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# Does Knowledge Make a Difference? Assessing nursing students' knowledge of proper hand hygiene techniques in correlation with their progression through nursing school

Charika R. Carradine

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The University of Southern Mississippi

Does Knowledge Make a Difference?  
Assessing nursing students' knowledge of proper hand hygiene techniques in correlation  
with their progression through nursing school

by

Charika R. Carradine

A Thesis  
Submitted to the Honors College of  
The University of Southern Mississippi  
in Fulfillment  
of the Requirements for the Degree of  
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in the College of Nursing

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Approved by

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Elizabeth Tinnon, Ph.D., RN, CNE, Thesis Adviser  
Assistant Professor of Collaborative Nursing Care

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Katherine Nugent, Ph.D., RN, Dean  
College of Nursing

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David R. Davies, Ph.D., Dean  
Honors College

## Abstract

Proper hand hygiene techniques have been widely accepted as the most effective way for health care workers to prevent the spread of diseases. The main focus of this research was to determine differences between nursing students' semester level and their knowledge of proper hand hygiene techniques. A convenience sample was obtained from the nursing student population. The sample population included nursing students enrolled in the second, third, and fourth semester in nursing school. Data collected was analyzed using SPSS version Twenty. A Parametric and descriptive statistics were used to measure the magnitude of relationships between variables, and describe students' knowledge regarding hand hygiene. As a result, student's overall knowledge of proper hand hygiene was calculated as a mean score of 7.19 out of a possible 10. An F statistic also suggested that there is no difference in semester level and correct knowledge of hand hygiene. This study contributes to the field of nursing by recommending that the teaching of hand hygiene techniques be taught with more hands on activities and faculty members continue to emphasize the importance of hand hygiene each semester.

**Key Words:** Honors College, undergraduate research, hand washing, proper hand hygiene, hand hygiene techniques, thesis

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## Chapter I

### Introduction

For years, the usage of proper hand hygiene techniques has been widely accepted as the most effective way for health care workers to prevent the spread of diseases. Not only is hand hygiene an effective way to prevent the transmission of diseases, but it is also the least expensive method. According to the Center for Disease Control (CDC) (2012):

Health care providers should practice hand hygiene at key points in time to disrupt the transmission of microorganisms to patients including: before patient contact; after contact with blood, body fluids, or contaminated surfaces (even if gloves are worn); before invasive procedures; and after removing gloves (wearing gloves is not enough to prevent the transmission of pathogens in health care settings) (p.1).

If these hand hygiene guidelines were followed correctly, there would be a significant reduction in the transmission of health-care acquired infections (HCAIs) among patients.

The World Health Organization (WHO) (2009) estimated that nearly 2 million hospital patients are infected with a HCAI each year. They estimated that in the United States, 1 out of every 20 patients admitted to the hospital was infected with a HCAI (p.1). Not only do HCAIs create a threat for the patients of a medical facility, they also pose a detrimental issue for anyone in the hospital. Each time a patient is infected with an HCAI, the hospital incurs additional costs. In 2004, Graves indicated the primary cost of patients with HCAIs was \$6.7 billion per year. Because of these infections, patients can



have their stay prolonged in the hospital requiring additional diagnostic and therapeutic interventions.

At the University of Southern Mississippi (USM) College of Nursing (CON), the professors place emphasis on the importance of proper hand hygiene techniques starting in the middle of first semester and it is continuously integrated in every semester of school. At the CON, students are taught infection control policies and the proper use of personal protective equipment (PPE) in order to diminish the risk of contracting a HCAI, and to prevent transmission of infections between patients. Additionally, students are instructed on the “real world” application of these important safety measures. Such measures include: (a) students are to always wear gloves whenever they come in contact with a patient, (b) wash hands for at least 15 seconds with anti microbial soap if hands are visibly soiled, and after gloves are removed, (c) alcohol-based sanitizer may serve as a substitution if the hands are not visibly soiled and soap and water are not immediately available. Currently, there are two hundred and four students enrolled in the Bachelor’s of Nursing Program, in second through fourth semester, who are being taught the concepts of proper hand hygiene.

The main focus of this research was to determine differences between nursing students’ semester level and their knowledge of proper hand hygiene techniques. In this study, nursing students enrolled in second through fourth semester were asked to complete a modified copy of a Hand Hygiene Questionnaire that assessed their knowledge regarding the use of proper hand hygiene techniques. Using the data obtained from the questionnaire in Appendix A, statistical analysis was completed to determine if there was a correlation between an increase in hand hygiene knowledge and a student’s

semester progression in school. The author predicted that the fourth semester students would have the highest knowledge of proper hand hygiene techniques.

