Vietnamese Nurses’ and Nursing students’ conceptions about healthcare associated infections

An empirical research study in patient safety and quality of care

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**ABSTRACT**

**Title:** Vietnamese Nurses’ and Nursing students’ conceptions about healthcare associated infections

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**Introduction:** Healthcare associated infections (HAIs) are a global problem and lead to a large burden for the patients, healthcare systems and society. In low and middle-income countries the burden and prevalence is higher than in high-income countries. It is possible with good prevention to reduce the prevalence and burden of healthcare associated infections. **Aim:** Investigate Vietnamese Nurses’ and Nursing students’ conceptions about healthcare associated infections and their role in prevention of healthcare associated infections. **Method:** Qualitative research with a cross-sectional design and the data was collected through eight semi-structured interviews and unstructured observations. The data was analyzed by content analysis. **Results:** Four categories were identified in the data analysis: Understanding and conceptions about HAI, Hinders for the prevention of HAI, How to work in a preventive way for HAI, Responsibility for patient safety. **Conclusion:** The study showed hinders for the nurses to perform their work correctly, limitations in the environment, lack of time, and equipment and supplies. The need for improvements are more nurses, make equipment and supplies more available and more rooms for patients. The participants acknowledge about responsibility and the importance of following guidelines at the hospitals are identified in the result.
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Introduction
Every day around the world a great amount of people are infected by an infection which they have contracted during the time they have been in contact with healthcare at a hospital or other facility. The infection that the persons have acquired is associated with the healthcare system and those infections can many times be avoided and the risks reduced by the healthcare workers. The infections lead to a large burden for the patients, the healthcare system and for society. These healthcare associated infections (HAIs) are a global burden and in low- and middle-income countries are the burden greater compared to the high-income countries (World Health Organization [WHO] 2018a).

Healthcare associated infections and epidemiology
The World Health Organization (2018a) defines a HAI which also is called nosocomial infection as an infection the patient has acquired from the hospital or other healthcare facilities during the time of the healthcare process. The infection the patient contracted did not exist in the beginning of the healthcare process. HAIs tops the list of adverse events related to healthcare delivery (WHO 2018a).

An infection can be caused in two ways. Endogenous sources are when the microorganisms are coming from the patient and cause an infection in the patient. It is common that transmission of microorganisms to different sites of the patient’s body occurs via healthcare workers hands. If microorganisms are transferred from one site of the body to an another it can cause an infection, and the microorganism can become invasive (WHO 2011). Exogenous sources are microorganisms coming from an outstanding source such as visitors, medical devices and equipment or healthcare workers which can cause an infection with the patient. It’s not only the patients who are at risk of being infected by HAIs, but also the healthcare workers and visitors (WHO 2011).

Common ways to acquire a HAI are through medical devices such as catheters and ventilators and four types are especially known. Catheter-associated urinary tract infection, central line-associated bloodstream infection, ventilator-associated pneumonia and infection in surgery sites are different infections which are included as different types of HAIs (Centers For Disease Control and Prevention 2014). Those four types of HAIs along with their interventions to prevent the infections have attained great attention around the world because of the harm HAIs can cause for patients (WHO 2016a). Bacteria is the most common pathogen related to HAI. Virus and fungal parasites also play an important role. Depending on populations, environment and medical facilities there is a variation in the range of microorganisms which are prevalent (Khan et al. 2017).

Incidence and prevalence of healthcare associated infections and surveillance system
Even if HAI is the most common adverse event that a patient can encounter from a healthcare service, there is limited information and statistics about the global burden of HAI. The lack of surveillance systems for HAI in many countries leads to difficulties in gathering information and data about the global burden. It is also difficult to compile data from surveillance systems from different countries because of the uniformity of criteria for HAI and complexity in those surveillance systems which are used today (WHO 2018a).

WHO (2011) pointed out one important aspect about surveillance system and the estimated burden of HAI. There are serval types of HAIs which are not included in the compiled information. Needles and syringes which are contaminated, transfusion with bloodborne
pathogens and infections acquired by health-care workers are not included. Probably is the burden larger than it is estimated (WHO 2011). A survey from WHO (2011) shows that the lack of surveillance systems around the world is higher in low- and middle-income countries. Only 23 of 147 countries had a national surveillance system for HAI (WHO 2011). Compared to Europe’s high income-countries, in which a national surveillance system existed in 17 countries to monitor surgical sites for infections and infections acquired in the intensive care unit (European Centre for Disease Prevention and Control [ECDC] 2010).

Statistics from WHO (2011) showed that in low- and middle-income countries the prevalence and the burden of diseases of HAI are higher compared to high-income countries. In low- and middle-income countries the prevalence of HAI is 10.1% and in high-income countries the prevalence is 7.6% at any given time. Estimated during a year and all over the world hundreds of millions of patients are infected by HAI. In Europe more than 4.1 million patients and in the United States of America 1.7 million patients are infected by a HAI (WHO 2011).

Consequence’s and burden of healthcare associated infections
HAI’s affects a large group of patients worldwide every year. For the patients, it leads to extra suffering including pain, psychological trauma and in the worst-case scenario death. The patients are also affected economically when costs increase which can affect their families. HAI’s also have a large impact on the healthcare system due to a longer duration of stay in the hospital for the patient and the risk for microorganism to become resistant to antibiotics increases. The society is affected economically due to patient morbidity and mortality which in turn leads to a loss in productivity (WHO 2016a). Lien at al. (2018) state that Vietnam can be described as a lower middle-income country with high levels of HAIs. The Ministry of Health in Vietnam has tried to regulate hospital infection control in the past, but the compliance to the regulations is still unidentified. It is a challenge for healthcare workers to have an effective control over HAI at the hospitals because infection control has not been a priority (Lien et al. 2018).

Lien et al. (2018) found that a deficient surveillance system for infections is advantageous for the spread of infections which can result in higher levels of HAI. One study (Thu et al. 2012) showed that in Vietnam the use of antibiotics is high which can lead to problems with multiresistant organisms and that is a risk that those infections can be spread through the healthcare services (Thu et al. 2012). Pathogens causing HAI have in many instances been identified as bearing multidrug resistance which can lead to higher virulence (WHO 2011).

