Improving Hand Hygiene Compliance in a Psychiatric Unit

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Abstract

The quality improvement initiative was initiated to control the occurrence and spread of hospital-acquired infections (HAIs) and promote proper hand hygiene compliance in an inpatient psychiatric unit using a multifaceted approach. HAIs are infections that are typically not present at the time of admission but manifest within 48 hours of admission to the hospital (Puro et al., 2022). HAIs have been linked to increased hospital stays, longer recovery time, and increased risk of mortality. Proper hand hygiene compliance is recognized as one of the most influential and oldest ways to reduce the occurrence of HAIs (Haque et al., 2020). The method adopted included a 5-weeks implementation of the proposed interventions in a mental health facility. HAI was diagnosed using Centers for Disease Prevention and Control guidelines. Hand hygiene was taught using the WHO Hand Hygiene Technical Reference Manual, while compliance was assessed using the WHO Hand Hygiene observation tool. The first intervention was educating and training the healthcare workers on the importance and process of hand washing. Secondly, hand hygiene resources were provided at the facility. Consequently, an ongoing evaluation and feedback process (surveillance system) of hand hygiene compliance among healthcare workers was put in place. In addition, reminders and posters were deployed to promote the population's hand hygiene awareness and compliance. The project results reflected that HAI prevalence was reduced while incidence remained fairly similar. A high level of compliance with hand hygiene was recorded. With the recorded reduction in the prevalence of HAIs at the facility, healthcare costs are expected to be reduced. Hand hygiene must be emphasized in mental health facilities to lower the risk of nosocomial infections. Further investigation is required to establish the attributable benefits of hand hygiene education to hand hygiene compliance.

Keywords: Hand hygiene, Hospital-acquired infections (HAIs), Psychiatric facility, Hand hygiene compliance, Inpatient facility, Mental health, Interventions, Multifaceted approach, Proper hygiene training and education, healthcare workers (HCWs), and patients.

Introduction

This Doctor of Nursing Practice (DNP) scholarly project is intended to improve patients' hand hygiene compliance in a psychiatric unit by proving patients with education on the importance of the hand hygiene process and the importance of healthcare workers. The identification and formulation of this doctoral project are to provide enough scholarly evidence on the success of hand hygiene compliance as an evidence-based practice towards improving nursing practice and clinical care in the project location. The topic will allow an evaluation of the gap between the project site facility and CDC clinical guidelines for hand hygiene that will be crucial in the decision-making process of different policies and intervention programs. The identified barriers to implementing best practices on hand hygiene compliance at a psychiatric facility will be addressed. The formulation and use of an approach to assist the psychiatric facility in implementing and integrating an evidence-based practice of hand hygiene compliance into clinical practice are to improve patient outcomes through quality care. Identifying the patients' current perception and knowledge of the psychiatric facility and integration into the education program would improve View Heights' patient's knowledge of the importance of Hand Hygiene, behaviors, and attitude toward hand hygiene compliance through education from staff. The successful outcome of the proposed intervention topic would improve the quality of care in the psychiatric facility using the identified hand hygiene best practices to manage nosocomial infections or Hospital Associated Infections (HAIs).

The Problem at the site

Hand hygiene compliance has been recommended to various healthcare settings in the U.S. and globally by World Health Organization (WHO), the Centers for Preventable Disease Control (CDC), and various national healthcare organizations as a directive and evidence-based practice towards reducing the spread of HAIs (Schmidt & Stenger, 2021). However, hand compliance across many healthcare facilities in the United States has remained a challenge due to multiple factors, including inadequate financial support, limited staff resources to help in educating patients, low staff-to-patient ratio to help promote hand hygiene compliance, limited information technology (IT) access, insufficient hand hygiene supplies, and inadequate infrastructure to implement effective infection prevention control initiatives (Croke, 2022). This DNP project will be conducted in View Heights Convalescent Hospital in Los Angeles, California. The site is a medium-sized psychiatric facility with 163 beds with an average of 200 daily population of workers and patients.

The psychiatric facility needs to implement the best practices for hand hygiene compliance practices. Following a primary survey of the daily hand washing compliance among patients and subsequent analysis of secondary data of the facility's healthcare infection rate shows a correlation between Hand hygiene (HH) non-compliance with increasing HAIs in the psychiatric facility. The findings indicate a high level of hand hygiene non-compliance in View Heights psychiatric hospital, which presents a potential risk of transmission of microorganisms to mental health patients that may increase the spread of HAIs. Some identified barriers to implementing best practices for hand hygiene compliance at the facility were inadequate HH resources, lack of information technology, lack of hand hygiene training on patients, inadequate HH policies, and lack of posters or hand washing reminders. The low rate of HH compliance

disrupts the delivery of other mental health services in the psychiatric family by slowing down the effectiveness of the care delivery, impacting the quality of care due to rehospitalization. The failure of the facility to implement hand hygiene strategies has seen the facility incur additional financial repercussions on the facility management and the family of the patients for treatment costs for HAIs. Proper hand hygiene compliance reminders and posters in the facility are necessary for the patients to understand the importance of adherence to proper hand hygiene practices.

Significance of the Problem

Hand hygiene compliance is an evidence-based practice the healthcare system implements globally as a preventive measure against the spread of healthcare infections. There are national and global guidelines and frameworks have been developed to provide better standards and protocols for hand hygiene compliance (De Kraker *et al*., 2022). Healthcare organizations derive their policies of hand hygiene compliance for their respective facilities from the national or global hand hygiene standards and protocols. Bonine (2021) found that in the U.S, the Centers for Prevention and Diseases Control (CDC) hand hygiene guidelines and the U.S. Department of Health and Human Services directives for the national action plan for the prevention of HAIs have been key driving protocols in the adoption and adherence to HH across various healthcare organizations. Ojanperä *et al*. (2022) suggest that the medical staff can play an essential role in influencing the patients to comply with the provided hand hygiene practices through improved surveillance, training, use of posters, and other identified effective strategies for ensuring HH compliance. Martos-Cabrera *et al*. (2019) found that health workers are the primary implementers of hand hygiene compliance due to their regular engagements with patients and the additional capability to implement evidence-based practice. According to

Lotfinejad *et al*. (2021), through the education and training of patients and the provision of adequate hand hygiene infrastructure, education of patients on the importance and process of hand hygiene is essential to ensuring adherence to hand washing practices in a psychiatric unit. Health workers can play a pivotal role in ensuring the implementation of HH compliance to improve the provision of standard care by educating patients on better hand hygiene practices. Improving hand hygiene compliance would impact various stakeholders within the healthcare system (Patient CareLink, 2020). Successful implementation of the project would reduce HAIs in the psychiatric facility, leading to improved patient outcomes. Patients in long-term care and mental health facilities would rest assured of their safety against contracting HAIs since the project is patient-centered (Price *et al*., 2022). Educating the patients on the importance of hand hygiene compliance as an evidence-based practice would improve the nursing practice towards promoting the quality and effectiveness of care delivery.

Background

Healthcare-acquired infections are common during care, especially among hospitalized patients in long-term care facilities (LTCs), critical care units, or mental health-related facilities. Most patients admitted to these facilities are often diagnosed with severe medical conditions that make them unable to independently perform personal duties or care, leaving them vulnerable to several HAIs. According to CDC (2020), the contraction and spread of healthcare infections are highly linked to poor hand hygiene practices or non-compliance with hand-hygiene guidelines within healthcare facilities. The U.S. annually records 1 to 3 million infections across its various LTC. According to Fitzpatrick *et al*. (2020), the U.S. has 12 275 psychiatric facilities, of which 1806 are 24-hour inpatient psychiatric facilities with more than 35000 beds, while 9634 are less than 24-hour outpatient care. About 1 in 4 adults, representing 26% of Americans aged 18 and

above, reportedly have diagnosable mental illness yearly (McKnight-Eily *et al*., 2021). Due to the increasing prevalence of mental health in the U.S., the number of people administered to psychiatric and other associated mental health facilities is estimated to rise. According to McKnight-Eily *et al*. (2021), the U.S. has one of the highest mental health burdens among high-income nations, with minimal structural capacity, leading to inadequate workforce and preparedness. The nature of the patients in the psychiatric facility proves to be a key challenge in ensuring hand-hygiene compliance, leaving them vulnerable to healthcare infections. The characteristics of patients and the nature of treatment provided in psychiatric facilities make them vulnerable to contracting and spreading healthcare infections. Despite the measures provided by national health boards to improve hand hygiene adherence, the compliance rate has significantly remained very low, particularly in acute healthcare settings (La Rosa-Presume, 2022). Healthcare-acquired infections are a prevalent public health issue in the public health system across many healthcare facilities among patients, which affects the patient care process (Boyce, 2019). The prevalence of these cases in both psychiatric and general hospital populations influence the need for this project on psychiatric units to improve care delivery and prevent the spread of HAIs.

Problem statement

Cognizant that HH compliance in healthcare facilities, more specifically in long-term care facilities and nursing homes, is lower than the national average, the medical fraternity and healthcare stakeholders must collaborate in the evaluation and implementation of evidence-based practice that can foster HH compliance among healthcare professionals, nurses, and the patients. According to Mouajou *et al*. (2022), several healthcare facilities, particularly acute care and mental health institutions, have failed to undertake various initiatives to promote hand hygiene

compliance. The current HH compliance in a psychiatric facility in the U.S. is lower than the WHO's 92% recommended rate (Mkpuechina, 2022). There is a need to support interventions program and strategies such as educating patients on the importance and process and increasing surveillance, ensuring the provision of adequate hand washing infrastructure, and using reminders to influence patients' behaviors and attitudes towards hand washing practice.

PICOT Question

P: An adult psychiatric facility of patients aged between 18yrs and 65yrs old with multiple underlying psychiatric conditions, including impaired cognitive behavior and judgment.

I: Improved hand hygiene compliance among patients through education on the importance of handwashing and process through HCWs as educators, increasing hand hygiene infrastructure, review of the existing HH guidelines in the facility, and improved surveillance, with knowledge sharing about HH and its importance.

C: The comparison group will evaluate the level of HH compliance among psychiatric patients versus the non-compliant patients with HH compliance and how educating the patients on the importance of hand hygiene through healthcare workers and improving handwashing infrastructure to help the patients comply with hand hygiene practices and regulations.

O: Reduced the incidence of healthcare infections by improving hand hygiene compliance among patients.

T: Implemented and measured within five weeks**.**

Review of Literature

Search Terms

A comprehensive systematic literature review (SRs) of qualitative and quantitative papers was conducted through multiple scholarly search engines and databases. Some scholarly search engines and databases include PubMed, Sage Journal, JSTOR, EBSCO Host, CDC, CINAHL nursing database, Cochrane Library, and the WHO publications. The primary keywords used for the search included: hand hygiene standards and protocols, infection control and prevention measures, hospital-acquired infections, handwashing practices and hand hygiene compliance, nosocomial infection, patient safety, a culture of safety, adherence to evidence-based guidelines in a psychiatric unit, patients' knowledge, beliefs and attitude regarding the prevention of HAIs, infection prevention policy, psychiatric units, and education of patients.

The research strategy of open desk research and consultation from fellow students and university professors was used when searching for secondary data from peer-reviewed articles such as books, recent research articles relating to the area of studies, current healthcare statistics, and class materials. The search words focused on hand hygiene practices in general hospitals, long-term care facilities, surgical and medical wards, among other hand hygiene compliance in hospital settings which were significant when narrowing the focus to psychiatric or mental health units. The search led to the discovery of one hundred and ninety-six articles. To be included in the literature review, the identified studies had to meet all the inclusion criteria and did not meet any provided exclusion criteria.

More exclusion criteria were adopted in selecting articles for the next step of the literature review to reduce the number of articles. Articles and other related statistics to the

research question were excluded from the next step of the literature review if they were not published in the English language if they were not published within the last five years, non-peer-reviewed articles, articles that only focused on the theoretical review and not the actual best practice, and articles that did not assess or evaluate the impact or association between hand hygiene compliance among patients or healthcare workers (HCWs) and the spread of healthcare infections (HAIs).

The articles' inclusion criteria included a full-text article headline and content written in English, research published within the last five years, and research carried out in healthcare settings. Qualified articles utilized scientifically approved research designs such as systematic review, experimental design, cross-sectional studies, scoping review, longitudinal design, and meta-analysis research design, among other peer-reviewed articles. Both articles selected were those that assessed or evaluated the association between hand hygiene and healthcare infections. Furthermore, studies carried out in psychiatric units and other acute healthcare settings centered on assessing the impact of hand hygiene compliance among patients on healthcare infection control were given priority in selection. After the exclusion and inclusion criteria were deployed, out of the 196 previously discovered articles, only 19 were included in the systematic literature review.