## Chapter II

### Literature Review

#### **What is a HCAI?**

HCAI, originally known as a nosocomial infection, is an infection that can only be contracted while a person is hospitalized or in a medical institution. Microorganisms on the health care worker's hands and different instruments used in the hospital can transmit a health care acquired infection. According to the WHO (2009):

In the USA, similar to the position in other industrialized countries, the most frequent type of infection hospital wide is urinary tract infection (UTI) (36%), followed by surgical site infection (SSI) (20%), bloodstream infection (BSI), and pneumonia (both 11%) (p.4).

WHO (2009) also estimated that "1.4 million patients were infected with a health care acquired infection in various countries around the world" (p.15). HCAIs are very costly to patients and hospitals. Proper hand hygiene techniques have been proven to be very effective in eliminating some transmission of health acquired infections at the lowest possible cost. HCAIs continue to significantly impact the outcomes of patients because of their associated health problems and complications (Korniewicz and El-Masri, 2010).

#### **Proper Hand Hygiene Guidelines in Health care**

Hand hygiene is most often associated with hand washing in the health care field. A health care provider can wash their hands with anti-microbial soap or an alcohol based hand sanitizer. According to Boyce and Pittet (2012) anti-microbial soap is:

soap (i.e., detergent) containing an antiseptic agent and an alcohol-based sanitizer is an alcohol-containing preparation designed for application to the hands for

reducing the number of viable microorganisms on the hands. In the United States, such preparations usually contain 60%--95% ethanol or isopropanol (p.1).

Both of these items can be found in each patient's room and can be easily accessed. It is the health care provider's choice as to which method of hand hygiene to use. However, to be in compliance, one of these methods of hand hygiene is required. Additionally, visibly soiled hands are to be washed instead of using hand sanitizer. Potter and Perry (2012) indicated that hand sanitizer that is applied to visibly soiled hands does not kill the possible germs on the hands like washing with an anti-microbial soap will. Therefore, if a hand sanitizer is used instead of a thorough washing of the hands with soap, there is a higher risk of leaving germs on the hands making it easier to transfer them to another patient possibly causing that patient to obtain a health care acquired infection.

Because the use of proper hand hygiene is so important, WHO created a hand-washing poster that correctly displays how to wash hands. WHO explains the hand washing procedure should last between 40 and 60 seconds. WHO also emphasizes all the places to wash on the hand: the top surface on the hand, palm-to-palm, in-between each finger, and in the clasp of the palms (World Health Organization, 1). WHO also indicated that hands not visibly soiled could be washed with a hand sanitizer.

### **When to Wash Your Hands**

While in nursing school, students are taught that hand hygiene should be performed before entering and upon exiting the room, and after the removal of gloves in a clinical setting. More specifically, the CDC (2013) recommended that hand washing should be performed:

**Before**, during, and after preparing food; **Before** eating food; **Before** and after caring for someone who is sick; **Before** and after treating a cut or wound; **After** using the toilet; **After** changing diapers or cleaning up a child who has used the toilet; **After** blowing your nose, coughing, or sneezing; **After** touching an animal, animal feed, or animal waste; and **After** touching garbage (p.1).

If these guidelines for washing hands are followed correctly, and all health care workers perform hand hygiene when necessary, the potential exists to eradicate many HCAs.

### **Proper Hand Hygiene Education**

Proper hand hygiene technique is a basic skill that is incorporated into every nursing school's curriculum. However, different schools have different methods of teaching this skill. Kelcikova, Skodova, and Straka (2012) suggested that inadequate hand hygiene education is an important contributor for non-compliance of health care workers (p.152). Without proper hand hygiene education there is no way these techniques can be performed correctly. Kelcikova et al. (2012) stated that the basic teaching of proper hand hygiene techniques performed in the classroom setting does not effectively meet the requirements needed to perform these skills in a clinical setting (p.153). These researchers indicated, "a large number of highly specific issues have to be covered in the school curricula in the basic nursing education programs, and thus it is possible that hand hygiene has gotten less attention" (p. 153). There are several skills that students obtain throughout their years in nursing school. Just like it is pertinent that those skills be retained, proper hand hygiene techniques should be retained. Something as simple as washing one's hands correctly has the potential to prevent more illnesses than any other skill taught in nursing school.

