

## Experiences of the nursing student in learning HAI prevention and control in Asian countries through the use of scenario-based simulation: an explorative qualitative study

### *Experiências do estudante de enfermagem na aprendizagem da prevenção e controlo de IACS em países asiáticos através do uso de simulação baseada em cenários: um estudo qualitativo exploratório*

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## Abstract

**Background:** Healthcare-associated infections (HAIs) have posed a major threat to both patients and to the safety healthcare personnel worldwide. According to the World Health Organization, 10% of hospitalized patients are affected by HAIs worldwide.

**Objective:** The objective of this study was to explore the experiences of nursing students in learning HAIs prevention and control by the application of the scenario-based simulation pedagogy now in use in two Vietnamese and two Cambodian universities.

**Methods:** A qualitative study was conducted among 160 nursing students from 2 Cambodian universities and 2 Vietnamese universities, and by using the purposive-sampling method. The data were collected through a focus group discussion and analyzed by the Graneheim and Lundman method (Graneheim & Lundman, 2004).

**Results:** Two themes and six categories were generated. 1) First theme: factors for enhancing student learning on the prevention and control of HAIs by use of scenario-based simulation; and 2) Second theme: factors hindering students learning on HAI prevention and control by use of scenario-based simulation.

**Conclusion:** The findings showed that SBS is an effective learning method for nursing students that can be applied to enhance the quality of nursing education in the Asian countries as SBS not only improves the clinical skills, but also the soft skills of nursing students. However, the effective outcomes and impacts can only be achieved in the context with the appropriate learning materials and equipment, simulation facilities and the instructors with pedagogical skills.

**Keywords:** Enhancing Factors; Hindering Factors; Qualitative Research; Scenario-Based Simulation; Standardized Patient.

### **Resumo**

**Enquadramento:** As infeções associadas a cuidados de saúde (IACS) têm representado uma grande ameaça tanto para os pacientes quanto para a segurança dos profissionais de saúde em todo o mundo. De acordo com a Organização Mundial da Saúde, 10% dos pacientes hospitalizados são afetados por IACS em todo o mundo.

**Objetivo:** O objetivo deste estudo foi explorar as experiências dos estudantes de enfermagem na aprendizagem da prevenção e controlo de IACS através da aplicação da pedagogia de simulação baseada em cenários, atualmente em uso em duas universidades vietnamitas e duas universidades cambojanas.

**Métodos:** Um estudo qualitativo foi conduzido entre 160 estudantes de enfermagem de duas universidades cambojanas e duas universidades vietnamitas, utilizando o método de amostragem propositada. Os dados foram recolhidos através de uma discussão em grupo focal e analisados pelo método de Graneheim e Lundman (Graneheim & Lundman, 2004).

**Resultados:** Dois temas e seis categorias foram gerados. 1) Primeiro tema: fatores que contribuem para a aprendizagem dos estudantes na prevenção e controlo de IACS pelo uso de simulação baseada em cenários; e 2) Segundo tema: fatores que impedem a aprendizagem dos estudantes na prevenção e controlo de IACS pelo uso de simulação baseada em cenários (SBC).

**Conclusão:** Os resultados demonstraram que a SBC é um método de aprendizagem eficaz para estudantes de enfermagem que pode ser aplicado para melhorar a qualidade da educação em enfermagem nos países asiáticos, uma vez que a SBC não só melhora as habilidades clínicas, mas também as habilidades interpessoais dos estudantes de enfermagem. No entanto, os resultados e impactos efetivos só podem ser alcançados no contexto com os materiais e equipamentos de aprendizagem apropriados, instalações de simulação e instrutores com habilidades pedagógicas.

**Palavras-Chave:** Fatores Facilitadores; Fatores Impedidores; Paciente Padronizado; Pesquisa Qualitativa; Simulação Baseada em Cenários.

## **1. Introduction**

Healthcare-associated infections (HAIs) have posed a major threat to both patients and the safety of healthcare personnel worldwide. HAIs have also prolonged the duration of hospitalization and increased the costs for healthcare facilities and patients (Raka, 2012). Worldwide, 10% of patients are affected by HAIs. A total of 7% of patients admitted to acute care hospitals in developed nations and 15% in developing nations had acquired at least one form of HAIs (WHO, 2016). A prevalence rate of 5.9% occurred among patients with at least one HAI in the European Union and European Economic Area (EU/EEA). The prevalence of HAIs within the EU/EEA was estimated to be between 4.4% in primary care hospitals and 7.1% in tertiary care hospitals. It was highest in patients admitted to intensive care units, in which 19.2% of patients were infected with at least one HAI, as compared to an average of 5.2% for all other specialties combined (Suetens et al., 2018). In Southeast Asia, it was reported that in 2015, there was a 9% prevalence and 2% incidence of HAIs in the intensive care units (Ling et al., 2015). Results from a prospective surveillance of HAIs in the pediatric hospital in Cambodia, between January and December 2015, showed an incidence of 3.1% of admitted patients (Hearn et al., 2017). A study in 2016 on the burden of HAIs and antimicrobial use in Vietnamese adult intensive care units revealed that the prevalence of HAIs was 29.5% (Phu et al, 2016). These adverse events happened mostly in hospitals during healthcare delivery, and they could have been prevented by applying standard precaution measures (Raka, 2012). Among healthcare professionals, nurses represent the largest number of healthcare professionals, since they have close contact with patients. Thus, their knowledge, attitude and adherence to standard precautions have an impact on the prevention of HAIs (Sharma et al., 2012).