Other healthcare hand hygiene compliance and infection control guidelines, protocols, and standards were also searched to help improve the systematic literature review process. Some of the global and U.S. infection prevention and control guidelines and protocols retrieved from the World Health Organization (WHO), Centers for Preventable Disease Control (CDC), and other U.S. federal healthcare agency's websites were: "Society for Healthcare Epidemiology of America" (SHEA), The Joint Commission (TJC), the "Association for Professionals in Infection

Control" and Epidemiology (APIC), and "Agency for Healthcare Research and Quality" (AHRQ). Information obtained from the selected agency websites was relevant in assessing the nature of the required best practice for understanding the best practice and HH compliance.

Review of Research Methods

The research methods of the nineteen peer-reviewed articles that met the inclusion criteria were reviewed to provide more insights for subsequent literature interpretation and review synthesis. The review of the selected articles' research methods aided in identifying more relevant themes for the completion of this DNP project. Some of the selected articles shared similar research methods with different research designs, sample sizes, and populations, which led to understanding the appropriate research method for this project.

The literature discussed included a systematic review of peer-reviewed research studies, cross-sectional studies, longitudinal observation, observational studies, randomized controlled trials, a meta-analysis of randomized controlled trials, exploratory qualitative studies, mixed methods comparative studies, interventional trials, and integrative reviews. These methods that utilized either qualitative or quantitative approaches led to the key findings crucial in the review synthesis and identifying relevant themes to the DNP project. All the reviewed research methods were assessed, validated, and found to be reliable since they led to the findings on how improved hand hygiene compliance in various healthcare settings is an effective control against the spread of healthcare infections, which apply to this DNP project.

Review Synthesis

According to Bonine (2021), hand hygiene compliance is an evidence-based practice that promotes patient safety and quality care in hospital organizations by preventing and controlling the spread of healthcare infections. The impact of hand hygiene compliance has been tested and

verified by several global health institutions, such as the World Health Organization (WHO) and the Centers for Disease Prevention and Control (CDC). Healthcare organizations have adopted various frameworks and protocols to help promote hand hygiene compliance across various healthcare settings. However, despite all the efforts by the healthcare regulatory agencies to introduce various interventions to improve hand hygiene compliance, there has been a relatively low rate of hand hygiene compliance across various U.S. hospitals and globally. According to de Kraker *et al*. (2019), hand hygiene compliance in emerging countries is estimated to be between 5-38%, and that of developed countries like the U.S. averages 70%, which is still below the expected WHO average of 92% across. Lotfinejad *et al.* (2021) found that the low hand hygiene compliance rate across many healthcare settings has significantly led to healthcare infections associated with a reduced quality of care and additional health services cost for patients and governments. The results of the low rate of adherence to hand hygiene practices have pushed for the need for more scholarly evidence and research to identify strategies and interventions that can be used to improve the HCWs and patients' compliance with hand hygiene practices. Other studies have focused on quality improvements and identifying the existing challenges that impede the successful adoption and implementation of hand hygiene compliance against the spread of healthcare infections.

The nineteen articles included in the search methods contained significant works of evidenced-based literature from various study methods that examined the effectiveness of HH compliance, the barriers to hand hygiene best practices, and the interventions and strategies for increasing HH compliance. Ojanperä *et al.* (2022) conducted a longitudinal observational study in six medical and 7 surgical wards from May 2013 to December 2020 to determine the impacts of direct observation, feedback, and surveillance of healthcare worker's hand hygiene compliance

on prevent the occurrence and spread of healthcare infections in surgical wards. The results showed an increase of more than 10% and 20% in hand hygiene compliance across medical and surgical wards, which significantly decreased the recorded cases of healthcare infections. In a non-experimental quality improvement project by La Rosa-Presume (2022) on re-educating healthcare workers in long-term care facilities to improve hand hygiene compliance, the author focused on educating HCWs on the importance and process of hand hygiene practices. The author found that re-educating healthcare workers on the importance and process of hand hygiene practices positively impacted their attitudes, behaviors, and knowledge of evidence-based practice, significantly increasing hand hygiene compliance among the participants. In another systematic review study by Boyce (2019), the author reviewed recent literature on the current issues in hand hygiene, where he examined some of the current factors affecting the implementation of hand hygiene practices in hospitals and the best interventions and strategies for overcoming them. The author identified healthcare workload, inadequate hand washing resources, hand sanitizer or soap irritation, and constant use of gloves by HCWs as the common barriers to medical staff hand hygiene compliance. The author also recommended providing adequate handwashing resources, education and training, feedback, and improved surveillance as the best strategy for improving hand hygiene best practices.

In a generalized systematic review study, Lotfinejad *et al*. (2021) looked into some pertinent issues, challenges, findings, effectiveness, and analysis of hand hygiene compliance as an evidence-based practice. The authors systematically reviewed numerous pieces of evidence of literature within the past twenty years, identifying quality gaps for improving hand hygiene compliance. The analysis of the findings led to the discovery of surgical wards, intensive care units, and mental health units as the highly affected areas with high rates of healthcare infections

due to low hand hygiene compliance rates. A systematic review study by Mkpuechina (2019) investigated the best strategies for implanting HH protocol for direct care staff in a psychiatric patient unit. The study's findings correlated to those of Lotfinejad *et al*. (2021) in affirming the vital role of education and training for HCWs on the importance and process of hand hygiene best practices. Bonine (2019) also conducted a similar systematic review and researched the best strategies for implementing hand hygiene compliance in psychiatric units. The study results were the provision of better organizational policies for hand hygiene compliance in psychiatric units, the establishment of compulsory scheduled hand practice, increased surveillance, feedback, and random hand hygiene audits.

The low rate of hand hygiene compliance has significantly led to the prevalence of healthcare infections, leading to the decline of quality care and undermining patient safety. A global survey conducted by the WHO in ninety countries using the hand hygiene self-assessment framework confirmed the adverse impacts of hand hygiene non-compliance in healthcare settings (de Kraker *et al*., 2022). The study analysis discovered that most healthcare workers still need to adhere to hand hygiene protocols, which has undermined the care delivery process by risking patients' safety. Another survey study performed by Bimerew & Muhawenimana (2022) in a psychiatric unit hospital in South Africa aimed at investigating nurses' knowledge, attitudes, and practices towards compliance with hand washing practices. The study's results indicated that high cases of healthcare infections were reduced through increased monitoring, transformative leadership by physicians, and the need for education and training to influence the stakeholder's attitude, behavior, and knowledge on the importance of HH practice. In a mixed-method approach systematic review study, Purssell *et al.* (2019) evaluated the impact of the Hawthorne effect on adherence to HH compliance in patient care. The results confirmed that surveillance,

monitoring system, reminders, and feedback are the best strategies for improving hand hygiene compliance in psychiatric units and reducing the prevalence of healthcare infection.

In summary, the review synthesis of the selected articles led to the discovery of recurring themes, trends, and patterns relevant to understanding the importance and practice of hand hygiene in controlling the spread of healthcare infections. The impact of hand hygiene compliance was assessed and measured in various population settings using different research methods. Researchers have tested and verified hand hygiene frameworks provided by the WHO and CDC as a guideline for nurses to regularly wash their hands while providing patient care to promote the quality clinical practice and patient safety. Education and training programs for healthcare workers were identified to be effective interventions and strategies for improving the medical practitioner's knowledge, attitude, and behavior toward upholding the hand hygiene compliance guidelines to control the spread of HAIs. The impact of other strategies, such as ensuring enough handwashing resources in healthcare settings, improving surveillance, enhancing stakeholder awareness, and using reminders to improve hand hygiene compliance among patients and HCWs, has been proven effective. Additionally, the findings confirmed that hand hygiene compliance remains a public health issue even in developing and developed countries that must be addressed to improve the quality of clinical practice. Through recommendations and findings from the selected studies, numerous quality gaps in the HCWs and patients' capacity, ability, knowledge, and behavior in different healthcare settings toward ensuring proper hand hygiene compliance need to be improved. There is a need for more scholarly evidence that can help in the identification of tested and verified strategies and interventions for improving hand hygiene compliance in various healthcare settings.

Theme Development

The selected articles in the review methods are the primary resources for this survey literature review and have continuously been the source analysis and reference. The authors highlight the prevalence of lower hand hygiene compliance rates in various healthcare settings, such as inpatient psychiatric ward, intensive care units, and surgical units**,** and their associated impacts on increased healthcare infections**.** The review of the selected articles has led to the identification of significant themes that are relevant to the studies that, include; the established hand hygiene standards and protocols, best practices for hand hygiene; the importance of hand hygiene compliance in preventing HAIs; the impact of HH non-compliance in healthcare; and interventions and strategies for improving HH compliance in healthcare organizations**.**

The Importance of HH Compliance in Preventing HAIs

Hand hygiene compliance is an evidence-based practice to help prevent and control the spread of healthcare infections (Mouajou *et al*., 2022). Through adequate evidence, the articles have elaborated and substantiated the impact of HH compliance towards reducing the occurrence and transmission of HAIs. According to Lotfinejad *et al*. (2021), the healthcare organization implementing better hand hygiene compliance stands to gain many advantages of reducing the financial expenditure of treating the cost of healthcare infections and record improved service care delivery. Hand hygiene improvement is critical in eradicating HAIs, and a 10% improvement would lead to a 6% reduction in HAIs spread (Croke, 2022). However, the healthcare organizations that ensured proper hand hygiene compliance in their facilities also recorded a low morbidity and mortality rate from the recent COVID-19 pandemic, a nosocomial infection.

The Prevalence of HH Non-compliance among Patients

Most of the assessed study locations had a hand hygiene compliance rate of less than 92%, the WHO-required minimum rate. Nzanga *et al*. (2022) found that health workers only adhered to hand hygiene practices if they knew they were under surveillance, and some also lied about their compliance with the self-observation checklist. Even after implementing various intervention programs, some studies still did not record a 100% hand hygiene compliance rate (Ojanperä *et al*., 2022). The article's discovery that some patients and HCWs still failed to ensure HH compliance despite the provided interventions indicates how serious the issue of hand hygiene is overlooked in many healthcare settings. According to Kamara *et al*. (2022), hand hygiene compliance in low-income countries like Sierra Leone was discovered to be below 30%, which calls for more awareness and education on evidence-based practice.

The Need to Ensure HH Compliance in Psychiatric Unit

After searching for previous studies through relevant search databases and engines, only three articles were discovered to have assessed and evaluated the impact and importance of hand hygiene compliance in a psychiatric unit facility (Bonine, 2021; Bimerew & Muhawenimana, 2022; and Mkpuechina, 2022). Many previous studies that evaluated the impact of hand hygiene compliance focused mostly on long-term facilities, nursing homes, and critical care units (Lescure *et al*., 2021). There is more quality and research gap in better intervention for improving hand washing practices in psychiatric units. Bimerew & Muhawenimana (2022) found that the dysregulation of cognitive and judgment characteristics of patients in a psychiatric unit makes it a challenging population to regulate, control, and assess during a hand hygiene intervention which is one of the reasons why it has been overlooked by many of the previous researchers. Bonine (2021) found that psychiatric patients already have severe underlying such

as mental disorders, chronic illnesses, and substance abuse addiction that prevent them from practicing regular hand hygiene practice. Therefore, there is a need for more patient-centered interventions to improve hand hygiene compliance among psychiatric, including education and training of HCWs and ensuring patients' adherence to HH practice across numerous healthcare settings. Mkpuechina (2022) identified some of the challenges, essential best practices, and strategies that can be regulated or adopted when implementing hand hygiene compliance in psychiatric units which can be used to improve the outcome of the proposed DNP project.

Promoting Best Practices to Fill Existing Quality Gaps in HH Compliance

This project aims to evaluate the effect of a comprehensive educational training program for psychiatric patients on hand hygiene in terms of knowledge, attitude, and practices. Following the analysis of the articles, no intervention-oriented study achieved a 100% hand hygiene compliance rate even after implementing various intervention programs to improve handwashing adherence (Lotfinejad *et al*., 2021). The low level of hand hygiene compliance in various healthcare settings creates the research opportunity for more interventions and strategies to help successfully adopt hand hygiene evidence-based practice. A comprehensive analysis of the selected articles has led to the identification of a recurring pattern where most hand hygiene interventional studies have focused mostly on re-educating healthcare workers on the importance and process of hand hygiene practice and have ignored the role of patients in promoting infection control in healthcare settings (Ojanperä *et al*., 2022). Previous studies have relied on the theory of planned behavior and the Hawthorne effect, undermining the credibility and reliability of the measured outcomes. This intended project would provide more scholarly evidence and fulfill the identified best practice gaps in previous research by providing hand compliance intervention programs that aim to improve hand hygiene compliance among patients in a psychiatric unit by

using the health workers as educators. The completion of the study would fill previously identified research gaps on the need for a theory-based intervention program to promote hand hygiene practices among psychiatric unit patients.

