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Hand Hygiene Perceptions of Student Nurses.

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Thesis submitted in partial fulfillment of the
College of Nursing
Honors-in-Discipline Program

By

Brittany Berger
College of Nursing Honors College
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December 4, 2013

Patricia Moore 12/2/13
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Faculty Mentor

Audrey Greenwell 12/2/13
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Lea Carter Florence 12/2/13
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Chapter 1: Introduction

Statement of the Problem

Compliance with hand hygiene is widely recognized as the most important factor in preventing transmission of infection to patients in healthcare settings (Haas and Larson, 2007). Hand hygiene dramatically decreases the potential pathogens on hands and is considered the first measure for decreasing the risk of transmitting organisms to patients, healthcare professionals, and family members. Noncompliance with hand hygiene practices has been shown to increase healthcare-associated infections, costing hospitals $35.7-$45 billion each year (Centers for Disease Control and Prevention [CDC], 2012). Education about hand hygiene starts in school and should transfer into the real world of nursing. The purpose of this research is to determine how student nurses in a baccalaureate nursing program in northeastern Tennessee perceive hand hygiene and the importance of conducting the act of hand washing. Students who do not perceive it as important, or do not have the correct information, are unlikely to use principles of good hand hygiene in their practice. Few studies were found assessing nursing school students' perception of the importance of hand hygiene.

Research Questions

How do baccalaureate nursing students in northeastern Tennessee perceive their knowledge and the importance of hand hygiene?

How does the knowledge and perception of the importance of hand hygiene change as baccalaureate nursing students in northeastern Tennessee advance through semesters in their nursing program?

Assumptions

This study is conducted based on the following assumptions:

1. That the participants will take part in the survey and that the size of the sample will be sufficient;
2. That the participants will respond to questions honestly and without bias;
3. That the variables have been clearly defined and are measureable, and the instrument being used is a valid and reliable instrument created to measure those variables;
4. That the students will show significant differences in knowledge and perceptions as they advance through the semesters.

Definitions

According to the CDC (2012), hand hygiene is "a general term that applies to routine hand washing, antiseptic hand wash, antiseptic hand rub, or surgical hand antisepsis." There are two basic ways to perform hand hygiene, either by routine hand washing or by alcohol-based hand rubs. Routine hand washing includes washing hands with an antibacterial or antiseptic soap and warm running water, scrubbing all surfaces of the hands for 15 seconds. Alcohol-based hand rubs involve using the antiseptic handrub on all surfaces of the hands with good friction until dry. Compliance with these techniques is determined by whether or not the nurse meets the standard policies and procedures of hand hygiene.

Overview of the Study

The interest for this study came about with an initial question of why nurses don't already comply with hand hygiene practices, and whether this lack of compliance is due to a deficit in their knowledge base from school or an unawareness of the consequences of not using proper hand hygiene. This study will focus on how nursing students in northeastern Tennessee see hand

hygiene and what it means to them. If there is a knowledge deficit, then hopefully a change will come about to increase students' education on the subject, and henceforth increase compliance in their future practice. This study will also assess students' hand washing perceptions and knowledge during each semester of nursing school and how their perceptions and knowledge change as they advance through semesters.

Chapter 2: Review of the Literature

Integrated Literature Review

The World Health Organization (2012) is highlighting the importance of good hand hygiene practices for patient safety with the "Clean Your Hands Initiative." Infection prevention with hand hygiene is not only a problem in the United States, but it is also a major problem worldwide. Hand hygiene research has global significance.

> "Healthcare-associated infection is a major burden around the world and threatens the safety and care for patients," said Sir Liam Donaldson, WHO Patient Safety Envoy. "I urge the healthcare community to take firm and decisive action to save lives from this preventable harm." (Thomas, 2013)

Allegranzi and Pittet (2009) noted compliance with hand hygiene to play a major part in decreasing health care associated infections. They encourage the use of hand hygiene as an institutional and national priority for public safety, and feel commitments by national and local governments, by support of healthcare administrators, are essential. They further state that "higher priority should also be given to hand hygiene as a research topic."

Kennedy and Burnett (2011) conducted an experiment on second and third year nursing students comparing their knowledge, attitudes, and practices of hand hygiene. They used a student questionnaire, and found that students with more training and experience had a slightly better

understanding and knowledge of hand hygiene. The majority of both second and third year students strongly disagreed with the statement "If I wear disposable gloves, I do not need to comply with hand hygiene." Students had the most difficulty determining if the use of alcohol handrub was enough for patients with diarrhea, vomiting, and C. difficile. This study suggests that student nurses' awareness of when and how to perform hand hygiene is important to their learning and that the clinical experience as they progress through their training increases their knowledge and understanding of hand hygiene.

Celik and Kocasli (2008) emphasize that nursing students can have a significant impact on hospital infection rates. They found fourth year nursing students' performances of hand hygiene to be poorer than that of second and third year students. Most students were found to be knowledgeable on hand hygiene, but they "inadequately and carelessly put their theoretical knowledge of the subject into practice."

Infection prevention education in our healthcare workers' curriculum is a very important early intervention and one of the most critical aspects in their education. Barrett and Randle (2008) conducted a study on nursing student's perceptions of hand hygiene practices. They found a major deficit in the students' knowledge of hand hygiene. Many of the participants were found to have a lack of knowledge in the length of time it takes to perform hand hygiene, when to perform it, and if gloves were an effective method of keeping hands clean.

Chapter 3: Research Methodology

Study Design

The research was conducted by using a hand hygiene questionnaire. It is composed of ten simple questions, including dichotomous, multiple choice, or answers based on which type of hand hygiene should be performed (handrub, handwash, or none). The demographics used are gender,

semester the student is in, and whether or not they have had certified nursing assistant, patient care partner, or nurse intern/extern experience. The surveys did not include any participant names or identifiable information.

Setting

The participants were in a comfortable setting while taking the survey. The researcher was out of the room while the participants were completing their answers so that they did not feel pressured to complete the survey.

Population/Sample

The population for this study was a convenience sample of baccalaureate nursing students ages 18 years or older at a university in northeastern Tennessee.

Instrumentation

The instrument for this study is the Hand Hygiene Knowledge Questionnaire for Health-Care Workers originally developed by the World Health Organization (2009). The demographics of this tool were revised to adapt to nursing students (view Appendix A).

Data Collection

Class faculty passed out the surveys at the end of class; they did not know who did and who did not participate in taking the survey. The informed consent was attached to the survey and the researcher went over the informed consent with the class (view appendix B). Participation in taking the survey was voluntary. The researcher collected the surveys outside the classroom as the students left. The researcher was not in the classroom during survey completion. The completed surveys were stratified according to the semester the student was in to see if the perception of hand hygiene changes with the advancement of knowledge per semester.

