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## Infection Control: The Nurse's Responsibility

Marisa Francis

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INFECTION CONTROL: THE NURSE'S  
RESPONSIBILITY

By

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A doctoral project submitted in partial fulfillment  
of the requirements for the

Doctor of Nursing Practice

School of Nursing  
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December 2019



## **Doctoral Project Approval**

The Graduate College  
The University of Nevada, Las Vegas

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This doctoral project prepared by

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entitled

Infection Control: The Nurse's Responsibility

is approved in partial fulfillment of the requirements for the degree of

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School of Nursing

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## **Abstract**

Over the last century and a half, infection control measures implemented by nursing staff have continued to evolve, resulting in improved patient outcomes. While this progress is impressive, a decline in rates of hospital acquired infections (HAIs) seems to have slowed, with only a 0.5% decrease in the last seventeen years. Unfortunately, nurses are rarely provided educational support on infection control practices beyond undergraduate and new employee trainings. Meanwhile, the Centers for Disease Control (CDC) is frequently updating their infection control practice recommendations.

The purpose of this project was to observe the current rate of infection control compliance by nurses, through handwashing and PPE use observations. The student researcher observed registered nurses on multiple active medical-surgical units in a mid-sized hospital in an urban southwest area of the United States, practicing infection control measures during their interactions with patients. The data collected from these observations was analyzed in order to identify deficiencies in current infection control practices.

This project identified the gap present regarding infection control practices on live medical-surgical units and current CDC standards. Additionally, the project emphasized the importance of continued education, awareness, and observation of infection control practices through a thorough needs assessment.

## **Acknowledgements**

I would like to acknowledge the entire UNLV DNP faculty, who commit every day to leading the very best and brightest nurses to the highest level of nursing education. I am graduating inspired to lead other nurses in the same way.

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Lastly, thank you to the College of Nursing at the University of New Mexico, who supported me on this journey and provided me the ability to achieve this degree.

## **Dedication**

This project is dedicated to my family –

-- To my parents, who instilled in me a respect for education from a very early age. The desire to continue to grow academically is inside of me because of you.

-- To my husband, whose unwavering support, patience, love, encouragement, and capability to do all the daddy things while I was working on this project, provided me the ability to achieve this degree. You are my partner and best friend, and I am so grateful for you.

-- To my kids, this is for you. This is the concrete evidence that every dream can become a reality with hard work. Every hour missed with you working on this project, was so that one day you would know that anything is possible. I love you both beyond words.

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## **Chapter I**

### **Introduction**

Nurses fulfill many roles in a patient's care, but are most importantly the patient's primary advocate. Nurses do so by speaking up for the patient on their behalf, and caring for them in a manner directed at achieving the best patient outcomes. A vital component of patient advocacy is to help prevent the spread of healthcare acquired infections (HAIs) that may complicate the treatment and recovery trajectory. Nurses use a variety of methods to protect patients from new or worsening infection in common practice, broadly known as infection control. Infection control includes handwashing, respiratory hygiene, environmental sanitization, waste management, and isolation precautions, and is part of the daily responsibilities of all healthcare professionals. Healthcare facilities routinely maintain strict policies and procedures related to infection control, based on the Centers for Disease Control and Prevention (CDC) guidelines (Centers for Disease Control, 2017).

The literature suggests that comprehensive infection control does not take place in healthcare facilities to the specifications of these CDC guidelines. Hermann (2018) notes that roughly 1.7 million HAIs are occurring in the United States (U.S.) annually, resulting in nearly 100,000 deaths and \$20 billion in healthcare costs. Nurses, in particular, have low rates of infection control guideline compliance. A 2016 report found that fewer than 1 in 5 nurses comply with all nine standard precautions for infection prevention (Powers, Armellino, Dolansky, & Fitzpatrick, 2016).

Aside from detrimental patient outcomes, healthcare facilities are at risk for lack of reimbursement for follow-up care when infections are found to be hospital-acquired (Peasah,

McKay, Harman, Al-Amin, & Cook, 2013). An evaluation of the routine use of standard infection control practices on multiple active hospital units will help to determine the degree of compliance with CDC guidelines and the need for updated education of nursing staff to meet best infection control practices and decrease the spread of infection transmission.

## **History**

In the early days of medicine, medical equipment, even that which entered a patient's body, was routinely shared between patients and glove use and handwashing occurred sparingly. However, over time, as knowledge of various pathogens and the manner in which they spread has increased, infection control has become routine practice. In 1877, infection control was first implemented, as patients who were recognized as having infectious diseases were placed in separate healthcare facilities, away from those without symptoms of infection. However, patients were not separated by the type of diseases they possessed, causing the continued spread of viral and bacterial illnesses.

By 1910, patients in healthcare facilities were divided by illness using a cubicle system and hospital personnel washed their hands, disinfected shared medical equipment, and wore a clean gown between caring for patients. This process, in addition to placing some patients in infectious disease hospitals for tuberculosis, continued through the 1960's. In 1970, the CDC published the Guideline for Isolation Precautions in Hospitals, which allowed for the facility to make decisions on what type of personal protective equipment (PPE) was needed by healthcare personnel caring for the patient, in order to cut down on the cost associated with unnecessary isolation precautions. Additionally, the CDC introduced the various categories of isolation.