Aims and Objective

The (DNP) scholarly project is a quality improvement initiative aimed at educating and training patients in a psychiatric unit on the importance and process of hand hygiene to help control the occurrence and spread of healthcare infections. This quality improvement initiative aims to investigate how education and training on the process and importance of hand hygiene for patients will influence psychiatric patients' behavior, attitude, and knowledge on HH compliance to impact HAIs rates at the psychiatric unit. The goal is to improve patient safety at the psychiatric unit by promoting HH compliance as an evidence-based practice against controlling the spread of HAIs. The expected outcome is increased HH compliance and reduced HAIs cases among patients at the psychiatric facility within the provided five weeks. The derived objectives of the quality improvement study are to:

I. Evaluate the existing gap between current hand hygiene practice at the site and CDC clinical guidelines for HH and improve provider compliance with national standards for care on hand hygiene compliance 5 weeks before and 5 weeks after the intervention.
II. Reduce HAI rates by more than 50% after 5 weeks of interventions implementation.
III. Identify the existing barriers and facilitators of hand hygiene practices in the facility.
IV. Administer an education seminar to improve patients' and staff's attitudes, knowledge, and behavior toward hand hygiene compliance.

V. Increase hand hygiene compliance at the project site by more than 20% when measured 5 weeks after intervention.

Implementation of the Framework

The framework for this project encompassed the Iowa Model, a widely used framework for implementing evidence-based practice (EBP) to promote better clinical outcomes. According to Cullen et al. (2022), the IOWA model was developed by nurses at the University of Iowa Hospital and faculty from the University of Iowa College of Nursing in 1990 to provide a pathway for the adoption of EBP by nurses in improving patient care and safety. Hanrahan et al. (2019) found that the discovery of the Iowa Model led to a more effective and quick process to identify clinical issues, research solutions, and implement changes toward improving the quality of clinical care by supporting the implementation of various evidence-based practices to promote care delivery. The application and impact of the Iowa Model in the EBP application were reviewed and revised in 2017 to assert its usefulness in promoting better clinical practices (Cullen et al., 2022). Other subsequent research has also been carried out to evaluate and assess the opinions and perspectives who have used or interacted with applying the above framework to understand its application in other practice settings (Hanrahan et al., 2019). The Iowa Model has been used severally by researchers and nurses to base practice on research findings or other credible evidence.

Multiple scholarly evidence supports the successful use of the Iowa Model in promoting EBP in clinical and academic settings, which makes the model the best framework for this project. Hand hygiene compliance is an evidence-based practice that helps reduce healthcare infection cases. Thus, a project to improve hand hygiene compliance in a psychiatric unit promotes evidence-based practice toward promoting patient care and safety, supporting the Iowa

Model's use. This DNP project is a non-experimental quality improvement project that will adopt the IOWA model to provide education and training for in-patients in psychiatric units on the advantages and process of HH compliance. This project aims to identify issues and barriers to the best hand hygiene practices in a psychiatric unit, research and introduce necessary solutions, and implement the identified strategies or interventions to promote better nursing practices for controlling the spread of healthcare infections, which requires the Iowa Model application-oriented framework. Bedel *et al*. (2019) found that the Iowa Model can help better understand the causes of hand hygiene non-compliance among psychiatric unit patients and identify the most effective intervention and strategies to improve hand hygiene practices in such a clinical environment. Conducting a successful education and training program to improve the patient's behavior, attitude, and knowledge of the hand hygiene compliance process and importance is a positive way of creating and sustaining a hand hygiene adherence culture for patients and healthcare workers in ensuring clinical patient care and safety.

Application of the Iowa Model to the Project

The major tenets of the IOWA model will be applied in the intervention phase to help achieve the objectives and measure the outcomes of the proposed project to improve patients' hand hygiene compliance in a psychiatric unit. The first stage in the IOWA model is identifying triggering issues or opportunities. This stage will involve identifying the triggering problems causing the low hand hygiene compliance rate at the psychiatric unit. The patient's and healthcare workers' attitudes, behavior, and hand hygiene knowledge will be observed and recorded as the pre-invention period data against which the project outcome will be compared. Analyzing data from the project site will lead to identifying any opportunity and the need for an intervention project to promote the hand hygiene compliance rate. The existence of an

opportunity to initiate a clinical change will lead to the creation of a research question as the second stage of the Iowa model.

Completing the first stage leads to the second stage, which requires validating that the identified problem is a priority to the department, practice, and organization. As an evidence-based practice, hand hygiene compliance in a psychiatric unit is a priority in reducing healthcare infections to promote the nursing practice and save the organizations from multiple financial losses. The research question following the identification of the clinical practice opportunity will be "To what extent does a comprehensive education program for patients on hand hygiene process and importance help improve the participant's knowledge and behavior on hand hygiene compliance to eradicate or reduce healthcare infection?". Thirdly, there would be a verification of whether the selected project topic is a priority in clinical practice. The promotion of hand hygiene compliance in a psychiatric unit is indeed a priority aimed at promoting the safety and welfare of in-patients and supporting the process of quality care delivery to support clinical practice.

The fourth stage will involve forming and selecting an appropriate personnel team to help implement the project. According to Davis & Batcheller (2020), a good team designated to develop, evaluate, and implement the EBP change will require a combination of representatives within and outside the nursing unit to allow interdisciplinary implementation and evaluation of the change. Since the researcher cannot offer direct education and training to patients in a psychiatric unit on the importance and process of hand washing, selecting a team that combines neutral or other healthcare workers at the facility will help implement the change. The project manager (DNP student) is responsible for establishing and designating roles for the project team members, which can be made of the unit professor, members of the management board from the

selected project site, colleague DNP students, and any other professionally acquitted nursing member interested in joining the team to help in either implementation, observation, or evaluation stage.

The fifth stage will involve gathering, appraising, and synthesizing evidence around the selected topic, the identified research question, and discovered triggering issues. This step requires systematic reviews of articles and past studies to determine the current patterns, issues, and challenges in implementing interventions and strategies to address the barriers to hand hygiene. The synthesis will require a review of the selected articles research methods, analyzing the findings, and finding the correlation of the article's findings to the chosen research question and identified research gap. The findings and recommendations from the selected articles can be crucial in determining the best strategies and necessary adjustments for improving hand hygiene compliance in the project phase. The exercise will require critique and synthesis of various types of evidence, such as case reports, theoretical frameworks, scientific principles, and expert opinions.

The sixth stage of piloting a change involves the actual practical part of the project, where the best strategies identified previously in the synthesis of evidence are implemented to address the identified barriers to hand hygiene best practices at the project site to increase hand hygiene practices. Initiating a pilot change requires engaging the activity of other parties involved in the implementation of the project, such as the HCWs, the hospital leadership, and other resources needed. The first step in this stage will require considering the project's possible constraints, resources, and approval before developing a localized protocol for actualizing the project. The second part will involve selecting the setting facilitator, implementation plan and procedure, measurement instruments, and enlisting possible barriers to project implementation.

The evaluation plan for the collected data will be formulated with the prior preparation of the healthcare stakeholders involved and the review of the project materials.

The final step in the sixth stage of the Iowa Model, which is part of the pilot change, will include implementing the intervention and strategies to promote the best practices for HH compliance by addressing the possible barriers. The exercise will include providing education and training programs by the selected team members professionally qualified to conduct the process and providing reminders and surveillance towards ensuring HH compliance. This phase will be concluded by collecting the data within the intervention period of five weeks for analysis and comparison with the baseline data for the pre-intervention and post-intervention periods. The data will be focused on evaluating the patients and HCWs' attitudes, behavior, and knowledge of the hand hygiene process and its importance before, during, and after the intervention period of five weeks. The outcome of the intervention period will be measured and evaluated to assess any positive increase in the change of participants' attitude, behavior, and knowledge of hand hygiene practice that led to an increased rate of hand hygiene compliance rate at the facility and any impact on the recorded healthcare infections.

The last stage for the Iowa model framework for the proposed DNP project will require assessing and evaluating if the positive outcome of the project in improving hand hygiene compliance for patients in a psychiatric unit can be applied in the actual clinical practice at the facility or in other related healthcare organizations. This phase will require considering if the discovered change during the intervention period is appropriate for adoption in practice by identifying and engaging key stakeholders or evaluating other alternatives if the measured outcome is unsuitable for adoption into practice (Cullen et al., 2022). Adopting the intervention for educating the patients through HCWs to change their attitude, knowledge, and behavior

towards improving hand hygiene compliance in a psychiatric unit against reducing the cases of healthcare infections will require integrating the intervention into the hospital system and daily operations. There will be required monitoring of key hand hygiene factors for in-patient's psychiatric unit, such as motivation, training, and adequate human resources, and supervision through quality improvement initiatives to integrate the provident interventions into clinical practice change successfully.

Project setting and Population

Project Population

Los Angeles has a population of 3,792,621 people, according to the 2010 United States Census. 8,092.3 persons per square mile (2,913.0/km2) made up the population. The population samples for this project will comprise healthcare workers such as qualified LVNs, RNs, and CNAs, who provide direct patient care and patients from a mental health facility in California, U.S (Tucker *et al*., 2021), The inclusion criteria for the direct population will be qualified health workers responsible for providing direct care to the patients and are permanent employees or are present for more than three days a week at the facility. The exclusion criteria will be qualified healthcare workers who are directly involved in direct patient care but are not consistently present at the facility or working on per diem, part-time, or PRN staff and the health workers who are not directly involved in providing direct patient care to patients. The second group will be the indirect population consisting of patients diagnosed with different types of mental health who are admitted to the facility to receive care and treatment. The inclusion criteria will be admitted adult patients aged 18 years to 65 years of age. The exclusion criteria will be young patients below 18 years, the out-patients, and patients placed in confinement.

Project Setting

The study will be conducted in an inpatient mental health facility in Los Angeles, Southern California which has been operational for over 30 years. The mental institution is a 163-bed accredited skilled nursing facility (SNF) and designated institute for the Institute for Mentally Diseased (IMD) with approximately fifty employees. The facility is a leading provider of mental health services and nursing care for patients that specializes in providing different types of rehabilitative care, such as treating individuals diagnosed with different forms of substance and alcohol addiction, Co-occurring disorders, Schizophrenia, bipolar disorder, anxiety disorders, Post Traumatic Stress Disorder (PTSD), cognitive disorders, dissociative disorders, and in-patient levels of care (Viewheights.com, n.d). The facility integrates the process of delivery care with updated healthcare technology to promote better mental health outcomes, such as the use of Electronic Health Records (EHR), to capture and track patients' records and performance. The primary objective of the mental health institution's Inter-Disciplinary Treatment Team (IDT) is to stabilize the individuals diagnosed with behavioral and other mental disorders to ensure their social reintegration into the community. The mental institution is strongly affiliated with the Los Angele County Department of Mental Health (LACDMH) and collaborates to support clients, families, and the community in improving mental health and well-being.

Stakeholder's

The key stakeholders for the project include the project team members, the project site board of management, the Infection Control Interdisciplinary Team, the project site target population, and the Truro University administration in providing timely assistance, intellectual guidance, and support for data resources and interpretation to ensure the project's success. The

permission for this quality improvement project was granted by the project site leadership with the approval of the institution leadership to enhance collaboration (Appendix A). The board of management of the psychiatric facility and the departmental leaders agreed to provide any required assistance of data, resources, or human support for the team members to ensure the completion of the project intervention. The core project team must actively collaborate with the shareholders at the project site in granting access to data to guarantee a smooth and successful project implementation and data collection process for analysis and interpretation to complete the DNP project. According to Falkenberg-Olson (2019), accomplishing the derived project objective depends on the ability of the project team to gain the support and cooperation of the shareholders, particularly the organizational leader at the project site. The project unit manager continuously reviews the project's progress and will be required to help with the progressive review and assessment of the project planning to ensure quality and a successful implementation process.

Project's Interventions

Interventions

A series of interventions implemented to help improve hand hygiene compliance at the project site. The first intervention will involve performing education and training for the healthcare workers on the importance and process of hand washing. PowerPoint presentations from the Hand Hygiene Technical Reference Manual and WHO Five Moments for Hand Washing tools will be utilized (Croke, 2022) (See Appendix C).

Another change will involve improving the availability of the hand hygiene resource at the facility. This phase will involve procuring adequate hand washing resources, such as portable

alcohol-based sanitizers stations which has placed on every station for easy accessibility for both patients and staff.

The other intervention will involve evaluation and feedback that will integrate improving monitoring and surveillance of hand hygiene compliance among the healthcare workers, hand hygiene infrastructures, and the healthcare knowledge and perception of the exercise while providing feedback.

