Vietnamese nursing students’ knowledge and attitudes to hospital-acquired infections and hygiene guidelines

An empirical cross-sectional study

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Abstrakt

**Titel:** Vietnamesiska sjuksköterskestudenters kunskap och attityder till vårdrelaterade infektioner och hygienrutiner.

**Kort bakgrund:** Ökade vårdrelaterade infektioner och särskilt antibiotikaresistenta sådana är ett globalt bekymmer. Följsamhet av hygienrutiner är grundläggande för det förebyggande arbetet. Kunskap och attityder är viktiga faktorer som påverkar implementeringar av försiktighetsåtgärder inom hälso- och sjukvården.

**Syfte:** Syftet med studien var att beskriva kunskap och attityder kring vårdrelaterade infektioner samt följsamheten av basala hygienrutiner till dessa hos vietnamesiska sjuksköterskestudenter i år 2, 3 och 4.

**Metod:** En empirisk tvärsnittsstudie där enkäter med fasta svarsalternativ besvarades av 235 sjuksköterskestudenter vid ett universitet i Vietnam.

**Resultat:** Resultatet visade att studenternas kunskap i överlag var måttlig. Tredjeårseleverna var de som visade upp bäst kunskap, andraårseleverna näst bäst medan fjärdeårseleverna visade upp den sämsta kunskapsnivån. Attityden till basala hygienrutiner visade sig för det mesta vara positiv. De frågor som eleverna svarade mest negativt på handlade om prioriteringar relaterat till tidsbrist och resurser, ansträngningen av att komma ihåg basala handhygienrutiner samt bekvämlighet med att påminna annan vårdpersonal. År 4 var de som hade minst positiva attityder medan det var jämnt mellan år 2 och 3.

**Konklusion:** Poängen för kunskapstestet om handhygien blev bättre från år 2 till 3 men sämre i år 4. Mängden positiva attityder inom ämnet var lika i år 2 och 3 men mindre positiva i år 4. Detta indikerar på att utbildning inom infektionskontroll bör fortlöpa under hela utbildningen. Det bör också belysas för kliniska handledare och annan vårdpersonal att de har ett ansvar att förstärka vikten av handhygien när framtida sjuksköterskor utbildas.

Nyckelord: Vårdrelaterade infektioner, kunskap, attityd, hygienrutiner, Vietnam
Abstract

Title: Vietnamese nursing students' knowledge and attitudes to hospital-acquired infections and hygiene guidelines.

Background: Increased hospital-acquired infections are a global concern. Compliance to hygiene guidelines is essential to prevent infections in health care. Knowledge and attitudes are important factors that affect implementations of precautions in health care.

Aim: The aim of this study was to describe the knowledge and attitudes of Vietnamese nursing students' in year 2, 3 and 4 regarding hospital-acquired infections and hygiene guidelines.

Method: An empirical cross-sectional study were 2 questionnaires with set responses was answered by 235 nursing students at a Vietnamese university.

Result: The result showed that the students’ knowledge was overall at a moderate level. The 3rd year students reported best amount of knowledge, 2nd year the next best and 4th year students reported the lowest. Students’ attitudes regarding hand hygiene were mostly positive. Questions students reported negative attitudes into were regarded priorities due to lack of time and resources, the effort of remember hand hygiene actions and comfort in reminding other health care workers. Students in 4th year were the ones with the least positive attitudes while year 2 and 3 were more equal.

Conclusion: The scores on the hand hygiene (HH) knowledge test improved from year 2 to year 3 but decreased in year 4. The amount of positive attitudes in the subject was equal in year 2 and 3 but less positive in year 4. This indicates that infection control training needs to be ongoing during all the education. We also think it should be highlighted to clinical supervisors and other HCWs that they have a responsibility to emphasize the importance of hand hygiene when teaching future nurses.

Keywords: Hospital-acquired infections, knowledge, attitudes, hygiene guidelines, Vietnam
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1. Background

Hospital-acquired infections (HAI) are infections not present or incubating at the time of the admission but occur when patients are at the hospital or after discharge. It also includes infections that health care staff acquire during time at work (World Health Organization, 2011). It is a major problem for patient safety since it leads to prolonged hospital stay, long-term disability and increased deaths. For the society this leads to massive additional financial burden. Another huge problem is that HAI implies increased resistance of microorganisms to antimicrobials (World Health Organization, 2011). Of every 100 hospitalized patients, 7 patients in developed countries and 10 patients in developing countries are affected by a HAI (World Health Organization, 2011). The most common types of HAI in USA and other industrialized countries are urinary tract infection, surgical site infection, bloodstream infection and pneumonia (Klevens et al. 2007). In developing countries the most frequently surveyed types of HAI are surgical site infection, affecting up to one-third of operated patients. World health organization (WHO) presented in their annual report 2007 that antibiotic resistance is a major threat to future health (World Health Organization, 2007). Cooperation between countries is essential to avoid contagious diseases (Folkhälsomyndigheten 2015).

In Vietnam health care has been more accessible compared to most other countries on a similar level of development (Mårtensson & Von Konow, 2015). A major challenge for The Western Pacific Region is, however, the increasing antibiotic resistance (World Health Organization, 2015). An observational study was performed in Vietnam to explore environmental barriers for implementation of routines in a resource-limited and crowded healthcare setting. They observed that in the respiratory ward it was common that patients shared beds and that it was maximum one meter space between the beds (Sax et al. 2007). Another observational study was performed at three different hospitals in northern Vietnam, in ICU: s concerning hygiene precautions. The staff showed highest adherence to demands to wear short-sleeved workwear 98.3 %, short or hair up 100 % and short nails without nail polish 98.3 %. Gloves were used correctly 86.7 % of the time. Hand disinfection was performed correctly 41.7 % of the time. There were no posters or other visible information on hygiene guidelines in the hospitals. Usually they washed their hands with soap and water and did not use alcohol-based handrub (AHR) (Johansson et al.
During another study done in Vietnam, hospital personnel had to undergo training in infection control according to WHO guidelines, followed by observations of how well the procedures were followed. Of the total 2813 hygiene occasions an average 47% compliance was achieved. Nurses were more likely to wash their hands compared to the rest of the healthcare staff consisting of administrators, cleaners, and technicians and physicians. For nurses, the average was 57%, and for physicians 34% (Salmon et al. 2014). Compliance to hygiene guidelines is essential to prevent infections in healthcare (The National Board of Health and Welfare, 2015b). In 2009 the Ministry of Health in Vietnam decided to follow WHO’s guidelines (World Health Organization, 2009). Several factors should be considered regarding infection prevention, such as education, costs, acceptable products and resources (World Health Organization, 2006).

Attitudes and knowledge regarding prevention in HAI and contaminations are important factors that need to be considered in order to resolve issues affecting the implementation of precautions in healthcare (Seibert et al. 2014). A complex combination of knowledge, skills and attitudes are factors that determines the clinical practice of healthcare professionals. When it comes to development in healthcare it has historically been focused at development of knowledge and competency in skill delivery which of both are simple to examine by for example a written exam or by observation. These are of course important factors when it comes to make the personnel practice in an evidence-based manner but literature has shown that it is not enough. What has been found to often be overlooked is the importance of attitudes in influencing clinical practice behavior. Attitudes cannot be taught in the same manner as knowledge and skills but are a product of the individual’s beliefs, professional and personal life experiences. In the example of infection control practices the health care worker itself must believe that change is necessary, and this must also be supported by senior clinical leaders (Wye & McClenahan, 2000).

In United Kingdom a study was conducted where both semi structured interviews, focus groups and questionnaires were used to determine barriers and levers to hand hygiene compliance among health care workers (HCW), categorized in themes. The theme most frequently mentioned was environmental factors where understaffing and lack of time was seen as barriers. The second most frequent theme mentioned
was cultural/social and it included peer pressure, teamwork and patient expectation. One nurse explained that she as a senior nurse wants to set a good example for everybody else. Regarding the theme knowledge/skills most nurses considered that they had good knowledge and skills and that was to them a lever. A number of participants thought, however, that basic training had not covered hand hygiene sufficiently, and some participants were not sure if they believed in the effectiveness of hand hygiene in infection prevention. Improvement strategies such as audit and feedback, posters and campaigns were seen as lever but participants experienced that over time strategies got desensitized and less effective. The consequences occurring with bad hand hygiene compliance did many participants experience as lever to perform adequate hand hygiene. Especially for them who had seen the serious consequences of HAI. Other consequences desired to be avoided were high costs due to infections and bad reputation both on person- and organization level. Internal motivation was a lever to good compliance while complacency was a barrier. Attitude was cited as a barrier and was referred to other individuals with negative attitude. Only one person described this trait in themselves and said that one of the biggest barriers is not the understanding but the attitude (Dyson et al. 2011).