Improving nursing competence in infection prevention and control (IPC) would contribute to the reduction of HAIs. One of the effective methods for improving the competency of nursing students on IPC is the application of scenario-based simulation (SBS) education. There is no doubt that it is a valid learning and teaching method to help students learn clinical and non-clinical skills, such as self-confidence, teamwork, communication, critical thinking, clinical reasoning and problem solving (Cant & Cooper, 2017). The study on reflection as a factor promoting the learning of inter-professional collaboration in a large-group simulation in social and health care shows that the simulation, in particular, promoted collaboration skills and strengthened the significance of collaboration. Moreover, the inter-professional simulation strengthened the participants' knowledge of the significance of interacting with patients (Silén-Lipponen & Saaranen, 2021). This innovative learning and teaching method has been implemented over the past decades in developed countries, where it has been shown to be useful and effective for the learning process and clinical practice of the students without causing risk to actual patients before they begin providing professional patient treatment (Cant & Cooper, 2017). Although it has been shown to be an effective method for learning, the literature reveals that simulation has barely been implemented in low-income countries (Bø et al., 2021).

Although SBS has been recommended in nursing education and there is evidence of its benefits, many institutions have difficulties in integrating simulation methods into their curricula. The reasons are the lack of national incentives to transform and scale up nursing education, unavailable funding, the condition of the existing facilities, the state of the curriculum management and the disposition of the school faculties (WHO, 2018). This situation is similar in Cambodia and Vietnam, where the traditional methods are still widely used in most universities. Nevertheless, some universities in Vietnam have recently experimented with simulation-based training as an innovative learning and teaching method (Tram & Lam, 2022). The Vinmec Medical Simulation Center was established in Vietnam in 2017 to promote continuous professional development for healthcare professionals. This center offers simulation training such as a nursing process-based skill-training program and communication-skills training, among others (Gullo & Vu, 2018).

The simulation pedagogy has been piloted as a PrevInf project “Capacitating the competence of Asia's nursing students on the prevention and control of HAIs” in Vietnam and Cambodia. It is a joint project of a Nursing School in Portugal, a University in Finland and two Vietnamese and two Cambodian Universities. The purpose of the project is to improve the knowledge and skills of nursing students regarding HAIs. The project has introduced a simulated pedagogy method for nursing courses. As the simulation-based pedagogy is rather new for most universities in Vietnam and Cambodia, it is therefore necessary to assess the students' experiences with this learning method.

The objective of this study was to explore the experiences of nursing students on their learning of HAI prevention and control by the application of the SBS pedagogy in two Vietnamese and two Cambodian universities. This paper attempts to answer the following questions:

- What are the factors enhancing student learning of HAI prevention and control by the use of SBS?
- What are the factors hindering student learning of HAI prevention and control by the use of SBS?

## **2. Methodology**

### **2.1. Study Design**

This is a descriptive qualitative study conducted among nursing students from two nursing universities in Vietnam and two nursing universities in Cambodia. The descriptive approach helped to illustrate the learning experiences of nursing students by use of the SBS included in a nursing-education program aimed at the prevention and control of HAIs.

### **2.2. Participants**

A purposive-sampling method was used in this study. The participants were thus intentionally selected on the basis of specific inclusion criteria, such as being in their second and third year of nursing courses and having completed their studies on IPC. Students were invited to participate in the SBS sessions and to join the focus

group discussions (FGDs) for this study as per mutual consent. 16 FGDs were conducted involving 160 nursing students from 4 different nursing universities, of which 2 of the nursing universities were located in Cambodia and the other 2 in Vietnam. Each nursing university had conducted 4 different SBSs, followed by 4 sessions of FGDs; and 8 to 12 nursing students were invited to join in each FGD. Certain abbreviations were used to refer to the participants for citation purposes. Accordingly, the abbreviation “Vs” referred to Vietnamese students, while “Cs” referred to Cambodian students.