Additionally, there will be a continuous use of reminders and posters to promote hand hygiene compliance awareness for the population. The project manager will print charts and pictures of the WHO-recommended hand hygiene steps, and five moments of hand hygiene (Appendix C and Appendix D) will be exhibited in public halls and accommodation areas, such as toilets, near washing sinks, and admission wards (Boyce, 2019).

Timeline

There is a previously determined timeline that the quality improvement project is estimated to be implemented within November 2023 (See Appendix E). The exercise will involve the implementation of the CDC/SHEA/APIC hand hygiene guidelines, providing educational and training to the healthcare workers using *WHO Five Moments of Hand Hygiene* as an educational tool, improving hand hygiene evaluation and feedback, and using hand hygiene reminders (La Rosa-Presume, 2020).

Tools and Resources

Different measurement tools will be used to help implement the selected interventions and collect and analyze data. The tools discussed below will be used in different capacities: self-reporting, direct observation, and indirect measurement of hand hygiene product usage.

WHO Five Moments of Hand Hygiene

According to De Kraker et al. (2022), the WHO My 5 Moments of Hand Hygiene (See Appendix C) protocol is a WHO-verified hand-cleaning process for healthcare workers offering direct care to patients to prevent the occurrence and spread of HAIs. The WHO hand washing guideline for Moments of Healthcare Workers' Hand Cleaning will be an educational tool for healthcare workers on proper handwashing. In a study carried out by De Kraker et al. (2022), WHO Five Moments of Hands Hygiene had a positive impact in increasing hand hygiene compliance. The components of the WHO guideline in Moment of hand washing will be explained and demonstrated to the healthcare workers and all participants.

WHO Hand Hygiene Observation Tool

Thirdly, the *WHO Hand Hygiene Observation Tool* (See Appendix D) will be used to record the observation of hand hygiene compliance among healthcare workers during pre-intervention and the intervention period for analysis. De Kraker et al. (2022) found that the *WHO Hand Hygiene Observation Tool* is a tested and verified WHO data collection framework that is applied in capturing moments of hand hygiene practices in medical facilities by validating specific indicators and situations. The observation tool is a useful diagnostic tool for assessing and evaluating the barriers to implementing hand hygiene best practices in a medical facility and determining the necessary intervention for addressing them.

WHO Hand Hygiene Technical Reference Manual

Educators and leaders have successfully used the technical reference manual across numerous healthcare settings to address and eliminate barriers to hand hygiene compliance by changing the healthcare worker's behavior, knowledge, and attitude toward the provided HH protocols (Martos-Cabrera et al., 2019). The document summarizes the key processes and

resources an organization requires to comply with the standard hand hygiene required to control healthcare infection rates. The WHO-established tool is open for trainers, observers, and healthcare workers to monitor or ensure compliance with hand hygiene protocols. The tool provides a guideline on how a hand hygiene education and training program should be performed, the topics that must be discussed, and the resources required.

Analysis Tools

The fourth tool for the project is the analysis of the collected data. The Excel spreads will primarily organize, reorganize, and store data. The obtained data for the project will be sorted and analyzed using SPSS Version 28.0.0.0. According to Pallant (2020), the SPSS is an analytical software package for advanced analysis of different types of statistical data. The statistical package is highly recommended for data analysis for research since it provides an efficient and organized approach to sorting and managing large and complex data sets and performing advanced statistical analysis for easy interpretation (Pallant, 2020). The software package can be downloaded from the internet website of the developer and used for data analysis, data management, and data visualization without any special permission required.

Data Collection and Analysis

Data Collection Plan

Data will be collected on the quality improvement project objectives to evaluate the outcomes after implementing the hand hygiene interventions. The Handwashing Competency Checklist from the CDC will be used to record data on the healthcare workers' hand hygiene compliance rates. Data will be collected on the number of healthcare workers (HCW) who will be compliant and non-compliant with hand hygiene practices every week during implementation (Appendix D II). The charge nurses for each of the three nursing stations will collect the data on

the HCWs. While the Infection Preventionist nurse will collect data on the charge nurses and the RN shift supervisor, all by direct observation using a checklist, after which the checklists will be handed over to the RN shift supervisor for storage and subsequent submission for analysis. The Infection Preventionist Nurse will retrieve from the storage and submit the recorded checklists to the Infection control interdisciplinary committee weekly for review and analysis. The Infection Preventionist Nurse will present deficient practices along with and a performance improvement plan (PIP) in the monthly Quality Assurance and Performance Improvement (QAPI) meeting.

Also, on the behavior monitoring section of each the patients' Electronic Medication Administration Records (eMAR), a monitoring schedule is created to trigger a timely reminder to perform hand washing three times a day, prior to mealtimes. A check list is also designed to be used when needed to capture patient's hand hygiene compliance (See Appendix D.I.) . As part of their documentation of HH performance, nurses are required to respond to the prompt in the eMAR with a "yes" or "no" and a comment. If the patient does not conduct HH, the nurse will document a "no" and then add a comment explaining why the patient did not comply with the requirement. During the period of implementation, there will be an electronic report of the monitoring schedule and analysis carried out to determine whether or not compliance has been met. The HH compliance of the patients is evaluated using audit electronic reports of the eMAR that are generated every two weeks.

Data on hospital associated infections (HAIs) will also be collected from the facility's EHRs system. The Infection Preventionist Nurse will run a report before the project implementation to evaluate the number of HAI cases existing within the facility and also record the number of HAIs after the project implementation period of 5 weeks. This data will help in evaluating the effectiveness of the project's interventions in promoting proper hand hygiene

among patients and healthcare workers which will likely impact the rate and incidence of HAIs within the facility.

Ethics and Human Protection

According to Nebeker *et al*. (2019), ethical standards are fundamental to every quality improvement project in ensuring the research participants' safety, dignity, and privacy. The project site and the Touro University of Nevada do not require an Institutional Review Board (IRB) for quality improvement projects. However, the quality improvement project has been officially approved by the project site's management, affirming its alignment with ethical requirements. The confidentiality of the collected participants in this quality improvement project will be protected. The hand wash checklist will not capture any personal information of the observed healthcare workers and patients to preserve privacy. The obtained data will also be electrically stored and given a password to limit unauthorized success. The obtained medical chart data will be held in protected files and used only for the quality improvement project.

Data Analysis Plan

The DNP student will transfer the collected data to the SPSS spreadsheet for analysis and comparison to evaluate the outcomes of the quality improvement project. Pallant (2020) notes that the SPSS is a readily available analytical software package for advanced analysis of different types of statistical data. Before performing the analysis, the observation checklist will be screened for errors, such as multiple answers for one question or unanswered questions. A descriptive data analysis will be performed to assess the providers' and patients' hand hygiene compliance rates. Descriptive analysis refers to statistical analysis that aims to summarize a collected data set with the assumptions of normality, equality, variance, and linearity (Riffenburgh & Gillen, 2019). Thus, the research will assume the normality meaning the data

will be assumed to be approximately normally distributed. In addition, the research will assume homoscedasticity where the spread of data (compliance rates) will be assumed to be approximately consistent across weeks and nursing stations. Finally, assumption of linearity will be adopted, implying that changes in HHC rates among healthcare workers and patients are expected to exhibit a consistent, proportional relationship with the passage of time as the project evaluate the impact of the interventions. The three descriptive statistics of distribution, central tendency, and variability will be done, and results will be expressed in graphs, tables, and percentages. In addition, the data analysis for the HAI rates will include the calculation of the incidence and the prevalence rates of HAIs through correlating the pre-intervention and post-intervention data. Completing the analyses will help assess the general outcome of the quality improvement project in accomplishing its anticipated purpose and outcome.

Project Results

Results

The project had a total sample size of 52. Of these, two were dropped from the analysis due to their large proportion of missing entries, while the missing values in all the other instances were successfully imputed using the respective columnar modes as they were deemed to be missing at random. As a consequence of the data type collected during the implementation of the project, which consisted of categorical data, the analysis plan deviated from the planned methods. Due to the statistical inappropriateness of using measures of central tendency and variation in describing this data type, only percentages and graphical methods were used. The Healthcare workers at the facility demonstrated high compliance rates, 51% and above, in six of the twelve techniques on which they were trained under the project. HCWs observed a very high rate, 70% and over, of compliance in rubbing palms together and washing the back of hands, as

well as hand washing after patient observation. However, low compliance rates were observed for techniques that related to proper cleaning of fingers and fingernails. The results are presented in Table 1 below.

Table 1: HCW checklist post-intervention

HCW CHECKLIST

	RESPONSE	N	PERCENTAGE
Rub palm-to-palm	Yes	15	71.4%
	No	6	28.6%
Rub the back of both hands	Yes	15	71.4%
	No	6	28.6%
Interface fingers and rub hands together	Yes	9	42.9%
	No	12	57.1%
Interface fingers and rub both hands	Yes	5	23.8%
	No	16	76.2%
Rub thumb, rotating the area between index and thumb on both hands	Yes	7	33.3%
	No	14	66.7%
Rub fingertips on the palms of both hands	Yes	5	23.8%
	No	16	76.2%
Hand wash arrival before meals leaving ward patient area	Yes	13	61.9%
	No	8	38.1%
Hand wash after cleaning equipment and patient furniture	Yes	13	61.9%
	No	8	38.1%
	Yes	15	71.4%

Hand wash after completing patient observation and bed-making	No	6	28.6%
Hand wash after using the toilet	Yes	11	52.4%
	No	10	47.6%
Hand wash after contact with body fluids	Yes	9	42.9%
	No	12	57.1%
Hand wash before and after infectious or neonatal patient	Yes	10	47.6%
	No	11	52.4%

Among the residents, there was an increase in compliance with guidelines on the proper application of sanitizer, non-water and soap hand washing products, use of water at the correct temperature, and hand drying. Despite improvements in patients' behavior regarding hand hygiene compliance, there was still less than 50% compliance in four of the eight aspects of hand hygiene on which patients were trained, as shown in Table 2 and Figure 1 below.

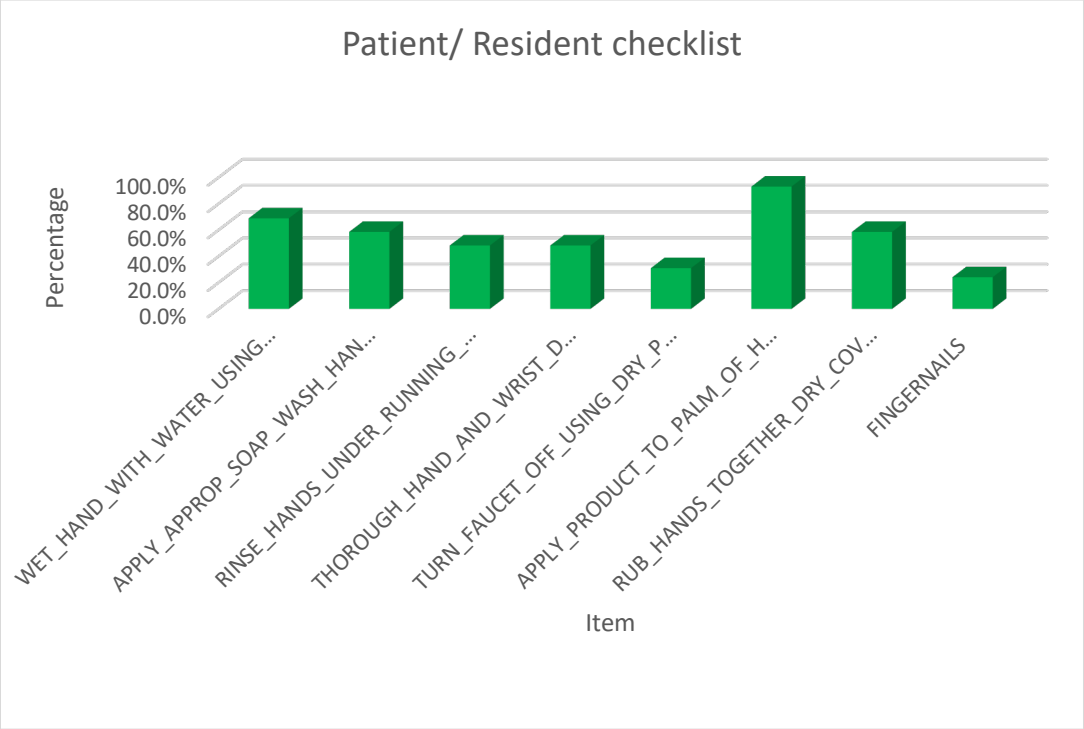
Table 2: Residents/Patients checklist

RESIDENTS/PATIENTS CHECKLIST

ITEM	RESPONSE	N	PERCENTAGE
Wet hand with water using a comfortable temperature	Yes	20	69.0%
	No	9	31.0%
Apply appropriate soap wash on hands and wrists vigorously, covering all surfaces.	Yes	17	58.6%
	No	12	41.4%

Rinse hands under running, allowing dripping from fingers.	Yes	14	48.3%
	No	15	51.7%
Thorough hand and wrist drying with a paper towel	Yes	14	48.3%
	No	15	51.7%
Turn the faucet off using a dry paper towel to avoid contamination.	Yes	9	31.0%
	No	20	69.0%
Apply the product to the palm.	Yes	27	93.1%
	No	2	6.9%
Rub hands together dry, covering all hand surfaces.	Yes	17	58.6%
	No	12	41.4%
Fingernails	Yes	7	24.1%
	No	22	75.9%

Figure 1: Residents/ Patients checklist post-intervention



Among the HCWs, adjusting for station use proportion, the South Back station rated the lowest in most of the hand washing techniques, as shown in Table 3 below.