In a Swedish study where a questionnaire was used to examine nurses’ knowledge of infection prevention only 12 % of 397 participants achieved full score. The participants estimated the grade of their own, politicians, head of departments and managers responsibilities for infection prevention and most people expressed that all categories have a "big" or "very big" responsibility. The authors imply that the lack of knowledge might indicate insecure care and that knowledge needs to be raised by education (Lindberg et al. 2012). According to The National Board of Health and Welfare (2015a) the head of the department have an obligation to ensure that personnel have adequate competence adapted to performed activities (The National Board of Health and Welfare, 2015a). A cross-sectional survey was conducted in United Kingdom to examine nursing students’ knowledge of infection control and investigate how university education and clinical practice influence the students’ infection control practices. The students reported University education as the main influence on knowledge and practice. It was followed by the influence of mentors, doctors, and other health care workers. Other factors affecting compliance to infection control practice were workload, time, and availability of facilities and
equipment. The authors highlight the importance of both theoretical and practical knowledge combined with competent role models (Hinkin & Cutter 2014).

1.1 Significance of the study
According to this background literature emphasize that education has an impact for how nurse’s later act in their profession and that attitudes is an important factor to follow precaution in health care. Therefore we wanted to explore how attitudes and knowledge were in nursing students during their time in training. By enlighten the subject it could give an idea of where efforts in education should be directed. Thereby future nurses may assimilate knowledge and gain a broader understanding of the importance of adherence to hygiene and thus prevent transmission of pathogenic agents. By identifying the source of inadequacy, improved guidelines as well as other quality improvements can be formed. An improved knowledge of infection prevention in nurses would increase patient safety and thereby contribute with positive effects on the economy by reducing the length of hospital stays (World Health Organization, 2005). With this in mind, we wanted to examine knowledge and attitudes for nursing students in year 2, 3 and 4 at Hanoi Medical University (HMU).

1.2 Overall aim
The aim was to examine Vietnamese nursing students’ in year 2, 3 and 4 regarding knowledge and attitudes about hospital-acquired infections and hygiene guidelines.

1.3 Theoretical framework

1.3.1 Theory of planned behavior
According to (Ajzen, 1991) and his “Theory of planned behavior” (TPB), human behavior in specific situations is a result of a person’s intention, which is built on three predictors: Attitude toward the behavior - Whether an individual’s attitude to an execution is positive or negative depends on how desirable the individual estimates the result of the execution to be in relation to how much it requires from the person. Subjective norms - Perceived social pressure to execute or not execute the behavior. From society or people of significance to the person like for example friends or teachers. Perceived behavior control - The perceived amount of resources to perform the behavior combined with past experiences, positive and negative.
Example of resource can be economical-, time- and knowledge resources. These factors are independent of each other and affects the behavior in different extents dependent on the situation. The stronger the intention and self-efficacy, the more likely it is that the execution gets performed.

1.3.2 Virginia Henderson
The American nurse, researcher and theorist Virginia Henderson (1897-1996) developed the Nursing Need Theory were she identified 14 human needs to define the focus in nursing. In particular 2 of them do we consider directly connected with the subject of this essay: “Keep the body clean and well-groomed and protect the integument” and “Avoid dangers in the environment and avoid injuring others”. We believe that avoiding spread of infections in health care is an important part of avoiding danger for the patient (Current nursing, 2012).

2. Methodology

2.1 Design
A quantitative method was used to conduct a cross section study to perform two different comparisons between nursing students in year 2, 3 and 4 in Vietnamese- and English speaking classes.

2.2 Sample
A convenience sample was used and participants were students from HMU. The university had 2 different nursing programs, Vietnamese speaking classes (VSC) and English speaking classes (ESC). Our supervisor described that VSC received their education in Vietnamese and ESC in English. The total number of HMU students in year 2, 3 and 4 were 373 which of 286 in VSC and 87 in ESC. For more details, we refer to table 2 in the result chapter.

2.2.1 Inclusion criteria
The participants needed to be nursing students from HMU and completed at least one course at the university highlighting the basic setup of hygiene in the importance of care.
2.2.2 Exclusion criteria

Students’ not attending classes at the time the questionnaires were distributed, did not participate.

2.3 Procedure

This study was made by two nursing students at Umeå University, Amanda and Marie. We believed it would be awarding to explore the culture and care in a developing country to expand our understanding of global differences and thus develop our assessment to patients from other cultures. We sent a project plan and were granted Minor Fields Studies, a SIDA founded scholarship that students from Swedish universities can apply for to travel to a developing country and write their essay about issues of importance to the economic, social, political or academic development of the country (Universitet och högskolerådet, 2016). With help from the international coordinator at our university we got in contact with the Vietnamese supervisor, Mr. Thruong, who made it possible to perform the study in HMU and facilitated to found suitable participants for the survey. Permission from the International Cooperation Department at HMU was performed. A schedule was coordinated by two nursing students from ESC year 4 that Mr. Thruong had appointed to be helpers during the distributions to all classes. The distribution took place for over a 1 week period. Both of us have been equally involved in the whole process during the study. That includes everything from searching articles, distribute questionnaires to the classes to writing the conclusion.

2.4 Data Collection

Questionnaires were distributed after classes to reach out to as many students as possible from each class. Verbal information was given by us in English and was translated to Vietnamese by our helpers. Data was collected with two different questionnaires with set responses. Quantitative surveys are characterized by structuring (Holme & Krohn Solvang 1997, 80) as these questionnaires were. Both questionnaires were borrowed from other studies with the authors’ approvals (Appendix 1 and 2). All students first answered the knowledge questionnaire and then the attitude questionnaire to not potentially be affected of the latter.
The first questionnaire "Hand Hygiene Belief Scale" is a Likert Scale created by Thea F. Van de Mortel and has been controlled by 3 different experts in infection control. The experts determined the reliability and validity of her material. Two pilot tests were conducted to make sure that the participants found it readable, easy to understand and had no redundant information. After collecting the suggestions, modifications of the statements was conducted to increase the validity of the questionnaire (Van de Mortel et. al 2012). It consists of 22 claims about attitudes to HAI and hygiene guidelines (Appendix 3) like for example “Hand hygiene is considered an important part of the curriculum” and “Performing hand hygiene in the recommended situations can reduce patient’s mortality”. Students are allowed to pick between different statements on a scale from 1 (strongly disagree) to 5 (strongly agree).

The other questionnaire “Hand Hygiene Knowledge Questionnaire for Health-Care Workers” by World Health Organization emphasize the students’ knowledge about correctly performed hand hygiene (Appendix 4) and starts with demographical data such as age, sex and education level. Then questions were asked if students received education in hand hygiene and infection control and if they routinely use AHR. At last it allowed the students to pick between different answer alternatives at 8 questions, some of them with sub queries were 1 answer per sub queries was the correct one. It contained multiple choices and “yes” or “no” questions. An example of a question was “Which of the following is the main route of cross-transmission of potentially harmful germs between patients in a health-care facility?” followed by the answering alternatives “a. Health-care workers hands 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”. The questionnaire is originally part of “WHO Multimodal Hand Hygiene Improvement Strategy” that is aimed to help health-care facilities to implement improvements in hand hygiene. It was developed after WHO had their first “Global Patient Safety Challenge (1stGPSC)” “Clean care is safer care” that was launched in 2005. “New global Guidelines on Hand Hygiene in Health Care” was developed during 4 years work with help from more than 100 international experts and have been tested in different parts of the world in both modern hospitals in developed countries and in poor-resource villages around the world.
Recommendations were based on evidence such as literature and already existing international infection control guidelines. It was in accordance to these guidelines “WHO Multimodal Hand Hygiene Improvement Strategy” including “Hand Hygiene Knowledge Questionnaire for Health-Care Workers” was developed. Pilot sites were conducted and validity and reliability of the interventions in the implementation toolkit (including the questionnaire used in this study) were tested before the concept was published 2009 (World Health Organization, 2009).