### 2.3. Data Collection

Data were collected via FGDs after the SBSs were performed. Each nursing university had conducted 4 different SBSs, followed by 4 sessions of FGDs. From 8 to 12 nursing students were invited to join in each FGD. Eight semi-structured interviews with open-ended questions were used to guide the FGDs with nursing students, and they were moderated by two researchers per each group. The interview guide was developed based on a literature review of IPC education from European InovSafeCare research partners and then it was checked, translated, and pilot tested by the team of researchers from each university before they were used to guide the FGDs to explore the experiences of the students in an SBS. The data collection was conducted from September to October of 2022.

### 2.4. Data Analysis

Graneheim and Lundman’s (2004) five-step content analysis approach was used in this qualitative analysis. In the first step, the interview texts were transcribed from an audio recording by each of the researchers from the universities and translated into English, and thereafter the data analysis was conducted by two researchers from one university. In the second step, the interview texts were read several times to gain a general understanding and to familiarize the students with the contents. In the third step, a decision was reached on the concept of meaning unit as based on the research questions, and the reduction process then started. So, the meaning units and condensed meaning units were determined. In the fourth step, the grouping, abstraction and conceptualization were started. At this stage, similarities and differences were discussed. In this way, the similar initial content was classified into subcategories as examples, as shown in Table 1. In the fifth step, the abstraction and grouping were finished. The subcategories were compared with each other. Accordingly, the main categories were introduced and finally the themes were presented as examples, as shown in Table 2. All themes and categories were examined by the project group to ensure clarity of the categories and the fit of the data within each subcategory.

**Table 1:** Examples of meaning units, condensed meaning units and subcategories.

Meaning Units	Condensed Meaning Units	Subcategories
“Simulation is very useful; it is an enjoyable experience. So, to me, simulation scenario is quite interesting, I will recommend it to my friend to try it if she is invited.”	Students are satisfied and expected to be more involved in learning through SBS.	Excitement and joyfulness during simulation.
“Students felt satisfied when they experienced a closeness to reality when participating in SBS and having the opportunity to discuss both theoretical knowledge and clinical experiences with their instructors more interactively.”	The SBS model has produced pedagogical power for the student interactive-learning approach.	Satisfaction with simulation-produced energy for learning.

**Source:** The method adapted from Graneheim & Lundman, 2004.

**Table 2:** Examples of extracted themes and main categories from a content analysis of the data.

Subcategories	Main Categories	Theme
Improved teamwork skills. Enhanced self-learning abilities. Improved self-confidence and critical thinking skills	Improved nursing competence.	Factors enhancing student learning on HAI prevention and control by using SBS.
Excitement and joyfulness during simulation Satisfaction with the simulation-produced energy for learning.	Personal satisfaction.	

**Source:** The method adapted from Graneheim & Lundman, 2004.

### 2.5 Trustworthiness

In this qualitative study, the concepts of credibility, dependability and transferability were estimated for their trustworthiness (Graneheim & Lundman, 2004). Credibility was established through data collection by two investigators for each FGD. The guiding questions were prepared by research experts from the PrevInf project and translated into local languages by an investigator team from both countries and tested with nursing students to check the understandability of these questions before conducting the FGDs. Then data were transcribed from an audio recording and then underwent a peer review to verify its content. Moreover, the debriefing was held with peers who were qualitative-research experts to verify the data collection and analysis processes. Dependability was achieved by conducting pilot FGDs with nursing students during the same academic year as the study participants. The purposive-sampling technique was used to select study participants from the four universities of two countries. Nursing students in their 2<sup>nd</sup> and 3<sup>rd</sup> years who have learned fundamental nursing and IPC, and who shared other similar characteristics and learning experiences, were selected for this study. Detailed information of the study participants and the study context were presented to ensure transferability.

### 2.6. Ethical Consideration

Ethical approval for the study was obtained by the Institutional Review Board of Asian partner universities. Study information was provided in Vietnamese and Cambodian, and participants were encouraged to ask questions before they signed their informed consent forms. The present investigation was also approved by the Ethics Committee of Asian Universities and is registered in the Health Sciences Research Unit: Nursing (UICISA: E), of the Nursing School of Coimbra (Portugal) with the reference number P761-3/2021. The participants were informed about the study and its objectives, as well as the voluntary nature of participation. Alphanumeric characters were used instead of the participant's names in the analysis of the results and publication.

## 3. Results

There were 160 nursing students from 2 nursing universities in Cambodia and 2 nursing universities in Vietnam participating in this study. The information pertaining to the characteristics of students is shown in below Table 3.