Ways of reducing healthcare associated infections
WHO (2011) has identified several interventions for improvement towards a greater control leading to a more effective prevention of HAIs. It is important to understand local causational factors which are creating the burden of HAI and introduce a national system for surveillance of HAI with a good system for reporting those infections. For success in infection control it is important that the core components are established at the national, regional and local levels. Core components according to WHO (2011) includes better procedures for disinfection and sterilization, maintaining a clean environment, a standard implementation for isolation of patients, and measures to ensure safety before, during and after injections. Core components should be in place before implementation of other specific measures.
HAI is a global problem and more knowledge about it is needed to reduce the prevalence and consequences. WHO (2018a) stated that conducting research on HAI is important for finding solutions to improve prevention work. In developing countries there is an interest and need to create surveillance systems adapted to the reality of these countries (WHO 2018a). Improved education for healthcare workers about infection control is a significant measure in the solutions to control infections. The most important measure is to treat HAI as unacceptable and to prioritize the work for prevention for patient’s safety. Evidence shows that HAI and the burden of it can with good prevention be reduced by 50% or even greater (WHO 2011).

Ershova et al. (2018) found that an implementation of an infection prevention and control program can decrease the levels of HAI, and also reduce the resistance of antibiotic at a neuro-intensive care unit in a middle-income country. An evidence-based infection prevention and control program showed to be highly effective: the mortality decreases, and the number of days patients stay in the intensive care unit become fewer (Ershova et al. 2018). Another study (Thi Anh Thu et al. 2015) of cost-effectiveness of a hand hygiene program in intensive care units at hospitals in Vietnam reported the program as being an effective strategy. The program decreased the incidence of HAI and increased the compliance for hand hygiene procedures. In the work for preventing HAI the hand hygiene program was shown as cost-effective.

Thi Anh Thu et al. (2015) stressed that in low and middle-income countries it is common that there is a lack of control for infections and limited perceptions about the situation among the healthcare workers. The hospital is dealing with resources which are inadequate. In Vietnam those factors are a reality and because of the lack of possibilities for hand hygiene and the limited perceptions of the situation, washing the hands is not commonly well performed at all times. The hand hygiene program is a good way for the hospitals to reduce the HAIs and it is a cost saving method (Thi Anh Thu et al. 2015).

**Nurses responsibility for patient safety**

The definition of patient safety by WHO (2018b) is that during the time a patient is in the healthcare process, preventable harm should be absent and other risks to the minimum level of acceptable consequences. The National Board of Health and Welfare in Sweden (Socialstyrelsen 2017) defines patient safety as protection for patients to avoid harm in the healthcare process.

HAI needs to be seen as an important part of patient safety. The International Council of Nurses [ICN] (2018) states patients’ safety as fundamental for the quality of nursing care and healthcare. Enhancement of patient safety involves a wide range of actions and ICN believes that some of those actions involve infection controls, safe use of medicines, safe clinical practice and safe use of equipment. For healthcare workers is it important that risks are identified for preventing injuries, and that patient safety can be addressed in all aspects of care. ICN (2018) believes that nurses have an important role to play and the responsibility to take active role to improve patient safety. Nurses should constantly make assessments to ensure the quality of care and safety for patients. Nurses should work towards initiating guidelines for infection prevention and control programs to enhance the safety for the patients, through learning from the mistakes which has been made by the healthcare system (ICN 2018).
Problem definition
HAI is a global problem and it is difficult to estimate the global burden of those infections. Developing countries are affected by HAI in a large way and the work to prevent those infections needs to be improved. With good prevention measures, it is possible to reduce the burden and the prevalence of HAI and create a greater healthcare for patients and staff and also lower costs for the healthcare service and society. Healthcare workers have a great responsibility to lead the work of prevention. Even if we have the knowledge about cost-effectiveness programs and we know the progress they can make in the healthcare systems, there are still very many people around the world who will become infected by HAI. Due to HAI, there is a greater risk for unnecessary use of antibiotics which can result in resistant organisms. Studies have been done in this area before but there is still a need of complementary researches. It is significant to have knowledge about nurses and nursing students’ conception about HAI to understand the situation and their needs to perform good healthcare service. To continue the work to reduce the incidence of HAI is it important to gain perspectives in areas for improvements and also identify areas for upcoming research.

Aim
The aim of study was to investigate Vietnamese Nurses’ and Nursing students’ conceptions about healthcare associated infections and their role in prevention of healthcare associated infections.

Questions: What are the conceptions Vietnamese nurses and nursing students’ have about healthcare associated infections? What are their conceptions about their role and responsibility for the prevention of healthcare associated infections?
Method

Study design
The study design was cross-sectional with a qualitative approach. Data collection was done through semi-structured interviews and unstructured observations.

Sampling
The sampling in this study included nurses and nursing students. Inclusion criteria for the nurses were that they work at the University Hospital, they would have at least two years of work experience in healthcare and could speak English or Vietnamese. Another inclusion criteria was that only one nurse from the same department could participate in order to get a greater variety of experience. The inclusion criteria for the nursing students were that they were studying at Hue University of Medicine and Pharmacy and were in the third or fourth year in the nursing program, and they could speak English or Vietnamese. The study didn't exclude anyone dependent on age or sex.

The sampling in the study has been a mix of convenience sampling, snowball sampling, and a variant purposive sampling called reputational case sampling in order to include participants with different years of experience. According to Polit and Beck (2017) reputational case sampling is when participants have been identified through an expert when the researcher does not have enough information to proceed with the sampling (Polit & Beck 2017). Most of the participants were contacted through lecturers from the faculty of nursing according to the author's criteria. For the snowball sampling two final year students were found through the participant of the pilot interview who could refer two participants. An overview of the participants is present in table 1.