Guil, Ustundag, Neriman (2010) suggested that “Undergraduate education of health care students influences their hand hygiene compliance” (p.279). The foundation for proper hand hygiene techniques is introduced in school, and that foundation determines how nurses will comply in clinical settings.

### **Importance of Proper Hand Hygiene Techniques**

Previous research has provided evidence to support that proper hand hygiene can significantly decrease HCAs at a low cost. McLaughlin and Walsh (2012) stated in their research that, “the hands of health care workers continue to be the main vector for nosocomial infection in the hospital” (p.653). Because health care workers’ hands harbor the majority of the microorganisms that cause HCAs, emphasis is placed on the fact that hand hygiene is vital for patients’ health and safety.

The most severe consequence of not using proper hand hygiene techniques is a patient contracting a HCAI. Guil et al. (2010) stated, “health care associated infections are a major cause of morbidity and mortality (rate) in hospitalized patients and hands play an important role in the transmission of infections” (p. 275). Proper hand hygiene is the simplest method to prevent HCAs. Korniewicz and El-Masri (2010) stated, “in spite of increased surveillance for HCAs, good hand hygiene compliance that reduces hand-to-hand or hand-to-skin contamination remains the most effective way to decrease the risk of HCAs” (p.86). Because HCAs are a major source of morbidity and mortality among patients, there is no reason why all health care providers should not be competent in hand hygiene (Celik and Kocash, 2010).

### **Some Reported Reasons for Non-compliance of Hand Hygiene**

Because hand hygiene is such a simple task, one might think there would be full compliance. But, in reality, several studies have documented some self-reported reasons of non-compliance. McLaughlin and Walsh's study (2012) reported that, "the most frequent reasons for not washing hands were internal reasons and prompted by an event or lack of an event" (p.656). Rickard (2004) cited that some reasons health care providers did not comply to hand hygiene were, "skin problems, workload, low risk from acquiring infection from patient, and not having contact with infectious patient" (p.404). Backman, Zoutman, and Marck (2008) states that some more possible reasons of low hand hygiene compliance are, "skin irritation, inaccessibility to hand washing supplies, lack of adequate hand hygiene facilities, health care workers 'not thinking about it', high workloads and inadequate time, busy schedule, time-consuming, hands don't appear soiled, poor location of sinks and lack of education about hand hygiene in the curriculum" (p.334). Although these are factors that a health care provider might prioritize more important than using proper hand hygiene, if the risks of coming in contact with these microorganisms are low, the patient has a better chance of not contracting a HCAI.

### **Recommendations for Better Compliance of Hand Hygiene**

Many researches have suggested numerous ways to improve knowledge of proper hand hygiene techniques. Guil et al. (2010) recommended that proper hand hygiene be, "emphasized more in trainings and undergraduate education by highlighting the importance of hand hygiene, when and why to use proper hand hygiene, and how contamination of health care acquired infections occur" (p.279). Proper hand hygiene

techniques should be perceived as a “Just Do It” skill instead of time consuming in nursing school and the clinical setting.

Guil et al. (2010) suggested that improving compliance of hand hygiene began with undergraduate education. Rickard thought of it in another way, concentrating on improving hospital settings. Rickard (2004) stated that to improve hand hygiene compliance, “one must make cultural changes which makes it easier for health care workers to comply by improving hospitals and their materials and have health care workers to provide feedback on infection rates and areas that should be targeted” (p.404). Rickard further explained some factors that hindered compliance with hand hygiene were “skin conditions, workload, health-care workers assuming the risk for acquiring an infection was low, and not coming in contact with a patient a health care worker considers contagious” (p.404). He also indicated factors that promoted hand hygiene compliance. Rickard also suggested that a simple way to improve compliance regarding hand hygiene is to inform patients that all health care workers should perform hand hygiene and allow patients to ask health care workers whether they have performed these tasks before providing care. According to Rickard, allowing the patients this type of authority has the potential to build patients’ trust and relationships with health care workers.

### **Predictions**

Proper hand hygiene techniques are important skills that all nursing students must master. For example students must learn when it is appropriate to wash hands or use hand sanitizer. The mastering of this skill begins in nursing school in the first semester. Increasing the knowledge of proper hand hygiene throughout nursing school is also



extremely important to guarantee that the proper skill will be performed in the clinical settings. Noncompliance regarding proper hand hygiene techniques, for whatever reason, is an increasing problem in hospitals worldwide. If the importance of proper hand hygiene techniques is stressed while students are still in school, students are more likely to comply with these techniques once they are employed. Often, when a person starts to have a skill-based mindset, they will rely on rote memory instead of policy and procedure. Hand hygiene is not only an important clinical skill, it is also important in the classroom. Nursing school is where the foundation of many skills is taught, including proper hand hygiene.