In response to the HIV epidemic, Universal Precautions were created in 1985, which focused on healthcare personnel protecting themselves against all blood and body fluids, regardless of whether a known infection was present (Gardner, 1996). The 1990's brought increased concern over multidrug resistant organisms, and therefore more specific guidelines on various isolation precautions were instituted. This included the move from Universal Precautions to Standard Precautions, which focused on not only the safety of the healthcare provider, but the decrease of transmission of infection between patients with or without diagnosis of infection (Gardner, 1996).

Throughout the last nearly 150 years, infection control measures have increased, including the manner in which shared medical equipment must be handled between patients, the appropriate use of PPE, and the requirement of handwashing before and after patient contact. The CDC's latest guidelines, updated in 2017, reflect this progression.

### **Problem Statement**

Studies have shown that one in twenty-five hospitalized patients (4%) in the United States will be diagnosed with a healthcare associated infection (HAI) (Centers for Disease Control, 2018a). Unfortunately, this constitutes only a 0.5% drop from 4.5% of patients in the United States alone who were infected with HAIs in 2002 (World Health Organization, 2011), showing there is still room for improvement. While 4% appears to be a small percentage, this translates to over 1 million patients annually in the U.S.

### **Purpose Statement**

Studies show that when healthcare facilities, professional teams, and individual healthcare staff are aware of infection control issues and begin to practice specific compliance

measures, rates of some specific HAIs, such as central line-associated bloodstream infection (CLABSI) can decrease by 70% (Centers for Disease Control, 2018a). The purpose of this project was to observe the rate of infection control compliance among nurses on multiple active medical-surgical units in a mid-sized hospital in the southwest area of the U.S. Additionally, determination of the presence of gaps between infection control guideline knowledge and application of these guidelines in practice was made.

### **Goals**

Rates of nursing adherence to infection control guidelines was collected and a greater understanding of the prevalence of infection control compliance was obtained. Additionally, the nurse's role in infection control practices was identified.

### **Outcomes**

During this project, observation of current compliance with the CDC infection control guidelines by nurses on medical/surgical units took place. Rates of adherence to these guidelines was analyzed.

## Chapter II

### Review of the Literature

A comprehensive review of the literature was performed using Cumulative Index to Nursing and Allied Health (CINAHL), PubMed, WorldCat, and Google Scholar. The following keywords and terms were searched: isolation precautions, isolation precautions best practices, infection control, healthcare acquired infection rates, rates nurse compliance to infection control, nurses infection control, nursing infection prevention, rates of accuracy infection control. Articles which did not directly relate to the topic were excluded through manual methods. Results were limited to 2012 through 2018. Five studies were identified as relevant to this project.

#### CDC Infection Control Guidelines

Before the relevant studies will be discussed, a basic understanding of the CDC Infection Control Guidelines must be attained. There are four major infection control guidelines outlined by the CDC. These include Disinfection and Sterilization, Environment Infection Control, Hand Hygiene, and Isolation Precautions (Centers for Disease Control, 2017). It is the nurse's responsibility to be familiar with and to maintain compliance with all four of these sections.

The Disinfection and Sterilization guideline dictates the appropriate methods of cleaning various multiuse items used by nurses (Centers for Disease Control, 2008). For example, the guideline recommends the frequent use of disinfecting wipes on vital sign machines and mobile computers, and alcohol swabbing of stethoscopes between patient uses (Centers for Disease Control, 2008). This guideline also includes information specific to killing different pathogens, such as *Clostridium difficile*, or C. Diff, and tuberculosis, on surfaces (Centers for Disease

Control, 2008). Additionally, the Occupational Safety and Health Administration (OSHA) standards on bloodborne pathogen exposure is included in this section (Centers for Disease Control, 2008).

The next section outlines environmental infection control measures. This includes items such as utilizing disinfecting wipes on bedside tables and other surfaces in patient rooms, cleaning spills of blood and body fluids from flooring, handling of contaminated laundry away from the nurse's clothing, and the appropriate disposal of medical waste (Centers for Disease Control, 2003). This section includes many topics that will not pertain to the typical nurse's daily duties, such as cleaning of the ice machine or hydrotherapy pools, but that are important for the nurse to observe the apparent cleanliness of this equipment as well (Centers for Disease Control, 2003).

The third CDC infection control guideline outlines appropriate hand hygiene practices for nurses. This includes recommendations on when hand washing with soap and water must take place, when use of hand sanitizer gels can be utilized, how to perform surgical hand antisepsis, the methods by which various pathogens can be removed from the skin's surface, and how to evaluate efficacy of hand hygiene (Centers for Disease Control, 2002).

The final infection control guideline provided by the CDC for nurses is the Isolation Precautions Guideline. This section thoroughly explains the various infection control precautions, beginning with standard precautions to be used with all patients. Contact, droplet, and airborne transmission of pathogens is described, including the various personal protective equipment (PPE) required to protect the nurse from each (Centers for Disease Control, 2007).

The guidelines set forth by the CDC concerning infection control compliance for nurses is quite extensive. Much of this information is first obtained by the nurse in the pre-licensure nursing program completed during undergraduate education. Nursing students learn this not just through a classroom didactic modality, but via application to clinical experiences in healthcare facilities as well. Nurses will utilize this knowledge base every day in their work after licensure. However, the CDC is constantly updating their infection control guidelines and it is the responsibility of the nurse to stay abreast of current practice recommendations. This can be accomplished through reading current and relevant nursing journals and attendance at nursing conferences, for example. However, nurse leaders must focus on disseminating important updates to their teams and providing continuing education opportunities on updated infection control practices to help assure knowledge is applied to practice.