Table 1. Demographic information for the participants

<table>
<thead>
<tr>
<th></th>
<th>Nurses n= 5</th>
<th>Nursing students’ n= 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Years of experience</td>
<td>5, 7, 10, 13, 15.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Md=10</td>
<td></td>
</tr>
<tr>
<td>Years in nursing program</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Departments</td>
<td>Emergency</td>
<td>Hue University of Medicine and Pharmacy</td>
</tr>
<tr>
<td>University</td>
<td>Internal medicine</td>
<td></td>
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<tr>
<td></td>
<td>General surgery</td>
<td></td>
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<tr>
<td></td>
<td>Obstetric</td>
<td></td>
</tr>
<tr>
<td>Position</td>
<td>3 General nurses</td>
<td>Students</td>
</tr>
<tr>
<td></td>
<td>2 Head nurses</td>
<td></td>
</tr>
</tbody>
</table>

Data collection
Data collection was conducted in September 2018. The author had contacts with lecturers from the Nursing faculty of Hue University of Medicine and Pharmacy to get assistance with contacting the participants, interpreting the interviews and organizing times for observations. The lecturers were informed about the aim of the study and had access to the promemoria in order to understand the plan of the study and the criteria for sampling. The interview guide was discussed with the interpreters, so they had an understanding of the purpose of the interviews.
Two pilot interviews were performed to test the interview guide whether or not the questions were adequate and how it worked with the interpreter. The first pilot interview was conducted with a student without an interpreter and the second pilot interview with a nurse and an interpreter. Conclusions from the pilot interviews were that an interpreter should participate in all interviews because of the barrier in the language. Some modifications in the interview guide were made related to the differences between nursing students and nurses.

Semi-structured interviews were done according to Polit and Beck (2017) and clarify that the interviewer should follow a topic guide as a help to cover the areas in the interviews. The interviewer should let the participants the possibility to speak freely about the different topics in order to reach richer and more detailed data (Polit and Beck 2017). An interview guide (appendix 1) was used with open-ended questions so the participants could speak freely about the questions. The questions were in a logical sequence from general to more specific, and the interviewer had some follow up questions as for example, “can you explain further?”, “what do you mean when you said that?”, “is that something you want to tell me that I have not asked about?” to get more information from the participant. The interviews took place in different places around the hospital, in meeting rooms, staff rooms, lecture halls and outside on a bench. The importance of the setting for the interviews was that the participants could speak freely and not be affected by the surrounding environment. The interviews had a duration of 15 to 35 minutes, due to the different need of the interpreter and depending on whether the participant was a nurse or nursing student.

Before the interviews started an introduction was given about the research to the participants and an explanation about how the interview was planned and that the information would be treated with confidentiality. The interviewer asked the participants for their permission to record the interview and explained how the recording would be used and treated. In the case that the interviewer was not allowed to record the interview the interviewer had to put more attention to take notes related to no possibility to listening on the record afterwards. Out of the eight interviews, seven were recorded and one interview was not recorded. Seven individually interviews and one interview with a pair of nurses were conducted. Four interviews were with nurses from different departments and four interviews were with nursing students attending their third or fourth year of the nursing program. During the interviews those who took part were the interviewer, the interpreter and the participant (interviewee).

Unstructured observations at different departments were conducted. The author received help from students and teachers from the university who could explain and show around the departments. The unstructured observations have been done according to Polit and Beck (2017) who state observations as a supplement to the data from the interviews. Observational data can give an understanding of a behavior in a natural setting. The major method to collect data during unstructured observation is through field notes which are descriptive and reflective. Usually field notes are written after and close in time to the observation. It needs skills from the researcher to create good notes which can work as a reminder to the permanent record to the data collection (Polit & Beck 2017). The unstructured observations were done in order to get a greater understanding of the data from the interviews and get an overall understanding for the entirety of the study for the author. During the observations the author wrote field notes which were written in more details as soon as possible after the observations to be a part of the data collection. In total, 7.5 hours of observations were conducted in three departments: Emergency Department, Internal Medicine Department, and Surgery Department.
Data analysis
The collected data from the interviews and observations were transcribed in verbatim and analyzed by the content analysis method according to Granheim and Lundman (2004). The unit of analysis in this study are the interviews and unstructured observations. Two content analysis were done of the transcribed data, one for the interviews and one for the unstructured observations. The transcribed data was read thoroughly several times to identify meaning units which could be related to the aim of the study.

The meaning units have later been extracted and collected into one text and sorted in a table for a greater overview of the collected data. The meaning units were condensed to reduce the size of the meaning units without an impact of the importance in the meaning units. Those condensed meaning units were based on the whole context of the study and the condensed meaning units were given a code which described the content. The procedure of the analysis is described with examples in Table 2. Those codes from the analysis of the interviews and observations were collected and together they were formed into eight sub-categories which could be brought together to four main categories for a greater overview. The categories from the analysis constitute the results of the study.

Table 2. Examples from the content analysis with meaning units, condensations and codes from the interviews.

<table>
<thead>
<tr>
<th>Meaning units</th>
<th>Condensation</th>
<th>Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>see some patients come to the hospital but the patient do not have any infections but after admission so the patient have some symptom with infection. So that is HAI.</td>
<td>Patient got infections symptoms after admission.</td>
<td>HAI after admission in hospital.</td>
</tr>
<tr>
<td>Healthcare-associated infections are related to hand wash before and after a meeting with a patient. The instrument should be sterile. The nurse should follow the guidelines.</td>
<td>HAI related to hand washing. Sterile instruments. Follow guidelines.</td>
<td>Hand washing. Sterile instruments. Guidelines.</td>
</tr>
</tbody>
</table>

Ethical consideration
The research plan was sent to the contact person at the Faculty of Nursing at Hue University of Medicine and Pharmacy, Vietnam, for assessing if the study required ethical approval. It was judged that no ethical approval from the ethical committee was necessary for the study because the research only included nurses and nursing students as participants. The study has followed ethical guidelines according to Nordic Nurses Federation [NNF] (2003) which clarify four requirements a researcher must fulfill during a study. The requirements concern information, consent, confidentiality, and participants safety. The participants were told the aim of the study and received information about the study which was described in an easily-understandable way by the author and interpreter through an information letter (Appendix II). The purpose of the study was conveyed so that participants understood what they participate in and know what to expect from the interview, that their participation is voluntary and that they could withdraw from participation the interview or chose to not answer a question. It was made clear about confidentiality in the study and the management of the data described so they could feel able to speak freely and that the author will have the information from the interviews stored safely.
Result
The content analysis from the interviews and observations resulted in four categories with eight sub-categories which is shown in Table 3. The categories from the analysis are: Understanding and conceptions about HAI, Hinders for the prevention of HAI, How to work in a preventive way for HAI and Responsibility for patient safety.