Data Analysis

The data was analyzed by using the Statistical Packages for the Social Sciences (SPSS) system. The ANOVA-Tukey Kramer method was used to compare each semester to one another using a p-value of < 0.05 with a confidence interval of 95%. A t-test was used to compare the participants that have been employed or currently do work as a Certified Nursing Assistant/Patient Care Partner/Nurse Intern (CNA/PCP/NI) to those who do not to see if there are any differences in their answers. The t-test was also used to compare the gender of participants to the survey questions to see if there are any differences between male and female answers.

Chapter 4: Results

The demographics used for this survey included the participant's gender, the semester they were in, and if they have or do work as a CNA/PCP/NI. A total of 407 people participated in the survey, 70 (17.2%) males, 317 (77.9%) females, and 20 (4.9%) did not mark gender. There was no significant difference in answers found between males and females, except in the questions based on transmission of germs to the patient or healthcare worker, time needed for alcohol-based handrub to be effective, and actions that should be avoided, as associated with increased likelihood of colonization of hands with germs (view Table 1). The participants were separated into the 5 different semesters of nursing school, 2nd semester sophomores, 1st semester juniors, 2nd semester juniors, 1st semester seniors, and 2nd semester seniors (see Table 2). The participants were asked if they had ever worked as a CNA/PCP/NI, 243 (59.7%) said no, 139(34.2) said yes, and 25 (6.1%) didn't answer; there is statistical significance between 2nd semester sophomores and 2nd semester seniors, 1st semester juniors and 1st semester senior, 1st semester juniors and 2nd semester seniors, and 2nd semester juniors and 2nd semester seniors (see Table 3).

(Table 1)

Comparison Based on Gender		Significance (p-value <0.05)
Which of the following hand hygiene actions prevents transmission of germs to the patient? Before touching a patient	Equal variances assumed Equal variances not assumed	.213 .008
Which of the following hand hygiene actions prevents transmission of germs to the healthcare workers? After exposure to the immediate surroundings of a patient	Equal variances assumed Equal variances not assumed	.088 .000
What is the minimal time needed for alcohol-based handrub to kill most germs on your hands?	Equal variances assumed Equal variances not assumed	.043 .020
Which of the following should be avoided, as associated with increased likelihood of colonization of hands with harmful germs? Wearing jewelry	Equal variances assumed Equal variances not assumed	.194 .005

(Table 2)

Semester	Frequency	Percent
2nd Semester Sophomore	33	8.1
1st Semester Junior	103	25.3
2nd Semester Junior	67	16.5

1st Semester Senior	75	18.4
2nd Semester Senior	116	28.5
Missing	13	3.2
Total	**407**	**100**

(Table 3)

Dependent Variable	(I)Semester	(J) Semester	Significance (p-value <0.05)
Have you or do you work as a CNA/PCP/Nurse Intern?	2nd Semester Sophomore	1st Semester Junior	.982
		2nd Semester Junior	.997
		1st Semester Senior	.124
		2nd Semester Senior	.045
	1st Semester Junior	2nd Semester Sophomore	.982
		2nd Semester Junior	.772
		1st Semester Senior	.001
		2nd Semester Senior	.000
	2nd Semester Junior	2nd Semester Sophomore	.997
		1st Semester Junior	.772
		1st Semester Senior	.098
		2nd Semester Senior	.021
	1st Semester Senior	2nd Semester Sophomore	.124
		1st Semester Junior	.001
		2nd Semester Junior	.098
		2nd Semester Senior	.998
	2nd Semester Senior	2nd Semester Sophomore	.045
		1st Semester Junior	.000
		2nd Semester Junior	.021
		1st Semester Senior	.998

The first two questions of the survey were related to hand hygiene and the participant. Question one was “Did you receive formal training in hand hygiene in the last 3 years?”, 46 (11.3%) said no, 360 (88.5%) said yes, and 1 (0.2%) did not answer; there is statistical significance between 2nd semester sophomores and 2nd semester juniors, 2nd semester sophomores and 1st semester

seniors, 2nd semester sophomores and 2nd semester seniors, 1st semester juniors and 1st semester seniors, and1st semester juniors and 2nd semester seniors (see Table 4). The second question was "Do you routinely use an alcohol-based handrub for hand hygiene?" and 33 (8.1%) said no, 373 (91.6%) said yes, and 1 (0.2%) did not answer; there is statistical significance between 2nd semester sophomores and 2nd semester juniors, 2nd semester sophomores and 1st semester seniors, 2nd semester sophomores and 2nd semester seniors, 1st semester juniors and 2nd semester juniors, 1st semester juniors and 1st semester seniors, and 1st semester juniors and 2nd semester seniors (see Table 5).

(Table 4)

Dependent Variable	(I)Semester	(J) Semester	Significance (p-value <0.05)
Did you receive formal training in hand hygiene in the last 3 years?	2nd Semester Sophomore	1st Semester Junior	.212
		2nd Semester Junior	.005
		1st Semester Senior	.000
		2nd Semester Senior	.000
	1st Semester Junior	2nd Semester Sophomore	.212
		2nd Semester Junior	.251
		1st Semester Senior	.011
		2nd Semester Senior	.000
	2nd Semester Junior	2nd Semester Sophomore	.005
		1st Semester Junior	.251
		1st Semester Senior	.844
		2nd Semester Senior	.325
	1st Semester Senior	2nd Semester Sophomore	.000
		1st Semester Junior	.011
		2nd Semester Junior	.844
		2nd Semester Senior	.931
	2nd Semester Senior	2nd Semester Sophomore	.000
		1st Semester Junior	.000
		2nd Semester Junior	.325
		1st Semester Senior	.931

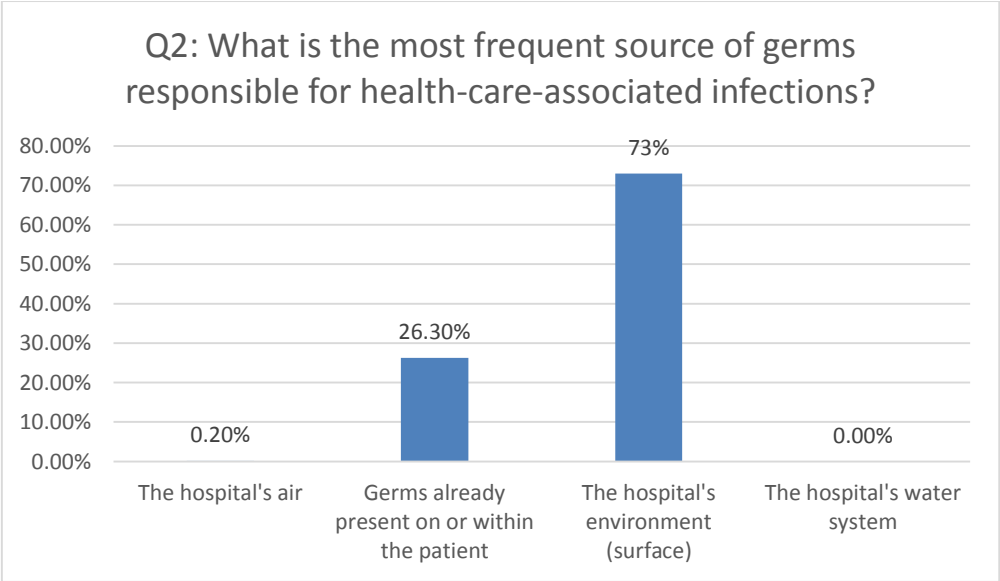
(Table 5)