### **The Importance of Education**

Nurses working in any area of healthcare must have appropriate knowledge regarding infection control. This knowledge begins with undergraduate education. Cox, Simpson, Letts, and Cavanagh (2014) reviewed the knowledge of eight infection control registered nurses with at least five years of experience in Australia, regarding the perceived preparation of undergraduate nurses in infection prevention. Semi-structured interviews were conducted and asked about the adequacy of new graduates' knowledge of infection control and microbiology and the degree to which those skills have transferred to the workplace. All participants described graduate nurses having poor or very basic knowledge of infection control. However, they conceded that newly licensed nurses are not expected to know everything. All eight acknowledged that there is a theory-practice gap when it comes to infection control measures, as new graduates have difficulty putting their university education on infection control into practice. Lastly, the nurses

agreed that additional knowledge of microbiology and infection control would be helpful, especially that which takes place in the clinical setting, and that role modeling for new nurses is important.

Once employed as a nurse, continuing education from the facility is an important factor in successful infection control, as Kaur, Stone, Travers, Cohen, and Herzig (2017) found. The authors studied the effect that staff training has on rates of infection control quality measures in U.S. nursing homes. Two thousand five hundred and fourteen randomly selected nursing homes within the U.S. were surveyed between December 2013 and 2014 to learn about the current state of infection prevention and control, resulting in a 39% response rate to the survey. Survey questions focused on whether staff had received training on infection control, what method the training was delivered (computerized, handouts, in-services), frequency of training, and timing of that training in relation to the new employee orientation and when infection outbreaks occurred. Responses to the authors' survey were compared with results from the national Centers for Medicare and Medicaid Services database, Nursing Home Compare. Analysis of the survey was correlated to four patient populations: residents with urinary tract infections, indwelling urinary catheters, influenza and pneumococcal vaccinated patients, and those with pressure ulcers. The study found that most infection control training was computer based and provided both during new employee orientations and when an infectious outbreak occurs. However, a major correlation was found between nursing homes with high urinary catheter use and having had lower rates of infection control training during new employee orientation or when an infection outbreak occurred. Additionally, nursing homes that performed staff training on infection control during both new employee orientation and when outbreaks occurred had better quality related to urinary catheter use. Infection control training was not found to have a



significant influence on urinary tract infection prevalence. The authors recommend staff training on infection control measures at both new employee orientation and when infectious outbreaks occur to provide better urinary catheter infection control outcomes.

### **Infection Control Solutions**

In addition to increased training regarding infection control measures for registered nurses, further means by which nurses can develop better infection control practices were another focus of the literature review. Havill (2013) discussed the importance of disinfection of noncritical surfaces in healthcare settings. Noncritical surfaces are those that only come in contact with skin, such as bed rails, bedside tables, and blood pressure cuffs, as well as walls and ceilings. The author found that patients who are roomed in an area that previously roomed a patient with an infectious disease will have a higher likelihood of acquiring an HAI. This points to the need for greater adherence to the CDC infection control guidelines. Nursing staff are not usually responsible for disinfecting patient rooms once a patient is discharged; but, Havill recommends monitoring and providing feedback to housekeeping staff to improve cleaning practices. Items that are the responsibility of nursing staff to disinfect, such as glucometers, vital sign machines, and portable computers, should be monitored in the same manner. Havill developed an information bundle that outlined a proper environmental disinfection and cleaning protocol, similar to that commonly associated with central line and ventilator care. The bundle included a list of the specific items to be cleaned, the products used to clean each item, and who is responsible for cleaning. Havill (2013) did not include a discussion of how the information bundle was tested, creating a gap in the literature and an excellent area for future study.

In a 2017 study, McConeghy, Baier, McGrath, Baer, and Mor piloted a handwashing and unspecified surface cleaning practice process and educational intervention between October 2015 and May 2016 within five nursing homes in Colorado. The study was designed to assess the possibility of implementing the practice guidelines in nursing homes to reduce infection rates, antimicrobial orders, and hospitalization of residents. Five additional nursing homes in Colorado were utilized in the study as control facilities. The practice and education intervention involved providing eleven hand hygiene and surface cleaning products to the five facilities, educating staff on the products' use and the influence of proper staff practice in infection control, and an audit of compliance and feedback from the facility nursing staff. Monitors were assigned in each facility to observe infection control practices. Three of the five intervention facilities had excellent rates of practice and education implementation, greater than 90%, and the other two facilities had rates of 13% and 23%. The majority of participants (58%) responded positively to the intervention and stated they would be likely to recommend it to others. Handwashing rates were found to be unchanged from rates prior to the study at 81.8% and microbial surface counts were found to be reduced during the study. No statistically significant reduction in infection rates, antimicrobial use, or hospitalizations were found. The authors emphasized the importance of the reduced surface bacterial counts and participant satisfaction with the program. Further research utilizing this intervention is recommended.