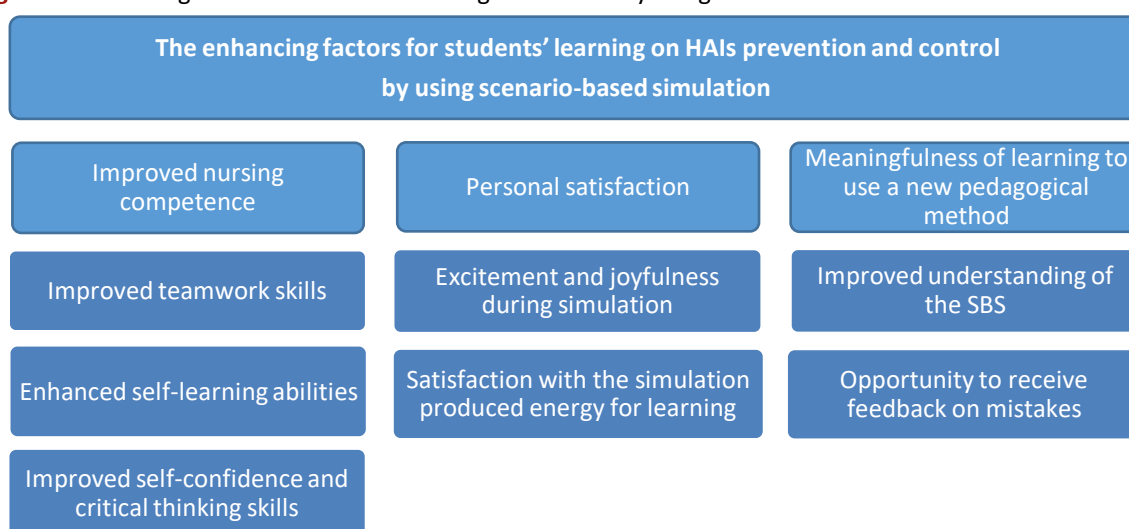
**Table 3:** Characteristic of study respondents.

Characteristic of Respondents		Number (N)	Percentage (%)
Sex	Male	20	12.50%
	Female	140	87.50%
Age	20	30	18.75%
	21	110	68.75%
	22	20	12.50%
Course	Nursing	160	100%
Year of study	2 <sup>nd</sup> year	90	56.25%
	3 <sup>rd</sup> year	70	43.75%

**Source:** The research group’s own elaboration.

After the subcategories were created, they were integrated into creating categories, followed by the creation of themes. The first theme integrates 3 categories and 7 subcategories. We will present each category with its subcategories as presented in Figure 1.

**Figure 1:** Enhancing factors for student learning on HAIs-PC by using SBS.



**Source:** The research group’s own elaboration based on the method of Graneheim & Lundman, 2004.

**Improved Nursing Competence**

This main category illustrated the pedagogical benefits of using a simulation approach as a modern, innovative method that could improve nursing competencies among students. According to the participants, their nursing competencies were improved by their exposure to the interactive learning environments of the SBS. This main

category consisted of three subcategories: *improved teamwork skill, enhanced self-learning and improved self-confidence and critical thinking skills.*

### **Improved Teamwork Skills**

Practice during SBS created an interactive learning environment and enabled the students to practice and improve their non-clinical skills, such as effective communication with patients and team members, as well as coordination and teamwork.

“Simulation not only allowed me to practice nursing skills, but also helped me to practice skills related to communication and teamwork” (Vs).

“The simulation scenario helped students to receive information more easily and effectively than traditional teaching methods” (Cs).

### **Enhanced Self-Learning Abilities**

Simulation gave students a new perspective and personal responsibility for their learning. Prior to the simulation, students were given pre-reading materials to read before performing the simulation scenarios. Such a simulation created the cognitive and mental preparation for simulation scenarios and motivated them in the learning process.

“I must be more active in self-learning and better prepared before coming to the simulation scenario” (Vs).

### **Improved Self-Confidence and Critical Thinking Skills**

The nursing students expressed their conviction that the simulation had enhanced their self-confidence and critical thinking skills. This innovative method made students generally more confident and helped them to communicate more interactively and effectively with standardized patients. Moreover, the mental preparation of the students, which led to an improved receptivity of clinical and non-clinical knowledge and skills from their practice, together with their enhanced ability to discuss and reflect on the feedback from the instructors, were attributed to their self-confidence. These positive factors were the basis for the development of the critical thinking skills of the students. Below are excerpts from the interview:

“Simulation would help students to capture information more easily and effectively than the traditional teaching methods” (Cs).

“Pre-reading the materials helped me to be confident because now I know what I will be doing in the simulation” (Vs).

### **Personal Satisfaction**

*Personal satisfaction* consisted of two subcategories, of which one such subcategory was the excitement and joyfulness of nursing students during simulation and the other was satisfaction with the simulation, which produced energy for learning.