Dependent Variable	(I)Semester	(J) Semester	Significance (p-value <0.05)
Do you routinely use an alcohol-based handrub for hand hygiene?	2nd Semester Sophomore	1st Semester Junior	.602
		2nd Semester Junior	.002
		1st Semester Senior	.003
		2nd Semester Senior	.001
	1st Semester Junior	2nd Semester Sophomore	.602
		2nd Semester Junior	.013
		1st Semester Senior	.020
		2nd Semester Senior	.001
	2nd Semester Junior	2nd Semester Sophomore	.002
		1st Semester Junior	.013
		1st Semester Senior	.999
		2nd Semester Senior	1.000
	1st Semester Senior	2nd Semester Sophomore	.003
		1st Semester Junior	.020
		2nd Semester Junior	.999
		2nd Semester Senior	.997
	2nd Semester Senior	2nd Semester Sophomore	.001
		1st Semester Junior	.001
		2nd Semester Junior	1.000
		1st Semester Senior	.997

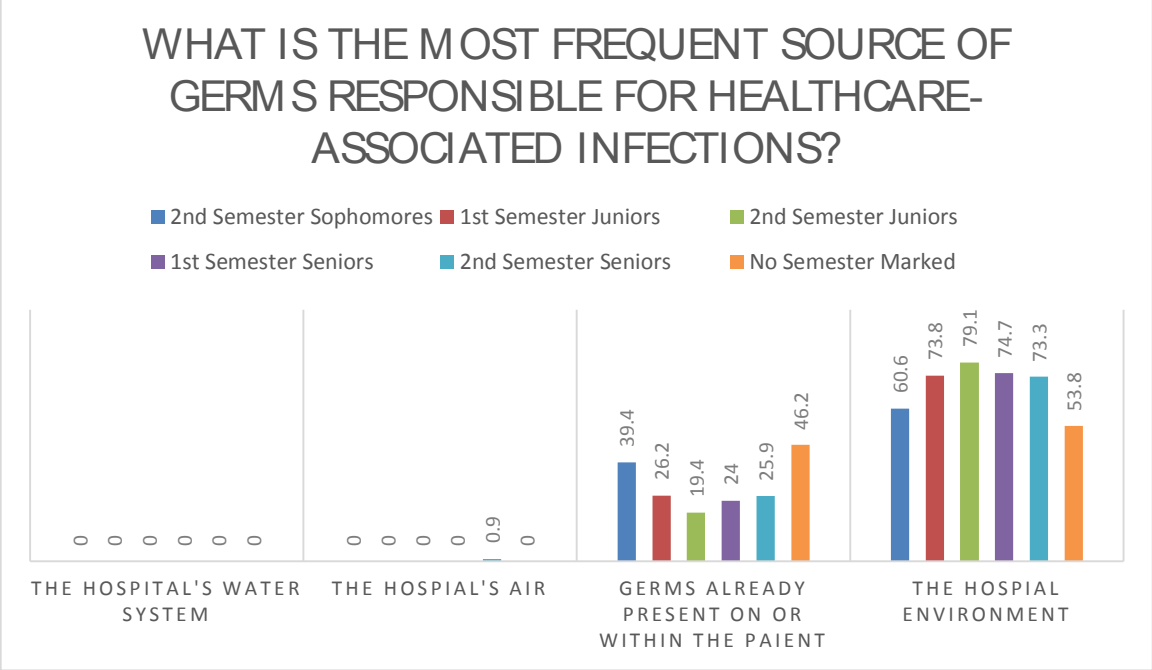
When comparing the correct answers of the rest of the questions to what the majority of the participant's answered there were a few that the majority had gotten wrong, as well as a few that were close to being divided, but overall the majority answered a large portion of them correctly. The third question, "Which of the following is the main route of cross-transmission of potentially harmful germs between patients in a health-care facility?" was correctly answered "Health-care workers' hands when not clean" by 360 (88.5%) of participants; 27 (6.6%) said "Patients' exposure to colonized surfaces", 18 (4.4%) said "Sharing non-invasive objects", and 2 (0.5%) said "Air circulating in the hospital".

Question four, "What is the most frequent source of germs responsible for health-care-associated infections?" was answered incorrectly "The hospital environment (surface)" by 297 (73%) of participants. The correct answer is "Germs already present on or within the patient" (see Graph 1). Each semester consistently missed this question as well; the majority of each semester answered "The hospital environment" (see Graph 2).

(Graph 1)

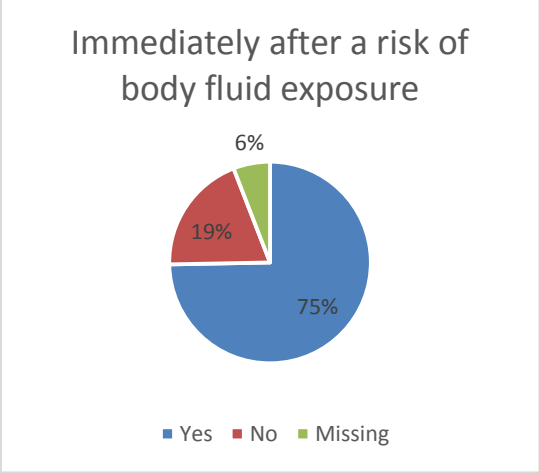


(Graph 2)

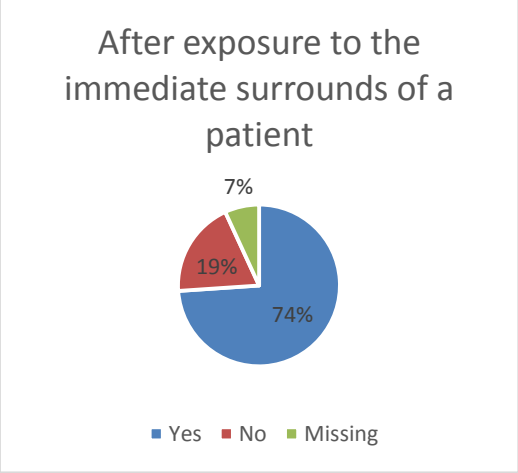


The fifth question, "Which of the following hand hygiene actions prevents transmission of germs to the patient?" had four situations to answer yes or no to. Situation 5.1, "Before touching a patient" was answered correctly "Yes" by 391(96.1%) of participants; 7(1.7%) answered "No" and 9(2.2%) did not respond. Situation 5.2, "Immediately after a risk of body fluid exposure" was answered incorrectly "Yes" by 304 (74.7%) of participants; the correct answer was "No" (view Graph 3). Situation 5.3, "After exposure to the immediate surrounds of a patient" was also answered incorrectly "Yes" by 301 (74%) of participants; the correct answer was "No" (view Graph 4). Lastly, situation 5.4, "Immediately before a clean/aseptic procedure" was answered correctly "Yes" by 388 (95.3%) of participants; 6 (1.5%) answered "No" and 13(3.2%) did not respond.