Mody, Washer, and Flanders (2018) discussed the importance of integrating infection prevention programs from hospitals to local nursing homes. The authors emphasized the success seen in central line-associated bloodstream, surgical site, and *Clostridium difficile* infections in hospital systems throughout the country, due to proficient infection control measures. They note that infection control programs within nursing homes are far less developed, leading to higher

rates of infection within these facilities. The authors concluded that infection is one of the leading causes of hospital admission for nursing home residents. The authors conclude that many factors, including an aging population and often less than fully staffed nursing homes, make now the time to implement shared infection control practices and procedures between these two facilities. By doing so, both facilities will improve the quality of care and patient satisfaction, while seeing less hospital admissions, lower costs, and fewer transmissions of pathogens.

## **Chapter III**

### **Theoretical Framework**

The theoretical framework utilized in this project is Lewin's Theory of Change (1947). Lewin theorized that change is a dynamic process that is comprised of three stages. This model supports the path of this project and the desired change that will take place. Lewin's Change Theory allows for either an increase in motivation for change or decreased resistance to change. Additionally, this model provides a structure for maintaining the change.

Lewin's Change Theory describes the process for developing and implementing a change item through unfreezing, transition, and refreezing (Lewin, 1947). The first stage, unfreezing, is the stage in which a needed change is identified (Lewin, 1947). This most often occurs after recognition of an unsuccessful process. The current process is stopped or interrupted in this stage. Unfreezing is most successful when the driving and restraining forces are identified and tackled appropriately (Lewin, 1947). The driving forces are the present factors that are promoting the change, while the restraining forces are the existing barriers that may make implementing the change difficult (Lewin, 1947). Once these are recognized, the transition period can begin. Transition is the phase in which the change is implemented and movement toward a new method of action is occurring (Lewin, 1947). Transition can include changes to thoughts, feelings, actions, or all three. The refreezing period is when the change becomes the new norm and the standard of practice (Lewin, 1947). Refreezing produces an innovative system that can be maintained long term (Lewin, 1947). All three steps are important to the success of the change.

In this project, the first stage of unfreezing occurred at the identification of any gap that may be present between policy and practice. During the literature review, it was discovered that very little research is present concerning rates of nurse compliance with infection control measures. Additionally, through personal observation on multiple medical/surgical units, registered nurse compliance with infection control measures was assessed. This provided a greater understanding of current infection control compliance rates among nurses.

The transition stage in Lewin's Change Theory occurred in the next portion of the project. Based on the information obtained through observation, the data was analyzed and shared with the units' management and education teams. This information can be shared with the unit staff and information regarding current CDC standards disseminated by unit management.

The third and final stage of Lewin's Theory of Change is the refreezing period. This period focuses on the maintenance of the change following the dissemination of the observation data. Occurring over time, it is hoped that the nursing staff on the studied units will incorporate their heightened awareness of current infection control practices and new knowledge of infection control into daily practice. Additionally, management on the unit can develop a plan for ensuring preservation of changes implemented from analysis of the new data. New policies may be developed, the culture of the unit changes, and continued observation of compliance should take place. All of these actions will solidify the sustainability of the project outcomes.

As mentioned, Lewin's Change Theory is a dynamic process and can occur cyclically. Once the refreezing period of this project takes place, unit leaders may recognize the need for

additional change. In this case, the process can repeat, moving back to the unfreezing period and progressing through the three stages again.

## **Chapter IV**

### **Project Plan**

#### **Setting**

The setting for this project was a 556 bed, academic affiliated, level one trauma center hospital located in an urban city in the southwestern portion of the United States. The observations took place on multiple medical-surgical units in this facility.

#### **Population of Interest**

The population of interest was registered nurses participating in direct patient care on the chosen medical-surgical units in this healthcare facility. The nurses represented a mix of experience levels, knowledge and abilities, and patient load. Some nurses were employed by the observation unit while others were working on the unit as visiting nurses for the time during observation.

#### **Measures, Instruments, and Activities**

The student researcher observed nurses performing hand hygiene before entering and upon exiting patient rooms. Additionally, the student researcher observed the use of personal protective equipment (PPE) with patients under isolation precautions to evaluate for appropriate practice. The student researcher developed a Hand Hygiene Observation Tool (Appendix A) that was utilized to record observation data. This tool recorded hand hygiene actions of only registered nurses on the unit. This tool allowed for differentiation between alcohol hand rub and washing with soap and water, as well as additional specifications of patients in isolation protection.

The student researcher also created a PPE Observation Tool (Appendix B) that was used to record data from observed nurses using PPE. This tool allowed the observer to maintain information concerning the donning, use, and doffing of PPE, and the accessibility of PPE and appropriate signage. Complete adherence to CDC guidelines dictated appropriateness of PPE use identified in the observation tool.

## **Timeline**

Initial development of this project began in March 2018. Literature review took place in April through June of 2018. The project was submitted for approval from the first observation unit in November 2018, with approval received in January 2019 from the unit manager and unit based educator. In February 2019, the DNP Project proposal submission was presented and approved by the advisory committee. Non-research status was determined from the facility's Human Research Protections Program in July 2019. Final approval from the hospital administration, to include a completed affiliation agreement between the University of Nevada, Las Vegas (UNLV) and the hospital, was achieved in August 2019. An Institutional Review Board application was submitted to UNLV's Office of Research Integrity in August 2019, and received exempt status in October 2019. Additional observation units were approved by unit managers in October 2019. Observations took place in October and November 2019. A final project defense was scheduled in the last semester of the DNP program in accordance with Graduate College policy (Appendix C outlines the timeline).

