A study of radiographer student’s knowledge about hygiene aspects

A comparative study in Vietnam and Sweden

**MAIN FIELD:** Radiography

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Sammanfattning

En studie om röntgensjuksköterskestudenters kunskap om hygienaspekter


Syfte: Att undersöka kunskapen om hygienaspekter i patientnära arbete bland röntgensjuksköterskestudenter i Vietnam och Sverige.

Metod: En kvantitativ studie med deskriptiv statistik och statistiska tester där datainsamling skedde via enkäter och observationer. Antalet medverkande i enkätsstudien var 100 studenter, 50 i Vietnam och 50 i Sverige. Observationerna genomfördes på 12 studenter vid ett sjukhus i Vietnam. Data analyserades i SPSS och beskrevs sedan i text och tabeller.

Resultat: Studenterna hade relativt god kunskap gällande hygienaspekter men resultatet visade att saker kan förbättras i båda länderna. Bristande kunskap fanns gällande användandet av plastförkläde samt användandet av smycken som exempelvis klockor. Studenterna var noggranna med att ha håret uppsatt, ha rena arbetskläder och använda plasthandskar vid risk för kontakt med kroppsvätskor.

Slutsats: Studien visar att det finns likheter och skillnader bland studenternas kunskap i båda länderna. Det finns områden som kan förbättras i både Sverige och Vietnam då kunskap och basala hygienrutiner ligger till grund för minskad spridning av sjukvårdsrelaterade infektioner.

Nyckelord: Basala hygienrutiner, handdesinfektion, sjukvårdsrelaterade infektioner, studenter, utbildning.
Summary

**Background:** It is important to have good hygiene in healthcare. Studies have shown that bad hygiene among healthcare professionals can lead to spread of bacteria and microorganisms, which in turn can lead to healthcare-associated infections. To counteract this there are established routines, laws and regulations, as basic hygiene routines.

**Purpose:** To study the knowledge of hygiene aspects in patient-related work among radiographer students in Vietnam and Sweden.

**Method:** A quantitative study with descriptive statistics and statistical tests, data was collected through surveys and observations. The number of participants in the survey was 100 students, 50 in Vietnam and 50 in Sweden. The observations were conducted on 12 students at a hospital in Vietnam. Data was analyzed in SPSS and then described in text and tables.

**Results:** The students had relatively good knowledge of hygiene aspects, but the results showed that things could be improved in Sweden and Vietnam. There was insufficient knowledge about the use of plastic apron and the use of jewelry such as watches. The students were careful to fixed their hair, have clean work clothes and wear plastic gloves at risk of contact with body fluids.

**Conclusion:** The study shows that there are similarities and differences among the students in both countries. There are areas that can be improved in the countries because knowledge and basic hygiene routines underlie the spread of healthcare-associated infections.

**Keywords:** Basic hygiene routines, education, handdesinfection, healthcare-associated infections, students.
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Introduction
Healthcare-associated infections (HCAI) is one of the largest patient health problems in healthcare all over the world (Po-Liang L., LK, S., Tun-Chieh, et. al., 2009). The risks of HCAI are known and effective methods are available to reduce these infections. Despite this, HCAI is a problem in healthcare that is difficult to remedy. Meticillin resistant staphylococcus aureus (MRSA) is an example of HCAI, a bacterium that has developed resistance against many antibiotics (WHO, 2009a). It has become one of the largest healthcare hygiene problems in the world. (Po-Liang L., LK, S., Tun-Chieh, et. al., 2009). There are studies that indicate that simple measures can reduce the number of HCAI. This means that by simple measures like compliance with basic hygiene routines, clothing rules and risk prevention, healthcare professionals can protect themselves from infectious agents but also the patient from the risk of having HCAI. By using basic hygiene routines, spread of infection can be prevented (Po-Liang L., LK, S., Tun-Chieh, et. al., 2009; WHO, 2009b).

Radiographer students meet many patients on a daily basis during practice at hospitals and therefore become a potential pathway for microorganisms, which could be spread shortly to patients if basic hygiene is not followed (WHO, 2009b). It is during the education to become a radiographer, knowledge is laid as basis for a safe work in the future, both theoretically and practically. Good hygiene is a safety both for patients and for healthcare professionals, that is why knowledge about hygiene is important.

Background
Healthcare
Florence Nightingale was one of the founders of the modern nursing profession and is best known for efforts during the Crimean War, where she managed to help reduce the mortality of soldiers by having a clean environment as well as good hygiene (Biography, 2017). HCAI is a problem within healthcare, influencing both patients and healthcare professionals all over the world. HCAI infections are harmful and often effect patients socio-economically and sometimes even leads to death. It is even an increased risk of microorganisms developing a resistance against antimicrobials (WHO, 2009a). MRSA, one of the consequences of HCAI, is bacterium that has developed a resistance against many antibiotics and it has become one of
the largest healthcare hygiene problems in the world (Po-Liang L., LK, S., Tun-Chieh, et. al., 2009; Redulla, R., 2015; The Public Health Agency of Sweden, 2017b).

According to The Public Health Agency of Sweden, numbers from 2017 shows that Vietnam is at the sixth place of the list for most frequently reported countries infected with MRSA (The Public Health Agency of Sweden, 2017a). Sweden is not mentioned in this specific study for MRSA but studies shows that developed European Countries has around 5% to 10% affected patients (WHO, 2009a). Several studies have been conducted about HCAI in developing countries but the data from WHO is not representative due to the fact that the studies are performed in a few hospitals. However, the results showed that there was a substantial problem with HCAI in developing countries (WHO, 2009a). A study by Khan, Ahmad and Mehboob (2015) has shown that HCAI is more prevalent in Asia then Europe. In Europe and North America ends 5%–10% of hospitalizations with infections and in Asia, Latin America and Sub-Saharan Africa over 40%.