(Graph 3)



(Graph 4)



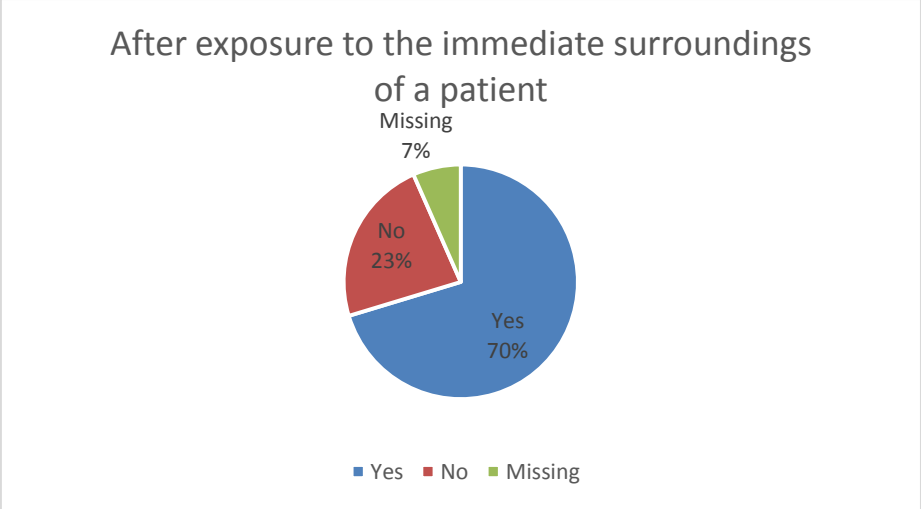
For question five, each semester consistently missed two of the situations. The first situation is 5.2, "Immediately after a risk of body fluid exposure"; the majority of every semester answered "Yes". The second situation is 5.3, "After exposure to the immediate surrounds of a patient"; the majority of every semester answered "Yes" (view table 6). The bolded yes or no shows the correct answers for Table 6.

(Table 6)

Which of the following hand hygiene actions prevents transmission of germs to the patient?:	Before touching a patient		Immediately after a risk of body fluid exposure		After exposure to the immediate surrounds of a patient		Immediately before a clean/aseptic procedure	
	Yes	No	Yes	No	Yes	No	Yes	No
2nd Semester Sophomore	97.0%	0.0%	72.7%	18.2%	75.8%	15.2%	90.9%	3.0%
1st Semester Junior	95.1%	1.0%	73.8%	22.3%	73.8%	21.4%	95.1%	1.0%
2nd Semester Junior	97.0%	1.5%	77.6%	14.9%	71.6%	17.9%	94.0%	1.5%
1st Semester Senior	98.7%	1.3%	73.3%	20.0%	66.7%	26.7%	96.0%	0.0%
2nd Semester Senior	94.8%	3.4%	75.0%	21.6%	79.3%	16.4%	96.6%	2.6%
No Semester Marked	92.3%	0.0%	76.9%	0.0%	76.9%	0.0%	100.0%	0.0%

Question six, "Which of the following hand hygiene actions prevents transmission of germs to the health-care worker?" also had four situations to answer yes or no to. Situation 6.1, "After touching a patient" was answered correctly "Yes" by 392 (96.3%) of participants; 8 (2%) said "No" and 7 (1.7%) did not answer. Situation 6.2, "Immediately after a risk of body fluid exposure" was answer correctly "Yes" by 393 (96.6%) of participants; 3 (0.7%) answered "No" and 11 (2.7%) did not answer. Situation 6.3, "Immediately before a clean/aseptic procedure" was answered incorrectly "Yes" by 286 (70.3%) of participants; the correct answer was "No" (view Graph 5). Lastly, situation 6.4 "After exposure to the immediate surroundings of a patient" was answered correctly "Yes" by 383 (94.1%) of participants; 13 (3.2%) said "No" and 11 (2.7%) did not answer.

(Graph 5)



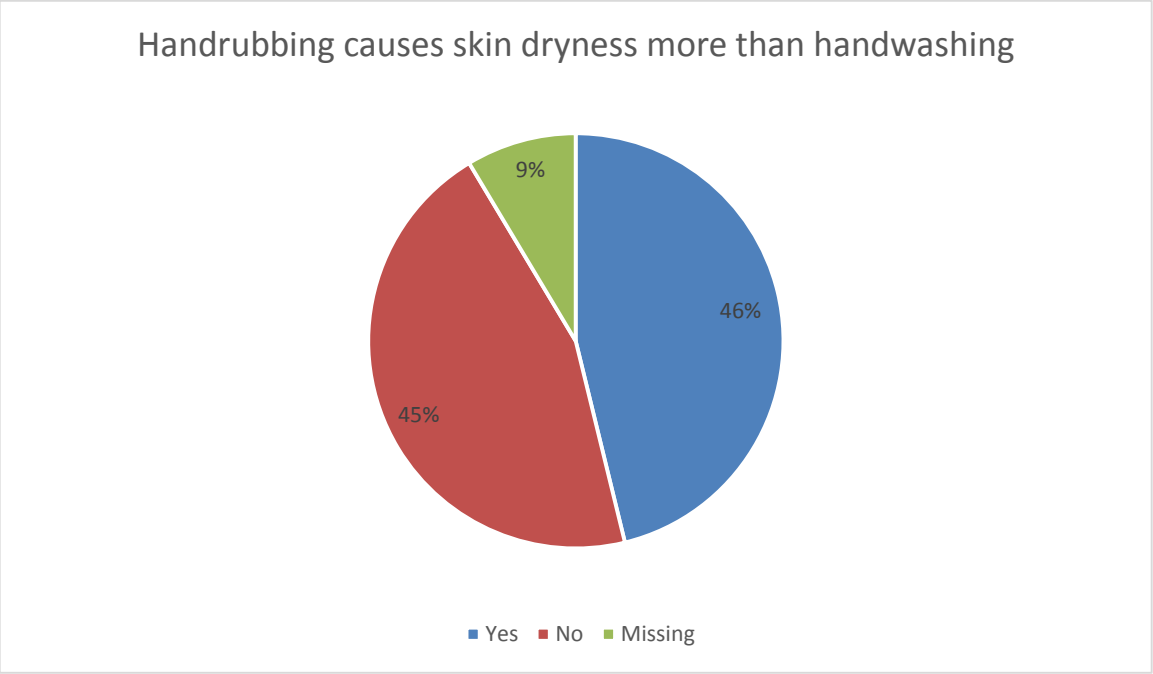
For question six, every semester consistently missed situation 6.3 "Immediately before a clean/aseptic procedure"; the semesters answered "No" when the correct answer is "Yes" (view table 7). The bolded yes or no shows the correct answers in Table 7.