### **Excitement and Joyfulness During the Simulation**

The student experiences with the SBS, which is an innovative learning method, elicited a range of positive feelings. These feelings included excitement, joy and satisfaction, all of which fostered engaged learning behaviors in the nursing students. Some students perceived SBS as an effective learning method before going to their real nursing practice in the clinical setting. Applying the simulation scenario in its relationship to HAI topics created a positive atmosphere that would enable students to learn the various topics of HAIs and to improve their knowledge and skills, as mentioned by the nursing students:

“It is an enjoyable experience, and it was quite interesting to learn and practice the simulation scenario.”

“Simulation is very useful; it is an enjoyable experience” (Vs).

### **Satisfaction with the Simulation Produced Energy for Learning**

The students revealed that applying the SBS was a very innovative approach that produced energy for their learning and created an interactive, attractive and friendly learning environment. Additionally, the simulations provided opportunities for them to engage in discussions and to receive feedback from instructors on their performance and practice during the simulation. This feedback process further enhanced the students' ability to apply their theoretical knowledge in practice and to improve their skills for real clinical practice, as mentioned by a nursing student:

“The simulation scenario has helped me in brainstorming, thinking and applying knowledge in clinical practice and connecting with clinical reality more clearly and intuitively” (Cs).

“I must be more active in self-learning and remember to prepare lessons before coming to the simulation” (Vs).

The meaningfulness of learning to use a new pedagogical method

The meaningfulness of learning a new pedagogical method consisted of an improved understanding of the SBS and an opportunity to receive feedback on mistakes during the debriefing phase of simulation, which were the enhanced factors of the learning method.

### **Improved Understanding of the SBS**

SBS was perceived by the students as a new student-centered learning method. Some students suggested that pre-reading materials, visual aids and videos of simulation pedagogy helped them to gain more sufficient knowledge and enhanced their abilities to apply it in clinical settings. Moreover, they had better acceptance of their responsibility as learners, who need to study before and after the simulations. Implementing this new learning approach was deemed necessary to provide students with sufficient experience that could closely mirror real clinical practice.

“The video of the simulation and the information I received from it made me aware of the Personal Protective Equipment (PPE) and the steps of donning and doffing PPE. It helped me to understand the whole procedure and the status of the patients” (Cs).

“Pre-reading the materials helped me to prepare mentally and cognitively for the simulation” (Vs).

### **Opportunity to Receive Feedback on Mistakes**

The debriefing process of the SBS was identified by the nursing students as an important method that helped to facilitate their reflection on both the positive and negative feedback that had come from students and instructors. For example, mistakes and errors in the nursing interventions were reflected positively as being important learning moments for all the students. The debriefing process helped students to recall clinical and non-clinical knowledge, who then corrected mistakes in their interactions with patients. The students thus acquired a clearer understanding of the activities scenario.

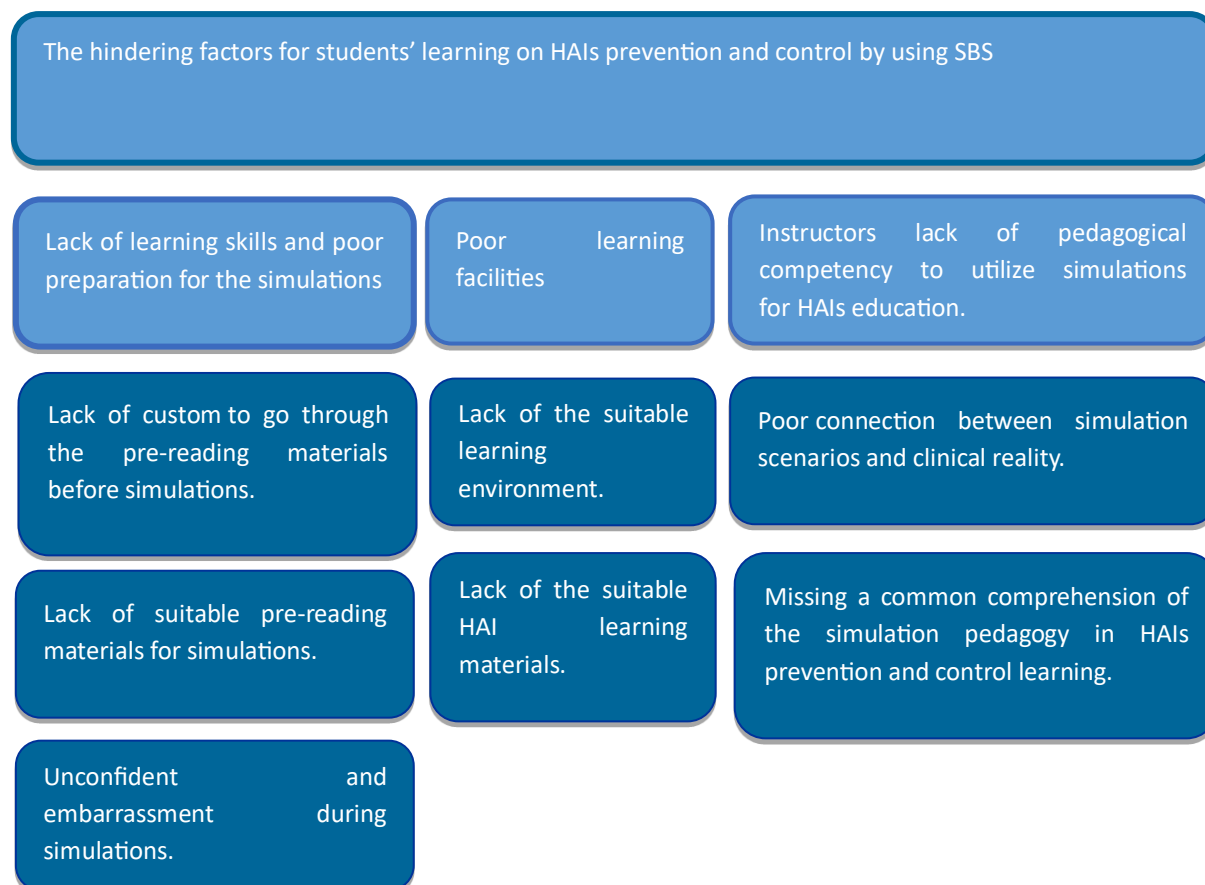
“Debriefing could help us to reflect on some aspects of our performance, which we did correct where it may have been incorrect. It was useful in helping us to learn HAI prevention.” (Cs)