Working in the profession as a radiographer implies meeting with people with different diseases. To reduce the risk of transmitting diseases and specifically HCAI in contact with patients, studies show the importance of using alcohol-based handrub, gloves, gowns and masks (Redulla, R. 2015; O’Donoghue, M., Ng, S., Suen, L. & Boost., 2016).

However, today we are facing more complex problems not previously seen, as multiresistant bacteria are more frequent occurring. Studies have also shown that attention is low to prevent exposure against microorganisms and some of the reasons are the lack of knowledge and time (Redulla, R. 2015). Studies performed in Asia have shown that basic hygiene routines are the best preventive protection to counteract the spread of healthcare-related diseases such as MRSA (Po-Liang L., LK, S., et.al 2009). According to WHO, knowledge and the dissemination of knowledge are the most important initiatives to a better hand hygiene in healthcare and will lead to a reduced spreading of bacteria (WHO, 2009b).

Hence, it is important to spread further knowledge about prevention in developing countries, mainly because the spread of the infection is more extensive in those countries. Since knowledge is the greatest protection against the spread of healthcare-associated infection, it is important to expound further knowledge about this (The Public Health Agency of Sweden,
Sweden
Hygiene

Basic hygiene routines should be applied by all healthcare professionals during examination and treatment or other direct contact with a person receiving care. This is to prevent the spread of bacteria and viruses that can cause diseases (SOSFS 2015:10). The healthcare in Sweden is governed by various laws and regulations. The Health Care Act calls for all patients to receive good care. This means that the care should be of good quality and with a good hygienic standard to take into account the patient's safety and security (SFS 1982:763). There is also a law governing the quality of care, which has the objective of protecting the population from infectious diseases. The act means that healthcare professionals must have the knowledge and experience needed to counteract infection spread (SFS 2004: 168).

Good healthcare in Sweden means following the basic hygiene routines. Meaning that healthcare professionals should wear short-sleeved upper parts for examination, care and treatment. The work clothes are only used in the workplace, should be replaced daily or as soon as they become dirty (Vårdhandboken, 2017a). Plastic apron should be used to protect the work clothes from getting dirty in close contact with patients (Vårdhandboken, 2017b). The hands and arms should be free from jewelry. The nails should be kept short cut without nail polish. If the healthcare professionals has long hair or beard that can get in the way, it should be attached (Vårdhandboken 2017a). Hand desinfection should be used before and after patient contact. In case of suspicion that the patient has vomiting or diarrhea, wash hands thoroughly with soap and water before hand disinfection and gloves are used. Protective gloves are for single use and should be exchanged between different work and patient.

According to an article from Hong Kong, gloves are the most common personal protective equipment and it is important that the gloves are changed between every patient since they can spread infections to material, environmental surfaces and other people (Chau, J P-C., Thompson, D R., Twinn, S., et.al. 2011) The purpose of basic hygiene routines and clothing rules is to prevent possible transmission of infection in the healthcare, both among patients and healthcare professionals (Vårdhandboken, 2017b).
Education
During the education in Sweden to become radiographer, knowledge is the basis for a safe patient care. Already in the first course students learn about hygiene aspects. In practical terms, students will assess how they work according to basic hygiene routine before they go to their first practical placement. The education should also provide the theoretical knowledge of nursing that is required to establish and maintain a nursing relationship before, during and after an radiology examination or treatment. In addition to this, education includes learning about laws and regulations governing healthcare in Sweden (Jönköping University, 2015; Jönköping University, 2016). A certified radiographer should be able to account for healthcare measures, spread of infection, common bacteria and viruses. As well as comprehensive account of antibiotics and antibiotic resistance (The Swedish Society of Radiographers, 2011).

Vietnam
Country
Vietnam is located in southeast Asia with a population of approximately 95 million people. The capital, Hanoi, has about 7.5 million inhabitants. Besides tourism, the country’s main source of income comes from industries. The currency is Vietnamese dong (VND) and 1 Swedish crown corresponds to around VND 2000. The languages spoken are Vietnamese as well as many minority languages. Religions are mainly Buddhism and Catholicism but also many indigenous religions are found (Central Intelligence Agency, 2017).

Vietnam used to be a very poor country, but since the 80’s the number of people living below the poverty line has decreased with 50% of the population who lived in poverty in 2015 according to the United Nations Development Program, (UNDP:s) estimate. Vietnam has developed in several areas over the last 30 years, and today the country has generally good healthcare. Maternal and child mortality has decreased significantly and the average life expectancy is 71 years for men and 76 for women. The development of the current healthcare system is a significant improvement in Vietnam (Central Intelligence Agency, 2017).

The health status in Vietnam has improved considerably in recent years. Healthcare in Vietnam has become better than its neighbouring developing countries. However, there are
still inequalities in health between different groups in society. The people living in the poor areas do not have the same access to healthcare as those living in better-placed areas (World Health Organization, 2015).

**Hygiene**
According to the ministry of justice (MOJ) in Vietnam are there laws and regulations regarding hygiene in healthcare. In the Law on Medical Examination and Treatment there are measures to control bacterial spreading in medical examinations. Some of these actions are personal hygiene and protection. The healthcare professionals should use protective clothing and have a good personal hygiene to reduce the risk of spread bacteria (Ministry Of Justice, 2009). The Ministry of Health (MOH) are responsible for the guidance of healthcare and health industry in Vietnam (Ministry Of Health, 2013). MOH also get support from WHO in the work for better hygiene in healthcare (World Health Organization, 2015). WHO have developed several guidelines regarding good hygiene in healthcare. One of the guidelines is how to work for and have a good hand hygiene by disinfect hands before, during and after patient contact, wear gloves when it is needed and also wash hands (World Health Organization, 2009).

