

Nursing Students' Perception toward High Fidelity Simulation

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Abstract

Human patient simulation (HPS) has become widely used in nursing education illustrate physiological conditions of patients. It assists nursing students to practice nursing skills in a safe environment. High Fidelity Simulation (HFS) is one of the HPS types of manikins that can be programed to provide realistic responses as well as a high level of interactivity of manikins to practitioners. This study developed an HFS activity associated with five main vital signs routinely monitored by nursing professionals, and sought to understand nursing students' perception towards HFS in general and the simulation in particular. Adopting an in-depth interview approach with 10 nursing students, the result showed that nursing students identified that the HFS activity helps them develop problem-solving and decision-making, self-efficacy and reflective improvement. The nursing students recognised that the simulation allows them to cultivate problem-solving skills as the responses of the manikin are similar to those of human patients, and thus they have to exercise prompt decision-making. In addition, mastery experience built by the practice with the HFS makes the nursing students feel more confident and capable of dealing with real patients in the future. Furthermore, after using it, they could reflect and evaluate themselves about their performance in clinical practices and plan what needs to be done to improve their performance and skills in the future.

Keywords: High Fidelity Simulation, Problem-Solving, Decision-Making, Self-Efficacy, Reflective Improvement

High Fidelity Simulation (HFS) and Nursing Education

Human patient simulation (HPS) has become widely used in nursing education (Herm, et al., 2007; Hoffman, et al., 2007). It enhances knowledge, self-efficacy, skill attainment and critical thinking (Jeffries and Rizzolo, 2006; Brown and Chronister, 2009; Alinier, et al., 2006; Shinnick and Woo, 2013). Nursing institutes use HPS to illustrate physiological states of persons in both normal and abnormal conditions. It assists nursing students to practice nursing skills in a simulated scenario, bridges content knowledge and hand-on practices, and helps nursing instructors evaluate ways in which nursing students synthesis their nursing knowledge and put technical skills into practices (Monti, et al., 1998; O'Donnell, et al., 1998; Nehring, et al., 2001). The HPS can be classified into three classes according to the resemblance of reality. First, Low Fidelity Simulation (LFS) is a part task training that is static, lacks of realism and is not interactive. It is used to primarily train simple clinical skills for nursing students. An example of the LFS is intravenous arms and resuscitation torsos (Laerdal, 2013). Second, Moderate Fidelity

Simulation or Medium Fidelity Simulation (MFS) more resembles to reality than the LFS. It is a full-body manikin that can be controlled by an external device, i.e. computers and mobile devices. It has features of heart sounds, breathe sounds, pulse and blood pressure. However, the manikin is not programmed to talk, move the chest nor the eyes. An example of the MFS is “Harvey” cardiology simulator (Laerdal, 2017). High Fidelity Simulation (HFS) is more realistic and can be controlled by a computer. It can talk, breathe, blink the eyes and respond to physical and physiological interventions (Arthur, et al., 2011; Al-Elq, 2010). An example of the HFS is “Simman3G” (Laerdal, 2016)

The HFS is increasingly popular for many nursing institutes. It is an effective teaching-learning strategy for integrating theoretical knowledge of nursing students with practical activity (Power, et al., 2013). It can be programmed to provide realistic patient responses to students’ actions and is able to provide a high level of interactivity of manikins to practitioners (Rodgers, 2007). It has real-time physiological parameters of person in both normal and abnormal conditions. It has a monitor that links with computer and simulator showing vital signs of person such as EKG waveforms, temperature, heart rate, respiratory rate, blood pressure and pulse oximeter. (Laerdal, 2013; Nehring, Ellis and Lashley, 2001; Issenberg, et al., 2005). In the HFS room, nursing students can make initial and ongoing assessment of the patient, giving nursing procedure to release or prevent critical health condition and administrate the medication belong to doctor’s orders in the safe environment (Nehring, et al., 2001).

Nursing Instructors’ Perceptions of HFS

Being perceived by nursing instructors, HFS is found to be largely positive in foster nursing students’ knowledge and skills. In the USA, Feingold, Calaluce and Kallen (2004) reveal nursing instructors’ perception regarding the use of the HFS in a simulated clinical scenario. They indicate that the HFS has multiple functions and provides non-threatening environment that supports nursing students gaining clinical skills which can be transferred to a real clinical setting. In Canada, Akhtar-Danesh, Baxter, Valaitis, Stanyon and Sproul (2009) study nursing faculty members’ perception of the implementation of the HFS in a nursing school. The participants reflected that the HFS effectively supports learning because it has a full set of medical equipment ready at hand and a virtually simulated environment that supports clinical settings that help nursing students to see the real context and potentially decrease their anxiety. Furthermore, in Brazil, Quilici, Bicudo, Gianotto-Oliveira¹, Timerman, Gutierrez and Abrao (2015) explore faculty members’ perception of the HFS. They emphasized that the HFS is crucial for universities to adapt it for clinical learning. The simulated reality of the HFS lead to the effectiveness of nursing students to stay focused on practicing and scenarios that prompt students to think in various and systematic ways.