Table 3: Hand washing technique by station

Response	North Station	South Front	South Back	Total
Rub Palm to Palm				
No	2	1	3	6
Yes	6	5	4	15
Rub the Back of Both Hands				
No	3	0	3	6
Yes	5	6	4	15
Interface Fingers and Rub Hands Together				

No	3	4	5	12
Yes	5	2	2	9
Interlock Fingers and Rub Hands Together				
No	7	5	4	16
Yes	1	1	3	5
Rub Thumb, Rotating the area Between Index and Thumb on Both Hands.				
No	4	6	4	14
Yes	4	0	3	7
Rub Fingertips on the palms of Both Hands.				
No	7	4	5	16
Yes	1	2	2	5

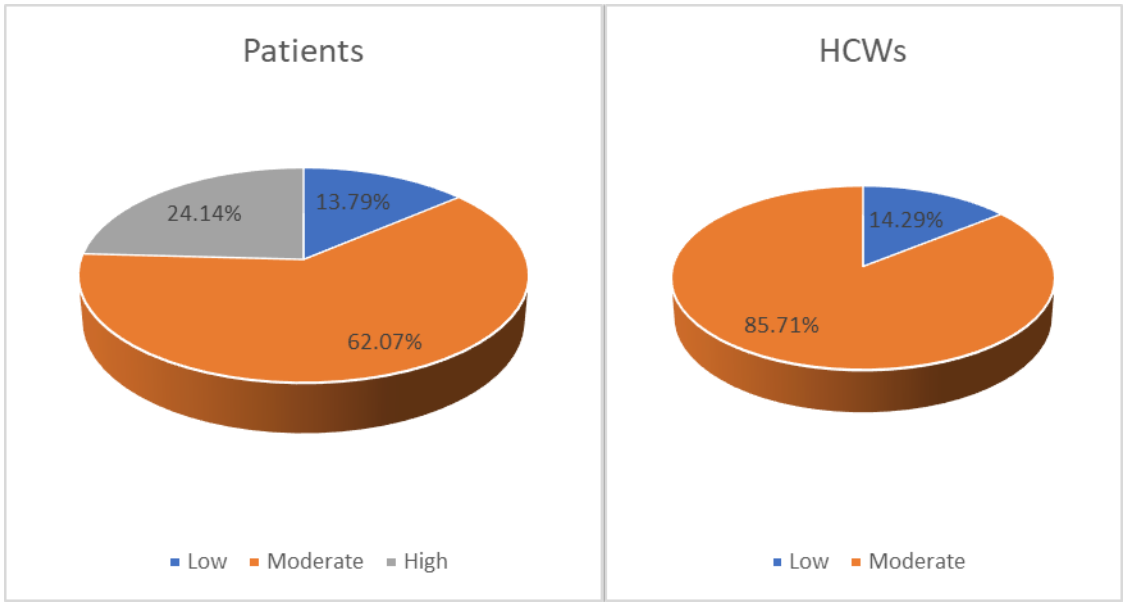
The WHO defines compliance to hand hygiene as the percentage of fulfilled hand hygiene opportunities. Working off this in their work, (Krishnamoorthy et al., 2023) categorized HCWs as compliant if they followed all six essential steps of handwashing recommended by WHO. Building on this, in this project, the overall compliance of HCWs and residents to the hand hygiene protocols was assessed by, tallying the adhered to hand washing techniques for every participant then dividing by the total possible number of techniques. The results were thus abstracted into three equal ordered levels: low, moderate and high, obtained by. For the HCWs tool, compliance with 4 or less of the techniques was regarded as low, between 5 and 8 moderate and above 8 as high. On the other hand, compliance with 2 or less of the techniques was regarded as low, between 3 and 5 was moderate, and above 5 was high for the patients' tool. The majority

of the HCWs, 85.7% recorded a moderate level of compliance to the interventions, while none had a high level of compliance to the hand hygiene techniques as shown in Table 4 and figure 2 below. Patients on the other hand also had a majority moderate compliance, 62.1%, while 24.1% had a high level of compliance, showing adherence to at least 9 of the 12 techniques as shown in table 4 and figure 2 below.

Table 4: Compliance to Hand Hygiene

HCWs Compliance		
	Frequency	Percentage
Low	3	14.3
Moderate	18	85.7
Patients Compliance		
Low	4	13.8
Moderate	18	62.1
High	7	24.1

Figure 2: Compliance level



HAI Rates

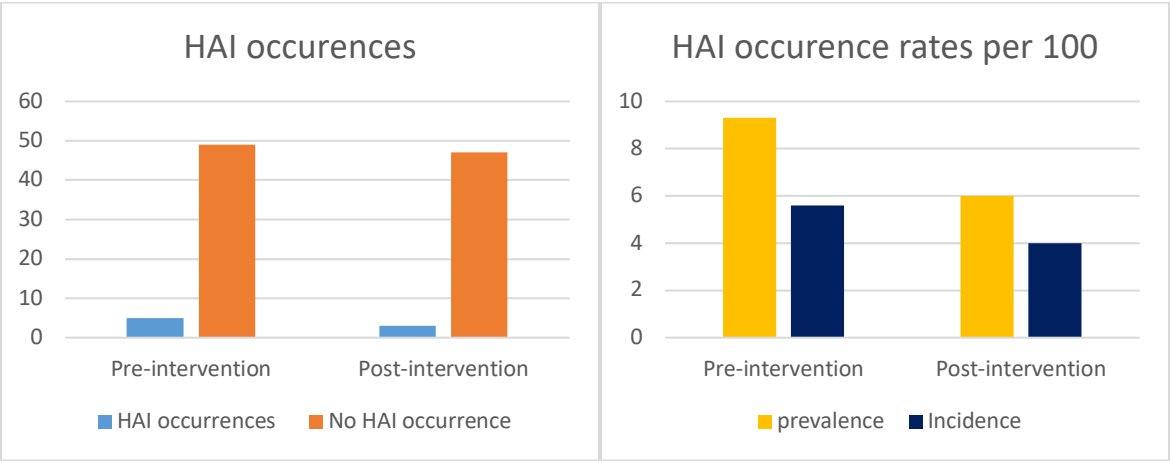
An audit or report of the patients' Electronic Health Records (EHRs) was completed for the number of patients who developed cases of infections (both respiratory and skin infections). In the pre-intervention period (5 weeks before the project implementation) the total of records that met the inclusion criteria was 54. The data of interest to the project was found to be fully entered in the hospital records so all 54 were retained. Five weeks after the project implementation(post-intervention), 52 records met the inclusion criteria, however 2 had missing entries and so were dropped, bringing the final sample size to 50. To control for this difference in sample sizes, HAI rates in the report were calculated and reported with a common denominator, i.e. per 100. On top of that, since HAI occurrence data was summarized on a weekly basis at the facility, and given that the post intervention data was only collected over five weeks, the data on HAI rates in both periods was presented in a 2x2 contingency table.

Table 5: HAI Rates

Period	HAI occurrences	No HAI occurrence	Total	prevalence	Incidence
Pre-intervention	5	49	54	9.3	5.6
Post-intervention	3	47	50	6	4

As shown in table 5 above, the prevalence of HAIs in the pre-intervention period was 9.3 per 100 in the facility, and reduced to 6 per 100 post-intervention. In the pre-intervention period there were two individuals who already had reported cases of HAIs, thus the period incidence in the pre-intervention period was 5.6 per 100. In the post-intervention sample, there was 1 pre-existing case of HAI, with the period incidence being 4 per 100. Figure 3 summarizes this data.

Figure 3: HAI occurrence



Summary

Over the five-week implementation period of the project, a moderate observation to hand hygiene was observed in the compliance of healthcare workers at the facility across all aspects of the hand hygiene guidelines. Interfacing of fingers and rubbing hands together had the largest increase in compliance, increasing by 11 percentage points to 42.9%. Furthermore, following the

intervention, HCWs had the highest rate of compliance to hand washing after completing patient observation and bed making at 71.4%. Among the patients, cleaning of fingernails was the lowest observed at 24.1%, whereas the use of hand sanitizers had the highest level of compliance at 93.1% in the same period. Overall, among both HCWs and patients, the project recorded moderate levels of compliance to hand hygiene; 85.7% and 62.1% respectively, corresponding to adherence to between five and eight hand hygiene techniques for HCWs and between five and eight hand hygiene techniques for patients/ residents. A larger difference was found in the HAI prevalence rate between the two periods, while incidence reduced by a much smaller margin.

Even though the project was successfully completed, there were identified strengths and weaknesses. The identified strengths of the project were as follows: The project site administration was committed to supporting the implementation of the quality improvement project by ensuring the provision of necessary support, resources, and data. Secondly, extensive searches of multiple databases and the use of scholarly search engines led to the identification of much evidence-based literature on the project topic that supported the effectiveness of HH compliance in reducing HAIs. Furthermore, each team member involved in the planning, mentoring, and implementing the quality improvement was highly experienced and invested in the project's success. Despite the strengths, the limitations of the project were inadequate hand washing stations at the project site, despite the addition of a few more hand-washing stations, particularly along the hallways, which led to poor hand-washing compliance among patients during mealtimes due to overcrowding. Additionally, there was a small sample of healthcare workers in the quality improvement project, which limited the generalization of the project to a broader population. The small sample resulted from the exclusion of the part-time staff, per diem staff, and ancillary healthcare workers who were not involved in the delivery of direct care to

patients. Furthermore, with no pre-data to compare to, the project lacks a baseline from which to assess effectiveness of the implemented techniques.

Interpretation

Following the completion of the project, it was found that a comprehensive education program for patients on hand hygiene process and importance may help to improve their knowledge and behavior on hand hygiene compliance, similar to the findings by (Hoffmann et al., 2020). However, it is not determined from this project the extent to which the observed levels of compliance are attributable to the project's implementation. For both target populations, the compliance rates were mostly moderate, with a significant proportion of the patients recording a high compliance, while none of the HCWs showed high compliance levels. From the implementation of the intervention, the project concludes that a comprehensive education program for patients on hand hygiene process and importance may have an influence on their compliance and behavior on hand hygiene however, the education program needs establish a baseline to continuously assess effectiveness of the program. In relation to the HAIs, the number of new cases per 100 hospitalizations only slightly reduced following the implementation of the interventions, however the total number of cases of HAIs in the period following the intervention was much smaller compared to a similar period before intervention, hence the conclusion that hand hygiene intervention reduces the prevalence of HAI, however the incidence only has a slight improvement as a result.

Data Analysis/Discussion

Limitations

The data on hand washing was made by direct observation, which carries the risk of ascertainment bias. This type of bias arises when collected project data is more likely to be collected from some members of a population more than others (Esserman et al., 2021). Even though the sample size was adequate to assess the project's objectives at the site, the project was carried out at a single facility, which limits its generalizability to the overall population. Without baseline pre-intervention data on hand hygiene practices, the project could not reliably determine the impact of the implemented measures on hand hygiene compliance. Furthermore, the project was implemented for five weeks, limiting the capacity to assess the impacts of the interventions extensively. The other limitation to the implementation of the project's interventions was the consideration of limiting open access to hand sanitizers due to the setting of the project in a psychiatric facility; the project site is an inpatient psychiatric facility, and the challenges that this poses, including not leaving hand sanitizers in the hallway or any patient accessible areas as patients can easily consume them. The nurses who assisted in the data collection were trained to minimize observer bias. Additionally, the observations were made randomly, and caution was taken not to intervene in the hand washing once initiated to minimize performance bias. Since the project had no pre-intervention data on hand hygiene compliance from which any changes in hand hygiene compliance could not be inferred, the analysis on this aspect was limited to a descriptive level only.