## **Resources and Supports**

The primary supports on this project were the unit managers and the unit based educators on the chosen medical-surgical units. The facility's nursing administration approved this project.



The unit's management teams were involved in the project through allowance of observations taking place on the units. Additionally, the student researcher requested input from unit leaders on the utility of the project on its completion. Fifteen copies of each observation tool were required. A total of thirty xeroxed copies at a local print shop costed approximately \$11.50.

### **Risks and Threats**

The potential risks and threats to the project included inability to collect reliable data regarding infection control practices due to nurse awareness of observations and witnessing observations in progress (also called the Hawthorne Effect) and resistance of staff to observations. These threats were ameliorated through covert observations when possible, emphasis on beneficial patient outcomes when infection control measures are practiced appropriately, and support from unit management. There were no risks associated with a nurse's employment security based on the student researcher's observations of infection control practices. The identity of the observation units and hospital remained confidential. The units were not at risk of disciplinary action, loss of funding, or other penalty related to the results of this project.

### **Evaluation Plan**

The purpose of this project was to assess current rates of adequate infection control practices as per the current CDC guidelines by registered nurses on various medical/surgical units. The project was evaluated based on the ability to observe nurses and obtain reliable data, the utilization of the hand hygiene and PPE use observation tools, and the expressed satisfaction or anecdotal communication from unit management and educators with the project.

## Chapter V

### Project Implementation and Summary

#### Précis

The Centers for Disease Control and Prevention (CDC) is continually updating its policies and procedures for infection control practices. These updates, derived from evidence based research and practice, serve to protect both patients and healthcare providers. However, continuing education concerning these updated standards of practice is often lacking in healthcare facilities, leading to infection control rates that do not meet the standards expected if infection control measures were consistent and properly applied.

The most current data from the CDC indicates that 4% of hospitalized patients in the United States will be diagnosed with a healthcare associated infection (HAI) (Centers for Disease Control, 2018a). While at first glance 4% appears to be a small percentage, this equates to over 1 million U.S. patients annually who will be diagnosed with an HAI, and only a 0.5% drop in the last 16 years in the U.S. (World Health Organization, 2011). Considering the boost in availability of infection control equipment that has taken place during this time frame, such as hand sanitizer and disinfecting wipes, this small drop in HAI rates is unacceptable.

Studies show that the most effective way to reduce HAIs is through education. When healthcare facilities and staff are aware of infection control issues and begin to practice specific compliance measures, rates of some HAIs can decrease by up to 70% (Centers for Disease Control, 2018a). The purpose of this project was to observe the current rate of infection control compliance by nurses, through handwashing and PPE use observations. This was accomplished utilizing multiple active medical-surgical units in a mid-sized hospital in an urban southwest area of the U.S.

## **Threats and Barriers**

This project experienced several delays leading to the implementation stage, as noted in the timeline, leading to a delay in implementation from the time of project proposal to data collection of nearly one year. During this time delay, the subject hospital implemented an electronic monitoring system to collect data regarding frequency of handwashing upon entering and exiting patient rooms. While this system is a benefit to the hospital and to its healthcare staff, it did potentially skew the results of this study. The nurses were freshly educated on hand hygiene policies and procedures and were more aware of the data collection that was occurring through the automated observation system, separate from any awareness of the student researcher's observations. Additionally, some unit managers that the student researcher approached to participate in the study were less open to partaking, as they felt their staff were already overwhelmed with infection control education and observations because of this new system. While most nurses expressed interest in participating in the study, there were fewer participants than anticipated, with only twenty nurses consenting to take part. This may be attributed to the oversaturation of infection control updates, education, policy changes, and practices taking place in the hospital.

The student researcher did not have access to patient charts or patient information, therefore was unable to identify patients who may have active isolation precaution orders but did not have signage or supplies outside of their door. This would have been a helpful addition to the project to provide a more accurate evaluation of PPE use.

While accurate observations are an expectation, some barriers to recording accurate results for hand hygiene can be identified. For example, one nurse notified the student

researcher, after observations were completed during a particular time period, that she utilized an individual hand sanitizer and soap, as she had a negative reaction to the products provided on the unit. Therefore, every time this nurse needed to clean her hands before and after patient contact, she had to go to the break room to access her supplies. This created a difficulty for the observer to identify compliance and may have caused inaccurate observations for that time period.

Additional nurses may have had the same issue, but the student researcher was not notified.

Additionally, the student researcher does concede that some nurses may have utilized sinks located in patients' rooms to wash hands with soap and water, of which the observer would be unable to visualize.

Lastly, the Hawthorne Effect was difficult to overcome in this study. Characterized by participants' actions being modified due to the knowledge of observation and the units' long, open hallways led to a lack of ability for the student researcher to perform covert observations. Nurses signed consent forms at the beginning of the shift after a short presentation on the study was provided. Therefore, nurses participating in the study were easily able to identify the student researcher and had knowledge of her observations. Also, as noted previously, recent policy changes and education programs may have predisposed nurses to heightened awareness of infection control practices.