(Table 7)

Which of the following hand hygiene actions prevents transmission of germs to the health-care worker?:	After touching a patient		Immediately after a risk of body fluid exposure		Immediately before a clean/ aseptic procedure		After exposure to the immediate surrounds of a patient	
	Yes	No	Yes	No	Yes	No	Yes	No
2nd Semester Sophomore	90.9%	3.0%	90.9%	3.0%	75.8%	12.1%	87.9%	6.1%
1st Semester Junior	96.1%	0.0%	96.1%	0.0%	64.1%	29.1%	94.2%	1.9%
2nd Semester Junior	97.0%	3.0%	97.0%	0.0%	74.6%	17.9%	91.0%	6.0%
1st Semester Senior	96.0%	4.0%	94.7%	2.7%	72.0%	21.3%	93.3%	4.0%
2nd Semester Senior	97.4%	1.7%	99.1%	0.0%	69.8%	26.7%	97.4%	1.7%
No Semester Marked	100.0%	0.0%	100.0%	0.0%	76.9%	7.7%	100.0%	0.0%

Questions seven, "Which of the following statements on alcohol-based handrub and handwashing with soap and water are true?" had four statements to answer yes or no for. Statement 7.1, "Handrubbing is more rapid for hand cleansing than handwashing" was answered correctly "Yes" by 383 (94.1%) of participants; 60 (14.7%) said no and 16 (3.9%) did not answer. Statement 7.2, "Handrubbing causes skin dryness more than handwashing" was answered incorrectly "Yes" by 188 (46.2%) of participants; the correct answer was "No" (see Graph 6). Statement 7.3, "Handrubbing is more effective against germs than handwashing" was answered correctly "No" by 271 (66.6%) of participants; 108 (26.5%) said "Yes" and 28 (6.9%) did not answer. For situation 7.3, there is statistical significance between 1st semester juniors and 2nd semester seniors with a p-value of .011 as well as with 2nd semester juniors and 2nd semester seniors with a p-value of .017. Lastly, statement 7.4 "Handwashing and Handrubbing are recommended to be performed in sequence" was answered correctly "No" by 231 (56.8%) or participants; 142 (34.9%) said "Yes" and 34 (8.4%) did not answer. For situation 7.4 there was statistical significance between 2nd semester sophomores and 1st semester juniors with a p-value of .022.

(Graph 6)



For question 7.2, “Handrubbing causes skin dryness more than hand washing”, the majority of 2nd semester sophomores and 1st semester juniors answered correctly “No”; but the majority of 2nd semester juniors, 1st semester seniors, and 2nd semester seniors answered incorrectly “Yes”. For question 7.4, “Handwashing and handrubbing are recommended to be performed in sequence” was answered incorrectly “Yes” only by the majority of 2nd semester sophomores; the majority of the other semesters answered the question correctly “Yes”. (See table 8) The bolded yes or no show the correct answers in Table 8.

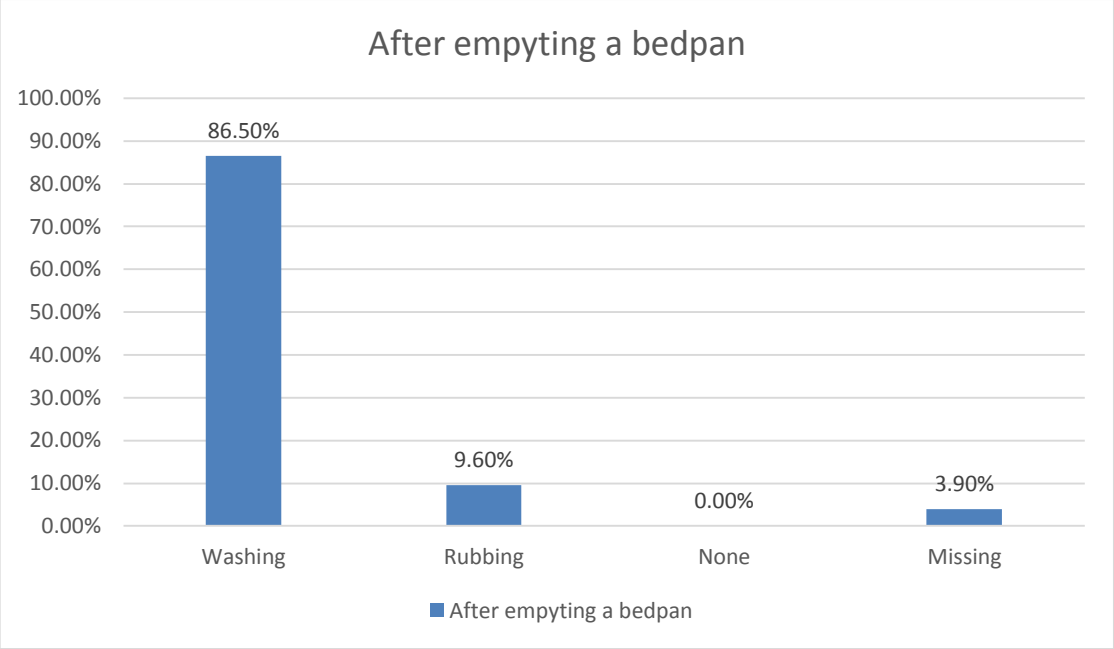
(Table 8)