“Debriefing helped students recall knowledge related to infection prevention and control, as well as to update their knowledge.” (Vs)

After the subcategories were created, they were integrated into newly created categories, followed by the creation of themes. The second theme integrates 3 categories and 7 subcategories. We will present each category with its subcategories, as presented in figure 2.



**Figure 2:** Hindering factors affecting student learning on HAIs-PC while using SBS.



**Source:** The research group's own elaboration based on the method of Graneheim & Lundman, 2004.

### Lack of Learning Skills and Poor Preparation for the Simulations

Based on responses received from the nursing students in this study, lack of learning skills and poor preparation for the simulations were considered to be hindering factors. These factors hindered the student-learning process and the acceptance of the simulation learning method. This main category was composed of three subcategories: *unaccustomed to going through a pre-reading of the materials prior to the simulations; lack of suitable pre-reading materials for the simulations; and unconfident and feeling embarrassed during simulations.*"

### Unaccustomed to Going Through a Pre-Reading of the Materials Prior to the Simulations

The students emphasized that they did not understand how to prepare before attending the simulations. The reason was that they were unaccustomed to going through the pre-reading materials, which in turn led to their poor preparation for the simulations and consequently hindered their learning process during the simulations. Moreover, student-reading attitudes could have been fostered by providing the students with the most relevant materials for them to read prior to attending the simulation performance.

"The handout and video materials presentation were not always purposeful with the simulation scenarios. We were not always confident with the performance." (Cs)

### Lack of Suitable Pre-Reading Materials for the Simulations

The students mentioned that no suitable pre-reading materials on HAI prevention and control were available for them, so they were not able to capture the full knowledge and practical skills on HAIs through a simulation-scenario process.

“In order to attend the simulation more effectively, I need to re-read the basic content, such as medical equipment classification, healthcare waste classification and health education for patients on infection prevention and control.” (Vs)

“Preparing myself for the simulation and for interactive communication with the patient is needed.” (Cs)

### **Unconfident and Feeling Embarrassed During the Simulations**

Students felt that they were not ready yet to practice in the SBSs, because they did not have skills for the new pedagogical method. Most of the time, the students were not familiar with simulations which were based on creativeness, learner centeredness and active participation in learning. Thus, they felt nervous and unconfident. Moreover, students revealed that a lack of confidence and a sense of embarrassment were the key hindering factors that affected their performance and communication with the standardized patient and teammate during their simulation performance, as mentioned by a student:

“I felt nervous, trembled and embarrassed while performing the simulation for the first time.” (Vs)

### **Poor Learning Facilities**

Students thought that the SBS required appropriate learning facilities for the implementation. This main category was composed of two subcategories, *i.e.*, “*lack of suitable learning environment*” and “*lack of suitable HAI learning materials*”.

#### **Lack of Suitable Learning Environment**

The students stress that lack of suitable simulation facilities, such as adequate space for simulation, together with poor preparation and unavailability of needed materials and equipment, caused the difficulty for the students, making it hard for them to follow and learn during the simulation process. Moreover, lack of orientation and instruction for both simulation performers and observers prior to the simulation led to a poor learning environment and loss of any motivation for the students to learn, thus hindering their ability to learn through the simulation on HAI prevention and control.