An accompanied letter (Appendix 5) gave the participants written information about the aim of the study, reminded them that it was voluntary to participate and that collected data would be handled anonymous. The reason questionnaires and convenience selection were selected were partly based on the language barrier and time limit for the study. It is important for the validity to control that the collected data is truthful (Eliasson 2010, 17) and all data in this study have been controlled twice after getting inserted to SPSS.

Translating of the questionnaires were done by two intermediaries, both speaking and understanding Vietnamese and English. One of them had a background in nursing and the other in interpreting. The interpreter translated the material to Vietnamese and the one with knowledge of health care controlled that it were translated correctly. Mr. Thruong added some demographical alternative to make it easier for us to analyze the data and make possible correlations. “Year” was added and also the alternative “program” where students could pick between “Vietnamese” or “English”. “Age” was changed to “Year of birth” because Mr. Thruong explained that Vietnamese people have a special system to count their age. He also adapted the alternatives on “department” so it better applied to the study population. The original question “Did you receive formal training in hand hygiene in the last three years?” was complemented with “Did you receive formal training in infection control in the last three years?”. This was because students in VSC read a course in infection control in semester 2 which ESC did not. He also added 2 lines where students should write the year they last received infection control and hand hygiene.
2.5 Pilot test
A minor group of 5 Swedish nursing students in year 3 from Umeå University was issued. The group matched the inclusion criteria. In average, the questionnaires were submitted after 15 minutes. It is important to do a pilot test to control if the questionnaire really works before using them on the target population (Bell 2006, 149). The minor group found both questionnaires readable and feasible do conduct.

2.6 Data analyzes
Analyzing of collected data was carried out in IBM Statistical Package for the Social Sciences, SPSS 23. When the raw data is transferred to SPSS, the data must be thoroughly checked (Olsson & Sörensen 2011, 192). When all the data were put into SPSS it was double-checked by one of us who controlled that the encoding had been entered properly while the other read the answers from every questionnaire out loud. In SPSS descriptive statistics were used to analyze data and present it in tables.

2.6.1 Questionnaire about knowledge
The knowledge questionnaire was analyzed by using 4 different methods. The first part of the questionnaire, consisting demographics, were presented in numbers and percent. The second method was used on question 9-16. These questions formed a knowledge test that were analyzed separately and compared between the different groups by using cross tabulations and Pearson's chi-square test. The results were presented in numbers and percent. In the third method students were categorized into three different levels of knowledge based on the percent of their total score on the knowledge test. In the fourth and final step the groups’ total score on the knowledge test (question 9-16) were compared between each other. The mean scores were compared and significance tested using Independent samples T-test and the median of score were compared and significant tested using Mann-Whitney U test.

2.6.2 Questionnaire about attitudes
Each of the 22 questions concerning attitudes were analyzed separately. The median of correct answers were compared between groups and significant tested with Mann-Whitney U test. It is a nonparametric test that explores whether two data samples are different. When reporting descriptive statistics from a nonparametric test such as Mann-Whitney U test the median and range should be given instead of mean and
standard deviation (Brace et al. 2012, 133). In this case median (md) and interquartile range (IQR) are presented. If the questions had a positive outcome such as "hand hygiene is considered an important part of the curriculum", then response 1 gave 1 point, response 2 gave 2 points and so on. If the question had a negative outcome, e.g. question number 22: "cleansing hands after going to the toilet can’t reduce transmission of infectious diseases" then reversed scored items were used. Response 1 gave 5 points, response 2 gave 4 points. The maximum score on the test was 5 and the minimum was 1. After recoding the items into different variables, the result could be summarized and analyzed by using Mann-Whitney U-test in SPSS. Students’ with the highest scores had the best attitude concerning hand hygiene.

2.7 Ethical considerations
According to the Swedish law of ethical reviews studies like this do not need ethical review since the study were not conducted in Sweden and no personal data were collected (SFS 2003:460). However, the project plan was first consulted by the Swedish supervisor regarding ethical considerations. Then the Vietnamese supervisor were in contact with the International Cooperation Department in HMU regarding permission to conduct this study. The permission was preceded by ethical consideration.

When we met the students, sufficient information, both written and verbal was provided to clarify the main purpose of the study and how the data would be used. Personal contact between the actors and the participants may build up a cooperation approach (Bell 2006, 150). If a person with authority over the group, for example a teacher, encourage the students to participate you often get a high answering frequency (Eliasson 2010, 30). An ethical aspect of this is that it may have made it more difficult for students to refuse to participate in the study. That is why it was even more important for us to make sure that they understood that it was voluntary to participate. The collected data has been handled with accuracy to not disclose any information from the participants to unauthorized persons. To protect the anonymity of the small number of male participants analyzes of sex were sparsely done. In conclusion, “The declaration of Helsinki” states that researchers must protect the dignity, integrity, right to self-determination and confidentiality for personal records.
when humans are involved in research (WMA, 2013). In this study all of those obligations have been respected and followed.

3. Results

3.1 Guide to the result chapter
This is a small introduction to the result which is divided into different chapters. Chapter 3.2.1 describes demographics of all participants. Chapter 3.3 describes results from the knowledge test. It is analyzed and presented in 3 different ways and therefore it is divided into 3 subchapters. Chapter 3.4 presents results from the attitude questionnaire from which only 1 analyze was done.

3.2 Results from nursing students in year 2, 3 and 4 at HMU

3.2.1 Demographics

<table>
<thead>
<tr>
<th>Table 1. Demographical characteristics</th>
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<tbody>
<tr>
<td>Demographic facts</td>
</tr>
<tr>
<td>Sex</td>
</tr>
<tr>
<td>Man</td>
</tr>
<tr>
<td>Woman</td>
</tr>
<tr>
<td>Missing</td>
</tr>
<tr>
<td>Year of birth</td>
</tr>
<tr>
<td>1993</td>
</tr>
<tr>
<td>1994</td>
</tr>
<tr>
<td>1995</td>
</tr>
<tr>
<td>1996</td>
</tr>
<tr>
<td>1997</td>
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<tr>
<td>Missing</td>
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<td>Occupation</td>
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<td>VSC</td>
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<tr>
<td>ESC</td>
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<tr>
<td>Missing</td>
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<tr>
<td>Grade</td>
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<td>3</td>
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Table 1 shows that students were born in 1993-1997 and 91.5 % were women.

### Table 2. Distribution of students.

<table>
<thead>
<tr>
<th>Classes and (N)</th>
<th>total number of students in the classes</th>
<th>Questionnaires completed and returned= n</th>
<th>External non responses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Year 2 (137)</td>
<td>111</td>
<td>26</td>
<td></td>
</tr>
<tr>
<td>Year 3 (89)</td>
<td>57</td>
<td>32</td>
<td></td>
</tr>
<tr>
<td>Year 4 (147)</td>
<td>63</td>
<td>84</td>
<td></td>
</tr>
<tr>
<td>Missing (4)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Total: 373</strong></td>
<td><strong>231</strong></td>
<td><strong>142</strong></td>
<td></td>
</tr>
</tbody>
</table>

*Classes* = Total number of students in VSC and ESC together. *Questionnaires completed and returned* = Questionnaires distributed, completed and returned. *External non responses* = Students not attending classes. *Missing* = Returned questionnaires in which students had not completed during their class.

In table 2, all students in the column “questionnaires completed and returned” answered both questionnaires about knowledge- and attitudes. VSC returned 177 questionnaires and ESC 58.

### 3.2.2 Demographics concerning hand hygiene

The students were asked if they had received formal training in infection control (IC) respectively hand hygiene (HH) in the last 3 years. In all VSC classes >85 % answered that they received it in IC and >84 % in HH. All students in VSC 4 responded “yes” to both questions. In ESC, the number of students stating that they had received formal training in IC was noticeably lower (Year 2: 19 %, Year 3: 25 %, Year 4: 38.9 %). When it came to HH, a majority of the students stated that they had received formal training (Year 2: 72.7 % Year 3: 100 % Year 4: 88.2 %). The students were asked if they frequently used AHR for hand hygiene, 198 (84.3%) out of 222 students answered that they did.