<table>
<thead>
<tr>
<th>Categories</th>
<th>Sub-categories</th>
</tr>
</thead>
</table>
| - Understanding and conceptions about HAI | - Understanding of HAI.  
- Conceptions about HAI in the departments. |
| - Hinders for the prevention of HAI | - Limitations in the environment.  
- Lack of time to follow guidelines.  
- Equipment and supplies. |
| - How to work in a preventive way for HAI | - Guidelines for a good hygiene.  
- Education and knowledge.  
- Thoughts about opportunities for improvements. |
| - Responsibility for patient safety |                                                                                 |

Understanding and conceptions about HAI
The participants' conceptions about HAI was explained similarly and could be their understanding of what HAI is and their thoughts about the situation at their departments and what HAI could be related to. This category is presented in two sub-categories: Understandings of HAI and Conceptions about HAI in the departments.

Understanding of HAI
The description of what a HAI is was described similarly in the interviews and was seen as an infection which is acquired in the hospital. A patient who had no symptoms of an infection at the first contact with the hospital but showed symptoms of an infection after admission has become infected by an HAI. HAI can be caused by the healthcare workers, by other patients, by medical equipment and/or the environment. The healthcare workers can also be infected by an infection. HAI is related to the hospital and the sources to the infection can vary, but all cases of HAI have in common that they are associated with the healthcare system. HAI can be very serious and lead to higher morbidity or mortality in the worst case scenario.

*Healthcare associated infections is in my opinion, is an infection between medical staff and patient. Medical instrument, handwashed instrument and medical staff. Everyone and everything in hospital, between us. (Student, 1)*

Conceptions about HAI in the departments
The participants could see some few cases of HAI in their departments and generally the rate of HAI was low in their conceptions. Some cases of infection could be related to a patient's disease and there were few cases which were associated with the healthcare workers. The few cases of HAI could be associated to the duration of stay in the department and the number of processes a patient has been through. At the emergency department it was considered that the cases of HAI were low in relation to shorter stay and fewer processes in that department. The participants spoke about their experience from their departments which differed depending on its specialty, but they shared similarities due to the situation of HAI and how it could be a risk.
in the departments. Some participants had conceptions that the risks of being infected by HAI were high in the hospital due to hospital’s hinders and that Vietnam has tropical infections.

*The infections are related to the diseases of the patients. However, there are a little bit case that infection are related to the healthcare of a nurse.* (Head nurse, 4).

**Hinders for the prevention of HAI**

The participants mentioned various hinders for them to perform their work correctly in the hospital and that could result in a higher risk of HAI. The hinders could be divided into three areas and are presented in three sub-categories: *Limitations in the environment, Lack of time to follow guidelines, and Equipment and supplies.*

**Limitations in the environment**

There are several risks for spreading HAI and the most common risk the participants mentioned was the high numbers of patients in the hospital. The participants explained the lack of rooms and beds could result in that patient needed to share beds with each other, so sometimes the only option is to have two patients in one bed. To avoid spreading HAI the nurse tried to isolate or separate patients with an infection from other patients to reduce the risks of spreading infection and that could be difficult because there were not enough rooms available. The participants explained that the high number of patients resulted in it becomes crowded in the departments, and in Vietnam it is common that the patients’ family is taking care of the patient in the hospital. From the observations could risks of spreading infections be identified in the environment. There were many patients with relatives, and in one room there were seven beds and nine patients, so they had to share beds. With all the healthcare workers, students, patients, and relatives in a small area resulted in it could be crowded which affected the nurses work in a negative way and the risk for spreading infection increases.

*In hospital sometimes, it’s really crowded and patients, two patients in one bed. So that makes the risks of infections higher. At least one bed for one patient.* (Student, 7)

The participants mentioned the hospital environment as important and that HAI is related to the environment and sometimes the hospital was not clean. In the observations was it found that could be very hard to follow good hygiene because of the limitations in the environment. The nurses did what they could to minimize risks in the environment. During the procedure of cleaning wounds and changing bandage the nurses turned the electric fans off in the ceiling to reduce the risk of spreading microorganisms. A nurse from the observation explained that the environment was not good enough to have the wounds uncovered for aeriation.

The participants mentioned that supplies, for example the gloves, was available in the departments, but it could be far away from the healthcare workers. That resulted in less use of the protective supplies and more difficult to perform the guidelines and procedure correctly. From the observations it noticed that gloves and disinfection gel were placed at a distance to use it which resulted in being used less often. At the emergency department one box of gloves was visible and just a few bottles of disinfection gel were available but in distance.

**Lack of time to follow guidelines**

The participants mentioned the lack of time for the nurses with a high work load could result in an increased risk of HAIs. The lack of time could result in guidelines and procedures being followed less correctly, some steps could be skipped due to the lack of time, but the nurses still had to ensure the safety of the patients. There could also be a risk to forget something due to
the hard work, such as forget doing some important guidelines for example handwashing before and after a meeting with a patient. It mentioned that the use of equipment and supplies was not correctly performed all times because the nurses had very much to do and they did not have the time to use it properly. The participants expressed with lack of time it could be harder to maintain the habits to perform the guidelines and that could be a risk for HAI. In the obstetric department the participants expressed it could be a risk for patients to get infected by a HAI when there were many surgeries in the same day, especially cesarean surgeries. The time for cleaning the operating room could be too short which resulted in that the room was not totally clean all the times.

