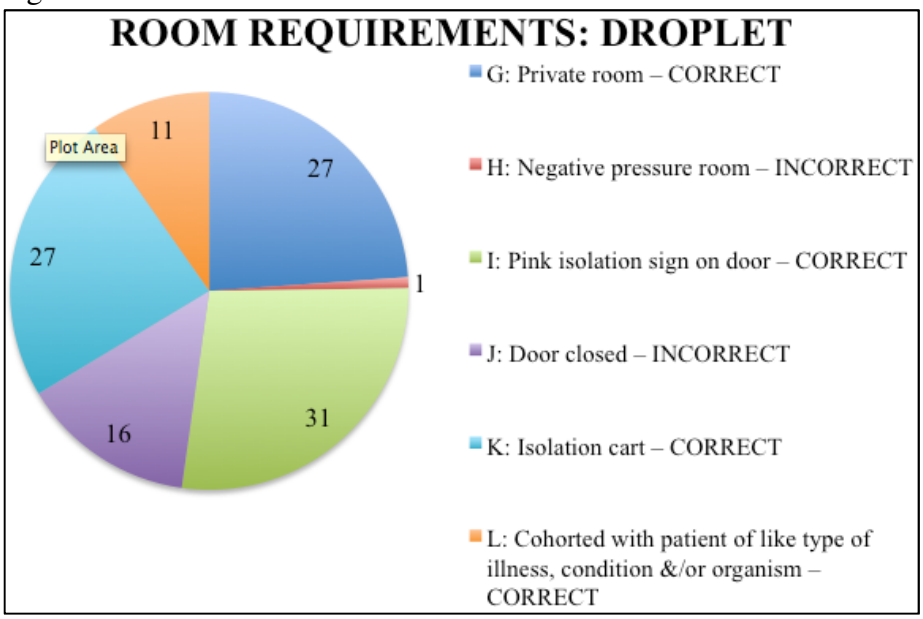


Figure I-2.3

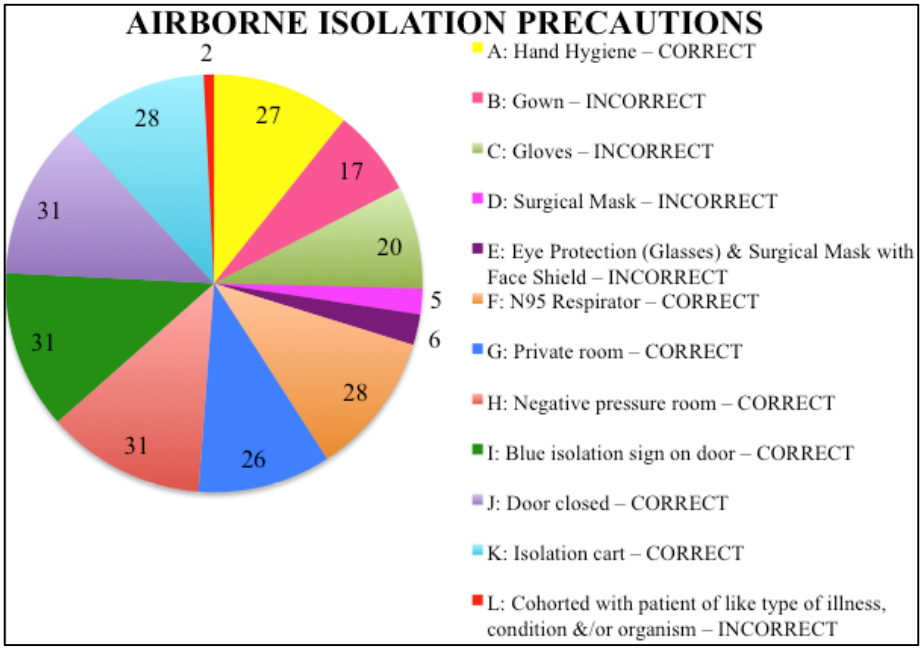


Appendix I Continued

Table I-3

Question 3: PPE/room precautions for AIRBORNE isolation precautions (select all that apply)	
Answer Choice	**# of Participants** *(who chose answer choice)*
A: Hand Hygiene – **CORRECT**	27
B: Gown – **INCORRECT**	17
C: Gloves – **INCORRECT**	20
D: Surgical Mask – **INCORRECT**	5
E: Eye Protection (Glasses) & Surgical Mask with Face Shield – **INCORRECT**	6