**Education**
The education to become radiographer in Vietnam are four years. The importance of the program is placed primarily on technology and diagnostic imaging. There is not much teaching about hygiene and nursing because the technical parts are in focus throughout the education. In the second year, students receive an hour’s hygiene lecture that includes hand hygiene according to the curriculum. They use WHO and MOH as sources and retrieve information from their websites (D. Doan, personal communication, 2 April, 2018).

**Radiography**
In the education to become a radiographer, the main field is radiography. Radiography is interdisciplinary and involves four different areas, Nursing, medicine, radiation physics and imaging- and functional medicine. Knowledge is gathered from these areas and radiography is based on evidence and also science. The education in radiography shall provide knowledge of nursing. It is required to establish and maintain a nursing relationship with the patient before,
during and after an examination or treatment. It should also provide the knowledge that is required necessary for the implementation of imaging morphological and functional methods for treatment and diagnosis (The Swedish Society of Radiographers, 2011).

**The Radiographers profession**

In the work as a radiographer is it important to have a professional conduct. Sweden have therefore developed both a professional code so radiographers can find ethical guidelines and support and also a competency standard for registered radiographers. In the Swedish competency standars for Registered Radiographers (The Swedish Society of Radiographers, 2011) are the four basic ethical principles: respect for selfe-determination (autonomy), nonmaleficence, beneficence and justice. All these principles are important for the radiographers to follow both among patients and fellow healthcare professionals. The professional ethical code for radiographers is formed by the radiographers own professional liability and main area, radiography. The ethical code has also four main areas, radiographer and the: patient, profession, society and professionals in caring. These have been evolved to give support in the daily work as a radiographer (The Swedish Society of Radiographers, 2008).

Because the radiographer has daily meetings with several patients is it important with good hygiene. All staff at radiology departments, including radiograpers, need good knowledge of contagious spread and measures to protect patients and healthcare staff according to a study from America (Sobia, K,. Mirza, MD,. Tyson, R, et.al. 2015).

**Rationale**

Studies have shown that the best way to prevent spread of healthcare-associated infections like MRSA is good basic hygiene routines and knowledge. In developing countries there is a major spread of MRSA and studies have shown that there is a tendency for it to also increase in Sweden. The authors will therefore identify how this can be prevented in the future work as radiographers because it is a profession that daily meets a substantial number of patients. The problem about HCAI is global and will become more complex so it is really important in our future profession to be aware of it and daily prevent it. It is important that students learn both
practical and theoretical about hygiene so that they can work independently and consciously in their future profession as radiographer.

Studies of this specific topic performed in Vietnam were not found. Hence, we would like to perform a study regarding knowledge of hygiene among radiographer students in Sweden and Vietnam. The comparison is expected to bring more knowledge so that both Vietnam and Sweden can learn from this and improve the knowledge ahead of our forthcoming work as radiographers.

**Purpose**

The purpose is to compare how the radiographer students in Sweden and Vietnam use the knowledge they have learn during the education about hygiene aspects and routines associated with patient-related work. Also see how they put this knowledge in to practice.

**Materials and methods**

This thesis has a quantitative design with descriptive statistics and comparative design. The study was conducted with a survey and an observation study. The material was collected through questionnaires (appendix 1 and 2) both among radiographer students from three different schools in Sweden and Da Nang University of Medical Technology and Pharmacy. The survey was designed in the survey program from Jönköping University, in Pingpong. The study also including observations from Vietnam.

Data collection was implemented in both countries using paper questionnaires the students had to fill in with pen. The inclusion criteria for participating in the study were that the students studying to become radiographers. The exclusion criteria were if they were not students because we had no specific requirements otherwise. The questionnaires were handed out to a number of 50 students in Sweden. Because of the small classes we have in Sweden the questionnaires were handed out to students from three different schools in year two and three. The surveys were first handed out to year two and three at one school. Since we wanted 50 participants the survey was then handed out to two other schools. No selection was made on the first school because the surveys were handed out to all the students in year two and three. At the other schools the survey was handed out to a few because we only wanted 50
participants. The selection of these students were randomly. In Vietnam, we handed out 50 questionnaires at one school and those were handed out to students in the third year, since the third year in Vietnam has the equivalent practice as student in year two in Sweden. The education differs between the countries. The selection of these students were random since the whole class could not participate because they were more than 50 in the class. The survey was handed out from the front of the classroom and backwards until all questionnaires were distributed. The participants were also able to indicate gender and age. The observations were performed for two days in one of the hospitals that the University cooperates with. This gave us the opportunity to observe how the students worked there and see how they worked hygienically.

The study was based on questionnaires and observations. Information was collected in a relatively easy way from a variety of individuals. The questionnaires included questions regarding alcohol-based handrub, use of the gloves and protective aprons among others. The survey was designed with five different answer options in the ordinal scale. In Sweden the questionnaire was in Swedish and in Vietnam both in English and Vietnamese so all the students who participated could understand all the information and provide a more reliable result. Before the trip to Vietnam, the data collection and the compilation of the results from the students in Sweden was completed in order to begin comparing the result as soon as the data collection in Vietnam was done. At the beginning of our stay in Vietnam we handed out the survey and after that we conducted the observations, to see how the outcome of the survey corresponds to clinical practice. We also took notes meanwhile. For the observations, we had developed a protocol (appendix 3) that was used. After the observations data was analyzed and compiled in a table.