Actually we don’t have the time and the equipment to make sure that we can follow the whole procedure. We can like in the procedure have a lot of step, some steps are not important, so we can go through it but also make sure that the patient have a sterile procedure. (Head nurse, 4)

Equipment and supplies
The equipment and supplies were perceived as insufficient, limited, expensive, and unmodern in some departments. The disinfection gel was used restrictively related to the conception that it is expensive to use it. There were differences between the perceptions about the limitations of the equipment in the different departments. Some participants mentioned the lack of equipment and supplies as a hinder to perform the guidelines correctly. According to one head nurse who expressed that there was enough equipment and supplies to perform the work but sometimes it was not possible to follow the guideline correctly due to the lack of equipment and supplies. From the observation was a lack of equipment and supplies identified, there were few venous tourniquets in the departments for use with blood sampling so it was common that a latex glove was used instead to tie around the arm.

How to work in a preventive way for HAI
The preventive work for HAI could be categorized into three main areas and are presented in three sub-categories: Guidelines for a good hygiene, Education and knowledge, and Thoughts about opportunities for improvements.

Guidelines for a good hygiene
The most important thing a nurse could do to ensure safe care for the patients was follow the guidelines to ensure good hygiene for themselves and for the patients in the procedures. For example perform an injection correctly according to the guideline’s steps. The most common guideline which were mentioned was handwashing because the hands was an easy way to spread bacteria. The participants mentioned the importance to make sure that the hands are clean before doing a procedure with a patient and also the importance of sterile procedure and sterile equipment often as an important thing a nurse could do to prevent HAI. They would ensure that the instruments are clean or sterile before the start of a procedure and that the equipment was only used for one patient. The head nurse expressed that some steps in a guideline may not be important to perform to ensure a good and sterile procedure.

The most important that is washing hands before doing the process, every process. (General nurse, 2)

The author could observe that several of the healthcare workers and students wore arm watches, braces, and rings when they worked, especially in the emergency department. Generally, the use of the disinfection gel for hand hygiene and handwashing was low
overall and the author could only see one who used the disinfection gel and one who washed the hands in the emergency department during the 2.5 hours of observation. The disinfection gel was used more often in the other departments at the hospital. One pair of gloves was sometimes used on more than one patient. Hand hygiene was many times low and inadequate among the staff. They cleaned the area before an injection on the patient but not their own hands. The wads they used to clean before the injection had laid in a cup of alcohol and after a time evaporation sometimes lead to the wads being dry when they performed the procedure. The nurses became more meticulous with following the guidelines when a student was close and did it well to show how to do it right. In sterile procedures their technique was good, and the nurse was more careful with the hand hygiene.

To prevent HAI ensure that sterile intervention to the patient. Secondly, to ensure handwashing. (Head nurse, 3)

Education and knowledge
The importance of having good knowledge about HAI was a common perception among the participants because knowledge was considered as a central key to reduce the risks for HAI. A nurse in one interview mentioned internal education as important and good for the nurses, and that the internal education should stay updated about infections. The participants mentioned that the nurse had a very important duty to teach the patients and the relatives about HAI so they know how they can protect themselves and how to avoid infecting other people. The participants emphasized the importance of teaching people from the rural areas about body hygiene and nutrition so they had better possibilities to become healthier and reduce the risks of diseases and infections.

Educate patient from the rural area about the importance of hygiene, movement and nutrition, the knowledge about that can be low. (General nurse, 5)

The nursing students described the university as having an important role for them and their progress. To learn as much as possible about HAI was a goal and they felt that they had a lot of information that they could use in their upcoming work as nurses. They expressed that they will do as they have been taught at the university and learn from the experienced nurses at the hospital. They would take the good points the nurses have and mix with their own knowledge. The students expressed a will to share the information they have acquired from their education to other healthcare workers, patients, and relatives to make the work better and safer in the hospital.

Thoughts about opportunities for improvements
Several participants stated a need of improvements in the hospital environment to reduce the risks and make it safer for patients, and also a need for more rooms for the patients. At the emergency department it would be preferable to have one room, or at least a private area, for each patient. Other departments expressed that they wanted more rooms to have better options to isolate patients with infection from other patients to reduce the risks of HAIs. The risk would be reduced by having only one patient in one bed so the patients do not need to share beds and by having better facilities and a cleaner hospital. The participants stated that it would be good if the hospital focused on developing the sterile center at the hospital and make sure to have better work for prevention, more modern equipment for sterilizing the different types of equipment at the hospital and more controls at the departments.
Better facilities possibilities. Better cleanliness. Reduce the risk for infections and spreading of diseases so avoid have two patients in one bed. Wish a bigger space. Less crowded. (General nurse, 5)

To make the prevention work better several participants stated the need for more nurses to work in the hospital. The thoughts with more nurses were to reduce the number of patients each nurse was responsible for and with fewer patients the nurse could have more time to perform the guidelines correctly. One participant mentioned an improvement to make gloves and antiseptic gel more available by storage it in the patient's room so it becomes easier to use it. There was also a conception that there was a need of more modern equipment, so the caregiving processes could be safer and reduce the risks of HAIs.

Responsibility for patient safety
The responsibility for patient safety was identified in different levels. The participants expressed that their responsibility was to follow the guidelines and do the procedures by following the steps to ensure safety for the patients. They make sure that the patients were safe, and education for the patients was also mentioned as very important in order to reduce the risks and that was their responsibility to do it. The head nurse of the departments had a responsibility to make quality controls. They made controls among the healthcare workers so they are doing the procedures right and following the guidelines like ensuring single use of the equipment. An important role of the head nurses was to lead the work for prevention and ensure it at the departments. One head nurse explained that there are some of the staff members who have the duty and responsibility to report the infections that happened in the department. There is also a head nurse for the hospital which is giving the nurses in the departments the guidelines that they have to follow when they are working.