Nursing Students’ Perceptions of HFS

Previous studies also show that the HFS is perceived to be useful and important for nursing students. This is because it visualizes physiological effects on the human body, enhances students’ clinical knowledge, technical skills and non-technical skills such as communication, teamwork, decision making and critical thinking. (Berger, et al., 2018; Reising, et al., 2016; Radhakrishnan, et al., 2007; Brown and Chronister, 2009; Nehring, et al., 2001). Nursing students build up self-confidence and self-efficacy after practicing with the HFS (Zhu and Wu, 2016).

Perceptions of nursing students towards the HFS have been investigated in various countries. For example, in Australia, Wotton, Davis, Button, and Kelton (2010) examine third year undergraduate nursing students' perception about the application of the HFS in clinical courses. The result shows that students enjoyed participating in the simulation and the HFS motivated them to think in more systematic ways for making decisions to solve the problems that occur to patient. In Portugal, Baptista, Paiva, Gonçalves, Oliveira, Pereira, and Martins (2016) study fourth year nursing students' attitude after experience with the HFS for 18 hours. They reveal that practicing with the HFS mad the nursing students understand the acquired clinical skills that are important in the real context, to take the responsibility that they should have to take control the situation in the simulation room, to create the systematization of thoughts for solving problem, to act nursing care without fear and without endangering the patient's life and to build good relationship with simulation peers.

Moreover, in China, Zhang (2017) investigates undergraduate nursing students after practicing with the HFS which takes up 20% of their traditional training. Nursing students reported that they liked the way clinical skills were taught using the manikin. They felt like they could learn more easily with the HFS compared to learning in the real clinical setting. It did help them understand the theoretical contents and transferring to clinical skills. However, there has been no report of perceptions of nursing students in Thailand towards the use of HFS in nursing trainings. This lack of information is partly because the number of HFS might be limited in nursing institutions. Nonetheless, this is crucial to explore in a greater depth as it would allow nursing institutions to make proper decision about the educational investment of this learning innovation.

Research Objective

Therefore, an objective of this study is set to develop an HFS activity associated with five main vital signs (body temperature, pulse rate, respiratory rate, blood pressure and pulse oximetry) routinely monitored by nursing professionals, and seek to understand nursing students' perception towards HFS in general and the simulation in particular.

Methodology

Ten second year nursing students who studied a Fundamentals of Nursing course that focuses on basic skills of nursing such as recording vital signs, injection, feeding and suction and who had no experience in practicing with High Fidelity Simulation were invited to take part in this study. After sign consent form, the nursing students were asked to make a group of two persons. Each group participated with the HFS activity about assessing five vital signs for 5-10 minutes. Then they were asked to take part in semi-structure interviews to express their perception on the HFS. The study was conducted under the approval from the Institutional Review Board Committee, Faculty of Nursing, Mahidol University. Researchers informed the purpose and method of the study to all participants. They can sign the consent to participate in this study without any pressure and free to withdraw at any time during the study. To prevention of direct identification, names of participants were coded by pseudonym.

Thematic analysis

All interview records were repeatedly listened to and transcribed. All transcripts were critically read and analysed by comparing and contrasting approaches. Attempting to avoid possible biases in this qualitative analysis, a researcher triangulation was adopted where two researchers separately analyse the interview narratives before comparing and finding consensus of the analysed data. Common and differing perspectives of the participants to each question were

drawn from their narratives. In order to find common themes, similar statements given by the participants were grouped into categories. In addition, the researchers tried to search for descriptions by individuals who tend to describe experiences somewhat differently in order to detail the range of perceptions of the relationship. Where conflicting ideas emerged, both iteratively discussed until common agreement was reached with satisfaction from both sides. Finally, the common themes and interesting individual differences were discussed in this written report.

Research Results

According to the thematic analysis, the participants' narratives were classified into three main categories: problem-solving and decision-making, self-efficacy and reflective improvement.

Theme 1: Problem-solving and decision-making

Nursing students thought that HFS is more useful than other types of manikins. The HFS helps them focus on their medical practices and how to solve encountering problems effectively. They explain that in this simulation where the manikin can respond like a real patient, they can face with problems and learn how to solve the problems by themselves.

"Nursing instructors provide simulated scenario that training for solving problem."

"The HFS is different from other manikins that I experienced before because it can react to me and stimulate situations that get me to use nursing skills for solving problems that may arise."

This is because the HFS is more realistic compared to Low Fidelity Simulation (LFS) and Medium Fidelity Simulation (MFS) which can only be used for practices with no responses. So it is rather a one-way practice without knowing what the patient may feel in reality.

"I thought this simulation is realistic than other manikins. If I practice only with the LFS or the MFS, I might not concern about patient's reaction. When I practiced with the HFS, the manikin can be talk and express feeling that make me confident to respond and not panic when patient gets critical conditions."

In addition, the problems are also very close to the reality that they will soon face in hospital. The critical scenario created in this HFS activity and function of the HFS itself stimulate nursing students to see the patient's symptoms and responses more clearly and encourage them to think analytically for taking care of patients.