Which of the following statements on alcohol-based handrub and handwashing with soap and water are true?:	Handrubbing is more rapid for hand cleansing than handwashing		Handrubbing causes skin dryness more than handwashing		Handrubbing is more effective against germs than handwashing		Handwashing/ Handrubbing are recommended to be performed in sequence	
	Yes	No	Yes	No	Yes	No	Yes	No
2nd Semester Sophomore	78.8%	9.1%	36.4%	42.4%	24.2%	66.7%	45.5%	33.3%
1st Semester Junior	84.5%	11.7%	43.7%	48.5%	35.0%	58.3%	23.3%	68.0%
2nd Semester Junior	79.1%	19.4%	53.7%	40.3%	37.3%	58.2%	43.3%	52.2%
1st Semester Senior	84.0%	13.3%	46.7%	45.3%	20.0%	72.0%	40.0%	52.0%
2nd Semester Senior	77.6%	19.0%	48.3%	46.6%	16.4%	77.6%	32.8%	62.1%
No Semester Marked	92.3%	0.0%	30.8%	38.5%	38.5%	46.2%	46.2%	30.8%

Question eight, "What is the minimal time needed for alcohol-based handrub to kill most germs on your hands?" was answered correctly "20 seconds" by 290 (71.3%) of participants; 69 (17%) answered "10 seconds", 39 (9.6%) answered "1 minute", and 5 (1.2%) answered "3 seconds". Question nine, "Which type of hand hygiene method is required in the following situations?" had six situations for the participants to answer rubbing, washing, or none. Situation 9.1, "Before palpitation of the abdomen" was answered correctly "Rubbing" by 334(82.1%) of participants; 53 (13%) answered "Washing", 4(1%) answered "None", and 16 (3.9%) did not answer. Situation 9.2, "Before giving an injection" was answered correctly "Rubbing" by 239 (58.7%) of participants; 150 (36.9%) answered "Washing", 1 (0.2%) answered "None", and 17 (4.2) did not answer. There is statistical significance in situation 9.2 between 2nd semester juniors and 2nd semester seniors with a p-value of .017 as well as with 1st semester seniors and 2nd semester seniors with a p-value of .012. Situation 9.3, "After emptying a bedpan" was answered incorrectly "Washing" by 352 (86.5%) of participants; the correct answer was "Rubbing" (see Graph 7). Situation 9.4, "After removing examination gloves" was answered correctly

"Rubbing" by 282 (69.3%) of participants; 104 (25.6%) answered "Washing", and 21 (5.2%) did not answer. Situation 9.5, "After making a patient's bed" was answered correctly "Rubbing" by 291 (71.5%) of participants; 94 (23.1%) answered "Washing", 4 (1%) answered "None", and 18 (4.4%) did not answer. Lastly, situation 9.6 "After visible exposure to blood" was answered correctly "Washing" by 376 (92.4%) of participants; 16(3.9%) answered "Rubbing", 2 (0.5%) answered "None", and 13 (3.2%) did not answer.

(Graph 7)



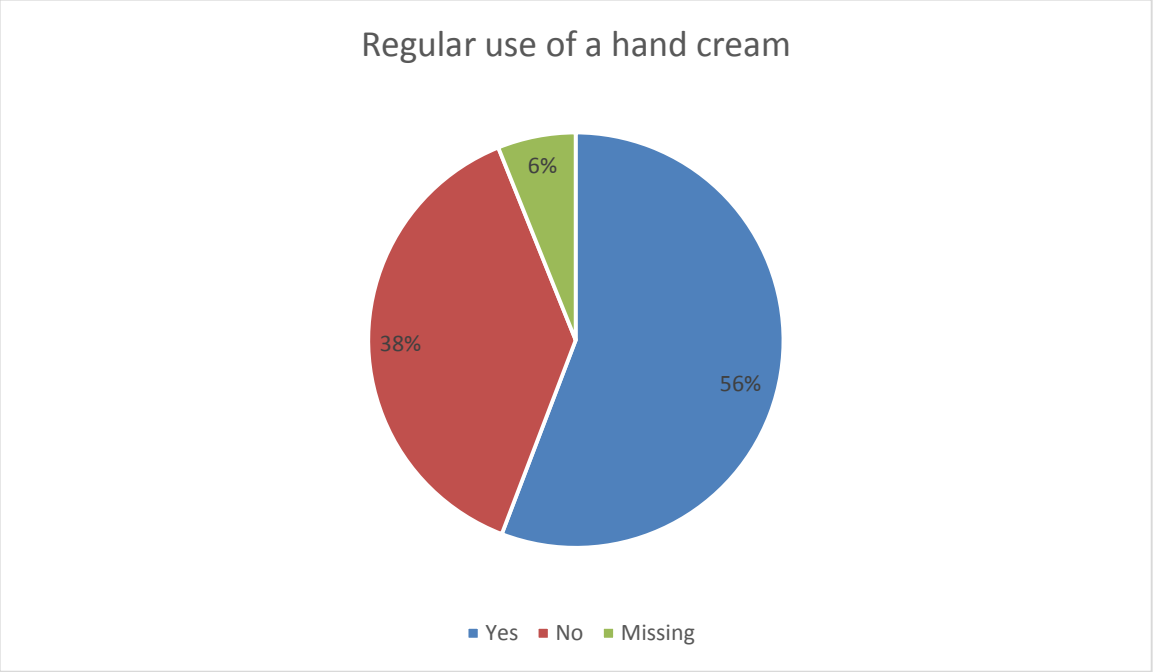
For question 9, the majority of every semester answered situation 9.3 "After emptying a bedpan" incorrectly "Washing"; the correct answer is "Rubbing" (view Table 9). In Table 9, the R stands for rubbing, W stands for washing, and N stands for none; the bolded yes or no also shows the correct answers in this table.

(Table 9)

Which type of hand hygiene method is required in the following situations?:	Before palpitation of the abdomen			Before giving an injection			After emptying a bedpan			After removing exam gloves			After making a patient's bed			After visible exposure to blood		
	R	W	N	**R**	W	N	**R**	W	N	**R**	W	N	**R**	W	N	R	**W**	N
2nd Semester Sophomores	78.8%	12.1%	0.0%	51.5%	39.4%	0.0%	3.0%	87.9%	0.0%	51.5%	39.4%	0.0%	57.6%	33.3%	0.0%	0.0%	90.9%	0.0%
1st Semester Juniors	82.5%	11.7%	1.9%	55.3%	39.8%	0.0%	8.7%	89.3%	0.0%	74.8%	21.4%	0.0%	74.8%	20.4%	1.0%	1.0%	96.1%	0.0%
2nd Semester Juniors	77.6%	20.9%	0.0%	52.2%	47.8%	0.0%	9.0%	91.0%	0.0%	62.7%	35.8%	0.0%	65.7%	31.3%	3.0%	6.0%	94.0%	0.0%
1st Semester Seniors	77.3%	18.7%	1.3%	52.0%	44.0%	1.3%	9.3%	86.7%	0.0%	69.3%	25.3%	0.0%	72.0%	25.3%	0.0%	2.7%	93.3%	1.3%
2nd Semester Seniors	89.7%	6.0%	0.0%	72.4%	23.3%	0.0%	12.1%	82.8%	0.0%	73.3%	20.7%	0.0%	75.0%	18.1%	0.9%	6.0%	90.5%	0.9%
No Semester Marked	69.2%	15.4%	0.0%	53.8%	30.8%	0.0%	15.4%	69.2%	0.0%	69.2%	15.4%	0.0%	76.9%	7.7%	0.0%	15.4%	69.2%	0.0%