### **Research Questions**

Research questions were as follows:

1. What is the current overall knowledge of proper hand hygiene techniques of nursing students at The University of Southern Mississippi?
2. Is there a difference between semester level and correct knowledge of hand hygiene?
3. Is there a relationship between knowledge of hand hygiene techniques and self reported compliance of hand hygiene?

## Chapter III

### Methodology and Materials

#### **Study Design and Sample**

A descriptive correlational design was used for this research study to explore the relationship between hand hygiene knowledge and USM CON students' progression in nursing school. The study was reviewed and approved by the USM Institutional Review Board (IRB) (Appendix B). A convenience sample was obtained from the nursing student population. Nursing students were informed that participation in this study was strictly voluntarily. The sample population included nursing students enrolled in the second, third, and fourth semester in nursing school. There are two hundred and four students currently enrolled in their second through fourth semester of nursing school at the University of Southern Mississippi baccalaureate-nursing program. Out of those two hundred and four nursing students, one hundred and sixty nine nursing students responded to the questionnaire, yielding a total participation rate of 82.8%. Most of the nursing students were female, 84%, and only 16% of students were male. There were 42.6% of second semester students; 18.3% of third semester students; and 39% of fourth semester students represented in the sample. The students' ages ranged from 20-46 years old. The mode age of students was 21.

#### **Instrument**

The original questionnaire created by Van De Mortel in 2009 was used for this study. The questionnaire was originally created to test hand hygiene knowledge of nursing and medical students. The author was contacted and permission was granted to modify and use the questionnaire in this research study. Two questions that asked students to

estimate the average cost of HCAs in the Intensive Care Unit in developed countries and eleven true false statements that concerned personal attitudes were removed from the questionnaire for this particular study. The Modified Hand Hygiene questionnaire, (Appendix A) compared nursing students' knowledge of correct hand hygiene methods: (a) ten multiple choice questions which assess basic hand hygiene knowledge; (b) thirteen item Likert scale which assess students' perceptions of the effectiveness related to various teaching methods used to teach hand hygiene; (c) two items that report student's percentage of compliance of hand hygiene guidelines, and students' perceptions of health care setting's rating of importance of hand hygiene as an infection control measure; (d) fifteen item Likert scale which assesses students' knowledge of when it is appropriate to use hand hygiene; (e) twenty-two item Likert Scale which assess students' overall knowledge regarding hand hygiene and their roles as it pertains to infection control. Reliability and validity of the Hand Hygiene Questionnaire was tested and scores were reported. The instrument received Cronbach's alpha values of 0.80, 0.74 and 0.77 (Van de Mortel, 2009).

### **Data Collection**

Students were asked to voluntarily participate in this research study. The author contacted teachers in each semester's major class and arranged an appropriate time to administer questionnaires. The following classes were chosen to obtain the highest response rate possible: NSG 338 Chronic Conditions Across the Lifespan; NSG 416 Nursing Care of Childbearing Women and Families; and NSG 425 Adult Health II. On the scheduled day, the author explained the research project per IRB protocol. Students who did not wish to participate in the study were allowed to continue to review their

course material or leave the classroom and take their scheduled break. The questionnaire took approximately fifteen-twenty minutes for each student to complete. Questionnaires were collected and safely secured in a locked filing cabinet. Only the author had access to this information.

Data collected was analyzed using SPSS version Twenty (20). A Parametric and descriptive statistics were used to measure the magnitude of relationships between variables, and describe students' knowledge regarding hand hygiene.

## Chapter IV

### Results

One hundred and sixty nine nursing students were surveyed from the questionnaire shown in (Appendix A). The questionnaire asked specific questions that tested their overall knowledge of proper hand hygiene techniques and procedures. A one-way ANOVA was conducted to assess student's overall knowledge of hand hygiene.

Results are reported in Table I.

Table I

Overall Knowledge of Proper Hand Hygiene

N	Mean	Standard Deviation	Standard Error	<u>Mean</u>		Minimum	Maximum
				Lower	Upper		
169	7.19	1.44	0.1102	6.97	7.41	2.00	10.00

Student's overall knowledge of proper hand hygiene was calculated as a mean score of 7.19 out of a possible 10. A standard deviation of  $\pm 1.44$  indicates that the data points tend to be very close to the mean score of 7.19. Students received a minimum score of 2.00 and a maximum score of 10.00.