Besides that, we could discuss what we saw and take out from that differences and similarities, good and less good things we saw. The things that was observe are how they were dressed, when they use alcohol-based handrub, gloves and so other. The protocol (appendix 3) for the observations were designed based on the questions in the survey, so that we observed were the same things that the students had answered in the questionnaire. Beside the survey and the observation, facts were gathered through scientific articles. The articles were collected from PubMed and Medline from the University Library at Jönköping University. The articles should be published between 2008 and 2018. The requirement was
also that they should be Peer-Review, available in English and have a free full text.

The statistics program SPSS version 25.0 was used for data analysis. The collected data from the surveys was transferred to SPSS and the results are presented in tables and current text. Measurements that have been used in the analysis are median, percentage (%) and p-value. Chi-square have been conducted to calculate numeric values and variations between variants. In order to strengthen the credibility of the correlations, the limit for significant relationships has been set to p-value < 0.05 (5%). SPSS was also used for the analyz of the observations. All data from the protocols was transferred in to SPSS and then statistics were counted. The results were then compiled in tables and text. The tables were made in Excel.

**Ethics**

The basic individual protection requirement can be embodied in four general key requirements for research. These requirements are the information requirement, the consent requirement, the confidentiality requirement and the utility requirement. The information requirement means that all participants in the study were informed that it was voluntary to participate, what conditions they had and their roles in the task. The consent requirement means that individuals were entitled to participate in the questionnaire voluntarily and that consent was given before participation. Information was given in written and oral about the questionaries and the study. Those who participated were allowed to discontinue their participation at any time during the survey, without consequences. The confidentiality requirement includes the protection and preservation of personal data so that no unauthorized persons gained access to them and could not identify the participants in the study. Ethically sensitive data was handled with confidentiality. The utility requirement means that the information and data collected were used solely as the basis for the essay (Vetenskapsrådet, 2002). When we are done with our thesis, Da Nang University of Medical Technology and Pharmacy will get access to it. The result will be presented in a way that no person can be identified and all papers both for surveys and the observations have been destroyed.
Results

Survey

The sample contained 100 radiographer students, 50 in Sweden and 50 in Vietnam (table 1). In the study there was no decline of questionnaires and 100% of the questionnaires were answered correct. The result shows a significant differences between the students in Sweden and in Vietnam at the majority of the questions. Some of the answers differs a lot while others do not.

Table 1. Demographic data. The table includes distribution and average of gender, age and semester.

<table>
<thead>
<tr>
<th>Question</th>
<th>Sweden n=50</th>
<th>Vietnam n=50</th>
<th>Total n= 100</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td>Men = 14 (28%)</td>
<td>Men = 19 (38%)</td>
<td>Men =33 (33%)</td>
</tr>
<tr>
<td></td>
<td>Women = 36 (72%)</td>
<td>Women = 31 (62%)</td>
<td>Women = 67 (67%)</td>
</tr>
<tr>
<td>Age</td>
<td>Median = 26,00</td>
<td>Median = 21,00</td>
<td>Median = 22,00</td>
</tr>
<tr>
<td></td>
<td>Min = 21,00</td>
<td>Min = 20,00</td>
<td>Min = 20,00</td>
</tr>
<tr>
<td></td>
<td>Max = 54,00</td>
<td>Max = 23,00</td>
<td>Max = 54,00</td>
</tr>
<tr>
<td>Semester 6</td>
<td>n = 29</td>
<td>n = 50</td>
<td>n = 79 (79%)</td>
</tr>
<tr>
<td>Semester 4</td>
<td>n = 21</td>
<td>n = 0</td>
<td>n = 21 (21%)</td>
</tr>
</tbody>
</table>
• Do you combine your work clothes with private clothes like pants and longsleeved shirt?

Figure 1. Compilation of answers from the first question in the survey. The table includes distribution of answers from students in both countries and also the total number of answers in common. The result shows that it is more prevalent with a combination of work clothes and privat clothes in Vientam comperad to Sweden. The majority of the students in Sweden, 90%, never combine work clothes with privat clothes. A statistical significance difference have been shown between the countries (p-value = ≤ 0,01).

• How often do you change work clothes?

Figure 2. Compilation of answers from the second question in the survey. The table includes
distribution of answers from students in both countries and also the total number of answers in common.

The result shows that it is a clear difference between Sweden and Vietnam. In Sweden 86% of the students change clothes every day, the number in Vietnam is 14%. A statistical significance difference have been shown between the countries (p-value = ≤ 0,01).

• If you have long hair or beard, do you fix it during working?
The result shows that five students in Sweden never fix it. In Vietnam zero students responded that they never fix it. Most of the students in both countries answered that they always fix it, in Sweden 43 (86%) students answered that and in Vietnam 40 (80%) students. A statistical significance difference has been shown between the countries (p-value = ≤ 0,01).

• Do you wear jewelry like watch and rings when you are working?

![Figure 3. Compilation of answers from the fourth question in the survey. The table includes distribution of answers from students in both countries and also the total number of answers in common.]

The result of the survey shows that in Sweden only one person wear jewelry, like watch and rings when they are working. In Vietnam the result shows a variation, the most common answer is that they do not wear jewerlys like watches and rings. A statistical significance difference have been shown between the countries (p-value = ≤ 0,01).

• Do you wear protective clothing like a plastic apron or protective coat during meetings with patients from other hospital departments?
Figure 4. Compilation of answers from the fifth question in the survey. The table includes distribution of answers from students in both countries and also the total number of answers in common.