### 3.3 Results from the knowledge test

#### 3.3.1 Example of questions from knowledge test in year 2, 3 and 4

Most students knew that HCW’s hands are the main route of cross transmission of germs. However, not many students knew that germs already present on or within
the patient is the most frequent source of germs responsible for HAI. The most correctly answered statement regarding AHR and hand washing was that hand rubbing with AHR is more rapid for hand cleansing. There were varying but overall low numbers of students (<52, 5%) who knew that hand rubbing is more effective against germs than hand washing. Not many knew that hand rubbing does not cause more skin dryness than hand washing (<13, 2%). About half of the students knew that the minimum time for hand rub was 20 seconds. When asked about which type of hand hygiene method is required in specific situations, most correct answers were found after visible exposure to blood (washing). Most of the students knew that wearing jewelry, damaged skin and artificial nails should be avoided, as associated with increased likelihood of colonization of hands with harmful germs. All questions are detailed presented in table 5 in appendix 6.

3.3.2 Level of knowledge regarding hand hygiene

Table 3. Level of knowledge regarding hand hygiene year 2, 3 and 4.

<table>
<thead>
<tr>
<th>Hand hygiene knowledge</th>
<th>Total students (n=231) (n) %</th>
<th>Year 2 (n=111) (n) %</th>
<th>Year 3 (n=57) (n) %</th>
<th>Year 4 (n=63) (n) %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low</td>
<td>(30) 13,0%</td>
<td>(14) 12,6%</td>
<td>(4) 7,0%</td>
<td>(12) 19,1%</td>
</tr>
<tr>
<td>Moderate</td>
<td>(192) 83,1%</td>
<td>(93) 83,8%</td>
<td>(51) 89,5%</td>
<td>(48) 76,3%</td>
</tr>
<tr>
<td>Good</td>
<td>(9) 3,9%</td>
<td>(4) 3,6%</td>
<td>(2) 3,5%</td>
<td>(3) 4,8%</td>
</tr>
</tbody>
</table>

In table 3 the students were divided into 3 categories based on how many points they managed to get at the knowledge test. The maximum obtainable score was 25. The students who obtained a score of more than 75% were presented in the column “good”, students with a score of 50-74% were put in “moderate” and students with scores of less than 50% where taken as ”poor”. Of total 231 students most were placed in “Moderate”.

3.3.3 Total scores of the knowledge test in median and interquartile range

The total scores on the knowledge test were compared between groups. Significance was tested with Mann-Whitney U test. The median indicates that year 3 had the highest scores (md: 16, 0 IQR: 3, 0) but year 2 (md: 15, 0 IQR: 3, 0) had higher
median than year 4 (md: 14, 0 IQR: 4, 0). There were 2 significant differences related to the final result each class obtained in the knowledge test. Between year 2 and year 3 (P =0,026) and between year 3 and year 4 (p=0,023).

3.4 Attitudes in year 2, 3 and 4 regarding hand hygiene

Table 4. Attitudes in year 2, 3 and 4 regarding hand hygiene presented in Md and IQR.

<table>
<thead>
<tr>
<th>Statements regarding attitudes in hand hygiene</th>
<th>Year 2</th>
<th>Year 3</th>
<th>Year 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Hand hygiene is considered an important part of the curriculum.</td>
<td>5.0 (1,0)</td>
<td>5.0 (1,0)º</td>
<td>4.0 (1,0)†</td>
</tr>
<tr>
<td>2. The facilities in which I do clinical practicum emphasize the importance of hand hygiene.</td>
<td>4.0 (1,0)</td>
<td>4.0 (1,0)</td>
<td>4.0 (0,0)</td>
</tr>
<tr>
<td>3. The importance of hand hygiene is emphasized by my clinical supervisors.</td>
<td>5.0 (1,0)</td>
<td>4.0 (1,0)º</td>
<td>4.0 (0,0)†</td>
</tr>
<tr>
<td>4. I have a duty to act as a role model for other health care workers.</td>
<td>4.0 (1,0)</td>
<td>4.0 (1,0)</td>
<td>4.0 (0,0)</td>
</tr>
<tr>
<td>5. When busy it is more important to complete my tasks than to perform hand hygiene.</td>
<td>3.0 (4,0)</td>
<td>4.0 (1,0)º</td>
<td>3.0 (2,0)</td>
</tr>
<tr>
<td>6. Performing hand hygiene in the recommended situations can reduce patient mortality.</td>
<td>5.0 (1,0)*</td>
<td>4.0 (1,0)</td>
<td>4.0 (1,0)†</td>
</tr>
<tr>
<td>7. Performing hand hygiene in the recommended situations can reduce medical costs associated with hospital-acquired infections.</td>
<td>5.0 (1,0)</td>
<td>5.0 (1,0)º</td>
<td>4.0 (1,0)†</td>
</tr>
<tr>
<td>8. I can’t always perform hand hygiene in recommended situations because my patient’s needs come first.</td>
<td>4.0 (1,0)</td>
<td>4.0 (1,0)º</td>
<td>3.0 (2,0)†</td>
</tr>
<tr>
<td>9. Prevention of hospital-acquired infection is a valuable part of a health care worker’ role.</td>
<td>5.0 (1,0)</td>
<td>5.0 (1,0)º</td>
<td>4.0 (1,0)†</td>
</tr>
<tr>
<td>10. I follow the example of senior health care workers when deciding whether or not to perform hand hygiene.</td>
<td>4.0 (1,0)</td>
<td>4.0 (1,0)º</td>
<td>3.0 (2,0)†</td>
</tr>
<tr>
<td>11. An infectious disease contracted in the health care setting may threaten my life or my career.</td>
<td>4.0 (1,0)</td>
<td>4.0 (0,0)</td>
<td>4.0 (0,0)</td>
</tr>
<tr>
<td>12. I believe I have the power to change poor practices in the workplace.</td>
<td>4.0 (1,0)</td>
<td>3.0 (1,0)º</td>
<td>4.0 (0,0)†</td>
</tr>
<tr>
<td>13. Failure to perform hand hygiene in the recommended situations can be considered negligence.</td>
<td>3.0 (2,0)</td>
<td>3.0 (2,0)º</td>
<td>4.0 (2,0)</td>
</tr>
<tr>
<td>14. Hand hygiene is a habit for me in my personal life.</td>
<td>4.0 (1,0)</td>
<td>4.0 (0,0)</td>
<td>4.0 (0,0)</td>
</tr>
<tr>
<td>15. I am confident I can effectively apply my knowledge of hand hygiene to my clinical practice.</td>
<td>4.0 (0,0)</td>
<td>4.0 (0,0)</td>
<td>4.0 (0,0)</td>
</tr>
</tbody>
</table>
16. It is an effort to remember to perform hand hygiene in the recommended situations. & 3,0 (2,0) & 3,0 (2,0)° & 2,0 (1,0)† \\
17. I would feel uncomfortable reminding a health professional to hand wash. & 3,0 (2,0) & 3,0 (2,0) & 3,0 (1,0) \\
18. Performing hand hygiene slows down building immunity to disease. & 4,0 (1,0) & 3,0 (2,0)° & 2,0 (1,0)† \\
19. Dirty sinks can be a reason for not washing hands. & 2,0 (1,0)* & 2,0 (0,0) & 2,0 (1,0) \\
20. Lack of an acceptable soap product can be a reason for not cleansing hands. & 2,0 (2,0) & 2,0 (1,0) & 2,0 (1,0)† \\
21. Performing hand hygiene after caring for a wound can protect from infections. & 4,0 (1,0) & 4,0 (1,0) & 4,0 (1,0) \\
22. Cleansing hands after going to the toilet can reduce transmission of infectious diseases. & 5,0 (1,0) & 5,0 (1,0)° & 3,5 (3,0)† \\

Pearson Chi-Square ($P = <0,05$). * means that it was a significant difference between year 2 and year 3 $P = <0,05$. ° = means that it was a significant difference between year 3 and year 4 $P = <0,05$. † = means that it was a significant difference between year 2 and year 4 $P = <0,05$.