The frequency of student responses to the hand hygiene quiz was also calculated.

Table II provides the results.

Table II

Frequency of response on the Hand Hygiene Knowledge Quiz

Score	Frequency	Percent
2.00	1	0.6
3.00	1	0.6
4.00	5	3.0
5.00	13	7.7
6.00	28	16.6
7.00	47	27.8
8.00	42	24.9
9.00	28	16.6
10.00	4	2.4

The majority of students (71.7%) scored exactly at or above the mean score of 7.19. Only 28.5% of students scored below the mean overall knowledge of proper hand hygiene.

This suggests that students' overall knowledge is satisfactory.

A one-way ANOVA test was used to determine if there were differences between semester level and correct knowledge of hand hygiene. Results are reported in Table III.

Table III

Differences between Semester Level and Correct Knowledge of Hand Hygiene

Semester	N	Mean	Standard deviation
2	72	7.49	1.40
3	31	6.87	1.80
4	66	7.01	1.24

An F statistic was calculated to see if there was a significant difference of semester level and correct knowledge. The F statistic,  $F(2,166)=2.817$ ,  $p=0.63$ , suggested that there is no difference in semester level and correct knowledge of hand hygiene.

To determine if a correlation existed between knowledge of hand hygiene and self reported compliance, Table IV provides correlation results for Pearson's R.

Table IV

Relationship Between Hand Hygiene and Compliance

		Knowledge Total
Percentage	Pearson Correlation	.095
	Sig. (2-tailed)	.230
	N	161

The Pearson's R (.095) demonstrates there is no correlation between hand hygiene and self reported compliance. The results of a two-tailed T- Test were not statistically significant (.230).

Students self reported their compliance with proper hand hygiene guidelines during their clinical rotation and rated the importance of hand hygiene as an infection

measure in the health care setting. Sixty-four students out of all semesters (37.9%), self reported that they comply with hand hygiene guidelines during clinical rotation 100% of the time. However, 1.4% of all nursing students self reported that the percentage of hand hygiene compliance during clinical rotations were less than 50%. Students rated the importance of hand hygiene as an infection measure in health care setting on a scale of 1-10, where 1 represented the least important and 10 represented the most important. One hundred, fifty-five students ( 91.7%), reported hand hygiene as most important as an infection control measure in the healthcare setting.



## Chapter 5

### Discussion

The purpose of this research project was to assess USM CON nursing students' knowledge of proper hand hygiene techniques and compare the relationship between those nursing students' semester level and their knowledge of proper hand hygiene techniques. Nursing students provide patient care during assigned clinical hours while being supervised by an instructor and continue to receive additional information in classroom; because nursing students do provide patients with care they have a role in the prevalence and frequency of hospital infections inquired by patients (Celik and Kocash 2010). Overall, students received a mean score of 7.19 out of 10 on the hand hygiene quiz portion of the questionnaire, with 71.7% of students getting 7 or more questions correct.

The author predicted that nursing students in their fourth and final semester of nursing school would have the highest knowledge of proper hand hygiene techniques among all the nursing students. According to data retrieved from the questionnaires the author's prediction was incorrect. Students that were enrolled in the second semester had the higher overall knowledge of hand hygiene techniques between semesters (n=7.4861). Students in the fourth semester were predicted to have the higher knowledge of proper hand hygiene techniques because of the longer time enrolled in school and more clinical practice hours, however, this was not the case. A possible explanation for these results is that second semester students had just finished their Introduction to Clinical Nursing Practice class where proper hand hygiene was a major focus.

Students self reported their estimated percentage of compliance related to hand hygiene guidelines in clinical practices. Only 37% of students self reported to wash their

hands 100% of the time during clinical rotation. This is an alarming value because according to authors Celik and Kocash (2010), “nurses are sources of contamination in their nursing roles, which include getting patients out of bed, taking pulse rates, measuring arterial blood pressure and body temperature, performing various invasive interventions, as well as dressing and feeding patients” (p.207). Although the self reported rate of overall compliance of hand hygiene in clinical rotation was significantly low, 91.7% of students rated hand hygiene the most important infection control measure in a healthcare setting. Even though the majority of nursing students think that hand hygiene is the most important element in infection, one reason that they may not comply with hand hygiene is complications that come with excessive hand washing. Some reasons identified for non compliance of hand hygiene Backman et al. (2006) identified in their study were: “skin irritation, lack of adequate hand hygiene facilities, health care workers “not thinking about it,’ high workloads and inadequate time, busy schedules, poor location of sinks, and some health care providers feel that hand hygiene is time consuming” (p. 334). Although students understand that hand hygiene is most important in a healthcare setting, students may feel that the complications outweigh the benefits of hand hygiene.