“Simulation must have all the necessary materials and equipment, and a suitable and convenient space for the simulation facility.” (Cs)

“Being an observer with no clear orientation, I felt confused and worried over what to observe.” (Vs)

#### **Lack of Suitable HAI-Learning Materials**

Lack of proper HAI-learning materials created difficulties for students in their efforts to learn and acquire clinical and non-technical skills related to HAI prevention and control procedures. Lack of important materials for simulation, such as pre-reading materials, leaflets, posters and video clips also hindered students from being well prepared for the simulation performance and observation.

“Pre-reading material helped me to be confident. I knew what I would be doing in the simulation. So, now I can perform easily.” (Vs)

“Placing instruction posters on the wall would be helpful for easy viewing during the simulation.” (Vs)

### **Instructors’ Lack of Pedagogical Competency to Utilize Simulations for HAIs Education**

This main category was composed of two subcategories; *i.e.*, “*poor connection between simulation scenarios and clinical reality*” and “*lack of any common comprehension of the simulation pedagogy in HAI prevention and control learning*”.

#### **Poor Connection Between Simulation Scenarios and Clinical Reality**

SBS and clinical reality were not well connected and linked with each other for improving the student-centered learning process. Some students suggested that the simulation could be better connected with the current

clinical practices at the hospitals to expose students to real practical experience. Furthermore, students wished to have more SBSs so they may be able to practice decision-making skills authentically.

“When students go into their clinical practice, they are often not ready for decision-making. The simulation should, for that reason, help students to experience clinical situations and to prepare them both psychologically and intellectually for improved capability in infection prevention and control.” (Vs)

### **Lack of Any Common Comprehension of the Simulation Pedagogy in HAI Prevention and Control Learning**

The lack of a common comprehension of the simulation pedagogy among actors and instructors hindered the application of the simulation scenarios in practice. The instructors of the simulation were not always skillful, competent and knowledgeable with this innovative teaching method. This deficiency also led to a situation where the students did not get enough instruction prior to the simulation and guidance that took place during the simulation.

“Actors should be skillful, competent and knowledgeable in their demonstration of the simulation.” (Vs)

“The actors shall perform the simulation by turning their face to observers so that we can see the performance clearly.” (Cs)

## **4. Discussion**

This study was intended to explore the experiences of nursing students in learning HAI prevention and control by the application of the SBS pedagogy in two Vietnamese and two Cambodian universities. The findings showed that the application of SBS increased student satisfaction in learning HAI. Furthermore, this pedagogy improved non-technical skills, such as teamwork, coordination and communication among nursing students and with patients. This approach engaged students to learn from the pre-reading materials for improving their clinical knowledge before going to real clinical practice. Additionally, the simulations provided opportunities for students to engage in discussions and receive feedback from instructors and observers for improving both clinical and non-technical skills. Similarly, Solli et al. (2022) suggested that it is essential to create a trusted learning environment for students with dynamic interaction and collaboration. Such an environment would contribute to fostering a learner-centered perspective. Findings in previous research have shown that students must be psychologically safe to achieve their learning outcomes. Akselbo et al. (2020) identified a different trend in that students often reported they felt stressed and were afraid of making mistakes during simulations whenever others were watching their performance. Paige & Morin (2015) described a similar learning perspective as, “I’m engaging and so should you”, in which students experienced the simulation as if it were real, as if it were a wake-up call, so that they did not feel defeated. Kiernan & Olsen (2020) also revealed that deliberate practice and video debriefing were effective modalities in simulation for nursing skills acquisition and self-assessment. Nursing education develops knowledgeable nurses who are capable of providing safe, highly competent, and skilled patient care (Kiernan & Olsen 2020).

The simulation on HAIs was capable of improving the nursing students’ learning of non-technical skills and clinical competence as long as it was organized within a convenient environment and with a sufficient resource of skillful instructors. Students perceived that simulation imparted clinical and non-technical skills better than the traditional teaching methods. Kim et al. (2021) similarly explored and found that simulation improved IPC competence through increased knowledge and the compliance of nursing students in developing their practical skills. According to Nasrabadi et al. (2021), the replacement of traditional approaches with innovative educational approaches like SBS had a powerful impact on clinical nursing education. In another study by Jouzi et al. (2015), the students emphasized the key role of instructors as a communicative model for teaching communication skills. Respectful behaviors, realistic expectations, truth-telling, encouragement and helpfulness in clinical issues on the part of the instructors also attributed significantly to the students’ acquisition of communication skills.