Question ten "Which of the following should be avoided, as associated with increased likelihood of colonization of hands with harmful germs?" had four different situations the participants had to answer yes or no to. Situation 10.1, "Wearing jewelry" was answered correctly "Yes" by 382 (93.9%) of participants; 9 (2.2%) answered "No" and 16 (3.9%) did not answer. Situation 10.2, "Damaged skin" was answered correctly "Yes" by 372 (91.4%) of participants; 16 (3.9%) answered "No" and 19 (4.7%) did not answer. There is statistical significance in situation 10.2 between 2nd semester sophomores and 1st semester juniors with a p-value of .017. Situation 10.3, "Artificial fingernails" was answered correctly "Yes" by 393 (96.6%) of participants; 14 (3.4%) did not answer. Lastly, situation 10.4 "Regular use of a hand cream" was answered incorrectly "Yes" by 227 (55.8%) of participants; the correct answer was "No" (view Graph 8).

(Graph 8)



Lastly, for question 10.4 "Regular use of a hand cream" the majority of every semester consistently answered incorrectly "Yes"; the correct answer is "No" (view table 10). The bolded yes or no shows the correct answers in Table 10.

(Table 10)

Which of the following should be avoided, as associated with increased likelihood of colonization of hands with harmful germs?:	Wearing Jewelry		Damaged Skin		Artificial Fingernails		Regular Use of a Hand Cream	
	Yes	No	Yes	No	Yes	No	Yes	No
2nd Semester Sophomore	84.8%	3.0%	75.8%	12.1%	87.9%	0.0%	45.5%	39.4%
1st Semester Junior	92.2%	2.9%	94.2%	1.0%	96.1%	0.0%	56.3%	37.9%
2nd Semester Junior	97.0%	1.5%	92.5%	4.5%	98.5%	0.0%	52.2%	43.3%
1st Semester Senior	97.3%	0.0%	92.0%	2.7%	97.3%	0.0%	52.0%	41.3%
2nd Semester Senior	94.8%	2.6%	94.0%	4.3%	98.3%	0.0%	61.2%	35.3%
No Semester Marked	84.6%	7.7%	76.9%	7.7%	92.3%	0.0%	69.2%	15.4%

Chapter 5

Discussion

The data shows that each semester answered the majority of the questions correctly, with the exception of questions relating to the most frequent source of germs responsible for healthcare-associated infections, actions that prevent transmission of germs to the patient or healthcare worker, differences between handrubbing and handwashing, which hand hygiene method to use in specific situations, and actions to avoid, as associated with increased likelihood of colonization of hands with germs (refer to questions 4, 5.2, 5.3, 6.3, 7.2, 9.3, and 10.4); this shows a deficiency in knowledge of these areas. The data also shows there is a difference between semester in questions relating to differences between handrubbing and handwashing, which hand hygiene method to use in specific situations, and actions to avoid, as associated with increased likelihood of colonization of hands with germs (refer to questions 7.3, 7.4, 9.2, and 10.2). This suggests that as students at a northeastern Tennessee university advance through the semesters their education on hand hygiene does increase.

There were not many statistically significant findings between how males and females answered the survey questions. This could be due to the fact that the majority of nursing students surveyed were females, and the minorities were males. It was also found that as the semesters progressed, more students worked or had worked as a CNA/PCP/NI. This is probably due to the opportunity to work as a Nurse Intern at local hospitals after students complete their foundations' class. Working in one of these roles provides real world experience and education on proper hand hygiene usage.

The participants were asked if they had received formal training in hand hygiene. The majority answered yes, but there were significant differences between semesters. This may be due to

confusion on what formal hand hygiene training actually is, and what the participant thinks it means. The participants were also asked if they routinely use an alcohol-based handrub. The majority answered yes, but there were significant differences between many of the semesters, which may be due to increasing knowledge in the importance of performing hand hygiene.

In the third question about main route of cross contamination, the majority of each semester answered it correctly. However, when it came to question four about the most frequent source of germs responsible for healthcare-associated infections, the majority of students in every semester answered incorrectly. This may be due to a deficiency in knowledge about the transmission of germs.

Question five addressed which hand hygiene action prevents transmission of germs to the patient. Of the four situations listed, incorrect answers were noted relating to body fluid exposure and exposure to the surrounds of a patient. These two may have been missed due to participants just going down the line circling yes and not really reading and understanding what the question is asking.

Question six addressed which hand hygiene action prevents transmission of germs to the health-care worker. Of the four situations listed, incorrect answers were noted relating to performing hand hygiene before a clean/aseptic procedure. Again, this may have been missed due to participants going down the line circling yes and not really reading and understanding what the question was asking.Question seven asked true and false statements about handwashing and handrubbing. One of the statements a majority of each semester missed was on which hand hygiene action caused more skin dryness. Many believed that handrubbing caused more skin dryness than handwashing. This may be due to the belief that the alcohol in handrubbing agents causes more dryness than soap and water.

Question eight addressed how long it takes to kill most germs on your hands for alcohol-based handrub. The majority of each semester consistently answered this question correctly. This suggests that education on this topic is being addressed well by the nursing curriculum. Question nine addressed whether to use handrubbing, handwashing, or no hand hygiene in six different situations. The majority of each semester missed the situation on which type of hand hygiene should be performed after emptying a bedpan. The majority answered handwashing, but the correct answer is simply handrubbing. This suggests the participants need reinforcement in their education on the type of hand hygiene to perform during specific situations. There was a significant difference found between semesters in the situation addressing the type of hand hygiene to perform before giving an injection. This suggests that as the participants advance through semesters their clinical experiences reinforce previous knowledge on injections. Lastly, question ten addresses which situations should be avoided due to increased likelihood of colonization of hands with germs. The majority of each semester answered three of four situations correctly. The incorrect answers related to regular use of a hand cream. This may be due to the fact that the use of oil-based products have been found to further the colonization of germs on hands; participants may have been confused based on how they perceived the situation.

Limitations

This study is conducted based on the following limitations:

1. Limited by the participant's perceptions of the hand hygiene definitions;
2. 77.9% of participants were females, and only 17.2% were males;
3. Students may have confused their semester status between their standing in the nursing program and their university status overall;
4. The results of the study are limited by the honesty of participants, or their nonbiased participation.