In table 5 are md and IQR of the students’ attitudes from a Likert Scale ranged from “1 strongly disagree”-“5 strongly agree”. High numbers showed a positive attitude. When questions were asked that should have a negative outcome the numbers were reversed so that “1 strongly disagree” gave 5 points. Test of significance was done with Mann-Whitney U test. Overall students reported positive attitudes but in some questions negative attitudes shined through, especially in question 19 and 20. There were several significant differences found, most of these were between year 3-4 and 2-4. In these questions year 4 often had the most negative attitudes. For example all classes seemed to think it was somewhat an effort to remember to perform hand hygiene in recommended situations but year 4 had most problems with it despite their longer experience in clinical practice. Year 4 were most reluctant to agree that cleansing hands after going to the toilet can reduce transmission of germs, in opposite to the other classes. Out of the three groups, year 2 students considered that their clinical supervisors emphasized the importance of hand hygiene to the highest extent, even if all thought so.
4. Discussion

4.1 Result Discussion

The aim with this study was to examine Vietnamese nursing students regarding knowledge and attitudes about hospital-acquired infections and hygiene guidelines. It turned out that the knowledge score first increased from year 2-3 but then decreased in year 4. Students’ attitudes in year 2 and 3 were quite equal but decreased in positivity in year 4. This study’s discovery is consistent with the survey made of Celik and Kocasli (2008) who conducted an observational study in Turkey comparing the execution of hand washing techniques of student nurses. The fourth years in that study presented a poorer performance than the second and third year students. The authors believed that the explanation was that there had been significant gap in the education of those students within their nursing course. In another study from United Kingdom (Cole 2009) a student was quoted saying something within the same theme ‘I think my compliance was particularly good in the first year just after we had our training and passed our OSCE. Training acts as a reminder.’ Dentist students’ in primary oral health care institutions in Bangkok were investigated to see their effectiveness of hand hygiene based on different areas, for instance, 2 different self-reported questionnaires related to knowledge and attitudes. The participants were undergraduate- (1st, 2nd and 3rd year) and postgraduate students’. The result in the knowledge test were similar in all classes, but the 1 year undergraduate students had the highest scores related to attitudes about effectiveness in hand hygiene. The study concluded that the attitudes gradually become more decreased the more clinical experience students had (Yaembut et al. 2012). There are however studies with contradictory results from this study and those above mentioned. In a Scottish study the attitudes and knowledge regarding hand hygiene practice of student nurses’ were slightly better reported by third year students than second year students (Kennedy & Burnett 2011) and in the Italian study the nurse students’ hand hygiene scores improved over the duration of the course (Van de Mortel et al. 2012).

In this study the 4th year students were significantly more likely than year 2 and 3 to follow the example of other health care workers when deciding whether or not to perform hand hygiene. In the earlier mentioned study from United Kingdom the first year students instead were the ones who significantly were most likely to be
influenced by other HCWs which the authors believed had to do with their inexperience and novice status (Hinkin & Cutter, 2014). Lymer et al. (2004) suggests that it should be the other way around, nursing students are in an ideal position to share good hand hygiene knowledge with the qualified staff. However, all classes in this study reported that they would feel somewhat uncomfortable in a situation where they would have to remind another health professional to hand wash. This is in line with (Ajzen, 1991) Subjective norms- Perceived social pressure to execute or not execute the behavior. It could be that even if students know what is right or wrong, the solidarity and the feeling to ‘fit-in’ has a stronger impact and that they do not want to make a fuss. With a survey it was found that role models in clinical practice were important for the students - they have an influence factor related to adherence of hygiene guidelines. On the other hand, nursing students’ also felt that they needed to ‘fit-in’ in the clinical area and had to assimilate compliance of hand hygiene. They felt that they could not query their supervisor’s actions and statements because it could end up in an uncomfortable relationship (Barrett & Randle, 2008). Blais et al. (2006) writes that socialization has an impact in the student’s further role to become a nurse and their compliance to hygiene guidelines. By attaching into a group of people, adjusting of different behaviors and norms can be shown in practice. Fundamental principles learned from school can be faded and a pattern of worsening compliance to HH can appear, including attitudes and behaviors. To get socialized into a profession it is important to internalize personal values and norms comparing to attitudes and characteristics of the profession (Blais et al 2006, 100-110).

In our study, most of the students thought that HH is an important part of the curriculum. They also thought that both HCW’s and the clinical supervisor emphasized the importance of HH. One of the most important factors in nursing education program is the clinical practice that constitute a vital part for the nursing students. During clinical practice, the students have the opportunity to combine their theoretical practice in school with clinical practice in wards and are willing to apply concepts, attitudes and knowledge from their education (Tiwari et al. 2005). Though it is fundamental to implement all learning from school into clinical practice, the reality do not always reflect the curriculum which affect the student negatively (Ward, 2010). HCW’s behavior has a crucial role for students in affecting compliance to HH. Positive attitudes to basic hygiene routines in wards gives motivation to perform
these guidelines (Whitby et al. 2006) and the opposite for negative attitudes (Lohiniva et al. 2015). If the working team has a negative influence and non-acceptable compliance to HH, it will probably affect the daily work. Bad habits in wards can easily be assimilated (Erasmus et al. 2009). The clinical supervisors need to be aware of their own position and how they can influence the students to increase their basic skills. HCW’s need to remind themselves that they are role models for future nurses. Bad influence from supervisors and impregnated social norms will affect the learning for students (Erasmus et al. 2009).

Perceived behavior control is based on the perceived amount of resources to perform the behavior combined with past experiences, positive and negative (Ajzen, 1991). The first resource we identify regarding compliance to hand hygiene is knowledge. In the knowledge test the students overall had moderate knowledge so there is room for improvement. However, our perception is that knowledge is not the only culprit for the students to execute inadequate hand hygiene. Regarding the Hand Hygiene Importance Belief Scale, some of the statements might be more complex to take a stand at than others. This is since compliance to hand hygiene depends on more factors than the health care professional in person. Statement 5: “When busy it is more important to complete my tasks than to perform hand hygiene” and Statement 8: “I can’t always perform hand hygiene in recommended situations because my patient’s needs come first” both concern priorities due to time and workload. At statement 5, both year 2 and 4 reported insecurity of their attitudes. Year 4 also showed insecurity on item 8. A qualitative interpretive design was conducted in United Kingdom to examine nursing students’ attitudes of hand hygiene practices in clinical settings to see if there were any factors that could affect the students and HCWs adherence to hygiene guidelines. It was 10 preregistration students that participated in a semi-structured interview. The students perceived that compliance had been affected by specific barriers such as lack of time, heavy workload, worsening skin damage and overall did they want to adjust after other healthcare professionals. Another barrier they perceived was the time it takes to perform hand hygiene which they incorrectly believed took a lot longer time than what it really does (Barrett & Randle, 2008). Health care settings in countries with limited resources also have other factors necessary to recognize. Worth noticing was that 2 of the few questions from the Hand Hygiene Importance Belief Scale that stood out by getting
negative answers concerns the subject resources. The questions were “Dirty sinks can be a reason for not washing hands” and “Lack of an acceptable soap product can be a reason for not cleansing hands”. All classes reported a low number on both questions. In Vietnam there are several factors that infect the compliance to hand hygiene. The maintenance and the quality of the water supply and water system is a concern in health care facilities. In addition to this, the resources also affect the hygiene routines which can lead to HAI. For instance, there are dysfunctional sinks and lack of equipment such as soap in the facilities that makes a barrier for HCWs to perform fundamental hand hygiene. AHR are often only available in wards with high-risk patients which makes it more inaccessible for HCWs to do easy prevention against harmful germs (Salmon et al. 2014). In the Intensive Care Unit (ICU) the distance between patients’ beds were maximum half a meter. A clinical trolley was shared by several patients and contained clinical consumables, waste receptacles and a single AHR. The trolley was used by the clinical staff for aseptic/clean procedures and was seldom disinfected before use. In a resource limited healthcare environments it is not uncommon with overcrowding and several patients in one patient zone. It is often too little or no space between beds. These are the conditions that challenge healthcare workers abilities to follow WHOs guidelines (Salmon & McLaws, 2015).

To return to Ajzen’s (1991) PBT, we do not know the students’ past experiences, e.g. if they have witnessed the consequences of bad compliance to hygiene guidelines such as patients suffering from HAIs, or if their have experienced that nursing tasks must be executed fast and effective in order to get done. Ajzen (1991) also means that the attitude towards a behavior depends on the outcome of the execution in relation to effort needed. It could be the case that it is easier to see the short term rewards of for example fast work rather than the long term consequences as infections.

