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Initial Experiences of Pre-Licensure Bachelor of Science in Nursing Students with High-Fidelity Simulations

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ABSTRACT

Aim: The purpose of this qualitative study was to describe the initial experiences of pre-licensure Bachelor of Science in Nursing (BSN) students with high-fidelity simulations. **Background:** High-fidelity simulation (HFS) is increasing in nursing education. Improvement in critical thinking, improved prioritization of activities, active learning, and assessment of student learning in a non-threatening practice environment are expected with HFS. **Method:** This was a qualitative study. The study occurred at a private college in northern Indiana that began using HFS in the same academic year. The data were collected through interviews of 18 students. **Results:** Altogether, 7 themes emerged from the data analysis. Themes had negative, neutral, and positive characteristics. **Conclusion:** Nursing students new to HFS experiences could be overwhelmed with HFS scenarios and react emotionally in their initial participation. Therefore, adequate orientation is essential before exposing students to HFS simulation for learning purposes, and debriefing must be available at the end of all sessions.

INTRODUCTION

High-fidelity simulation (HFS) is a growing field in nursing education. Cognitive, affective and psychomotor domains of learning are assessed through HFS. The National League of Nursing (NLN) propagated, it gives faculty the ability to help students bring together critical thinking and physical skills, which are essential in today's ever-changing healthcare field.[1] Perspectives on the use of HFS in education vary among educators, administrators, hospital employees, and nursing students. All must play a part in creating highly effective HFS.

Based on research and experience, educators are beginning to replace a portion of traditional clinical hours with rich and complex simulated learning experiences.[1,2] In some nursing schools, up to 50% of clinical hours are in simulated settings.[1] Thus, it is important that students feel they gain beneficial experiences through simulation. In their recommendations for nursing simulation, the NLN found that evaluating both faculty and learners ensures nursing programs are meeting expected outcomes.

Background

HFS is becoming increasingly prevalent in nursing education throughout the world, replacing many traditional clinical hours (see Figure 1). The need for this advanced technology simulation stems from the continued difficulty of obtaining clinical sites and a national shortage of nursing educators.[3] The NLN[1] supports the importance of incorporating high-quality simulation into nursing education because of quickly evolving healthcare. Simulation, especially HFS, provides a means of keeping up with those changes in educational programs. HFS manikins allow students to practice a variety of tasks, including communication and clinical skills, while in a non-threatening environment before executing these skills in real clinical practice.[2,4] HFS has been suggested to decrease students' stress and anxiety levels, an ever-present problem in today's nursing schools.[3]

Figure 1. **Bethel College School of Nursing, Indiana, USA.** Nursing students, Beth and Andi are practicing skills and assessments using HFS prior to their clinical rotation with actual patients, while Hannah supervises from the viewing room.

Numerous nursing schools are replacing direct patient-care clinical hours with HFS lab hours.[5,6] It is important that research reflects the benefits and challenges that arise, from the students' perspective, when using this technology for education. The continuous improvement of education in nursing is essential to meet the increasing demands on nurses and the quickly changing healthcare system.[7] The Institute of Medicine continues to stress the importance of continuing education for effective healthcare outcomes. Much of this education could be completed using HFS, thus research in this area is essential.[6] In addition, there are insufficient standards for the teaching of simulation-based nursing scenarios, further emphasizing the need for research regarding HFS and education.[6]

Purpose and Research Question

The purpose of this qualitative study was to describe the initial experiences of pre-licensure BSN students with high-fidelity simulations. The research question used to underpin this

study was: What are the initial experiences of pre-licensure BSN students with high-fidelity simulations?