Students rated the importance of hand hygiene as an infection measure in health care setting on a scale of 1-10, where 1 represented the least important and 10 represented the most important. one hundred and fifty five students, 91.7%, reported hand hygiene as most important as an infection control measure in the health care setting. Data collected suggested that nursing students were most likely to perform hand hygiene if they were participating in procedures that exposed them to secretions, body fluids, or blood. Some

situations that were particularly alarming were: only 79.3% of students reported always performing hand hygiene after going to the toilet, 69.2% of students reported always performing hand hygiene after contact with a patient's skin, 72.8% reported always performing hand hygiene before patient contact, and 77.5% reported always performing hand hygiene after the removal of gloves. Authors Korniewicz and El-Masri (2010) suggested that, "although hand washing and the use of sanitizers have been instrumental to the prevention of HAIs, hand hygiene behaviors and compliance of hand hygiene have been less than optimal" (p. 86). According to the CDC (2012) hand hygiene should be performed: before and after patient contact; after contact with bodily fluids, or contaminated surfaces (even if gloves are worn); before an invasive procedure; and after removing gloves, because wearing gloves is not enough to prevent the transmission of some pathogens (p.1). Even though students possess the adequate knowledge of hand hygiene, they are not applying it. Although it is important for students to have the correct knowledge it is also important for them to comply with proper hand hygiene techniques.

### **Limitations**

The limitations of this descriptive correlational design were a convenience sample was obtained including current colleagues and some students may have felt compelled to volunteer despite the fact participation in this study was strictly voluntarily. Another possible limitation of this study was, because the author surveyed familiar people, someone that did not like the author may have tried to skew data on purpose.

## **Implications to Nursing Practice**

WHO (2009) estimated that nearly 2 million hospital patients are infected with a HCAI each year. That is 1 out of every 20 patients admitted to the hospital in the United States was infected with a HCAI (p.1). The hands of health care workers according to McLaughlin and Walsh (2012) continue to be the main vector for HCAs in the hospital (p.653). If all health care providers would perform proper hand hygiene techniques at the appropriate time, this could dramatically reduce the number of HCAs seen in patients. Authors Celik and Kocash (2010) stated that hand washing was the most important approach to preventing HCAs.

It is recommended that proper hand hygiene techniques be emphasized more in each semester of nursing school. Celik and Kocash (2010) stated, “it is important that academic instructors and nursing clinical instructors keep student’s knowledge updated during clinical application and that they act as role models of hand washing and give frequent feedback to students so as to improve the rate of hand washing” (p.210). In addition to a high level of knowledge regarding proper hand hygiene techniques, we also want to have a high compliance rate. Although, there are some possible complications that can occur with washing hands numerous times, preventing a HCAI in a patient is more important.

Even though, it is was predicted that as students progressed through nursing school their knowledge of hand hygiene and compliance with hand hygiene techniques would grow; according to the study that was not the case. One explanation for this could be the use of ineffective teaching strategies. Most nursing students in this study reported the following learning strategies as mildly or highly effective in teaching proper hand

hygiene: lectures, tutorial, clinical practice, demonstrations, practical laboratory sessions, videos, textbooks, lecture's notes, computer simulation, research articles, national or international hygiene guidelines and posters. The majority of teaching strategies that students reported to be mildly or highly effective were teaching styles that allowed students hands on learning of hand hygiene techniques. Guil, et al. (2010) suggested that "Undergraduate education of health care students influences their hand hygiene compliance" (p.279).

It is recommended that teaching of hand hygiene techniques be taught with more hands on activities. Such hands on activities could include: clinical practice, demonstrations and practical laboratory sessions. It is also recommended that faculty members continue to emphasize the importance of hand hygiene each semester.

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## Appendix A

By completing the survey you are agreeing to participate in the study.

### Hand Hygiene Questionnaire

Age in years: \_\_\_\_\_

Gender:  female  male

Semester in Nursing School:  First  Second  Third  Fourth

- Please read the questions carefully before answering. Your answers will be kept confidential.
- Mark **only one answer** to each question.

Alcohol-based hand rubs should **not** be used:

- when hands are visibly soiled
- during preoperative cleaning of hands by surgical personnel
- before inserting invasive devices such as urinary catheters
- after removing gloves

Which of the following statements about alcohol-based hand rubs is **incorrect**?