Based on the result of this study and the literature it refers to, we got the impression that several factors could contribute to the findings of this study that attitudes and knowledge decreases with time in education. It might be a complex mix of a gap in time for the students in year 4 since they received training in infection control. It could be that they have spent more time in clinical practice and adapted after others, sometimes bad habits, behaviors and social norms. Since forth year students have the most clinical experience they would likely also be the ones who seen and experienced the limitations due to resources more than the other classes.
4.1.1 Clinical practice in nursing

All students highly agreed with item 9 on the Hand Hygiene Importance Belief Scale that prevention of hospital-acquired infections is a valuable part of a healthcare worker’s role. By practicing adequate hand hygiene you decrease the risk of exposing patients to infections that mean more suffering and longer hospital stays. As we interpret Henderson’s definition it is a part of a nurses’ role: “The unique function of the nurse is to assist the individual, sick or well, in performance of those activities contributing to health or its recovery (or peaceful death) that he/she would perform unaided if he/she had the necessary strength, will or knowledge. And to do this in such a way as to help him/her gain independence as rapidly as possible” (Henderson 1966, 15). It is consistent with ICN’s 4 fundamental responsibilities: To promote health, to prevent illness, to restore health and to alleviate suffering (International Council of Nurses 2014, 3).

4.2 Method discussion

Quantitative method is characterized by structuring and a high degree of steering from the researcher. This enables generalization of the data (Holme & Krohn Solvang 1997, 87). Its’ weakness mainly lies in that it is more unlikely to get the broad and deep understanding for the phenomena that you can get by using a qualitative method (Holme & Krohn Solvang 1997, 80). Advantages with questionnaires with set responses are that they often are perceived as easy to answer which results in a big response rate. The researcher does not need to decode the responses in the same manner as with open questions which reduces the risk of decode errors. A disadvantage with set responses is that the questionnaires are designed in a way that might limit the participant’s possibilities to give the answer they perceive answer the question best (Eliasson 2010, 37). In this way the researcher can get exact but superficial information (Holme & Krohn Solvang 1997, 82-83).

4.2.1 Ethical consideration

One ethical reflection concerns the risk of misunderstanding due to the language barrier between us and the students. Since the verbal information was given by the two helpers from year 4 in Vietnamese we can only rely on that they rendered all information about the study to the students. But the fact that a professional
interpreter were involved in the translation of the written accompanied letter they received decreased the risk.

4.2.2 Missing data
According to Holme & Krohn Solvang (1997, 200) variables with high non-responses should not be analyzed. That was why we chose to not present the analyze of two demographic questions that the Vietnamese supervisor added were students should write the year they latest received formal training in hand hygiene and infection control. Questionnaires not fully completed were not excluded, the information from the rest of the questions were still analyzed. The exception was when “year” and “program” were unanswered, those questionnaires were excluded since the analyzing and comparisons in SPSS were dependent on that information. A well prepared and designed survey should be able to get a response rate at about 70% (Ejlertsson 2014, 13). Our study had an external non responses at 38%, this number represent the students not attending at the classes. The internal non responses were only 4 students. Still the number of external students missing from the study is worth noting when reading the results of this study.

4.2.3 Validity and reliability
Validity regarding the questionnaires means that they measure what they are intended to measure while reliability means whether repeated measurements give the same result (Ejlertsson 1996, 86). In this study questionnaires were used that already had been designed and tested for validity and reliability. A faulty translation of the questionnaires could have affected the reliability but now it was properly done. It was not an alternative to distribute the material in English since the knowledge of the language are poor in Vietnam and most of the students in VSC did not know the language. Technical terms should be avoided as much as possible unless you are absolutely sure that the participants understands the terms correctly (Eliasson 2009, 39). Our surveys were designed on the basis of medical terms but the WHO knowledge questionnaire includes a glossary and both questionnaires addresses to health care workers and students such as nursing students. Questionnaires that examines knowledge should be avoided in situations when the respondents have a possibility to look up the answer after reading the question, it affects the reliability because it is impossible to know if the knowledge shown on the test were there from
the beginning or not (Ejlertsson 1996, 51). We were present during the whole time between the distribution and collection of the questionnaires. The students did not have any electronics at the occasion.

4.2.4 Attitude questionnaire
The questionnaire was a 5-point scale. An advantage was that questions had several possible answers, which creates the opportunity for the participants to choose an option that suits them and experiencing the options as satisfying (Eriksson & Wiedersheim-Paul 2011, 105). According to Eliasson (2010, 40) questions about attitudes and values can easily be leading questions, which affect the result. Respondents tend to exaggerate their answers because they want to leave answers that are socially desirable and match the norms of the society (Ejlertsson 1996, 59). The authors do not find it unlikely that the students have adjusted their answers a bit after what they believe they are supposed to answer.

4.2.5 Knowledge questionnaire
In some cases it can be motivated to not have the alternative “Don’t know”. For instance, it can be a way for the participant to avoid having to take a stand in a question. But when there are questions that participants might not have enough knowledge to take a stand in there should be an alternative for “I don’t know” (Ejlertsson 1996, 65). It is missing in the WHO knowledge test and we believe it could have given a more reliable result if it was there because the students now had to either guess or refrain from the question if they did not know the answer.

After looking at the result of the data analyzing we have some critical thoughts about the knowledge questions “Which of the following hand hygiene actions prevents transmission of germs to the patient?” and “Which of the following hand hygiene actions prevents transmission of germs to the health-care worker?”. It gives the impression that either the students did not know the correct answers or did they not quite understand the questions. Afterwards we realized that the questions can be interpreted differently. A third alternative is that they did not read the questions carefully enough, but the word “to the patient” and “to the healthcare worker” were underlined. When the pilot test were conducted on the Swedish nursing students the results were different and there were no misunderstandings.
4.2.6 Sample
A disadvantage with convenience sample is that you cannot generalize or apply conclusion and results for a larger proportion. The result only applies to the study population (Eliasson 2010, 51). Because of time limit we had to use a defined study population consisting of nursing students at one university.

4.2.7 Distribution of questionnaires
As discussed in ethic review the advantage with the authors personally distributing the questionnaires were that it may have contributed to the low non responses among students present. One thing the authors noticed at the distribution occasions were that students sometimes chatted with each other meanwhile they answered the questionnaires. It is a possibility that some of them were comparing their answers or helping each other. However most students answered their questionnaires in silent.

4.2.8 Analyze method
It is important that the raw data has high quality to make the study meaningful. It is also important how the variables will be coded and registered. All calculations should be done through the computer since this is both faster and safer (Olsson & Sörensen 2011, 190-191). All calculations in this study were made in SPSS to avoid miscalculation. A potential weakness was that we were not used to working with SPSS which could have led to beginner’s mistakes. To avoid mistakes, coding has been done with help from the literature ‘SPSS for psychologists’ that illustrates how to proceed step by step (Brace et al 2012). Analyze methods have been chosen after the variables levels of measurement. For instance with ordinal variables median was used as central tendency and quartiles as measures of variation as appropriate (Eliasson 2010, 71). Pearson’s Chi-square can be used for nominal and ordinal scales (Eliasson 2010, 96) as also Mann-Whitney U test is (Brace et al. 2012, 133).

5. Conclusion
The aim with this study was to describe the knowledge and attitudes of Vietnamese nursing students’ in year 2, 3 and 4 regarding hospital-acquired infections and hygiene guidelines. We found that the students in year 3, based on the knowledge test, had the best results followed by 2nd year. Year 4 had less knowledge. In the questionnaire about attitudes, year 2 and 3 had similar results. In this test, year 4 had
less positive attitudes in comparison with the other classes. Questions students reported negative attitudes into were regarded priorities due to lack of time and resources, the effort of remember hand hygiene actions and comfort in reminding other health care workers. In the introduction to this study we expressed hopes that the results of this study could give an idea of where in education actions to prevent hospital-acquired infections should be directed. Our suggestion to increase positive attitude and knowledge about hygiene guidelines is due to results of comparison between students in year 2, 3 and 4 that education and training should proceed during all stages of nursing students’ education to act as a reminder. We also think it should be highlighted to clinical supervisors and other HCWs that they have a responsibility to emphasize the importance of hand hygiene when teaching future nurses. Our suggestion to future research within the subject is to keep examine barriers between what has been taught in school and how to translate this into clinical practice. Also to try and find solutions to enable adequate infection prevention in developing countries with limited resources.
6. References


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WMA (2013). Declaration of Helsinki - Ethical Principles for Medical Research Involving Human Subjects

World Health Organization (2015). Action Agenda for Antimicrobial Resistance in the Western Pacific Region:


Appendix 1

“Från: Thea van de Mortel <t.vandemortel@griffith.edu.au>

Skickat: den 22 december 2015 06:33

Till: amanda.landstrom@hotmail.com

Ämne: Re: Permission to use your questionnaire

No problems at all Amanda and Marie, good luck with your work. If you publish your findings please acknowledge the source.