"The HFS can speak out loud when it is painful and this makes the nursing training very interesting and exciting. The important thing is that it makes me understand more about the real scenario that can occur in the hospital because the HFS looks like the real patient and it is different from another Human Patient Simulation. It encourages me to practice more with no hesitation and helps me develop solving problem"

Furthermore, they learned that they have to promptly choose nursing skills that are important and practical for making the patient's condition better as quickly as they possibly can because some conditions need to be dealt with immediately. Therefore decision-making is a part of development under this simulation. They also reflected that they have to decide a plan of nursing care that they can do to mitigate the severity of symptoms of the patient before having a treatment by doctors.

"When I practice with the HFS, it stimulates me to make decision by myself for taking the best care for the patient because the patient cannot wait for a long time. I have to make decision quickly about what to do to help patients and make them feel better as much as I can."

Theme 2: Self-efficacy

The experience of mastery is one the most important factor highlighted by the nursing students. This aspect of self-efficacy is expressed that it is a good opportunity to participate in this HFS activity as they can practice their own nursing skills before actually meeting with real patients in hospital.

“The HFS is good for training nursing skills before practicing on ward. I had an opportunity to take care patient in the environment that imitate the hospital. Moreover, the HFS react like the real patient.”

“It helps me to practice before training in the actual setting.”

In addition, this simulated environment makes them feel more ready and confident to become registered nurses in the future.

“A chance for training actual nursing skills with the HFS activity is very useful because it makes me realize what might be in the real situation before I actually become a registered nurse. It makes me to think about nursing plans and nursing care for helping patient in the HFS room. After all, it makes me feel more confident when handling with real patient in the future. It resembles training nursing skills before facing with real patient.”

Not only mastering in nursing skills, participating in this simulation can also master their communication skills which are important when real patients and relatives are involved. The HFS helps them to face with the mimic patient that has symptoms like real patient. They can communicate by asking and assessing conscious of pseudo patient. It improves in their nursing as well as communication skills and getting them ready for dealing with patients before practice on ward.

“I thought the HFS helps me to train before going on ward. The occurred scenario in the HFS room make me concern about primary nursing care.”

“I had an opportunity for practicing in the simulated situation even it is not totally like real human but it can be used to assess vital signs and practice communication skills.”

Theme 3: Reflective improvement

The HFS also helps nursing students think more about their actions when they have to really take care their patient. They can evaluate their action by themselves and consider how to improve their skills to make the patient better during practicing with the HFS. First and foremost, they learned that they still have many skills to improve before encountering with the real situations.

“I get to learn what mistakes I’m still making and what needs to change.”

“It makes me realize what I have done wrong and what else that I need to know to avoid these mistakes.”

Not only realizing what mistakes have been done, the nursing students can also learn that about aspects that they have to reconsider and plan to make it better after practicing.

“I had an opportunity to practice in the situation that can occur in the hospital. It make me to know what I should do or should not. It helps me to evaluate my nursing skills by myself. Practicing with the manikin makes me reflect on my own that what else I have to learn to improve my practices in the future.”

Discussion

The result clearly shows that the nursing students who participated in this study positively perceived the usefulness of High fidelity simulation (HFS). It shows to help improve nursing students in at least three areas. One is their thinking which includes problem-solving and decision-making. Second is their self-efficacy which is shown as their mastery experience in

nursing skills and practices. Finally, it is perceived as a useful learning tool to help them reflect on their action and see how they can improve their practices in the future. All of which might be contributed by the fact that HFS differs from other teaching tools. (Sanford, 2010) It simulates real situations for students in practicing, learning, and understanding of different patient actions (Rauen, 2001). It is important to concern that there are three crucial elements of HFS. First, it is a human simulator which can verbally and physiologically interact to nursing students. Second, computer is used to connect to simulation for formulating various case studies and controlled by technicians. Third, monitors can be connected to simulator and computer showing patients' vital signs (Laerdel, 2013; Nehring, et al., 2001; Issenberg, et al., 2005).

A number of studies agree with this finding. Many show that nursing students perceive that after practicing with the HFS, it improves them in both cognitive and affective behaviours. They reveal that practicing with HFS enables them to feel more confident for making decisions to solve the problems that occurred to patient. It fosters them to prepare for nursing knowledge and nursing skills before practicing in real clinical environment. Previous studies also show that nursing students feel enjoyable when learning with the HFS. It motivates them to think in systematic ways, to build good relationship with simulation peers, to develop their nursing skills and to feel more confident for clinical practices (Wotton, et al., 2010; Baptista, et al., 2016). However, HFS cannot completely replace clinical study in hospital. Clinical placement is still important to nursing students. HFS serves as an initial step for them to know more how medical equipment works together, how nursing teamwork should be operated, and what possible reactions from patients could possibly be. Nursing students have to expose to such kind of manikins before dealing with real patients where no harms and mistakes can be expected. This can only get them prepared, but serial clinical practices are of importance. (Au, et al., 2016)

Conclusion

The High Fidelity Simulation is a useful learning tool that nursing instructors can designate for nursing students to make them face with the imitated situation that can occur in hospital. Nursing students perceive that HFS can help them develop thinking skills like problem-solving and decision-making, self-efficacy and reflective improvement after practicing with HFS.

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