- Alcohol-based hand rubs reduce bacterial counts on the hands of health care workers more effectively than plain soaps
- Alcohol-based hand rubs can be more accessible than handwashing facilities
- Alcohol-based hand rubs require less time to use than traditional handwashing
- Alcohol-based hand rubs are only effective if they are applied for  $\geq 60$  seconds

Which of the following statements regarding hand hygiene is **incorrect**?

- Poor adherence to hand hygiene practice is a primary contributor to hospital-acquired infection and transmission of antimicrobial-resistant pathogens
- R<sup>0</sup>, watches and bracelets should be removed before beginning a surgical hand scrub
- Hand hygiene is not necessary if gloves are worn during patient contact

Which of the following methods is acceptable for drying hands in patient care areas:

- a) single use cloth towels
- b) paper towels
- c) multiple use cloth towels of the hanging or roll type
- d) all of the above
- e) a and b only

Hand hygiene must be performed:

- a) before patient contact



- b) following emptying of a drainage reservoir, eg. a urinary catheter bag
- c) prior to and following venipuncture
- d) all of the above
- e) b and c only

When using an alcohol-based hand rub to decontaminate hands:

- hands should be rubbed together for 15 seconds
- hands should be rubbed together for 60 seconds
- hands should be rubbed together until they are dry

Hand hygiene is **not** required:

- a) prior to administration of an injection
- b) following handling of paperwork
- c) following contact with a patient's dry skin
- d) all of the above
- e) b and c only

Which of the following statements is **incorrect**?

- Hand hygiene should be performed when entering or leaving an isolation room
- Hand hygiene is not required following contact with the bed linen of a patient with a multi-drug resistant *Staphylococcus aureus* infection
- Hospital pathogens can be recovered from areas of normal, intact patient skin
- Cracked skin carries higher loads of pathogenic organisms than intact skin

Which of the following statements is **incorrect**:

- Alcohol-based hand rubs cause less skin irritation and dryness than handwashing using soap and water
- The use of hand creams and lotions is not recommended for health care workers because they increase the load of pathogens on the hands
- Hot water should not be used in the health care setting to wash hands as it increases the risk of skin irritation

Which of the following statements about glove use is **incorrect**:

- Gloves should be changed during patient care if moving from a contaminated to a clean body site
- The same pair of gloves can be used when caring for different patients as long as they are washed between patients
- Gloves should be worn when contact with blood, secretions and mucous membranes could occur

How effective did you find the following in teaching you about hand hygiene? (*Please circle your responses; circle not applicable if the teaching method was not used in your course*)

<b>Statement</b>	<b>Not applicable</b>	<b>Not effective</b>	<b>Mildly effective</b>	<b>Moderately effective</b>	<b>Highly effective</b>
Lectures	0	1	2	3	4
Tutorials	0	1	2	3	4
Clinical practice	0	1	2	3	4
Demonstrations	0	1	2	3	4
Practical laboratory sessions	0	1	2	3	4
Videos	0	1	2	3	4
Textbooks	0	1	2	3	4
Lecturer's notes	0	1	2	3	4
Computer simulations	0	1	2	3	4
Web sites	0	1	2	3	4
Research articles	0	1	2	3	4
National or international and hygiene guidelines	0	1	2	3	4
Posters	0	1	2	3	4

Please estimate your percentage compliance with hand hygiene guidelines on clinical rotation: \_\_\_\_\_%

Please rate the importance of hand hygiene as an infection control measure in the health care setting on a scale of 1-10 (where 1 is the least important and 10 is the most important):

1    2    3    4    5    6    7    8    9    10

*Please circle a number to indicate your response*

<b>I cleanse my hands:</b>	<b>Never</b>	<b>Some of the time</b>	<b>Half of the time</b>	<b>Mostly</b>	<b>Always</b>
After going to the toilet	1	2	3	4	5
Before caring for a wound	1	2	3	4	5
After caring for a wound	1	2	3	4	5
After touching potentially contaminated objects	1	2	3	4	5
After contact with blood or body fluids	1	2	3	4	5
After inserting an invasive device	1	2	3	4	5
Before entering an isolation room	1	2	3	4	5
After contact with a	1	2	3	4	5

patient's skin					
After exiting an isolation room	1	2	3	4	5
Before endotracheal suctioning	1	2	3	4	5
After contact with a patient's secretions	1	2	3	4	5
Before patient contact	1	2	3	4	5
After removing gloves	1	2	3	4	5
If they look or feel dirty	1	2	3	4	5