### **Data Collection**

Observations were performed on three separate medical surgical units in the participating hospital over the course of one week. The student researcher presented a short description of the study, followed by the consent statement, during the beginning of each shift in the unit's

breakroom. Consents were completed immediately following the presentation. Observations took place on day shifts only, but at various times throughout those shifts.

The student researcher then proceeded to observe nurses from the units' hallways performing hand hygiene and use personal protective equipment (PPE) during their regular patient care tasks throughout the day. Performance of these infection control practices were recorded via the Hand Hygiene Observation Tool (Appendix A) and the PPE Observation Tool (Appendix B), both created by the student researcher. Data was kept secure via a locked cabinet in the student researcher's home office and was not shared with staff or the management team during observations. Names of observed nurses were not linked to individual observation points, nor were times of observations.

### **Data Analysis**

An analysis of the observations was performed to determine current nurse compliance with infection control practices, as outlined by the CDC. The student researcher was able to observe a total of 105 hand hygiene opportunities, at either the moment just before entering a patient's room or just after exiting. Additionally, 27 PPE use opportunities were observed. These opportunities were defined as just before and after caring for a patient who was under isolation precautions.

Of the 105 total hand hygiene observations, 51 were before entering the patient's room and 54 were upon exiting. Hand sanitizer, located just outside every patient room on all three units, was the preferred method of hand hygiene. Of the 105 total recorded patient encounters, the observations revealed 71 occurrences of hand sanitizer use, 2 of soap and water cleansing,

and 32 encounters where neither were used. This constitutes a 69.52% compliance rate of hand hygiene before and after patient contact.

Patient rooms that were under isolation precautions were noted in the hand hygiene observations as well. A total of 21 of the 105 observations were noted to be of patients requiring isolation precautions, of which hand hygiene (either through hand sanitizer or soap and water cleansing) was utilized 13 times (61.9%).

Patients in rooms designated as requiring isolation precautions were also observed for appropriate PPE use. The criteria observed were the ordered precaution (via signage at patient's door), clarity of signage, accessibility of supplies, appropriate donning, PPE only worn in room, and appropriate doffing. Of the 27 recorded observations, 21 were contact only and 6 were contact and droplet. All 27 observations (100%) noted clear signage and easily accessed supplies. During 22 of the 27 total recorded observations, the student researcher witnessed the donning of PPE, of which 18 (81.82%) were performed appropriately. Additionally, 16 doffing episodes were witnessed, of which all 16 (100%) were performed appropriately. Lastly, 19 episodes of nurses wearing PPE in the patient's room were recorded, of which 18 (94.74%) remained in the patient's room while donned.

## **Discussion**

### **Results**

While performing the literature review, concrete numbers were not available concerning the goals at which nurses should be compliant with infection control practices. Optimally, the goal is 100% proper use of hand hygiene and use of PPE. This study found that 69.52% of patient encounters included appropriate hand hygiene practices, as outlined by the CDC. This

rate does not approach the expected rate of compliance with hand hygiene practices designed to control infections and diminish the opportunity for development of a hospital acquired infection in a patient care situation; nor does it comport with the over 90% compliance that nurses self-report (Russell et al., 2018).

The rate of compliance with CDC guidelines for PPE use were higher than that for hand hygiene compliance. With 81.82% and 94.74% compliance observed with donning of PPE and wearing of PPE only in the room, respectively, it is clear that the nurses were able to demonstrate a greater understanding and application of the CDC guidelines. Additionally, doffing of PPE was at 100% compliance, showing excellent application of the CDC guidelines among nurses observed in this study.

This project identified both a gap between infection control guidelines and nursing practice and the need for continued education to address the gap and resultant diminished compliance with national healthcare practice guidelines. Despite the recent hospital facility policy changes and presentation of an education program on hand hygiene and isolation precautions, and the student researcher's discussion about observation of these practices while obtaining nurses' consent to participate, compliance with CDC guidelines on hand hygiene did not meet the minimum standard of care. This student researcher must consider that the implementation of a new automated handwashing recording device were in its initial stages and compliance may increase following further practice and follow up. This student researcher does recommend the need for additional CDC infection control guideline education, specifically regarding hand hygiene practices.

The literature review indicated that when nurses have increased knowledge and awareness of infection control practices, compliance rates are higher. This urges the student researcher to consider what the compliance rates were on these units prior to the education and awareness brought about by the implementation of the automated hand hygiene monitoring system and the discussion that took place from the author prior to obtaining participants' consent for this study. Additionally, on some observation days, nursing students were present on the units. Crotty (2010) discusses the importance of nursing students working with nurses and encourage them to learn from each other. Additionally, Crotty (2010) recognizes the role modeling that nurses innately exhibit when practicing with nursing students present, pointing to the possibility that the nurses observed on days in which students were present were practicing in greater compliance with CDC recommendations. If the nurses were not demonstrating better infection control practices with the nursing students present, than one must consider the degree to which negative or faulty practice modeling was observed by those nursing students while on the various patient care units. Further research, including comparative observations, should take place to identify the potential differences in practice and work to close the knowledge and practice gaps observed in this study.

### **Potential for Sustainability**

This project can be implemented across various healthcare facilities, units, patient populations, and in any area of the country. While hand hygiene observations are often done in healthcare facilities, observations of PPE use are not as common. Observing both of these infection control practices gives a more complete picture of the knowledge and awareness of infection control practice guidelines performed by the nurses and the degree of gap between knowledge and practice in any given nursing and healthcare population.