I will tell my staff nurse keep sterile on step in injection process and I, and I always test my staff nurse to do that. (Head nurse, 4)

In the hospital, there is a sterile center which has responsibility to verify how the healthcare workers are following the procedures and guidelines in the departments. The participants mentioned that the nurses were following the guidelines better when someone was observing them. The sterile center had the responsibility to clean the rooms a patient with an infection had used. The last level of responsibility which was mentioned was the Ministry of Health who has established the procedures to ensure patient safety with sterile procedures and make sure to minimize the risk of spreading bacteria among the patients. The Ministry of Health also had a system for reporting infections in the hospital.
Discussion

Discussion of the results

The aim of the study was to investigate Vietnamese Nurses’ and Nursing students’ conceptions about healthcare associated infections and their role in prevention of healthcare associated infections. From the results of the interviews and observations could the author identify four categories which are: Understanding and conceptions about HAI, Hinders for the prevention of HAI, How to work in a preventive way for HAI and Responsibility for patient safety.

In the first category, Understanding and conceptions about HAI, the participants described HAIs in a similar way to how WHO (2018b) describes it, that the infection is acquired from the hospital and could be caused in several ways and also affect the healthcare workers. Some participants stated that they thought there is a high risk to be infected by HAI and some other believed the levels of HAIs was generally low in the departments. The participants described that the duration of stay and the number of processes had an impact on the prevalence of HAIs at the hospital. The difference in perceptions for HAIs that some saw higher risk could be explained by Ariyarathne et al. (2013) who found that compliance for techniques for hand hygiene could be better among persons which had updated knowledge. WHO (2018b) reports that 10.1% of the patients in low and middle-income countries are affected by HAIs and Lien et al. (2018) describe the level of HAIs as high in Vietnam and that makes a difference to the perceptions in this study about the levels of HAIs.

The result in the category Hinders for the prevention of HAI showed that participants saw a higher risk for HAI when the departments are crowded with people. Because of the number of patients and the lack of room it was difficult to isolate a patient with an infection in the departments and that could be a risk for spreading an infection. Sometimes the hospital could be unclean which was seen as a risk. Zborowsky (2014) emphasized Florence Nightingales environmental theory about the impact of the hospital environment have on the patient. Defects in the hospital environment are related to the ability a patient has to heal. Aspects in the environment which have a great impact on the patients are noise, ventilation, air, cleanliness, variety and light (Zborowsky 2014). Jackson et al. (2014) found that the environment is much cleaner today compared to the time of Florence Nightingale, but the environment is still a threat to patients’ safety with dirt and infections, with transmission through the environment. The author could see a need for improvements in the environment, develop the ventilation to minimize the risk of microorganisms spreading and ensure the cleanliness. There is a need to improve it and also a challenge to do it in a cost-effective way.

The results of the observations showed some hinders for the healthcare workers to have good hand hygiene and those hinders were also mentioned by the interviewees. The conditions were not optimal to ensure good hand hygiene, areas for hand washing were limited, and disinfection gel was sometimes at too far a distance for use. WHO (2016a) stressed the great importance of clean hands for the healthcare workers and state that as a core component for prevention work to HAI (WHO 2016a). The author could note a need to improve the hand hygiene in the departments in order to ensure good prevention work against HAIs. Introducing a cost-effective hand hygiene program is recommended and it can be achieved by improving the possibilities for hand washing and disinfection. Hand hygiene should be seen as a priority and a core component for the prevention work.
The result showed the high number of patients resulted in much things to do which lead to a lack of time to perform the guidelines correctly, for example, ensure clean hands. The participants stated that patients who had undergone surgery could be at greater risk for HAI related to not totally clean operation room because of the short time to clean the operation room. The participants stated that there was not enough equipment and supplies and it was unmodern, and it sometimes kept too far away which lead to less use. This was also seen in Lien et al. (2018) that the healthcare workers had knowledge about HAI and how it could develop in different ways. That limitations in equipment and supplies, overload with number of patients and lack of time was seen as difficulties to control HAI. The lack of time and many patients were reasons for why hand hygiene was not performed all the times (Lien et al. 2018).

In the category How to work in a preventive way, following the guidelines was stated by the participants as the most important thing a nurse could do to work in a preventive way to ensure good hygiene. The guidelines for handwashing and sterile procedures was seen as the most important measure. From the observations was it found that healthcare works and students did not always followed the guidelines correctly, for example handwashing was a guideline which many did not perform correctly. The author could see that the nurses were more meticulous and followed the guidelines better in sterile procedures compared to processes which needed basic hand hygiene. Ariyarathne et al. (2013) stressed that hand hygiene is important and an effective way to reduce the risks of HAI can result in reduced morbidity, shorter hospital stay, and lower costs. The knowledge about hand hygiene was moderate among nursing students and the study also showed the importance of clinical training for students with the involvement of healthcare workers (Ariyarathne et al. 2013). It could be interesting to implement practical workshops during which nurses and nursing students' can practice hand hygiene together in order to learn from each other.

From the observations was it found that the healthcare workers used a good technique for injection but sometimes not cleaning in a proper way before it or using dried alcohol wads to clean the injection site on the patients or not disinfect their own hands. Sometimes one pair of gloves was used for more than one patient. There were limitations to perform the guidelines well but sometimes they had the possibility to perform it better and did not do it. This was also seen in Jackson et al. (2014) in which the participants presented themselves with a good knowledge about infection prevention and not always followed the guidelines. The behavior the nurses had in work situation did not coincide with their knowledge about infection control, prevention, and transmission. There was a behavior of rationalizing their own deviation from guidelines but when someone else was not following the guidelines it was judged as irrational. The infection prevention was presented as a show or display to satisfy the patients and giving a good impression and also for protecting themselves (Jackson et al. 2014). The author could see in the observations that the nurses had good techniques in many areas but sometimes did not performed the basic hand hygiene because of hinders in the environment, lack of time, equipment and supplies, and their behavior.

Internal education was seen as a good way to keep the nurses updated about infections. According to WHO (2011) stated that education about infection control for healthcare workers is an important measure for the prevention of HAI and to have control on infections (WHO 2011). Internal education for healthcare workers is an important step in the prevention of HAI and something that the hospital could work on even more. Updated healthcare workers could lead to improvements in their work of prevention. The participants showed good knowledge in the interviews and sometimes a different behavior could be seen in the observations. That
behavior of rationalizing and criticizing others could be about self-awareness and/or a lack of understanding the consequences of an inappropriate hand hygiene.