*Please circle a number to indicate your response.*

<b>Statement</b>	<b>Strongly disagree</b>	<b>Disagree</b>	<b>Not sure</b>	<b>Agree</b>	<b>Strongly agree</b>
Hand hygiene is considered an important part of the curriculum.	1	2	3	4	5
The facilities in which I do clinical practicum emphasise the importance of hand hygiene.	1	2	3	4	5
The importance of hand hygiene is emphasised by my clinical supervisors.	1	2	3	4	5
I have a duty to act as a role model for other health care workers.	1	2	3	4	5
When busy it is more important to complete my tasks than to perform hand hygiene.	1	2	3	4	5
Performing hand hygiene in the recommended situations can reduce patient mortality.	1	2	3	4	5
Performing hand hygiene in the recommended situations can reduce medical costs associated with hospital-acquired infections.	1	2	3	4	5
I can't always perform hand hygiene in recommended situations because my patient's needs come first.	1	2	3	4	5
Prevention of hospital-acquired infection is a valuable part of a health care worker's role.	1	2	3	4	5
I follow the example of senior health care workers when deciding whether or not to perform hand hygiene.	1	2	3	4	5
An infectious disease contracted in the health care setting may threaten my life or my career.	1	2	3	4	5
I believe I have the power to change poor practices in the workplace.	1	2	3	4	5

Failure to perform hand hygiene in the recommended situations can be considered negligence.	1	2	3	4	5
Hand hygiene is a habit for me in my personal life.	1	2	3	4	5
I am confident I can effectively apply my knowledge of hand hygiene to my clinical practice.	1	2	3	4	5
It is an effort to remember to perform hand hygiene in the recommended situations.	1	2	3	4	5
I would feel uncomfortable reminding a health professional to handwash.	1	2	3	4	5
Performing hand hygiene slows down building immunity to disease.	1	2	3	4	5
Dirty sinks can be a reason for not washing hands.	1	2	3	4	5
Lack of an acceptable soap product can be a reason for not cleansing hands.	1	2	3	4	5
Performing hand hygiene after caring for a wound can protect from infections.	1	2	3	4	5
Cleansing hands after going to the toilet can reduce transmission of infectious diseases.	1	2	3	4	5

## Appendix B



THE UNIVERSITY OF  
**SOUTHERN MISSISSIPPI**

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### **INSTITUTIONAL REVIEW BOARD**

118 College Drive #5116 | Hattiesburg, MS 39406-0001

Phone: 601.266.5997 | Fax: 601.266.4377 | [www.usm.edu/research/institutional-review-board](http://www.usm.edu/research/institutional-review-board)

### **NOTICE OF COMMITTEE ACTION**

The project has been reviewed by The University of Southern Mississippi Institutional Review Board in accordance with Federal Drug Administration regulations (21 CFR 26, 111), Department of Health and Human Services (45 CFR Part 46), and university guidelines to ensure adherence to the following criteria:

- The risks to subjects are minimized.
- The risks to subjects are reasonable in relation to the anticipated benefits.
- The selection of subjects is equitable.
- Informed consent is adequate and appropriately documented.
- Where appropriate, the research plan makes adequate provisions for monitoring the data collected to ensure the safety of the subjects.
- Where appropriate, there are adequate provisions to protect the privacy of subjects and to maintain the confidentiality of all data.
- Appropriate additional safeguards have been included to protect vulnerable subjects.
- Any unanticipated, serious, or continuing problems encountered regarding risks to subjects must be reported immediately, but not later than 10 days following the event. This should be reported to the IRB Office via the "Adverse Effect Report Form".
- If approved, the maximum period of approval is limited to twelve months.  
Projects that exceed this period must submit an application for renewal or continuation.

PROTOCOL NUMBER: **13121601**

PROJECT TITLE: **Does it Make a Difference? Assessing Nursing Students' Knowledge, Beliefs, and Practices of Proper Hand Hygiene Techniques in Correlation with their Progression Through Nursing School**

PROJECT TYPE: **New Project**

RESEARCHER(S): **Charika Carradine**

COLLEGE/DIVISION: **College of Nursing**

DEPARTMENT: **Nursing**

FUNDING AGENCY/SPONSOR: **N/A**

IRB COMMITTEE ACTION: **Exempt Review Approval**

PERIOD OF APPROVAL: **01/06/2014 to 01/05/2015**

**Lawrence A. Hosman, Ph.D.**  
**Institutional Review Board**