The result shows that in Sweden one student never wears plastic aprons or a protective coat during meetings with patient from other hospital departments. In Vietnam 15 students answered never. The option rarely answered also one student from Sweden and 22 students in Vietnam. In Sweden six students said that they always wear protective clothing like a plastic apron or coat and in Vietnam was it two students who wear it. A statistical significance difference have been shown between the countries (p-value = ≤ 0,01).

• Do you wear protective gloves when there is a risk of contact with body fluids? For example, blood, stools, urine or stomach contents.

The result shows that in Sweden 44 students and in Vietnam 40 students answered that they always wear protective gloves when there is a risk of contact with body fluids. No statistically significant difference (p-value = > 0,37)

• 1. Do you disinfect your hands before each patient contact? 2. Do you disinfect your hands after each patient contact?
Figure 5. Compilation of answers from the eighth and ninth question in the survey. Options with number 1 before belongs to question number eighth (Do you disinfect your hands before each patient contact?) and options with number 2 before belongs to question number nine (Do you disinfect your hands after each patient contact?). The table includes distribution of answers from students in both countries and also the total number of answers in common.

The result shows that in both countries students are better at disinfect hands after each patient contact then before. A statistical significance difference has been shown between the countries. To the question ”Do you disinfect your hands before each patient contact?”", a statistical significance difference have been shown between the countries (p-value = ≤ 0,01). To the question ” Do you disinfect your hands after each patient contact?”", a statistical significance difference have been shown between the countries (p-value = ≤ 0,01). The students in Sweden were better to disinfect their hands.

• Do you think you have obtained sufficiently knowledge of basic hygiene routines during your education to become radiographer?

In Sweden all the students anwsered that they have obtained sufficiently knowledge about hygien during the education. In Vietnam is 32 of the studens satisfied by the knowledge they have received from the education and 18 are not satisfied. The result shows that the majority of all the studens are satisfied, in both countries. A statistical significance difference has been shown between the countries (p-value = ≤ 0,01).
Observations

The observations were conducted on 12 students, only in Vietnam. The authors observed the students clothing, hand hygiene, if they had jewelry, fixed hair and protective clothes. Nine different questions were observed and the authors documented the information in the protocol (appendix 3).

Table 2. Compilation of the result from the observations. The table includes the questions, distribution of students in total and percent and also comments.

<table>
<thead>
<tr>
<th>Question</th>
<th>Yes (%)</th>
<th>No (%)</th>
<th>Comments</th>
</tr>
</thead>
</table>
| Is the work clothes combined with private clothes?                       | 2 (16,7)| 10 (83,3)| One has private pants
|                                                                         |         |         | One has a longer t-shirt                      |
| Does the person have clean work clothes?                                 | 12 (100)| 0       | No visible stains or dirt on the clothes     |
| Are nail polish used or is the person having long nails?                | 0       | 12 (100)| No one has long nails or nail polish          |
| If the person has long hair or beard, is it set?                        | 12 (100)| 0       | Everyone with long hair has it set
|                                                                         |         |         | or wears a hat                                |
| Does the person wear jewelry?                                           | 7 (58,3)| 5 (41,7)| Three has watches
|                                                                         |         |         | Three has bracelets                           |
|                                                                         |         |         | One has a ring                               |
| Does the person use plastic apron if needed? Patient from healthcare department / risk of contact with body fluid. | 0       | 12 (100)| Did not see any visible plastic aprons at the labs |
| Use the person plastic gloves at risk of contact with body fluids? | 12 (100) | 0 | All used gloves during the whole meeting with patient |
| Are the hands disinfected before each patient visit? | 0 | 12 (100) | No handdesinfection is used |
| Are the hands disinfected after each patient visit? | 0 | 12 (100,0) | No handdesinfection is used |

This study contains the total of 12 student observations at one hospital in Da Nang, Vietnam. The result showed that the majority of the students did not combine the work clothes with privat clothes. All of the students had clean work clothes, had neither long nails or nail polishes, the ones with long hair had it fix and all of the students had a hat that belonged to the work clothes. More than half of the studenst wore jewelry. No student did use plastic apron during the observations. All the students wore plastic gloves when there was a risk of contact with body fluids and all students did not disinfect there hands before or after each patient contact.

Discussion

Result discussion

The purpose of this study was to compare how the radiographer students in Sweden and Vietnam use the knowledge they have obtained during the education about hygiene in patient contact and how they use this knowledge in practice. The result showed that there are some differences but also some similarities between the two countries.

Combined work clothes with private clothes was more prevalent in Vietnam then in Sweden. The survey unfolded that the most common answer in Sweden was that the students never combine work clothes with private clothes and in Vietnam the most common answer was that they do it sometimes (figure 1). According to the basic hygiene routines in Sweden that is followed private clothes should not be combined with work clothes (Vårdhandboken, 2017a). The obeservations in Vietnam showed though that it was not so common like the students
answered in the survey. Only two students had private clothes in combination with work clothes (table 2). A study from USA have shown that clothes at hospitals are contaminated with bacterium and a risk of spreading infektions, therefore should students and healthcare professionals wear separated work clothes from private clothes so they do not spread the bacteria outside the hospital (Mitchell, A., Spencer, M. & Edmiston Jr, C, 2015). One reason why some students choose to combine their own clothes with work clothes may be because they can not see the bacteria and microorganisms the clothes absorbs and therefore not be aware of the risks that exist. Another reason may be lack of knowledge.