The nurses have a responsibility in educating the patients and their relatives, and that could take much of the time of their work. The participants stated that the teaching for the patients and relatives as very important part of the work to avoid spreading of HAI in the departments. The importance of educating the patients and relatives about how to avoid infections and the importance of good hygiene became clearer for the author after the observations. Hammoud et al. (2017) found that higher awareness of infection control among nurses’ results in a greater teaching to the patients about measures to reduce risks with HAI. To improve the education for the patients and their relatives Hammound et al. (2017) identified a need to enhance the culture of the relationship between healthcare workers, patients, and relatives (Hammound et al. 2017). The author could see educating patients and relatives as a very important measure and a need for improvement in the environment and facilities at the departments, so the patients and relatives have the ability to comply with the information.

The participants stated that there was a greater need to educate people from rural areas about infections, nutrition and hygiene because the knowledge about it could be low. According to WHO (2016b), with a healthier and safe environment the risks for diseases can be reduced and premature deaths be prevented. There are many influences from the environment which affect the health, for example the infrastructure, poor working conditions, pollution, lack of sanitation, and access to safe water. Poorer health from environmental and social influences can further lead people into poverty because of the poorer health and increased cost for healthcare service (WHO 2016b). To reach a healthier population it is important to educate the public about infections, diseases, and hygiene and make sure that the minimum standard for living conditions is good enough for people living in rural areas and that they have possibilities to ensure a good hygiene. Environmental and social influences could be an important improvement worth to form strategies for reducing the high number of patients in the hospital which could lead to a facilitated work for the healthcare workers and get a healthier population.

The participants stated that it would be good if the hospital priors to develop the sterile center and for it to have more controls in the departments. Khan et al. (2017) showed the importance of a good infection control programs and surveillance methods to reduce HAI and it can be a help for healthcare institutes to devise a good infection control program by guides from WHO (Khan et al. 2017). A surveillance program could have a positive effect on the healthcare workers to enhance the knowledge about the situation of HAI in their departments and how it can work to prevent it better. An infection control program could be a good improvement to reduce HAI.

In the category Responsibility for patient safety, following the guidelines and educating the patients was stated by the participants as a responsibility the nurses had. The head nurses had a greater responsibility to ensure the preventive work in the departments through quality controls among the staff. Some of the healthcare workers had the duty to report infections. The author could see there was a need from the hospital and The Ministry of Health to update the guidelines and clarify the situation about HAI so the preventive work for HAI can develop. If all parts in the healthcare service should be able to take their responsibility requires possibilities for all the healthcare workers to perform the work in a correct way.
**Method discussion**

In a qualitative study the sampling is not made randomly and the participants for a research should be information-rich and lead to a good understanding of the subject. The researcher should select settings for the sample which can lead to participants with much information (Polit & Beck 2017). The author received help from the lecturers from the Nursing faculty of Hue University of Medicine and Pharmacy regarding to how to reaching the participants. To get a greater variety among the participants the author made clear with the lecturers the criteria for the sampling. For communication reasons, the author had to rely on the lecturers from the faculty for the sampling which resulted in a great variety in the participants and this variety lead to a richness data. Polit and Beck (2017) state the data saturation as a principle when the collecting of data is no longer new or useful for the study. The author could after the eighth interview not find any new information related to the aim of the study, the last interview had similarities to the already sampled data. Few informants can have a lot of information to share in the interviews, so the number of participants do not necessary lead to a greater trustworthiness in a study.

Semi-structured interviews were used in this study as the method for data collection. According to Polit and Beck (2017), semi-structured interviews allow the participants to speak more freely about the subject and the interviewer should have an interview guide with topics related to the subject which the interviewer is asking questions around. The questions in semi-structured interviews should be made so the answer could lead to a rich and detailed information (Polit & Beck 2017). In this study the interview guide (Appendix I) created opportunity for the participants to speak about their own thoughts and experiences related to the opened-ended questions used by the interviewer which resulted in a rich data with great variety.

Polit and Beck (2017) recommend that the location for an interview should have the possibility for privacy and low risk for interruptions. In this study it was many times difficult to find a location for the interviews which had total privacy. The interviews took place in areas which were silence and with as few people as possible in the room. During those interviews there were people in the room, thus the interviewer had to make an assessment about if the other persons in the room could have made an impact on the participants answers.

In this study all the interviews except one were recorded. It was good for the interviewer when the participants allowed the interview to be recorded, the interviewer could focus more on what the participants were saying. The records were transcribed in verbatim and were useful for the author in the data analysis. Polit and Beck (2017) strongly recommend that the interviews should be recorded to ensure that the data are the participants’ own words transcribed in verbatim subsequently. The interviewer can listen more intently when the interview is recorded instead of being distracted by taking notes during the interview. The ideal place for recording an interview is very quiet place but it is common to have sounds from the environment enter the recording. The recordings in this study were hard to hear sometimes because of noise in the environment, which lead to a few words that were not possible to hear. It is important to note that the meaning of the sentence in the records could be understood even with the noise from the environment.

Two pilot interviews were made, and the author found that there was a need for changing a few questions and their sequence in the interview guide. The changes in the questions was to make the questions simpler to understand but keeping the same meaning. Because of the differences between nurses and nursing students, some specific questions could be more relevant for the
nursing students’, that is why the nursing students were asked specific questions that the nurses did not have. For example, the question, *How are you working to prevent healthcare associated infections?* The interviewer found that interesting to ask the nursing students what they could do to prevent HAI with the knowledge they had from the university. Also in the question *What do you think about the healthcare associated infections at your unit?* The nursing students was asked what they thought more generally of the risk to be infected of HAI at the hospital. Some participants experienced difficulties in answering the opened-questions in the beginning and the author had to make the question more specific sometimes. Early in the data collection the author could see similar conceptions about the subject from the interviews. Related to the open-ended question the participants could speak more specifically about their own thoughts of HAI. That resulted in rich data and a great variety of personal perspectives in the subject of the study.