F: N95 Respirator – **CORRECT**	28
G: Private room – **CORRECT**	26
H: Negative pressure room – **CORRECT**	31
I: Blue isolation sign on door – **CORRECT**	31
J: Door closed – **CORRECT**	31
K: Isolation cart – **CORRECT**	28
L: Cohorted with patient of like type of illness, condition &/or organism – **INCORRECT**	2

Figure I-3.1



Appendix I Continued

Figure I-3.2

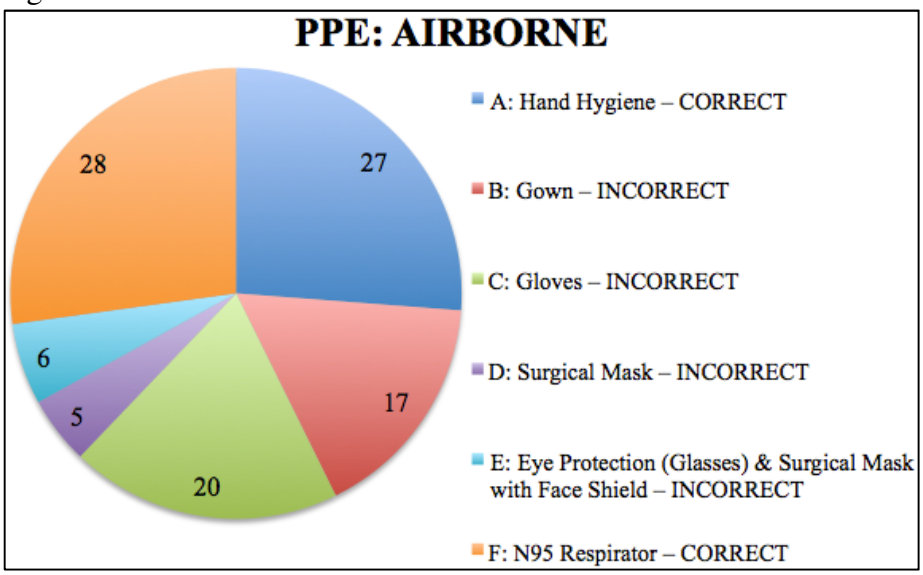
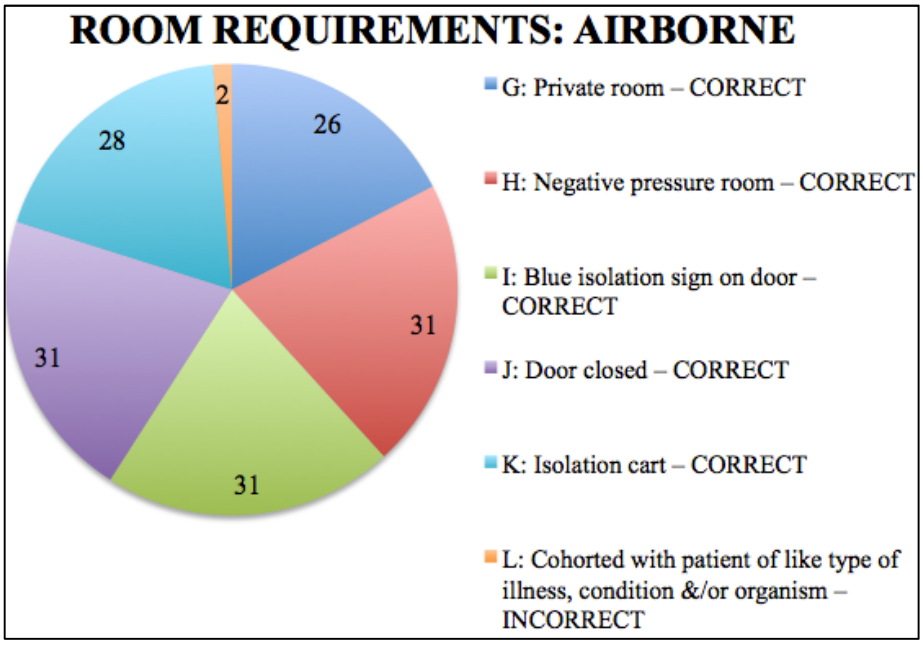