The result from the survey showed that the most of the students in Sweden changed their work clothes on a daily basis and in Vietnam most of the students did it every other day (figure 2). The observations from Vietnam showed that all of the students in Vietnam had clean work clothes without stains and dirt. None of the students in Vietnam had neither long nails or nail polish. A study from Canada have shown that nail polish that have been worn for more than four days contributes to increased presence of microorganisms (Cimon, K. & Featherstone, R, 2017).

Most of the students in both countries had their long hair or beard fixed during work. The result from the observations in Vietnam also showed that all of the students had it fixed. They also had their hair covered by a hat. According to Vårdhandboken should hair and beard that is longer be fixed so it does not hang loose and fall down (Vårdhandboken, 2017a).

In both Vietnam and Sweden the majority of the students responded to the survey that they do not wear jewelry, like bracelets and watches (figure 3). But the result from the observations showed that more than half of the students in Vietnam had jewelry. Three of the students had watches, three other had bracelets and one of them had a ring (table 2). One reason why the students wear jewelry on their arms and hands could be because you can not se all the bacterias and dirt that accumulate beneath them, but a pilot-study from USA have showed that 50% of 26 collected accessories from healthcare professionals had microorganisms that may be associated with nosocomial or healthcare-associated infections (Maharjan, U., Rajbanshi, L., Gurung, G., Gautam, R & Nepal, HP, 2014). One problem with using jewelry is that it can prevent a correctly wash of the skin and result in an increased spread of bacteria (Cimon, K. & Featherstone, R, 2017). Another reason for the outcome may be that it is a coincidence. The
observations were conducted on a small number of students and there is a chance that other students do not use jewelry like the students in the observations did. The result from the observations and the survey differed very much in this question. During the visit at the hospital the authors saw that the supervisors and other professionals had jewelry during work hours, which also can affect the students since they are learning from there supervisors.

The answers from the two questions about protective clothes showed that plastic apron or protective coat during meetings with patients from other hospital departments were not as accurate like wearing protective gloves when there is a risk of contact with body fluids. According to Socialstyrelsen should healthcare professionals wear plastic aprons when there is a risk of contact with body fluids (SOSFS 2015:10). In Sweden the result showed that the most common answer if they wear plastic apron or protective coat during meetings with patients from other hospital department was often and in Vietnam rarely (figure 4). At the observations in Vietnam none of the students had aprons or protective coats (table 2). During the observations in Vietnam did the authors not see plastic aprons in the labs and this could be one of the reasons for the result. Another reason may be the time shortage because it is often tightly booked patients in both countries and they work under a tight schedule. A study have shown that the lack of time is a common reason for this (Redulla, R. 2015)

The question about protective gloves, the majority of the students in both countries answered that they always used gloves and the result from the observation complies with the answer from the survey in Vietnam. A previous study has showed that protective clothes, plastic aprons and gloves, have a good protection against MRSA and other multiresistant bacteria. The study showed that the spread rate decreased drastically with protective equipment and should therefore be used carefully (Gaspard, P., Eschbach, E., Gunther, D., Gayet, S., Bertrand, X. & Talon, D, 2009).

The result from the questions in the survey about hand disinfection showed that the all of the students were better at disinfect their hands after each patient contact than before (figure 5). A reason could be that there is insufficient knowledge about hand disinfection among the students and that more education is needed. According to a study from England the result showed that if the healthcare professionals use alcohol-based handrub or hand disinfection
will it decrease the spread of HCAI. The study also mentioned that according to the UK national guidelines that alcohol-based handrub or disinfection should be used before, between and after each patient contact (Monoz-Figueroa GP., Ojo, O, 2018). In Sweden the majority of the students used hand disinfection always before and always after each patient contact. In Vietnam the majority of the students answered that they always did it after and to the question about before the most common answer was often.

The answers from the survey in Vietnam do not match the result of the observations. None of the students disinfect their hands before or after each patient contact (table 2). They only used gloves during all patient contact. The authors believe that one reason for this result could be because there is short time between the radiology examinations. The patients were tightly booked during the observations and according to the students in Vietnam was this common. Another reason could be that the students in Vietnam wear plastic gloves at all contact with patients and that gloves is used instead of hand disinfection. According to WHO is it important to also use hand disinfection when using gloves (WHO, 2009b).

Since it is so important with good hand hygiene and many studies show that it reduces the spread of HCAI all the students should be more accurately about using it. It protects both patients and healthcare professionals from being infected. The authors believe that the students are not careful in some cases since there is hand disinfection visible in the radiology departments, both in Vietnam and Sweden. In Vietnam are the bottles not as visible such in Sweden which also can affect the use of hand disinfection. Having the bottles visible could lead to a better use. A study from England showed that HCAI increases morbidity and mortality among patients, this is leading to longer hospitalization and increased costs. The study shows that all this can be counteracted and reduced by using disinfecting such as hand disinfection (Munoz-Figueroa, G, P & Ojo, O, 2018). According to WHO are both hand disinfection and hand wash an important process to prevent the spread of MRSA (Cimon, K. & Featherstone, R, 2017).

In Sweden all of the students were satisfied with the knowledge they inherited about hygiene during the education. In Vietnam 32 of the students were satisfied. The authors believe that there is a connection between this question and the result of the other questions in the survey. They believe that the students want to know and learn more about hygiene during the
education. One of the reasons for several of the results may be because students have not learned enough about hygiene, as many of them themselves answered in the survey.

**Method discussion**

From the beginning the idea was that we wanted students from only one school in Sweden to the survey, but we needed more participants and had to invite more schools as we wanted a sample of n=50. The number of participants in the study was the same in Vietnam and Sweden. We believed that it could be more valuable and give a clearer picture if we had the same number of students in both countries. Before we went to Da Nang we had translated the survey into English but when we arrived at the University our supervisor said that the questionnaire also had to be translated into Vietnamese. This in order for everyone in the class to understand the questions.