Regards

Thea

Dr Thea van de Mortel, RN, FACN

Acting Deputy Head of School (Learning & Teaching)

Centre for Health Practice Innovation | Menzies Health Institute Queensland

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On 22 December 2015 at 05:49, Thea Van De Mortel <Thea.VanDeMortel@scu.edu.au> wrote:

A/Deputy Head of School (Learning & Teaching)

School of Nursing & Midwifery,

Griffith University
Begin forwarded message:

**Resent-From:** <thea.vandemortel@scu.edu.au>

**From:** Amanda <amanda.landstrom@hotmail.com>

**Date:** 22 December 2015 at 2:00:17 AM AEDT

**To:** "thea.vandemortel@scu.edu.au" <thea.vandemortel@scu.edu.au>

**Subject:** Permission to use your questionnaire

Hi Thea,

We are two students from Umeå University, Sweden. We are on our 4th semester in the nursing programme. We received a scholarship to go to Hanoi, Vietnam in March to write our Bachelor thesis. We are going investigate Vietnamese students' knowledge, perspective and attitudes to health care-associated infections and hygiene guidelines.

We want to ask for your permission to use the questionnaire from your study "A cross-cultural comparison of health care students' hand hygiene knowledge, beliefs and practices" on page 187.

We would be thankful for your permission.

Best regards,

Marie Lidström and Amanda Landström"
Dear Mrs Landström,

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Appendix 3

Please circle a number to indicate your response

<table>
<thead>
<tr>
<th>Statement</th>
<th>Strongly disagree</th>
<th>Disagree</th>
<th>Not sure</th>
<th>Agree</th>
<th>Strongly agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hand hygiene is considered an important part of the curriculum.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>The facilities in which I do clinical practicum emphasise the importance of hand hygiene.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>The importance of hand hygiene is emphasised by my clinical supervisors.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>I have a duty to act as a role model for other health care workers.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>When busy it is more important to complete my tasks than to perform hand hygiene.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Performing hand hygiene in the recommended situations can reduce patient mortality.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Performing hand hygiene in the recommended situations can reduce medical costs associated with hospital-acquired infections.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>I can't always perform hand hygiene in recommended situations because my patient's needs come first.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Prevention of hospital-acquired infection is a valuable part of a health care worker's role.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>I follow the example of senior health care workers when deciding whether or not to perform hand hygiene.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>An infectious disease contracted in the health care setting may threaten my life or my career.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>I believe I have the power to change poor practices in the workplace.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Failure to perform hand hygiene in the recommended situations can be considered negligence.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Hand hygiene is a habit for me in my personal life.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>I am confident I can effectively apply my knowledge of hand hygiene to my clinical practice.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>It is an effort to remember to perform hand hygiene in the recommended situations.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>I would feel uncomfortable reminding a health professional to handwash.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Performing hand hygiene slows down building immunity to disease.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Dirty sinks can be a reason for not washing hands.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Lack of an acceptable soap product can be a reason for not cleansing hands.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Performing hand hygiene after caring for a wound can protect from infections.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>---</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cleansing hands after going to the toilet can reduce transmission of infectious diseases.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
</tbody>
</table>
Appendix 4

Hand Hygiene Knowledge Questionnaire for Health-Care Workers

- The knowledge required for this test is specifically transmitted through the WHO hand hygiene training material and you may find the questions more difficult if you did not participate in this training.
- Tick only one answer to each question.
- Please read the questions carefully before answering. Your answers will be kept confidential.
- Short Glossary:

   **Alcohol-based handrub formulation**: an alcohol-containing preparation (liquid, gel or foam) designed for application to the hands to kill germs.

   **Facility**: health-care setting where the survey is being carried out (e.g., hospital, ambulatory, long-term facility, etc).

   **Handrubbing**: treatment of hands with an antiseptic handrub (alcohol-based formulation).

   **Handwashing**: washing hands with plain or antimicrobial soap and water.

   **Service**: a branch of a hospital staff that provides specified patient care.

   **Ward**: a division, floor, or room of a hospital for a particular category or group of patients (it corresponds to the smallest segmentation of the health-care facility; one service can include multiple wards).

1. Personal ID**:
2. Date:
3. Facility:
4. Service**:
5. Ward**:
6. City**:
7. Country**:
8. Gender: □ Female □ Male

9. Age: □□ years

10. Profession***: □ Nurse □ Auxiliary nurse □ Midwife □ Medical doctor
    □ Resident □ Technician □ Therapist □ Nurse student
    □ Medical student □ Other

11. Department (please select the department which best represents yours):
    □ Internal medicine medical/surgical □ Surgery □ Intensive care unit □ Mixed
    □ Emergency unit term/rehabilitation □ Obstetrics □ Paediatrics □ Long-
    □ Outpatient clinic □ Other

12. Did you receive formal training in hand hygiene in the last three years? □ Yes □ No

13. Do you routinely use an alcohol-based handrub for hand hygiene? □ Yes □ No

14. Which of the following is the main route of cross-transmission of potentially harmful germs between patients in a health-care facility? (tick one answer only)
    a. □ Health-care workers’ hands when not clean
    b. □ Air circulating in the hospital
    c. □ Patients’ exposure to colonised surfaces (i.e., beds, chairs, tables, floors)
    d. □ Sharing non-invasive objects (i.e., stethoscopes, pressure cuffs, etc.) between patients

15. What is the most frequent source of germs responsible for health care-associated infections? (tick one answer only)
    a. □ The hospital’s water system
    b. □ The hospital air
    c. □ Germs already present on or within the patient
    d. □ The hospital environment (surfaces)
16. Which of the following hand hygiene actions prevents transmission of germs to the patient?

- e. Before touching a patient
- f. Immediately after a risk of body fluid exposure
- g. After exposure to the immediate surroundings of a patient
- h. Immediately before a clean/aseptic procedure

17. Which of the following hand hygiene actions prevents transmission of germs to the healthcare worker?

- i. After touching a patient
- j. Immediately after a risk of body fluid exposure
- k. Immediately before a clean/aseptic procedure
- l. After exposure to the immediate surroundings of a patient

18. Which of the following statements on alcohol-based handrub and handwashing with soap and water are true?

- m. Handrubbing is more rapid for hand cleansing than handwashing
- n. Handrubbing causes skin dryness more than handwashing
- o. Handrubbing is more effective against germs than handwashing
- p. Handwashing and handrubbing are recommended to be performed in sequence

19. What is the minimal time needed for alcohol-based handrub to kill most germs on your hands? (tick one answer only)

- q. 20 seconds
- r. 3 seconds
- s. 1 minute
- t. 10 seconds
20. Which type of hand hygiene method is required in the following situations?

u. Before palpation of the abdomen
   - Rubbing
   - Washing
   - None

v. Before giving an injection
   - Rubbing
   - Washing
   - None

w. After emptying a bedpan
   - Rubbing
   - Washing
   - None

x. After removing examination gloves
   - Rubbing
   - Washing
   - None

y. After making a patient's bed
   - Rubbing
   - Washing
   - None

z. After visible exposure to blood
   - Rubbing
   - Washing
   - None

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

   a. Wearing jewellery
      - Yes
      - No

   b. Damaged skin
      - Yes
      - No

   c. Artificial fingernails
      - Yes
      - No

   d. Regular use of a hand cream
      - Yes
      - No
Appendix 5

Vietnamese nursing students’ knowledge and attitudes to hospital-acquired infections and hygiene guidelines

A survey on students’ knowledge and attitudes

Research has shown that hygiene guidelines have a big impact in preventing hospital-acquired infections. Studies in several countries, including Vietnam, have also shown serious deficits in compliance to these routines among health care workers. We are interested in exploring nursing students’ relationship towards this subject during their time of training. The purpose of this study is to examine Vietnamese nursing students’ knowledge and attitudes to hospital-acquired infections and hygiene guidelines.