REVIEW OF THE LITERATURE

Peer-reviewed, scholarly articles were obtained using the Cumulative Index to Nursing and Allied Health Literature, EBSCOhost, Medline, and Google Scholar. Keyphrases included *high-fidelity simulation, education and simulation, effects of simulation,* and *nursing students.*

Benefits of HFS

Cant and Cooper[5] found that an increase in participant knowledge, critical thinking, and confidence were observed after participating in HFS. HFS allows nursing students to practice skills in a life-like situation. Students can repeatedly practice clinical skills and critical thinking in a realistic, yet safe environment.[5]

However, in another study, Hallin, Backstrom, Haggstrom, and Kristiansen[8] found that nursing students underperformed in HFS scenarios. This was attributed to lack of experience with HFS and problem recognition. However, the repeated use of HFS helped to increase students' performance in HFS scenarios, thus repetition equaled success. HFS is a valuable tool for connecting theory with practice. Hallin et al. indicated that HFS provides a risk-free environment for students to learn.[8] Students can be placed in a situation that they may not have the opportunity to experience at traditional clinical sites.

A meta-analysis of HFS in nursing education found that it might positively impact clinical judgment, critical thinking, knowledge acquisition, clinical competence and communication.[9] This study also indicated that repeated use of HFS helped students' performance and the retention of knowledge. There is a need for nursing students who are prepared to handle the complexity of the expanding health care system and the new technology.[9] This is where HFS can be a valuable tool for nursing education.

Simulation Debriefing and Self-Evaluation

Tutticci, Lewis, and Coyer[10] stated that a key component of students' critical thinking was the ability to critically reflect. The focus of this study was to test the reliability of the Reflective Thinking Instrument and Critical Reflection Self-Efficacy Visual Analogue Scale. Students

valued HFS as a clinical learning experience. Tutticci et al. concluded that HFS might help students transfer skills into the real clinical setting.[10]

Kirkbakk-Fjaer, Hedelin, and Moen[11] evaluated the debriefing phase in a simulation with undergraduate nursing students. Students felt that debriefing was very important to the effectiveness of the overall simulation experience. A second and unintentional finding was that smaller groups of students found their questions were better answered in debriefing sessions. Also, younger students found the processing of their feelings more important than older students.[11] This information can be applied easily to the continuing development of simulation learning experiences in nursing schools because it gives validity to the importance of including debriefing in the creation of simulation experiences. Any information the researchers can gain about any portion of the simulation process is essential for the formation of curricula and standards.

Simulation Curriculum

The International Nursing Association for Clinical Simulation and Learning (INACSL) created standards for developing a simulation design.[12] Eleven criteria are outlined: needs assessment; measurable objectives; the format of simulation; clinical scenario or case fidelity; facilitator and facilitative approach; briefing; debriefing or feedback; evaluation; participant preparation; and test of the design. They recommend that nursing programs follow these criteria when creating a simulation experience for their high-fidelity simulation labs.

Although there are recommendations as mentioned above, there is no set curriculum for using simulation specifically in nursing education.[6] Some studies are beginning to address this issue, including one by Herrington and Schneidereith[13] that outlined identification of concepts for learning in simulation, as well as a scaffolding of curriculum for different levels of nursing programs. They created these outlines by surveying 62 nursing faculty members and analyzing their opinions on using HFS in learning. What was neglected in the study was the perspective of the students using HFS, which also needs to be taken into consideration when creating guidelines for learning. Despite this gap, Herrington and Schneidereith effectively composed curriculum recommendations for integrating nursing education and simulation learning techniques through the results of their study.[13]

Student Perceptions of Simulation

Cantrell et al.[3] conducted an integrative review to analyze the effects of simulation on nursing students' stress. Through the analysis of 17 studies, they were able to find that HFS did indeed increase stress in nursing students, with the caveat that the same students also reported that HFS was valuable to their learning experience. Stress can have a negative impact on students' performance, so analyzing how HFS contributes to student stress is important for student success. Thus, these results led to recommendations that educators help students find ways to cope with stress and for continued research to determine if HFS eventually leads to decreased clinical stress.[3]

Just as decreased stress during HFS is desirable, another goal of HFS is to increase self-efficacy and confidence. In a quantitative study, Dunn et al.[4] found that self-efficacy and confidence increased after HFS as shown in communication and clinical skills performance. This could indicate that students will be less likely to miss patient needs in the clinical setting because of increased confidence.[4] Interestingly when faculty conducted HFS scenarios, they reported low self-efficacy in regards to their confidence level in teaching.[14] This could be attributed to several reasons, which may include, low confidence using the technology and the perception that students were learning to make mistakes that may negatively translate into the clinical setting.[14] It is interesting to compare the self-efficacy of students and faculty using HFS because they varied greatly.