When the survey was designed we added a question about age because we wanted to see if the students knowledge differed between the ages, also compare if there were similarities and differences based on the age of the students. But since there is a huge age range in Sweden and the students in Vietnam were equally balanced we felt that it would not add anything to the study and that it were not possible to compare.

Before we handed out the survey was it thought that we would begin with the observations and then hand out the surveys to reduce the risk that the survey would affect the students’ work. As the observations were changed from the student clinic to a hospital, more permissions were required from both the university office and the hospital. It was a process that took time and, therefore, not to lose several weeks of writing time, we chose to hand out the questionnaires directly.

There is a risk that the students may have answered differently in the questionnaires from how they work in reality, which is a risk we were aware of in the survey. Therefore, observations were also carried out. The most optimal would have been if we made observations in both countries for a better outcome of the study. The time we had before we left for Vietnam was limited and there was no opportunity to do observations because not enough students in Sweden were deployed to practice at that time. The plan was to do the observations at the University clinic in Da Nang, but our supervisor thought it was better to implement it at a
hospital where they had a practice to give a more realistic image, we chose to change the location for the observations since we found it to be better for this study. If the number of observations had been more, there would have been more reliable results and more conclusions could have been drawn and compared with the surveys. But as this was merely a supplement to the surveys, there was no time to allocate for a larger number of observations.

Since the survey was handed out to a small amount of all the radiographer students in both Sweden and Vietnam would it be a more clear result where you can draw more conclusions if several studies were conducted on the same subject. The observations were also conducted on a small proportion of all the radiographer students in both countries and the results could have been different if other students participated.

At the observations the students could feel integrity threatened since we reviewed their way of working. Before the observations our supervisor informed the students about it, so they would be aware that they were observed and that they were anonymous since we did not take their names. There is a risk that the students may have been affected in their work during the observations because they were aware that they were observed.

We believed that these methods would help us achieve the best possible results for our paper and give us a clearer picture of how big the differences and similarities was between the different countries and what can be improved in Vietnam and Sweden. The methods gave us answer to the purpose with this study. It was very rewarding and interesting to have the opportunity and see the differences and similarities in the two countries' ways of working.

**Clinical implications**

The results of the study could be used as a basis for clinical activities. First, by learning from previous studies and by comparing to our study, selecting the most essential and good parts that can be implemented at the workplace. Even comparing the countries between each other and learning from each other to develop the healthcare and see which parts are needed and what works well and what parts that can be better. A central part is education, where schools can learn from each other, so it becomes an expanded knowledge and ultimately it becomes a better healthcare. For example, students in Sweden can learn from the students in Vietnam to
be more careful to fix their hair on practical work. The students in Vietnam can learn from the students in Sweden to not wear jewelry in patient contact.

**Future research**

Future studies may be to do more studies but on a larger scale to draw more reliable conclusions. Studies could be done from several schools in both Vietnam and Sweden to get a better overview of the countries, but also to get a more reliable result. An improvement suggests is that the study could have focused on only one selected area, such as the use of handdesinfection. Then by hand out questionnaires but also making observations to really map the study based on a larger population.

**Conclusion**

HCAI is increasing worldwide and in order to prevent spread, basic hygiene routines are the basis for this. Studies have show that good hygiene and knowledge among healthcare professionals reduce the risk of HCAI and the spread of MRSA. The study shows that the students in Sweden and Vietnam have relatively good knowledge of how to work hygienically, both theoretically and practically. However, there are things that can be improved in both countries, such as being more careful about using handdesinfection. The result also show that all participating students in Sweden consider that they have sufficient knowledge of hygiene routines in their education. In Vietnam, about one third of the students found that they did not have enough knowledge of basic hygiene routines in their education. In order to reduce the risk of spreading HCAI, it is important that the students acquire knowledge during the education. Radiographers constantly meets a lot of patients and is a potential patway for spread of bacteria.
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Hej!


Med vänliga hälsningar,
Cassandra Heiskanen och Victoria Bengtsson

E-post: heca1524@student.ju.se / bevi1592@student.ju.se
Handledare: Berit Björkman
Enkät – En jämförande studie om hur röntgensjuksköterskestudenter lär sig om hygien i Sverige kontra Vietnam.

Vänligen ringa in endas ett alternativ för varje fråga.

Kön: Man/Kvinna/Annat

Ålder: ____

Termin: ____

Kombinerar du dina arbetskläder med privata kläder som byxor och långärmad tröja?
Alternativ:

Aldrig  Sällan  Ibland  Oftast  Alltid

Hur ofta byter du arbetskläder?
Alternativ:

Mer sällan  Varannan vecka  En gång i veckan  Varannan dag  Dagligen

Om du har långt hår eller skägg, fäster du upp det under arbetstid?
Alternativ:

Aldrig  Sällan  Ibland  Oftast  Alltid

Använder du smycken så som klocka och ring när du arbetar?
Alternativ:

Aldrig  Sällan  Ibland  Oftast  Alltid
Använder du skyddskläder som plastförkläde eller skyddsrock vid möten med patienter från vårdavdelningar?

Alternativ:

Aldrig  Sällan  Ibland  Oftast  Alltid

Anser du att du fått tillräcklig kunskap om basala hygienrutiner under din utbildning till röntgensjuksköterska?

Alternativ:

Nej  Ja

Använder du skyddshandskar när det finns risk att du kommer i kontakt med kroppsvätskor? Exempelvis blod, avföring, urin eller maginnehåll.