Conclusion

The project concludes that the hand hygiene interventions reduced the prevalence of HAI within then inpatient psychiatric facility. In addition, following the project's implementation, a

high level of compliance with hand hygiene was recorded. However, the project did not use pre-intervention data on hand hygiene compliance, thus limiting comparison and attributing the high hand hygiene compliance to the implemented interventions. The sustainability of the project's intervention is generally high. However, the facility's management has to hugely invest in managing and sustaining the operationalization of the projects through improving and updating the electronic surveillance system and hand washing stations, as well as carrying out continuous training and education on proper hand hygiene practices and compliance to patients and healthcare workers. Regardless, considering the change project is playing a positive role in addressing HAIs, promoting proper hand hygiene compliance, the benefits outweigh the costs. The project outcomes show that more emphasis should be put on hand hygiene to lower the risk of nosocomial infections. Further investigation is required to investigate the attributable benefits of hand hygiene education to hand hygiene compliance. Generally, the project's findings underscore the efficacy of hand hygiene interventions in reducing Healthcare-Associated Infections and emphasize the importance of sustained emphasis on hand hygiene practices (Haque et al., 2020). However, the limitation regarding long-term financial sustainability for providing hand sanitizer to all patients suggests a need for resource-conscious strategies in nursing practice without compromising the essential focus on infection prevention.

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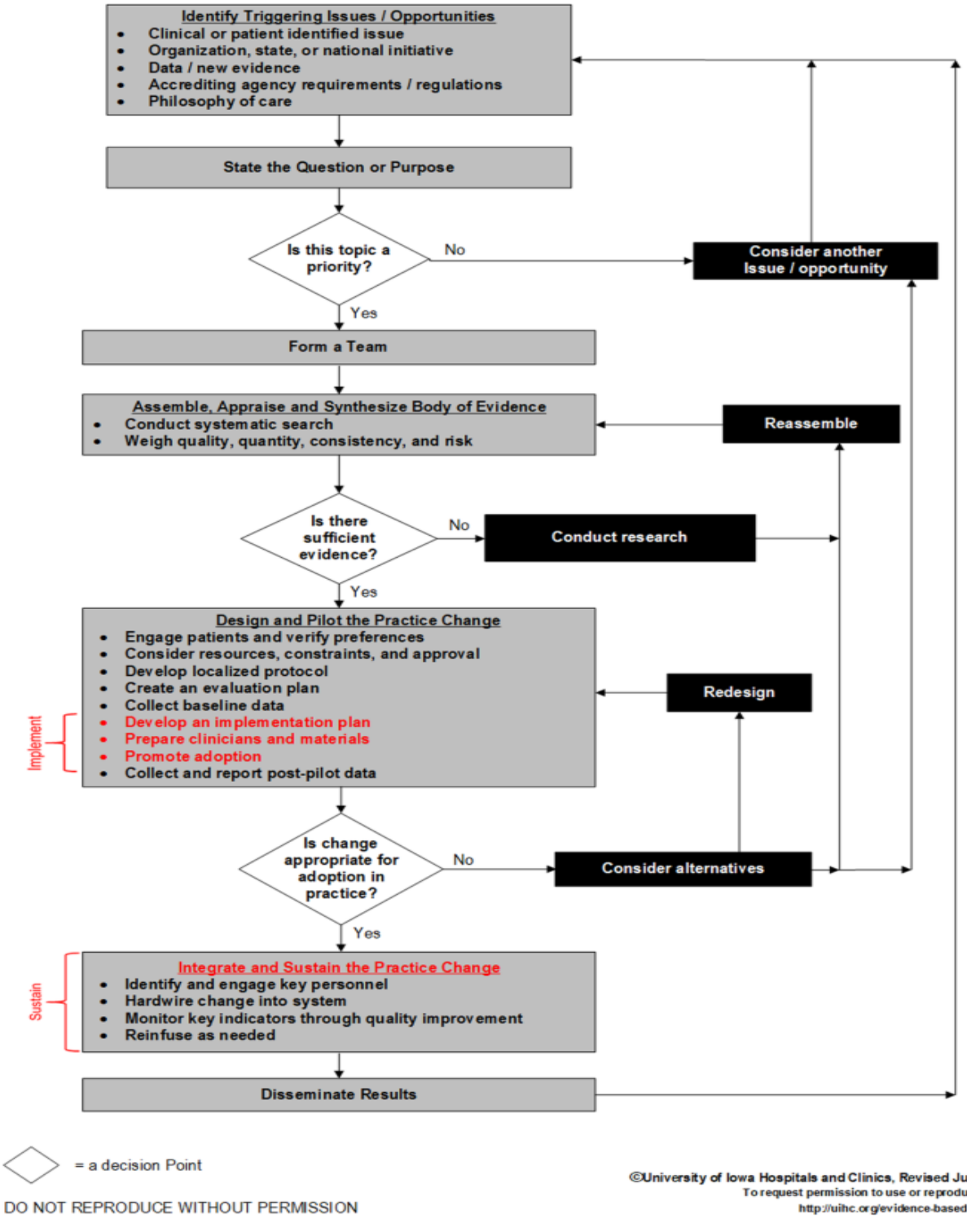
Appendices

Appendix A: Iowa Model Framework



Appendix B: Project Site Approval Letter

View Heights
Convalescent Hospital
an Amada Enterprises, Inc. facility

February 13, 2023

To whom it may concern:

The management of the View Height Convalescent Hospital Center has agreed to allow Lydia Njie, DNP student from Touro University, to carry out her Clinical Scholarly Project at our facility. I have reviewed her project's details and found it to be in line with our facility's mission. We look forward to the starting date of her project, and we shall assist her as needed. This facility does not require IRB to carry out this Clinical Scholarly Project.

Should you have any questions, please feel free to contact me at the facility's phone number.

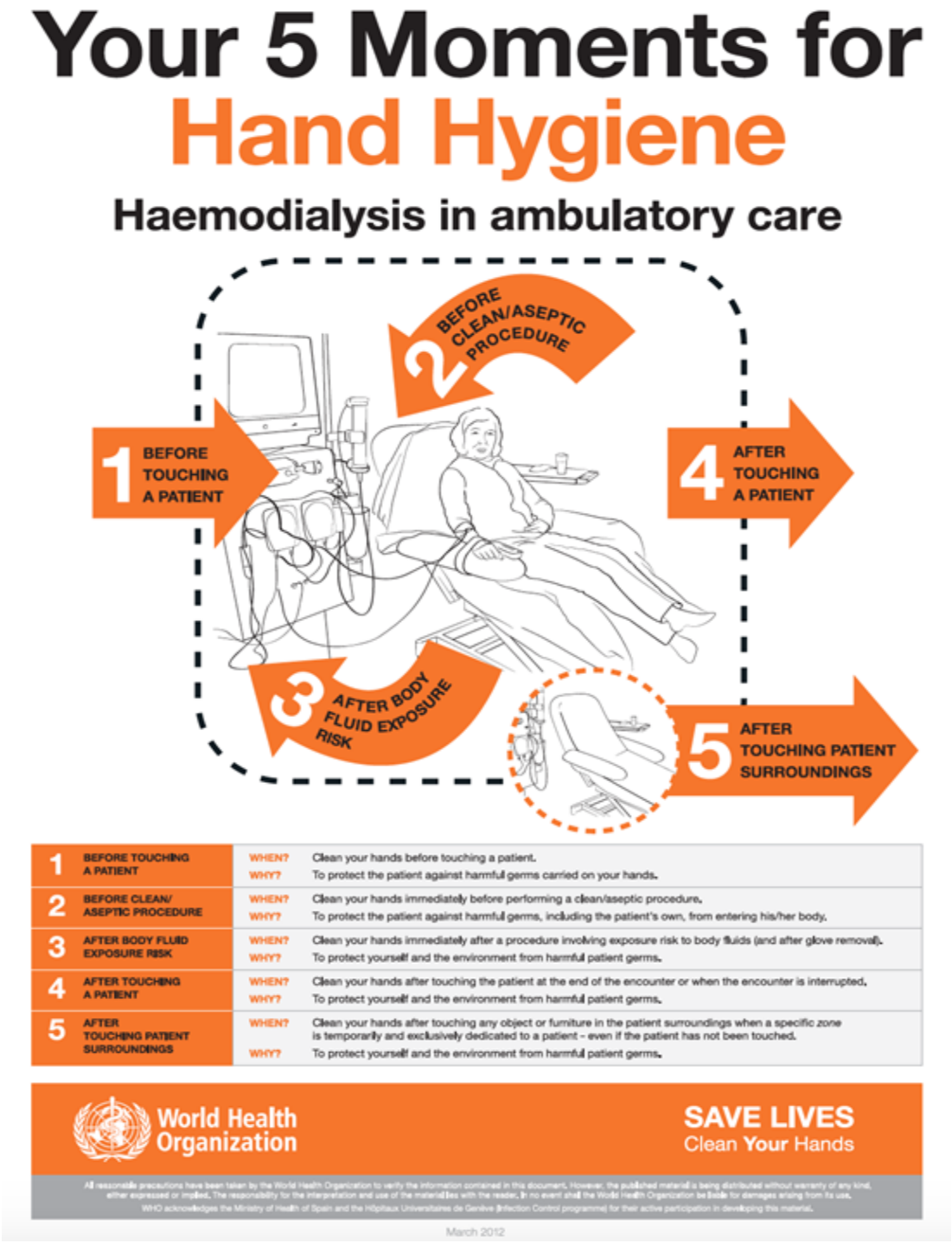
Sincerely,

Sullay Deen

Position: Program Director
Email: programdir@viewheights.com

TEL: (424)255-2864

Appendix C: Your 5 Moments for Hand Hygiene



https://www.who.int/campaigns/world-hand-hygiene-day

Appendix D (I): Hand Wash Observation Lists (For Residents/Patients)

Hand Hygiene Competency Checklist

Employee Name _____

Instructor _____

Date _____

YES = Correctly Demonstrated **NO** = Incorrectly Demonstrated

Observation	Correctly Demonstrated	Incorrectly Demonstrated	
Hand hygiene technique with soap and water			
1. Wet hand with water using temperature that is comfortable			
2. Apply appropriate soap, and wash hands and wrist vigorously for 15 seconds, covering all surfaces of hands and fingers (No bar soap.)			
3. Rinse hands under running water, allowing water to drop from fingertips.			
4. Thoroughly dry hands and wrists with paper towel.			
5. Tum faucet off using a dry paper towel to touch the handle, protecting your			

clean hands from the contaminated handle			
Hand hygiene technique for waterless sanitizer			
1. Apply product to palm of the hand			
2. Rub hands together covering all surfaces of hands and fingers until hands are dry.			
3. Fingernails			
Signature of validator			
Signature of employee			

Appendix D (II): Hand Wash Process and Technique Checklist (For HCWs)

Hand Wash Process and Technique Checklist

Nursing station:_____ Enclosure no: _____

Code no:_____

Name:_____

1) Name of solution used for hand wash:
2) Duration of hand wash:
3) Hand washing technique:

Steps Serial number	Actions	Compliance YES/NO
1	Rub palm to palm	
2	Rub the back of both hands	
3	Interface fingers and rub hands together	
4	Interlock fingers and rub back of both hands	
5	Rub thumb in a rotating manner followed by the area between index finger and thumb for both hands	
6	Rub fingertips on palm for both hands	

4) When to wash hands or to use hand rubs?

Sl.No.	Situations	Compliance YES/NO

1	On arrival for duty, before going for meals and before leaving the ward or patient contact area.	
2	After cleaning of equipment and patient furniture	
3	After completing patient observation and bed making	
4	After using the toilet	
5	After contact with blood or body fluids	
6	Before and after every contact with an infectious or neonatal patient.	

Appendix E: Timeline Sheet

Introduction	
Project Site	View Heights Convalescent Hospital
Project Mentor	
Project Purpose	The (DNP project) is a quality improvement initiative aimed at educating and training healthcare workers in a psychiatric unit on the importance and process of hand hygiene to help control the occurrence and spread of healthcare infections.
Project Question	To what extent does a comprehensive education program for patients on hand hygiene process and importance help improve the participant's knowledge and behavior on hand hygiene compliance to eradicate or reduce healthcare infection?
Project Timeline	

Plan out the activities you will be performing each week during the implementation phase of Project III. Clearly delineate the time needed to carry out interventions, collect data, and evaluate the project. Set concrete dates for all implementation activities (e.g., trainings/education, interventions, data collection and analysis) and include them in the appropriate weeks below. **Dates for implementation are posted in the Project II course announcements. Week 1 should correlate with the first week of DNP Project III, unless permission is granted to implement early.**	
Week 1 **1st Nov – 7th Nov**	Collect the baseline data by retrospective chart view of the healthcare infections rate reported within the past month. This phase will also evaluate the successful implementation of adequate hand hygiene infrastructure as promised by the institution. Conduct the education and training of the healthcare workers on the process and importance of hand hygiene compliance.
Week 2 **8th Nov – 14th Nov**	Conducting healthcare worker's education and training. A better education and training plan will be derived based on the data collected data on the first week of the working schedule of the staff. The education approach will combine online lessons and at-work training.
Week 3 **15th Nov – 21st Nov**	Introduce reminders, such as posters along the project site's main halls, toilets, patient wards, and nursing departments to promote hand hygiene compliance among patients too.
Week 4 **22nd Nov -28th Nov**	Promote monitoring and surveillance of hand hygiene practices at the project site and tap participant's feedback.
Week 5	The project manager will retrieve post-intervention data, collected by the charged nurses, to measure the outcomes of the intervention and evaluate whether the quality

29th Nov -5th Dec	improvement project objectives are achieved through the implementation of the provided interventions.