Conclusion

There is definite room for improvement when it comes to educating nursing students at a northeastern Tennessee university on hand hygiene. Nursing students' education needs to be redefined when it comes to situations addressing frequent sources of germs causing healthcare-associated infections, when to perform hand hygiene, the type of hand hygiene to perform specific to the situation at hand, and those actions needed to avoid the increased colonization of germs on hands. Recommendations for nursing education include better definitions of how to perform hand hygiene and the appropriate hand hygiene action to take in various situations. As students advance through the different semesters, the importance of hand hygiene needs to be readdressed so as to be fresh in their minds as they approach graduation. This will only help them when they go into the real world of nursing to remember how, when, and which action to use when it comes to hand hygiene. Better education will help decrease healthcare-associated infections, and it starts with the education of nurses while they are still in school.

References

Allegranzi, B., and D. Pittet. “Role of Hand Hygiene in Healthcare-associated Infection Prevention.” Journal of Hospital Infection (2009): n. pag. Print.

Barrett, Rachael, and Jacqueline Randle. "Hand Hygiene Practices: Nursing Students’ Perceptions." Journal of Clinical Nursing 17.14 (2008): 1851-857. Print.

Celik S, Kocasli S. (2008) Hygienic hand washing among nursing students in Turkey. Applied Nursing Research 21(4): 207–11.

Centers for Disease Control and Prevention. Centers for Disease Control and Prevention, n.d. Web. 02 Nov. 2012. <http://www.cdc.gov/ >.

Haas, J., and E. Larson. “Measurement of Compliance with Hand Hygiene.” Journal of Hospital Infection 66.1 (2007): 6-14. Print.

"Hand Hygiene Knowledge Questionnaire for Health-Care Workers." WHO. N.p., Aug. 2009. Web. 20 Feb. 2013.

Kennedy, M., and E. Burnett. "Hand Hygiene Knowledge and Attitudes: Comparisons between Student Nurses." Journal of Infection Prevention 12.8 (2011): n. pag. Print.

Thomas, Glenn. "WHO Highlights Importance of Good Hand Hygiene for Patient Safety." WHO. N.p., n.d. Web. 12 Apr. 2013.

"World Health Organization." Http://www.who.int/en/. N.p., n.d. Web. 20 Feb. 2013.

Appendices

Appendix A: Instrument

Hand Hygiene Knowledge Questionnaire for Nursing Students

Gender (circle one): Male Female

Semester (circle one): 2nd semester sophomore 1st semester Junior 2nd semester Junior 1st semester Senior 2nd semester Senior

Have you or do you work as a CNA/PCP/Nurse Intern (circle one): Yes No

1. **Did you receive formal training in hand hygiene in the last 3 years (circle one)?** Yes No

2. **Do you routinely use an alcohol-based handrub for hand hygiene (circle one)?** Yes No

3. **Which of the following is the main route of cross-transmission of potentially harmful germs between patients in a health-care facility? (circle one answer only)**
   A. Health-care workers' hand when not clean
   B. Air circulating in the hospital
   C. Patients' exposure to colonized surfaces (i.e., beds, chairs, tables, floors)
   D. Sharing non-invasive objects (i.e., stethoscopes, pressure cuffs, etc.) between patients

4. **What is the most frequent source of germs responsible for health care-associated infections? (circle one answer only)**
   A. The hospital's water system
   B. The hospitals air
   C. Germs already present on or within the patient
   D. The hospital environment (surfaces)

5. **Which of the following hand hygiene actions prevents transmission of germs <u>to the patient</u>?**

A. Before touching a patient Yes No
B. Immediately after a risk of body fluid exposure Yes No
C. After exposure to the immediate surrounds of a patient Yes No
D. Immediately before a clean/aseptic procedure Yes No

6. **Which of the following hand hygiene actions prevents transmission of germs <u>to the health-care worker?</u>**
   A. After touching a patient Yes No
   B. Immediately after a risk of body fluid exposure Yes No
   C. Immediately before a clean/aseptic procedure Yes No
   D. After exposure to the immediate surroundings of a patient Yes No

7. **Which of the following statements on alcohol-based handrub and handwashing with soap and water are true?**
   A. Handrubbing is more rapid for hand cleansing than handwashing Yes No
   B. Handrubbing causes skin dryness more than handwashing Yes No
   C. Handrubbing is more effective against germs than handwashing Yes No
   D. Handwashing and handrubbing are recommended to be performed in sequence Yes No

8. **What is the minimal time needed for alcohol-based handrub to kill most germs on your hands? (circle one answer only)**
   A. 20 seconds
   B. 3 seconds
   C. 1 minute
   D. 10 seconds

9. **Which type of hand hygiene method is required in the following situations?**
   A. Before palpitation of the abdomen Rubbing Washing None
   B. Before giving an injection Rubbing Washing None
   C. After emptying a bedpan Rubbing Washing None
   D. After removing examination gloves Rubbing Washing None
   E. After making a patient's bed Rubbing Washing None
   F. After visible exposure to blood Rubbing Washing None

10. Which of the following should be avoided, as associated with increased likelihood of colonization of hands with harmful germs?

A. Wearing jewelry	Yes	No
B. Damaged skin	Yes	No
C. Artificial fingernails	Yes	No
D. Regular use of a hand cream	Yes	No

Appendix B: Informed Consent

7/22/2013

Dear Colleague,

My name is Brittany Berger and I am a senior nursing student in the Honors-in-Discipline at East Tennessee State University. I am conducting a research project titled "Hand Hygiene Perceptions of Student Nurses."

The purpose of this research is to determine how student nurses in a baccalaureate nursing program in northeastern Tennessee perceive hand hygiene and the importance of conducting the act of hand washing. Students who don't perceive it as important, or do not have the correct information, are unlikely to use principles of good hand hygiene in their practice.

This survey will be completely confidential. Choosing to participate or to not participate will have no effect on your grades or standing in the College of Nursing. Your name and identifying information will appear nowhere on the survey, furthermore no professor outside of the research team will have access to the completed surveys. Confidentiality will be maintained; however the study personnel (Brittany Berger, Patricia Moore, and Rafie Boghozian) will have access to the completed surveys.

Participation in this research study is voluntary. You must be 18 years or older to participate. You may choose not to participate and can quit at any time. You may quit by not completing the written survey or leaving the survey blank.

If you have any questions, concerns, or problems related to the research study at any time you may contact Brittany Berger at (615) 426-7321 or the faculty advisor, Patricia Moore at (423)-439-4397. You may also contact the Chairman of the Institutional Review Board at (423) 439-6054 if you have any questions about your rights as a participant in this study. If you have any further questions or concerns about this study and would like to talk to someone not directly involved with the research team or you cannot reach the listed contact persons you may call an IRB Coordinator at (423) 439-6055 or (423) 439-6002.

Sincerely,

Brittany Berger