Summary of the Literature Review

In summary, it is obvious that nursing education will be shaped by simulation in the future; therefore, it is important that research explores the benefits of using simulation in nursing education. Many elements must be considered, including environment, emotional factors, physical challenges, student and facilitator techniques, and simulation curriculum. This study may help contribute to this knowledge-base and in return help, the simulation programs become as effective as possible.

Theoretical Framework

Jeffries[15] created a framework for using HFS in nursing education. The NLN officially changed the framework name to the NLN Jeffries simulation theory, and it is used as a basis

for simulation research nationally and internationally.[1] The theory helps to create a simulation and organize the process to produce a productive simulation experience.

The context of the simulation establishes the purpose of the experience as well as physical location.[16] Selecting specific activities that support the overall outcomes creates the background and design of the simulation.[16] The logic model helps to create an outline for evaluation of the simulations in a specific program and identify strengths and weaknesses. The components of the logic model are *resource/inputs*, *activities*, *outcomes*, and *impact*.[17] Finally, the steps of the simulation are identified, and the debriefing phase is executed.[16] It is important not to overlook the final debriefing stage because it has been found to be very beneficial for students.[11,15] Each of these elements is addressed when using a logic model, which is why this model guided this research to assess students' perceptions of HFS.

Once the simulation experience begins, it must be characterized by being learner-centered, collaborative, interactive, experiential, and have an environment of trust.[16] The facilitator and participant in the simulation have a responsibility to interact dynamically during the process. The participant's attributes, both modifiable and non-modifiable, can affect the experience as well and should be considered. Once completed, the simulation must be evaluated from the perspective of the patient, participant, and the system to see if each outcome was met.[16]

METHODOLOGY

Design

A qualitative phenomenological design was used. The key informants were chosen from the students enrolled in the nursing program. A purposive sampling method was used to obtain data from individuals who had information regarding lived experiences on the subject. The interviews were conducted on the campus, in a public area, away from distraction.

Sample

Convenience and snowball sampling methods were used. The sample was selected from volunteers in the sophomore and junior pre-licensure BSN classes. All nursing students who participated in the HFS scenario were invited; however, only 18 students volunteered for the interviews. Inclusion criteria for this study included pre-licensure baccalaureate nursing student who had participated in HFS at this private northern Indiana school of nursing. Any

student under the age of 18 years or any enrolled nursing student who had not participated in an HFS scenario was excluded from the study.

Interview Instrument

The in-depth interviews included five demographic items and one open-ended question. The interview statement was: Tell me about your experiences with HFS. The interview questions and prompts were reviewed by five peers and two professors to establish face validity. The interviews were completed in person through open-ended dialogue. Several prompts were prepared to be used if needed. However, the researchers tried to avoid using the prompts as much as possible to avoid bias.

Informed Consent and Confidentiality

Approval from the college's Institutional Review Board was obtained before beginning this research study. Each participant was required to sign an informed consent. Included in the consent form was the assurance that the participant's name, personal information, or any other identifiers would not be connected to their opinions and responses to the interview. This confidentiality assured participants that their responses would have no personal consequences. Upon completion of data analysis, the research documents were stored at the School of Nursing electronically for three years. Only the nursing administrators and research coordinators have access to these records.