Appendix F: SPSS Analysis Output

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
RUB_PALM_TO_PALM	21	0	1	.71	.463
RUB_BACK_OF_BOTH_HANDS	21	0	1	.71	.463
INTERFACE_FINGERS_AND_RUB_HANDS_TOGETHER	21	0	1	.43	.507
INTERFACE_FINGERS_AND_RUB_BOTH_HANDS	21	0	1	.24	.436
RUB_THUMB_ROTATING_THEN_AREA_BTWN_INDEX_AND_THUMB_BOTH_HANDS	21	0	1	.33	.483
RUB_FINGERTIPS_ON_PALM_BOTH_HANDS	21	0	1	.24	.436
HAND_WASH_ARRIVAL_BEFORE_MEALS_LEAVING_WARD_PATIENTAREA	21	0	1	.62	.498
HAND_WASH_AFTER_CLEANING_EQUIPMENT_AND_PATIENT_FURNITURE	21	0	1	.62	.498
HAND_WASH_AFTER_COMPLETING_PATIENT_OBSERVATION_AND_BED_MAKING	21	0	1	.71	.463
HAND_WASH_AFTER_USING_TOILET	21	0	1	.52	.512
HAND_WASH_AFTER_CONTACT_WITH_BODY_FLUIDS	21	0	1	.43	.507
HAND_WASH_BEFORE_AND_AFTER_INFECTIOUS_OR_NEONATAL_PATIENT	21	0	1	.48	.512
WET_HAND_WITH_WATER_USING_COMFORTABLE_TEMPERATURE	29	0	1	.69	.471

$HCW Frequencies

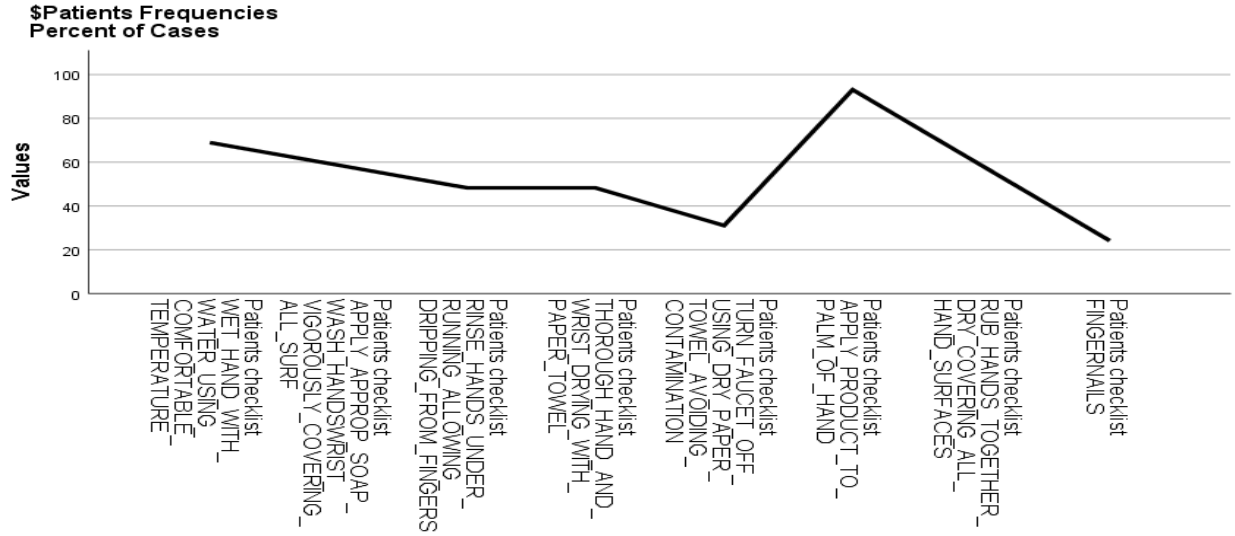
		Responses		
		N	Percent	Percent of Cases
HCW checklist[a]	RUB_PALM_TO_PALM	15	11.8%	71.4%
	RUB_BACK_OF_BOTH_HANDS	15	11.8%	71.4%
	INTERFACE FINGERS AND RUB_HANDS_TOGETHER	9	7.1%	42.9%
	INTERFACE FINGERS AND RUB_BOTH_HANDS	5	3.9%	23.8%
	RUB_THUMB_ROTATING_THEN_AREA_BTWN_INDEX_AND_THUMB_BOTH_HANDS	7	5.5%	33.3%
	RUB_FINGERTIPS_ON_PALM_BOTH_HANDS	5	3.9%	23.8%
	HAND WASH ARRIVAL BEFORE_MEALS_LEAVING_WARD_PATIENTAREA	13	10.2%	61.9%
	HAND_WASH_AFTER_CLEANING EQUIPMENT AND PATIENT FURNITURE	13	10.2%	61.9%
	HAND WASH AFTER COMPLETING_PATIENT_OBSERVATION_AND_BED_MAKING	15	11.8%	71.4%
	HAND_WASH_AFTER_USING_TOILET	11	8.7%	52.4%
	HAND_WASH_AFTER_CONTACT_WITH_BODY_FLUIDS	9	7.1%	42.9%
	HAND WASH BEFORE AND AFTER_INFECTIOUS_OR_NEONATAL_PATIENT	10	7.9%	47.6%
Total		127	100.0%	604.8%

a. Dichotomy group tabulated at value 1.

$Patients Frequencies

		Responses		
		N	Percent	Percent of Cases
Patients checklist[a]	WET_HAND_WITH_WATER_USING_COMFORTABLE_TEMPERATURE	20	16.0%	69.0%
	APPLY_APPROP_SOAP_WASH_HANDSWRIST_VIGOROUSLY_COVERING_ALL_SURF	17	13.6%	58.6%
	RINSE_HANDS_UNDER_RUNNING_ALLOWING_DRIPPING_FROM_FINGERS	14	11.2%	48.3%
	THOROUGH_HAND_AND_WRIST_DRYING_WITH_PAPER_TOWEL	14	11.2%	48.3%
	TURN_FAUCET_OFF_USING_DRY_PAPER_TOWEL_AVOIDING_CONTAMINATION	9	7.2%	31.0%
	APPLY_PRODUCT_TO_PALM_OF_HAND	27	21.6%	93.1%
	RUB_HANDS_TOGETHER_DRY_COVERING_ALL_HAND_SURFACES	17	13.6%	58.6%
	FINGERNAILS	7	5.6%	24.1%
Total		125	100.0%	431.0%

a. Dichotomy group tabulated at value 1.



$Technique_HCW Frequencies

		Responses		
		N	Percent	Percent of Cases
Hand hygiene Technique FOR HCW[a]	TYPE	21	27.3%	100.0%
	RUB_PALM_TO_PALM	15	19.5%	71.4%
	RUB_BACK_OF_BOTH_HANDS	15	19.5%	71.4%
	INTERFACE_FINGERS_AND_RUB_HANDS_TOGETHER	9	11.7%	42.9%
	INTERFACE_FINGERS_AND_RUB_BOTH_HANDS	5	6.5%	23.8%
	RUB_THUMB_ROTATING_THEN_AREA_BTWN_INDEX_AND_THUMB_BOTH_HANDS	7	9.1%	33.3%
	RUB_FINGERTIPS_ON_PALM_BOTH_HANDS	5	6.5%	23.8%
Total		77	100.0%	366.7%

a. Dichotomy group tabulated at value 1.

$wash_situation Frequencies

		Responses		
		N	Percent	Percent of Cases
what situation HCWs wash hands[a]	HAND_WASH_ARRIVAL_BEFORE_MEALS_LEAVING_WARD_PATIENTAREA	13	18.3%	61.9%
	HAND_WASH_AFTER_CLEANING_EQUIPMENT_AND_PATIENT_FURNITURE	13	18.3%	61.9%
	HAND_WASH_AFTER_COMPLETING_PATIENT_OBSERVATION_AND_BED_MAKING	15	21.1%	71.4%
	HAND_WASH_AFTER_USING_TOILET	11	15.5%	52.4%
	HAND_WASH_AFTER_CONTACT_WITH_BODY_FLUIDS	9	12.7%	42.9%
	HAND_WASH_BEFORE_AND_AFTER_INFECTIOUS_OR_NEONATAL_PATIENT	10	14.1%	47.6%
Total		71	100.0%	338.1%

a. Dichotomy group tabulated at value 1.

$Technique_soap Frequencies

		Responses		
		N	Percent	Percent of Cases
Hand washing technique with soap[a]	WET_HAND_WITH_WATER_USING_COMFORTABLE_TEMPERATURE	20	27.0%	71.4%
	APPLY_APPROP_SOAP_WASH_HANDSWRIST_VIGOROUSLY_COVERING_ALL_SURF	17	23.0%	60.7%
	RINSE_HANDS_UNDER_RUNNING_ALLOWING_DRIPPING_FROM_FINGERS	14	18.9%	50.0%
	THOROUGH_HAND_AND_WRIST_DRYING_WITH_PAPER_TOWEL	14	18.9%	50.0%
	TURN_FAUCET_OFF_USING_DRY_PAPER_TOWEL_AVOIDING_CONTAMINATION	9	12.2%	32.1%
Total		74	100.0%	264.3%

a. Dichotomy group tabulated at value 1.

$Technique_waterless Frequencies

		Responses		
		N	Percent	Percent of Cases
Technique for waterless sanitizer[a]	APPLY_PRODUCT_TO_PALM_OF_HAND	27	52.9%	93.1%
	RUB_HANDS_TOGETHER_DRY_COVERING_ALL_HAND_SURFACES	17	33.3%	58.6%
	FINGERNAILS	7	13.7%	24.1%
Total		51	100.0%	175.9%

a. Dichotomy group tabulated at value 1.

RUB_PALM_TO_PALM

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No	6	12.0	28.6	28.6
	Yes	15	30.0	71.4	100.0
	Total	21	42.0	100.0	
Missing	System	29	58.0		
Total		50	100.0		

RUB_BACK_OF_BOTH_HANDS

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No	6	12.0	28.6	28.6
	Yes	15	30.0	71.4	100.0
	Total	21	42.0	100.0	
Missing	System	29	58.0		
Total		50	100.0		

INTERFACE_FINGERS_AND_RUB_HANDS_TOGETHER

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No	12	24.0	57.1	57.1
	Yes	9	18.0	42.9	100.0
	Total	21	42.0	100.0	
Missing	System	29	58.0		
Total		50	100.0		

INTERFACE_FINGERS_AND_RUB_BOTH_HANDS

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No	16	32.0	76.2	76.2
	Yes	5	10.0	23.8	100.0
	Total	21	42.0	100.0	
Missing	System	29	58.0		
Total		50	100.0		

RUB_THUMB_ROTATING_THEN_AREA_BTWN_INDEX_AND_THUMB_BOTH_HANDS

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No	14	28.0	66.7	66.7
	Yes	7	14.0	33.3	100.0
	Total	21	42.0	100.0	
Missing	System	29	58.0		
Total		50	100.0		

RUB_FINGERTIPS_ON_PALM_BOTH_HANDS

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	0	16	32.0	76.2	76.2
	1	5	10.0	23.8	100.0
	Total	21	42.0	100.0	
Missing	System	29	58.0		
Total		50	100.0		

HAND_WASH_ARRIVAL_BEFORE_MEALS_LEAVING_WARD_PATIENTAREA

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No	8	16.0	38.1	38.1
	Yes	13	26.0	61.9	100.0
	Total	21	42.0	100.0	
Missing	System	29	58.0		
Total		50	100.0		

HAND_WASH_AFTER_CLEANING_EQUIPMENT_AND_PATIENT_FURNITURE

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No	8	16.0	38.1	38.1
	Yes	13	26.0	61.9	100.0
	Total	21	42.0	100.0	
Missing	System	29	58.0		
Total		50	100.0		

HAND_WASH_AFTER_COMPLETING_PATIENT_OBSERVATION_AND_BED_MAKING

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No	6	12.0	28.6	28.6
	Yes	15	30.0	71.4	100.0
	Total	21	42.0	100.0	
Missing	System	29	58.0		
Total		50	100.0		

HAND_WASH_AFTER_USING_TOILET

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No	10	20.0	47.6	47.6
	Yes	11	22.0	52.4	100.0
	Total	21	42.0	100.0	
Missing	System	29	58.0		
Total		50	100.0		