Sometimes the presence of the teachers would either make the students anxious or disturb their problem-solving processes. Additionally, students reported that they felt stressed and were afraid of making mistakes in situations where others were watching them perform the simulation. Akselbo et al. (2020) also stated that students felt disturbed when the facilitator was too active and interrupted them during the simulation.

The debriefing process during simulation was elaborated upon as an important method of receiving feedback, as Husebo et al. (2015) have stated earlier. It also facilitated reflective feedback on both positive and negative outcomes by students and instructors. In fact, debriefing helped students to recall clinical knowledge and to correct mistakes from their actions and interactions with patients, as well as to learn from the feedback of their instructors and peers. Reflecting on the simulation could better facilitate the students' acquisition of knowledge and clinical skills better than the lecturing method before going into real-world clinical practice. This understanding is consistent with the results of a study conducted by Johnsen et al. (2021), in which it was found that nursing students felt safe, because they were able to reflect on and express what they could do differently after receiving constructive feedback from their instructors.

The results revealed in addition that there were factors that hindered their simulation experiences. Generally, students were perceived as lacking confidence at their first exposure to the SBS because of their anxiousness and unfamiliarity with the new learning method. Moreover, they sometimes felt that simulation facilities and materials were poor. This finding is in line with the findings of Nasrabadi et al. (2021), who found that new educational methods require appropriate context for implementation. The requirements of running new programs include the provision of adequate financial resources and budget allocation in order to create a suitable structure and educational space and to provide standard facilities with convenience, while also providing a sufficient number of faculty members (Nasrabadi et al. 2021). Similarly, Johnsen et al. (2021) found that students were stressed and were out of their comfort zone whenever they had to take an active role in a simulation. This stressed-out condition was perceived as decreasing their learning outcomes.

Poor preparation prior to the simulation, i.e., lack of suitable pre-reading materials and reluctance to read pre-reading materials before simulation, made students feel nervous and unconfident during the simulation. Similarly, Nasrabadi et al. (2021) suggested that while new teaching methods were based on active and student-centered learning, students needed to be well prepared for learning by the new approaches. A hindering factor that had been mentioned in this study was poor learning facilities, which included lack of suitable environment and learning facilities. Because of an inconvenient learning environment, students were not motivated to learn, thus hindering the possibility of learning through the simulation on HAI prevention and control.

Poor connection between simulation scenarios and clinical reality, as well as missing a common comprehension of the simulation pedagogy in HAI prevention and control, also hindered student-centered learning. Some students suggested that simulation could be better connected with real clinical practice and wished to have more SBSs to practice their clinical decision-making skills. Johnsen et al. (2021) revealed differently that some students had indicated that the blended-simulation approach could provide them with various visual and contextual inputs, and it was perceived as advantageous for clinical practice in healthcare.

The implication of this study is that a lack of common comprehension of the simulation pedagogy among students or instructors has hindered the application of simulations in practice. The simulation instructors were not always competent to perform this new method. For instance, debriefing as reflective feedback was difficult for unskilled instructors. These results were in line with Nasrabadi et al. (2021), who found that pedagogical competency of the instructors was vital in applying simulation pedagogy. However, Ericsson (2008, as cited in Kiernan & Olsen, 2020) demonstrated that simulations were used for observing the competence of nursing students in their acquisition of clinical skills. Additionally, it was followed by feedback on the actual performance of students by comparison with the desired performance. This kind of method gave students the opportunity to reflect on their educational goals and to achieve a level of competence.

According to Nasrabadi et al. (2021), nursing instructors and faculty members were key in the role that they played in the movement toward innovative teaching methods. Additionally, it required that they be personally and professionally competent. Such instructors were innovative and believed in the need for change, had an inherent passion for teaching, possessed mental preparedness and were motivated in applying innovative teaching methods.

### 5. Conclusion

This study provides evidence that SBS is an effective learning method for nursing education because it enhances the quality of nursing education in the Asian health care educations. SBS not only improves the clinical skills, but also the soft skills of nursing students. Moreover, this innovative pedagogy fosters the student-centered learning as well as the preparation of the students for their real-world clinical practice. However, the effective outcomes and impacts of simulation pedagogy can only be achieved in the context where the appropriate learning materials and equipment, facilities and the instructors with pedagogical skills are in place. In practice, this means that organizations implementing simulation pedagogy carefully prepare plans for space, equipment, and teacher resources.

As per findings from this study, it is recommended that SBS could be integrated into nursing curricula by nursing universities in the countries where this study took place. Given the scope of this study, to some extent, the results might have some limitation to generalize for other countries as it was carried out only with Vietnamese and Cambodian students. Therefore, further studies shall be carried out in other Asian countries with similar contexts.

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### Declaração Ética

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**Revisão por Pares:** Dupla revisão anónima por pares.



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