Figure I-3.3



Appendix I Continued

Table I-4

Sequence for PUTTING ON PPE	Correct	Incorrect
1) HAND JEWELRY removal & TIE HAIR BACK	4	28
2) HAND HYGIENE		
3) GOWN		
4) MASK or RESPIRATOR		
5) GLASSES, GOGGLES, or FACE SHIELD		
6) GLOVES		

Figure I-4

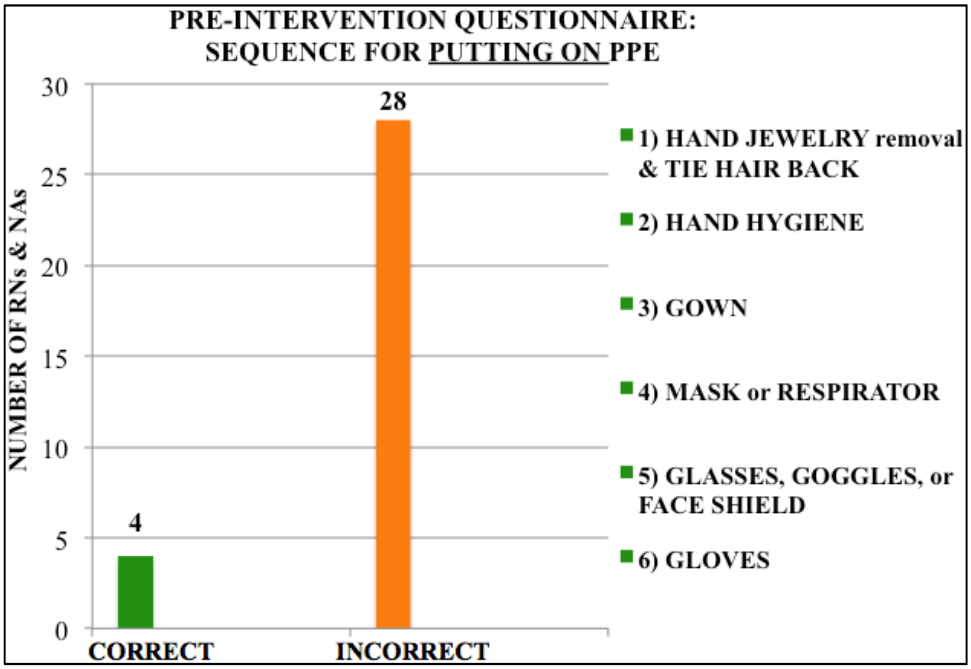
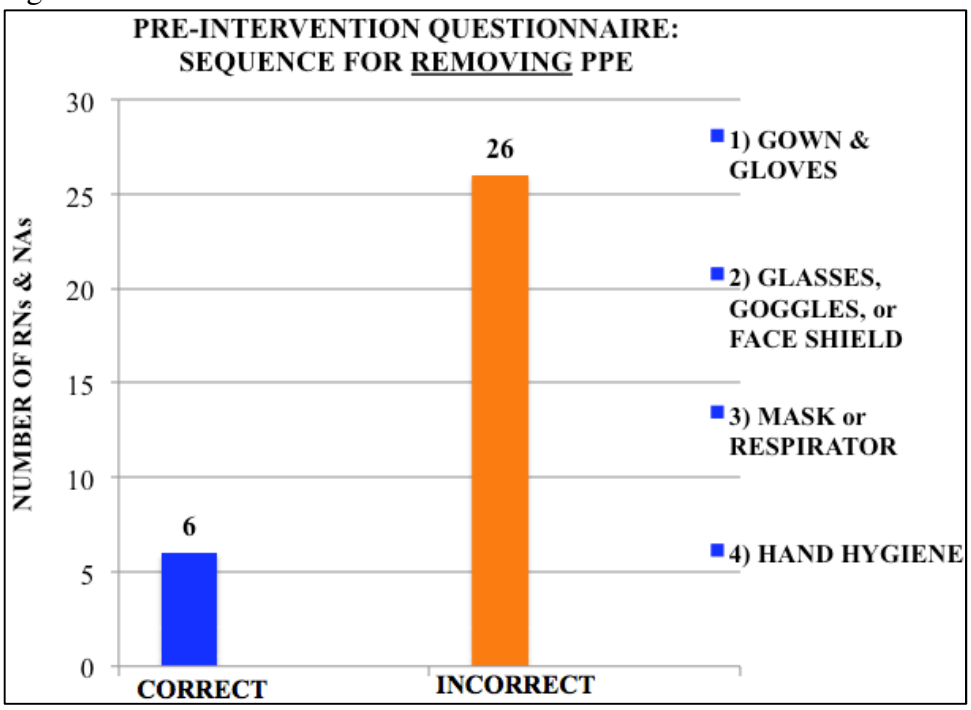