Additionally, this application of infection control guidelines should focus on other healthcare staff, including nursing assistants, medical providers, and other allied or integrated healthcare providers. Non-healthcare staff, such as janitorial, nutrition, and maintenance staff, should be observed for infection control guideline compliance as well. Decreasing hospital acquired infections is the responsibility of everyone in the healthcare facility, not only nurses and other direct patient care providers.

### **Recommendations for Future Practice**

During data collection, this student researcher saw many hand hygiene and infection control educational posters displayed around the unit. Additionally, the unit charge nurses often verbalized reminders during morning shift change pertaining to infection control practice improvements. This is an excellent first step to increase awareness on the unit and should continue, but it is not sufficient as demonstrated by the substandard compliance with CDC guidelines. Additional education and increased awareness of infection control practices can result in greater compliance.

Developing an educational session to be presented to the nursing staff, and other patient care providers interested, would be a next, best step in increasing awareness of the necessity of adhering to CDC infection control precaution guidelines. In particular, the nurses on medical surgical units observed in this study need additional education regarding the importance of hand hygiene before and after patient contact. This education should be offered at various times and days to gain as much participation as possible. Attendance should be incentivized, in ways that would be appropriate to individual units. Education should be offered at least on a yearly basis,

as part of new hire onboarding, and included in nurses' performance evaluations due to the critical nature of mitigating the spread and consequences of hospital acquired infections.

Future observations could include access to patients' charts or a report from the charge nurse in order to better identify patients who have ordered isolation precautions. This would provide better knowledge for the observer, as appropriate signage and equipment at the door of such patients is paramount.

### **Plan for Dissemination**

The first step of dissemination of the results is to share them with the management team and staff on the observation units. Knowledge of current practice and the areas that are lacking compliance will improve current practice, as the Centers for Disease Control (2018a) noted. Results of the study can be shared during educational sessions that may be provided following this study. Additionally, this information can be shared with other units within this hospital in order to assist in greater compliance and education in those areas as well. Lastly, this information would be of interest to other healthcare systems in this city and state, as well as around the country. Creating a poster for conference presentation, especially focusing on nurse executives or nurse educators, would be an excellent means in which to disseminate this information to a much broader audience.

### **Conclusion**

The purpose of this study was to identify the current infection control compliance rates practiced by nurses, and to determine if gaps exist between infection control guideline knowledge and application of these guidelines in practice. Nurses interact with patients dozens of times throughout the day and their adherence to the guidelines that the CDC have put in place

is paramount to diminishing the rate of hospital acquired infections. Nurses have the power to facilitate healing, but the nurses' responsibility to protect patients, families, and other healthcare providers by adhering to infection control guidelines may be even more impactful.

**Appendix A: Hand Hygiene Observation Tool**

**RN HAND HYGIENE OBSERVATION TOOL**

*Marisa Francis MSN, RN*

DATE	PATIENT ENCOUNTER	TYPE OF HAND HYGIENE	ISOLATION?
	Before / After	Alcohol sanitizer / Soap & Water / None	Yes / No
	Before / After	Alcohol sanitizer / Soap & Water / None	Yes / No
	Before / After	Alcohol sanitizer / Soap & Water / None	Yes / No
	Before / After	Alcohol sanitizer / Soap & Water / None	Yes / No
	Before / After	Alcohol sanitizer / Soap & Water / None	Yes / No
	Before / After	Alcohol sanitizer / Soap & Water / None	Yes / No
	Before / After	Alcohol sanitizer / Soap & Water / None	Yes / No

## Appendix B: PPE Observation Tool

### RN PPE OBSERVATION TOOL

*Marisa Francis MSN, RN*

DATE	ORDERED PRECAUTIONS	CLEAR SIGNAGE	ACCESSIBLE SUPPLIES	APPROPRIATE DONING	ONLY WORN IN ROOM	APPROPRIATE DOFFING
	Contact / Droplet / Airborne / C. Diff	Yes / No	Yes / No	Yes / No	Yes / No	Yes / No
	Contact / Droplet / Airborne / C. Diff	Yes / No	Yes / No	Yes / No	Yes / No	Yes / No
	Contact / Droplet / Airborne / C. Diff	Yes / No	Yes / No	Yes / No	Yes / No	Yes / No
	Contact / Droplet / Airborne / C. Diff	Yes / No	Yes / No	Yes / No	Yes / No	Yes / No
	Contact / Droplet / Airborne / C. Diff	Yes / No	Yes / No	Yes / No	Yes / No	Yes / No
	Contact / Droplet / Airborne / C. Diff	Yes / No	Yes / No	Yes / No	Yes / No	Yes / No
	Contact / Droplet / Airborne / C. Diff	Yes / No	Yes / No	Yes / No	Yes / No	Yes / No
	Contact / Droplet / Airborne / C. Diff	Yes / No	Yes / No	Yes / No	Yes / No	Yes / No