HAND_WASH_AFTER_CONTACT_WITH_BODY_FLUIDS

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No	12	24.0	57.1	57.1
	Yes	9	18.0	42.9	100.0
	Total	21	42.0	100.0	
Missing	System	29	58.0		
Total		50	100.0		

HAND_WASH_BEFORE_AND_AFTER_INFECTIOUS_OR_NEONATAL_PATIENT

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No	11	22.0	52.4	52.4
	Yes	10	20.0	47.6	100.0
	Total	21	42.0	100.0	
Missing	System	29	58.0		
Total		50	100.0		

WET_HAND_WITH_WATER_USING_COMFORTABLE_TEMPERATURE

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Incorrectly Demonstrated	9	18.0	31.0	31.0
	Correctly demonstrated	20	40.0	69.0	100.0
	Total	29	58.0	100.0	
Missing	System	21	42.0		
Total		50	100.0		

APPLY_APPROP_SOAP_WASH_HANDSWRIST_VIGOROUSLY_COVERING_ALL_SURF

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Incorrectly Demonstrated	12	24.0	41.4	41.4
	Correctly demonstrated	17	34.0	58.6	100.0
	Total	29	58.0	100.0	
Missing	System	21	42.0		
Total		50	100.0		

RINSE_HANDS_UNDER_RUNNING_ALLOWING_DRIPPING_FROM_FINGERS

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Incorrectly Demonstrated	15	30.0	51.7	51.7
	Correctly demonstrated	14	28.0	48.3	100.0
	Total	29	58.0	100.0	
Missing	System	21	42.0		
Total		50	100.0		

THOROUGH_HAND_AND_WRIST_DRYING_WITH_PAPER_TOWEL

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Incorrectly Demonstrated	15	30.0	51.7	51.7
	Correctly demonstrated	14	28.0	48.3	100.0
	Total	29	58.0	100.0	
Missing	System	21	42.0		
Total		50	100.0		

TURN_FAUCET_OFF_USING_DRY_PAPER_TOWEL_AVOIDING_CONTAMINATION

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Incorrectly Demonstrated	20	40.0	69.0	69.0
	Correctly demonstrated	9	18.0	31.0	100.0
	Total	29	58.0	100.0	
Missing	System	21	42.0		
Total		50	100.0		

APPLY_PRODUCT_TO_PALM_OF_HAND

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Incorrectly Demonstrated	2	4.0	6.9	6.9
	Correctly demonstrated	27	54.0	93.1	100.0
	Total	29	58.0	100.0	
Missing	System	21	42.0		
Total		50	100.0		

RUB_HANDS_TOGETHER_DRY_COVERING_ALL_HAND_SURFACES

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Incorrectly Demonstrated	12	24.0	41.4	41.4
	Correctly demonstrated	17	34.0	58.6	100.0
	Total	29	58.0	100.0	
Missing	System	21	42.0		
Total		50	100.0		

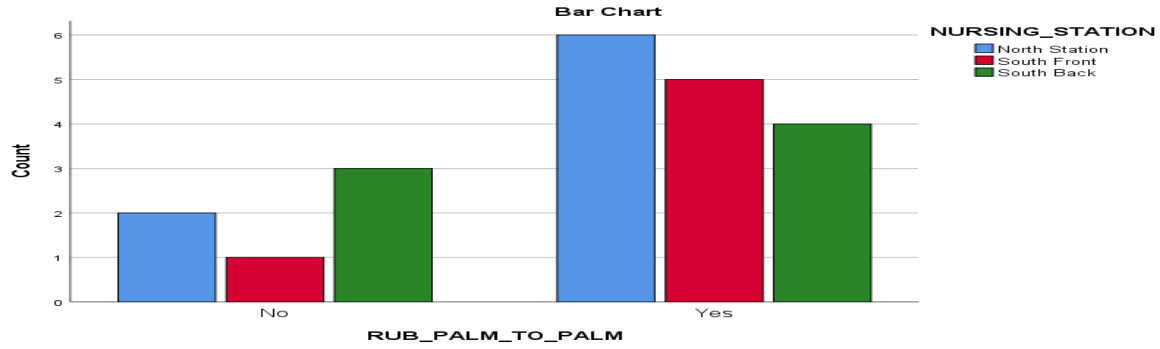
FINGERNAILS

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Incorrectly Demonstrated	22	44.0	75.9	75.9
	Correctly demonstrated	7	14.0	24.1	100.0
	Total	29	58.0	100.0	
Missing	System	21	42.0		
Total		50	100.0		

RUB_PALM_TO_PALM * NURSING_STATION Crosstabulation

Count

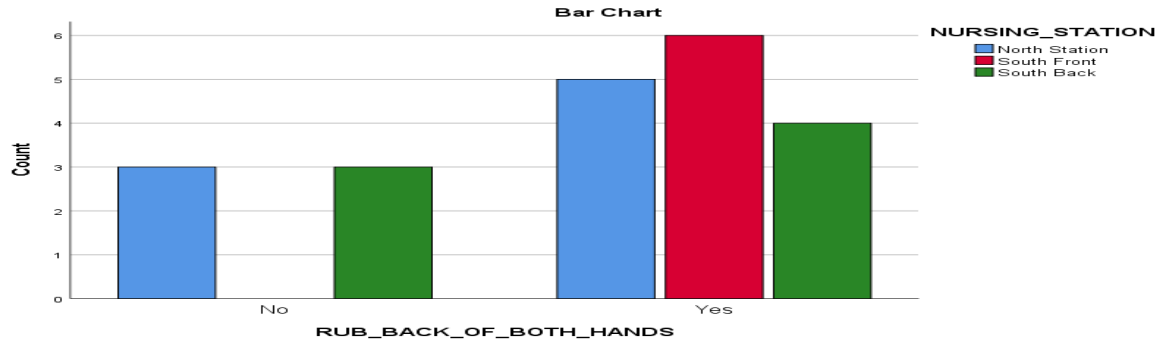
		NURSING_STATION			
		North Station	South Front	South Back	Total
RUB_PALM_TO_PALM	No	2	1	3	6
	Yes	6	5	4	15
Total		8	6	7	21



RUB_BACK_OF_BOTH_HANDS * NURSING_STATION Crosstabulation

Count

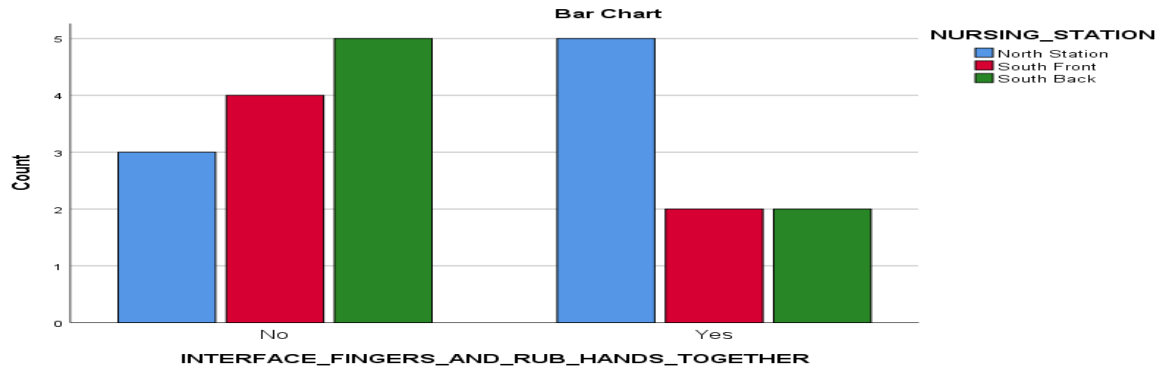
		NURSING_STATION			
		North Station	South Front	South Back	Total
RUB_BACK_OF_BOTH_HAN	No	3	0	3	6
DS	Yes	5	6	4	15
Total		8	6	7	21



INTERFACE_FINGERS_AND_RUB_HANDS_TOGETHER * NURSING_STATION Crosstabulation

Count

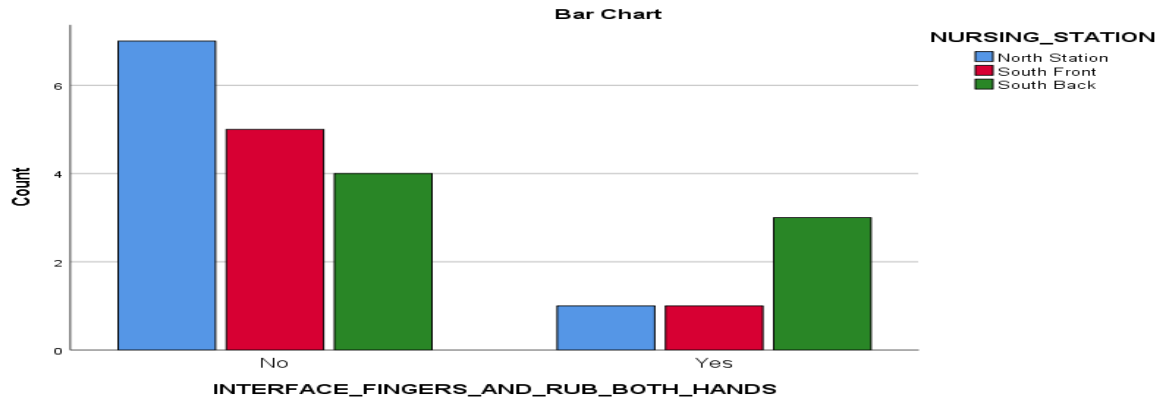
		NURSING_STATION			
		North Station	South Front	South Back	Total
INTERFACE_FINGERS_AND_RUB_HANDS_TOGETHER	No	3	4	5	12
	Yes	5	2	2	9
Total		8	6	7	21



INTERFACE_FINGERS_AND_RUB_BOTH_HANDS * NURSING_STATION Crosstabulation

Count

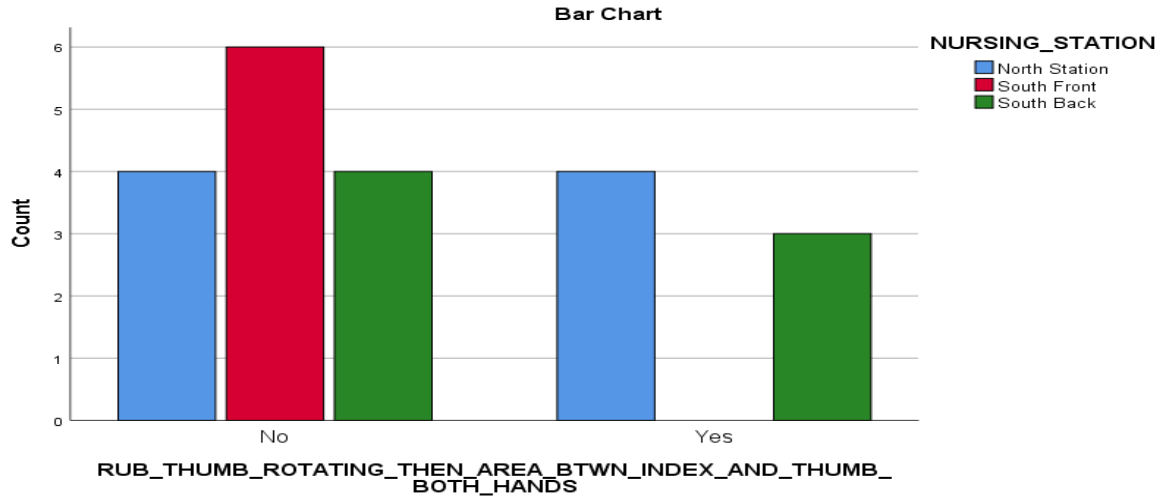
		NURSING_STATION			
		North Station	South Front	South Back	Total
INTERFACE_FINGERS_AND_RUB_BOTH_HANDS	No	7	5	4	16
	Yes	1	1	3	5
Total		8	6	7	21



RUB_THUMB_ROTATING_THEN_AREA_BTWN_INDEX_AND_THUMB_BOTH_HANDS * NURSING_STATION Crosstabulation

Count

		NURSING_STATION			
		North Station	South Front	South Back	Total
RUB_THUMB_ROTATING_THEN_AREA_BTWN_INDEX_AND_THUMB_BOTH_HANDS	No	4	6	4	14
	Yes	4	0	3	7
Total		8	6	7	21



RUB_FINGERTIPS_ON_PALM_BOTH_HANDS * NURSING_STATION

Crosstabulation

Count

		NURSING_STATION			
		North Station	South Front	South Back	Total
RUB_FINGERTIPS_ON_PAL M_BOTH_HANDS	0	7	4	5	16
	1	1	2	2	5
Total		8	6	7	21