Table I-5

Sequence for REMOVING PPE	Correct	Incorrect
1) GOWN & GLOVES	6	26
2) GLASSES, GOGGLES, or FACE SHIELD		
3) MASK or RESPIRATOR		
4) HAND HYGIENE		

Appendix I Continued

Figure I-5



Appendix J

Pre-Intervention Observation Results

Table J-1

Pre-Intervention Observation Results				
Analysis section	**CONTACT Isolation Precautions**[†] (29 participants)		**DROPLET Isolation Precautions**[‡] (4 participants)	
Perform **HAND HYGIENE** – with soap & water or use an alcohol-based gel hand sanitizer	13	45%	2	50%
Appropriate **SELECTION** of PPE	25	86%	1	25%
Correct sequence for **PUTTING ON** PPE	22	76%	1	25%
Correct sequence for **REMOVING** PPE	22	76%	3	75%

Appendix K

Post-Intervention Observation Results

Table K-1

Post-Intervention Observation Results				
Analysis section	**CONTACT Isolation Precautions**[†] (20 participants)		**DROPLET Isolation Precautions**[‡] (8 participants)	
Perform **HAND HYGIENE** – with soap & water or use an alcohol-based gel hand sanitizer	15	75%	6	75%
Appropriate **SELECTION** of PPE	16	80%	6	75%
Correct sequence for **PUTTING ON** PPE	15	75%	7	88%
Correct sequence for **REMOVING** PPE	17	85%	7	88%

Appendix L

Pre- & Post-Intervention Observation Results

Table L-1

Pre- & Post-Intervention Observation Results				
Analysis section	**Pre-Intervention Observations** (33 participants)		**Post-Intervention Observations** (28 participants)	
Perform **HAND HYGIENE** – with soap & water or use an alcohol-based gel hand sanitizer	15	45%	21	75%
Appropriate **SELECTION** of PPE	26	79%	22	79%
Correct sequence for **PUTTING ON** PPE	23	70%	22	79%
Correct sequence for **REMOVING** PPE	25	76%	24	86%

Figure L-1