### Appendix C: Project Timeline

Month/Year	Project Activities
March 2018	Initial project development
April – June 2018	Literature review
November 2018	Project submitted for approval from first observation unit
December 2019	Process for educational affiliation contract initiated with hospital
January 2019	Approval from first observation unit manager received
February 2019	Proposal of DNP project to UNLV Advisory Committee
July 2019	Non-research status was determined from the facility’s Human Research Protections Program
August 2019	Finalized affiliation contract between UNLV and hospital received
August 2019	Institutional Review Board (IRB) application submitted to UNLV’s Office of Research Integrity
October 2019	UNLV IRB determined exempt status
October - November 2019	Observation of infection control practices by registered nurses
November 2019	Analysis of observation data
November 2019	Completion of DNP project chapters and submission to Advisory Committee
December 2019	Defense of DNP project at UNLV

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## Curriculum Vitae

Marisa Francis  
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### Education

Doctor of Nursing Practice, Nurse Executive Concentration University of Nevada, Las Vegas - Las Vegas, Nevada	Expected December 2019
Master of Science in Nursing, Education Concentration University of New Mexico - Albuquerque, New Mexico	May 2011
Bachelor of Science in Nursing University of New Mexico - Albuquerque, New Mexico	December 2008
Associate of Science in Nursing Central New Mexico Community College - Albuquerque, New Mexico	April 2007
Diploma of Practical Nursing Central New Mexico Community College - Albuquerque, New Mexico	April 2005

### Teaching Experience

Senior Lecturer I University of New Mexico - Albuquerque, New Mexico	August 2014 – present
Course Coordinator Breastfeeding Elective Patient Education Elective Principals of Nursing Practice Internship I and II Evidence Based Practice	
Lab/Clinical Instructor Simulation Lab Principals of Nursing Practice Care of Patients with Chronic Conditions Advanced Medical/Surgical Clinical Intensive Capstone	
Faculty Representative Student Nurse Association	

Committee Member

VA Nursing Academic Partnership (VANAP) Faculty  
New Mexico Nursing Education Consortium (NMNEC) Member  
Inter-professional Education Committee  
ATI and HESI Task Force  
Undergraduate Faculty Search Committee  
Holistic Admissions Committee

Coordinator

College of Nursing Internship Coordination  
Nursing Excellence Awards Task Force  
Student Convocation Awards Task Force

Faculty, Clinical Coordinator

Carrington College Nursing Program, Albuquerque, New Mexico March 2010 – July 2014

Course Coordinator

Pharmacology II  
Leadership

Lab/Clinical Instructor

Fundamentals  
Medical/Surgical Nursing  
Acute Care Nursing

Committee Chair

Curriculum Committee

Committee Member

Clinical Committee  
Outcomes Committee

Clinical Coordinator

Nursing Program

**Nursing Experience**

Lovelace Healthcare System, Albuquerque, New Mexico  
Medical/Surgical Resource Team  
Registered Nurse

January 2018 – July 2018

Presbyterian Kaseman Hospital, Albuquerque, New Mexico  
Emergency Room  
Registered Nurse  
Preceptor  
November 2007-April 2012

Veteran's Administration Hospital, Albuquerque, New Mexico  
Medical/Surgical Inpatient Unit  
Licensed Practical Nurse  
Registered Nurse  
Charge Nurse  
Preceptor  
June 2005-November 2007  
June 2005 - June 2007  
June 2007-November 2007

### **Freelance Work**

Instructional Connections  
Academic Coach  
August 2016 – May 2017

Elsevier Sherpath Interactive Teaching Software  
Medical/Surgical Nurse Reviewer/Editor  
June – July 2016

### **Publications and Presentations**

Francis, M.A. & Cordova, A. (2018). Providing Specialty Nursing Topics within an Undergraduate Nursing Curriculum. Poster Presentation, AACN Baccalaureate Education Conference, New Orleans, LA. November 15-16, 2018.

Hernandez, S.H., Francis, M.A., & Winn, D. (2019). Employment and Retention of Nurses Who Completed an Internship and Residency Program. Poster Presentation, WIN Communicating Nursing Research Conference, San Diego, CA. April 10-13, 2019.

### **Awards and Honors**

Inductee, Sigma Theta Tau International Honor Society  
Sigma Zeta Kappa Chapter  
University of Nevada, Las Vegas - Las Vegas, Nevada  
February 2018

Recipient, TEACH Award - Teamwork and Communication  
Carrington College - Albuquerque, New Mexico  
June 2013

Inductee, Sigma Theta Tau International Honor Society  
Gamma Sigma Chapter  
University of New Mexico - Albuquerque, New Mexico  
April 2011

Recipient, Marie Hoch Nursing Scholarship  
University of New Mexico - Albuquerque, New Mexico

August 2009

### **Volunteer Work**

Albuquerque Preschool Cooperative  
Classroom and event volunteer  
Nursing career inspiration speaker

August 2014 – May 2019

Alice King Community School  
Parent Teacher Association (PTA) Treasurer  
Classroom and event volunteer  
Nursing career inspiration speaker

August 2017-October 2019

### **Licensure**

Registered Nurse License  
New Mexico Board of Nursing

June 2007 - present

Practical Nurse License (inactive)  
New Mexico Board of Nursing

June 2005 - June 2007

### **Certifications**

Certified Nurse Educator

March 2016 – present

Certified Lactation Counselor

June 2015 - present

### **Professional Memberships**

New Mexico Breastfeeding Taskforce

Sigma Theta Tau International Honor Society of Nursing

National League for Nursing

American Association of Colleges of Nursing