According to Björk Brämberg and Dahlberg (2013) the focus of an interview is to understand the meaning of the words rather than translate word by word for understanding. To get as good as possible translation the interpreter should be aware of the differences in the languages. The use of an interpreter is connected to the trustworthiness and it is important that the researcher ensure the competence of the interpreter to strengthen the trustworthiness (Björk Brämberg & Dahlberg 2013). In this study there was a barrier in the language between the interviewer and participants that resulted in an interpreter took part in interviews. It was also a barrier between the author and interpreter in the language because none of them had English as a native langue. The author received help from the Nursing faculty to find lecturers who accepted to interpret the interviews. In total four lecturers participated as interpreters in the study, generally it worked well with the interpreters though one of them the communication was better than with the others. The author asked specifically if that interpreter could participate more times because it worked very well. Overall the interviewer could ensure the meaning of the answers from the participants through the interpreter even if it was sometimes difficult to understand correctly. During the transcription process there were some parts which were unclear related to the interpreters’ pronunciation and the environment which was sometimes noisy. Those unclear parts were excluded from the content analysis. To ensure a greater credibility of the data the author could have taken help of the interpreters for the transcribing. The author assessed that was not necessary.

The study was done by one researcher who had supervision by a supervisor from Karlstad University, Sweden. The supervisor has been a support through the content analysis, which has an impact of a greater trustworthiness of the study. Graneheim and Lundman (2004) describe that trustworthiness is affected by credibility, dependability, and transferability. The trustworthiness can be greater if the researcher uses the most relevant method for collecting data and the amount of data is also important for the credibility. To reach a good credibility in the work of meaning units in the content analysis it is important that the meaning from the data not get lost in the condensation process (Graneheim and Lundman 2004). In this study the analysis method is shown in a table to strengthen the credibility of the content analysis by making it transparent. According to Graneheim and Lundman (2004), dependability is related to factors of instability and factors of changes. For data collection over time, which can change during the time with new insights about the phenomenon and others are not changing over time. In this study the interviewer was not familiar with the role of leading an interview and that could have had impact on the collected data and the result. It could be seen as weakness in the study. Interviews and observations are an evolving process and even if the author found new insights during the data collection the same questions and topics were asked to the participants. Transferability is about the result can be transferred to other groups (Graneheim & Lundman
The author believes that the result of the study can be transferred to other groups even in other countries and cultures, this study clarifies the conceptions nurses and nursing students have about HAI and their role of prevention.

Strengthening the trustworthiness is impacted by the selection of methods, semi-structured interviews, unstructured observations and content analysis for finding conceptions about the subject. Quotes from the interviews is showed in the results and those quotes are from participants and the interpreters. Those quotes from the interpreters are translated from Vietnamese. The author could find similarities and differences among the participants by the content analysis and could also confirm the findings in the observations.

**Clinical value**
The results showed that nurses and nursing students’ do not have the time and possibilities to perform their work correctly. The lack of time and the limitations in the environment at the hospital affected the work situation in a negative direction. Hinders to perform a correctly work has been showed in the result as lack of equipment and supplies and those has also not always been accessible in an easy way. There would be good to make changes so equipment and supplies could be more accessible, so it will be easier to reach it. It became clear in the study that the work to prevent HAI involves several levels in the healthcare system and also involves society. The hospital has an important role to develop the organization and lead the prevention work forward and the healthcare workers have to follow the guidelines to minimize the risks for HAI. It is a need to improve the chances for the healthcare works to follow the guidelines. There is a need for information in society about infections and diseases and increase the knowledge of health, so the people can become healthier. The findings in the result can be a foundation to keep up developing the preventive work.

**Future research suggestions**
Healthcare-associated infections are a global problem and it would be interesting to evaluate the effect an Infection Control Program could have in a department and how that would impact the work situation for the healthcare workers in further researches. Another interesting subject would be to look at how cost-effectiveness program could be introduced and how that would affect the healthcare in a department with limited resources.

**Conclusion**
The study presents nurses and nursing students' conceptions about healthcare associated infections and their role in their prevention of healthcare associated infections. The participants explained a general knowledge about the importance of HAI and about the current situation in the departments. There were three areas identified which made hinders for the nurses to perform their work correctly: limitations in the environment, lack of time to follow guidelines, and the equipment and supplies. The participants stated three areas about how to work in a preventive way against HAI which include guidelines for a good hygiene, education and knowledge, and thoughts about opportunities for improvements. Thoughts to make the situation better in the hospital was about the need for more nurses, and to make equipment more available and to have more rooms for patients. The responsibility for the patients' safety was mentioned in different levels from the nurses and nursing students’ own responsibility to follow the guidelines to the hospitals and the Ministry of Health responsibility for infection controls.
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References


Appendix I - Interview guide

Demographic information
Who are you? Gender, age, years of experience, which unit are you working on and what is your position?

Open-ended questions
- How would you describe healthcare associated infections?
- What do you think about the healthcare associated infection at your unit?
- What do you think is the most important thing a nurse can do to reduce the risks for healthcare associated infections?
- How are you working to prevent healthcare associated infections?
- What do you think about nurse’s responsibility to patient safety related to healthcare associated infections?
- What do you think the hospital can do to reduce the risks for healthcare associated infections?
- Is that something you would like to change at your unit so the prevention for healthcare associated infection becomes even better?
- Is that something you would like to tell me that I have not asked about, that you think can be good information for me?

Follow up questions
- Can you explain further?
- What do you mean when you say “that”?
Appendix II - Information to the informants

My name is Armas and I study the last semester at the nursing program in Karlstad, Sweden. I am wondering if you would like to participate in my study which is about nurses and nursing student’s conception about healthcare associated infections (HAI).

Any information I receive from you will be confidentially used and none of the answers will be able to locate to a specific person in the study. The interview will take place at Hue University Hospital and will approximately take 30min. If it seems to become a barrier in the language, an interpreter will take part during the interview, so the information will be as correct as possible. It’s completely voluntary to participate in the study and you have the right to withdraw from the interview at any time and can also choose not to answer a specific question. To receive firsthand information, the interview will be recorded and later transcribed in verbatim to be able for analyze.

I hope that you would like to participate in my study and feel free to contact me at any time.

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