Alternativ:

Aldrig  Sällan  Ibland  Oftast  Alltid

Desinfekterar du händerna innan varje patientkontakt?

Alternativ:

Aldrig  Sällan  Ibland  Oftast  Alltid

Desinfekterar du händerna efter varje patientkontakt?

Alternativ:

Aldrig  Sällan  Ibland  Oftast  Alltid

Tack för din medverkan!
Appendix 2

Hello!
Xin chào!

Our name is Cassandra Heiskanen and Victoria Bengtsson. We are studying the last semester to become radiographers at School of Health and Welfare, Jönköping University. During this spring, we are going to write our candidate thesis about hygiene among radiographer student’s in Sweden and Vietnam. The questions will be about knowledge gathered during the education and how this knowledge is used in practice. The survey is going to take about 10 minutes to fill in and it is completely anonymous. No identifiable data will be collected. It is voluntary to participate and you can cancel if you want. We are grateful for your participation!

Best regards,
Trân trọng!
Cassandra Heiskanen and Victoria Bengtsson

E-mail: heca1524@student.ju.se / bevi1592@student.ju.se
Supervisor: Berit Björkman
Giảng viên hướng dẫn: Berit Bjorkman
Survey – A comparative study how radiographer student’s learn about hygiene in Sweden versus Vietnam.

Mục tiêu nghiên cứu – nghiên cứu so sánh kiến thức mà sinh viên hình ảnh y học đã được học về vấn đề về sinh y tế ở Thụy Điển và Việt Nam.

Please choose only one option for each question. (Vui lòng chọn một đáp án cho mỗi câu trả lời sau đây)

Gender: Man/Woman.

Age: ____

Semester:____

Giới tính: Nam / Nữ

Tuổi:____

Sinh viên năm mấy: ____

Do you combine your work clothes with private clothes like pants and long-sleeved shirt? (Bạn có để áo blouse và áo quấn cá nhân (chẳng hạn như quần dài, áo len tay dài) chung với nhau không?)

Options:

Never                      Rarely         Sometimes               Often              Always
Không bao giờ    Hiếm khi    Thỉnh thoảng    Thường xuyên   Luôn luôn

How often do you change work clothes? (Bạn có thường xuyên thay áo blouse không?)

Options:

More seldom   Every other week   Once a week  Every other day    Daily
If you have long hair or beard, do you fix it during working? (Nếu bạn để tóc dài và râu, bạn có thường bước hoặc bởi nó trong giờ làm việc không?)

Options:

Never               Rarely             Sometimes        Often               Always
Không bao giờ        Hiếm khi           Thỉnh thoảng      Thường xuyên       Luôn luôn

Do you wear jewelry like watch and rings when you are working? (Bạn có thường mang các loại trang sức như đồng hồ, nhẫn trong quá trình làm việc không?)

Options:

Never               Rarely             Sometimes        Often               Always
Không bao giờ        Hiếm khi           Thỉnh thoảng      Thường xuyên       Luôn luôn

Do you wear protective clothing like a plastic apron or protective coat during meetings with patients from other hospital departments? (Bạn có mang đồ bảo hộ như tạp dề nilong hoặc áo choàng bảo hộ trong lúc gặp gỡ bệnh nhân tại các khoa phòng khác ở bệnh viện không?)

Options:

Never               Rarely             Sometimes        Often               Always
Không bao giờ        Hiếm khi           Thỉnh thoảng      Thường xuyên       Luôn luôn

Do you think you have obtained sufficiently knowledge of basic hygiene routines during your education to become radiographer? (Bạn có bao giờ nghĩ rằng bạn đã được trang bị đầy đủ kiến thức cơ bản về vấn đề vệ sinh y tế trong suốt quá trình học tập để trở thành nhân viên y tế không?)
Do you wear protective gloves when there is a risk of contact with body fluids? For example, blood, stools, urine or stomach contents. (Bạn có mang găng tay bảo hộ trong lúc tiếp xúc với các yếu tố nguy cơ từ dịch trong cơ thể không? Chẳng hạn như máu, phân, nước tiểu hoặc chất nôn mửa.)

Options:

- Never
- Rarely
- Sometimes
- Often
- Always

Do you disinfect your hands before each patient contact? (Bạn có khử trùng bàn tay trước khi tiếp xúc với bệnh nhân khác không?)

Options:

- Never
- Rarely
- Sometimes
- Often
- Always

Do you disinfect your hands after each patient contact? (Bạn có khử trùng bàn tay sau khi tiếp xúc với bệnh nhân không?)

Options:

- Never
- Rarely
- Sometimes
- Often
- Always

Thank you for your participation!
**Appendix 3**

Protokoll vid klinisk observation

Checka av protokollet under några undersökningar, har personen exempelvis klocka skriv det som kommentar. Om exempelvis handskar inte används vid varje tillfälle det behövs som vid kontakt med blod/kroppsvätskor, skriv det som en kommentar.

<table>
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<th>Att undersöka</th>
<th>Ja</th>
<th>Nej</th>
<th>Egen kommentar:</th>
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<td>Kombineras arbetskläder med privata kläder?</td>
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<tr>
<td>Har personen rena arbetskläder?</td>
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<td>Används nagellack eller har personen långa naglar?</td>
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<td>Om personen har långt hår eller skägg, är det uppsatt?</td>
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<td>Har personen på sig smycken?</td>
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<tr>
<td>Används plasthandskar vid risk för kontakt med kroppsvätskor?</td>
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<td>---------------------------------------------------------------</td>
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<tr>
<td>Desinfekteras händerna inför varje patientbesök?</td>
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<td>Desinfekteras händerna efter varje patientbesök?</td>
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</tbody>
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