Participation in this study is voluntary and the questionnaires are answered individually. Please answer all questions. The questions used are borrowed from two other different studies and we have the author’s approvals to use them. Collected data will be handled confidentially, no names or other personal information will be collected. Information and results of the study will be intercepted and presented in tables and unique answers will not be able to recite.

The questionnaires will be handed out to nursing students that have concluded some sort of training on health care-associated infections and the importance of complying with hygiene
guidelines. Do you have further questions or would like more information about the study? Don’t hesitate to contact us.

Thank you for your participation!


Marie Lidström, nursing student. m-ariie@hotmail.com

Amanda Landström, nursing student. amanda.landstrom@hotmail.com

Our Swedish supervisor: Lena Hägglund, Lecurer, Department of Nursing lena.hagglund@umu.se
## Appendix 6

### Table 5. Hand hygiene knowledge for students in year 2, 3 and 4 on each question.
Number and percent represent the participants who responded correctly.

<table>
<thead>
<tr>
<th>Knowledge questions about hand hygiene. Correct answers in parentheses.</th>
<th>Year 2 n=11</th>
<th>Year 3 n=57</th>
<th>Year 4 n=63</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N %</td>
<td>N %</td>
<td>N %</td>
</tr>
<tr>
<td>1. Which of the following is the main route of cross-transmission of potentially harmful germs between patients in a health-care facility? <em>(Health-care workers' hands when not clean)</em></td>
<td>87</td>
<td>79,8%</td>
<td>51</td>
</tr>
<tr>
<td>2. What is the most frequent source of germs responsible for health care-associated infections? <em>(Germs already present on or within the patient)</em></td>
<td>33</td>
<td>30,0%</td>
<td>23</td>
</tr>
<tr>
<td>3. Which of the following hand hygiene actions prevents transmission of germs to the patient?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Before touching a patient <em>(Yes)</em></td>
<td>108</td>
<td>99,1%</td>
<td>55</td>
</tr>
<tr>
<td>Immediately after a risk of body fluid exposure <em>(No)</em></td>
<td>22</td>
<td>20,6%</td>
<td>9</td>
</tr>
<tr>
<td>After exposure to the immediate surroundings of a patient <em>(No)</em></td>
<td>21</td>
<td>20,2%</td>
<td>11</td>
</tr>
<tr>
<td>Immediately before a clean/aseptic procedure <em>(Yes)</em></td>
<td>101</td>
<td>93,5%</td>
<td>56</td>
</tr>
<tr>
<td>4. Which of the following hand hygiene actions prevents transmission of germs to the health-care worker?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>After touching a patient <em>(Yes)</em></td>
<td>101</td>
<td>95,3%</td>
<td>55</td>
</tr>
<tr>
<td>Immediately after a risk of body fluid exposure <em>(Yes)</em></td>
<td>103</td>
<td>97,2%</td>
<td>53</td>
</tr>
<tr>
<td>Immediately before a clean/aseptic procedure <em>(No)</em></td>
<td>39</td>
<td>37,1%</td>
<td>23</td>
</tr>
<tr>
<td>After exposure to the immediate surroundings of a patient <em>(Yes)</em></td>
<td>97</td>
<td>90,7%</td>
<td>53</td>
</tr>
<tr>
<td>5. Which of the following statements on alcohol-based handrub and hand washing with soap and water are true?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Handrubbing is more rapid for hand cleansing than handwashing <em>(True)</em></td>
<td>67</td>
<td>61,5%</td>
<td>29</td>
</tr>
<tr>
<td>Handrubbing causes skin dryness more than handwashing <em>(False)</em></td>
<td>14</td>
<td>13,2%</td>
<td>5</td>
</tr>
</tbody>
</table>
Handrubbing is more effective against germs than handwashing *(True)*

<table>
<thead>
<tr>
<th></th>
<th>Year 1</th>
<th>Year 2</th>
<th>Year 3</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>52</td>
<td>11</td>
<td>32</td>
</tr>
<tr>
<td>%</td>
<td>48,6%*</td>
<td>20,8%*</td>
<td>52,5%</td>
</tr>
</tbody>
</table>

Handwashing and handrubbing are recommended to be performed in sequence *(False)*

<table>
<thead>
<tr>
<th></th>
<th>Year 1</th>
<th>Year 2</th>
<th>Year 3</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>15</td>
<td>15</td>
<td>23</td>
</tr>
<tr>
<td>%</td>
<td>14,0%*</td>
<td>56,4%*</td>
<td>37,1%†</td>
</tr>
</tbody>
</table>

6. What is the minimal time needed for alcohol-based handrub to kill most germs on your hands? *(20 seconds)*

<table>
<thead>
<tr>
<th></th>
<th>Year 1</th>
<th>Year 2</th>
<th>Year 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>57</td>
<td>48,6%*</td>
<td>56,4%*</td>
<td>50,9%</td>
</tr>
<tr>
<td>%</td>
<td>52,8%</td>
<td>50,9%</td>
<td>42,9%</td>
</tr>
</tbody>
</table>

7. Which type of hand hygiene method is required in the following situations?

<table>
<thead>
<tr>
<th>Situation</th>
<th>Year 1</th>
<th>Year 2</th>
<th>Year 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Before palpation of the abdomen</td>
<td>Rubbing</td>
<td>80</td>
<td>51</td>
</tr>
<tr>
<td>%</td>
<td>74,1%*</td>
<td>89,5%</td>
<td>84,1%</td>
</tr>
<tr>
<td>Before giving an injection</td>
<td>Rubbing</td>
<td>90</td>
<td>42</td>
</tr>
<tr>
<td>%</td>
<td>84,1%</td>
<td>73,7%*</td>
<td>46,0%†</td>
</tr>
<tr>
<td>After emptying a bedpan</td>
<td>Rubbing</td>
<td>16</td>
<td>4</td>
</tr>
<tr>
<td>%</td>
<td>14,8%</td>
<td>7,1%</td>
<td>1,6%†</td>
</tr>
<tr>
<td>After removing examination gloves</td>
<td>Rubbing</td>
<td>57</td>
<td>32</td>
</tr>
<tr>
<td>%</td>
<td>52,8%</td>
<td>56,1%*</td>
<td>30,2%†</td>
</tr>
<tr>
<td>After making a patient’s bed</td>
<td>Rubbing</td>
<td>36</td>
<td>14</td>
</tr>
<tr>
<td>%</td>
<td>33,6%</td>
<td>25,0%</td>
<td>27,0%</td>
</tr>
<tr>
<td>After visible exposure to blood</td>
<td>Washing</td>
<td>61</td>
<td>52</td>
</tr>
<tr>
<td>%</td>
<td>58,1%*</td>
<td>92,9%</td>
<td>93,5%†</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Activity</th>
<th>Year 1</th>
<th>Year 2</th>
<th>Year 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wearing jewellery</td>
<td>Yes</td>
<td>103</td>
<td>52</td>
</tr>
<tr>
<td>%</td>
<td>94,5%</td>
<td>92,9%</td>
<td>95,2%</td>
</tr>
<tr>
<td>Damaged skin</td>
<td>Yes</td>
<td>106</td>
<td>54</td>
</tr>
<tr>
<td>%</td>
<td>98,1%</td>
<td>96,4%</td>
<td>95,2%</td>
</tr>
<tr>
<td>Artificial nails</td>
<td>Yes</td>
<td>106</td>
<td>57</td>
</tr>
<tr>
<td>%</td>
<td>97,2%</td>
<td>100%*</td>
<td>87,3%†</td>
</tr>
<tr>
<td>Regular use of a hand creme</td>
<td>No</td>
<td>39</td>
<td>29</td>
</tr>
<tr>
<td>%</td>
<td>36,4%*</td>
<td>52,7%</td>
<td>60,3%†</td>
</tr>
</tbody>
</table>

Pearson Chi-Square *(P=<0, 05).* * means that it was a significant difference between year 2 and year 3 P=<0, 05. ° = means that it was a significant difference between year 3 and year 4 P=<0, 05. † = means that it was a significant difference between year 2 and year 4 P=<0, 05.