Data Collection

Interviews were conducted in person. Informed consent was obtained prior to the start of the interview. Even though the plan was to interview for up to an hour, most interviews lasted only about 30 minutes. Five demographic and one open-ended question were asked. Prompts were used as needed. Interviewers took written notes and electronically recorded the conversations. After completion of the interviews, the interviews were transcribed verbatim. The researchers used the notes and electronic recording to aid in this process. The signed informed consent forms and the manuscript of the interviews were kept separate to maintain confidentiality.

Data Analysis

The researchers reviewed the transcribed manuscripts of the interviews. Colaizzi's process for phenomenological data analysis was used. Colaizzi created a seven-step method for phenomenological inquiry.[18] This method allowed the researcher to evaluate the participants' lived experiences. The seven steps included: transcribing participants descriptions, extracting significant statements, creating formulated meanings, grouping the formulated meanings into themes, creating an exhaustive description, identifying the structure of the phenomenon, and following up with participants for validation.[18] Emergent themes and corresponding words were recorded. This information aided in describing nursing students' experiences of HFS.

Table 1. Participant Demographics

Variables	**f**	**%**
Gender		
Male	0	0
Female	18	100
Age		
20-21	15	83
22-23	2	11
24+	1	5
Ethnicity		
Caucasian	16	89
Hispanic	1	5
Asian	1	5
Year in Program		
Sophomore	8	44
Junior	3	17
# of Simulations Participated in		
1-2	18	100

Note. N=18

As noted in Table 1, all 18 participants were female. Fifteen of the participants were 20 or 21 years. As stated as part of participant requirements, all of these students were pursuing a

Bachelor's of Science in nursing degree. Sixteen of the 18 participants were ethnically white. Eight participants were sophomores in their nursing program, which was their first year of clinical experience in the nursing program. Ten participants were juniors in the nursing program, making it their second year of clinical experience. All 18 had participated in one to two total high-fidelity simulation scenarios.

Positive, neutral and negative characteristics are identified. Participants were labeled from P1 to P18. Common themes fell into seven distinct categories as ranked in Figure 2.

***Figure 2*. Common themes for initial experiences of pre-licensure BSN students with high-fidelity simulations ranked from 1-7.**

Theme 1: HFS helped practice skills and build confidence in a safe environment

Benefits from HFS were the most discussed theme. This is a very important topic to focus as it addresses some of the items participants valued with HFS. The greatest benefit seemed to be the opportunity to practice skills and nursing roles. Although students participate in clinical rotations throughout their nursing program, they do not always get to participate in the complete nurse role. P15 stated, "The biggest thing was learning that when we become nurses, and we're in charge, we're going to have to do all that. Because of that, I think I pay a little more attention to all the things the nurse has to do now in clinical."

Participants felt that it was a safe environment to learn and the decreased pressure allowed them to participate without the fear of hurting an actual patient. It also gave students the opportunity to use their critical thinking skills, one of the most desirable skills a nurse can have. Tutticci et al.[10] reported that HFS could help transfer skills into the real clinical setting. P9 stated, "I think we all know what to do, it's just harder to make that decision when you're in charge."

Another benefit to HFS that was mentioned several times was that it provided an opportunity for autonomy and authority. Hallin et al.[8] found that students struggled to recognize problems in HFS scenarios. This may be due to their inexperience in an autonomous nursing role because this is not something normally expected of a student nurse. Many of their first experiences with autonomy and authority are as a registered nurse.

Theme 2: Negative emotions were overwhelming during HFS

The next major theme that emerged was the overwhelming emotions experienced during HFS. Emotions play a big role in nursing practice. They are present whether practicing on a living patient or a high-fidelity mannequin. These emotions can affect the type of care a nurse provides. It is important that nurses are aware of their emotions and know how to cope with them.

Emotions varied among participants, but the most prevalent emotion discussed in this research encompassed nervousness, confusion, stress, and anxiety. These feelings were addressed multiple times. Participants described being nervous, stressed, and anxious for many reasons; a lot stemmed from not knowing what to do or what to expect. This could

have possibly been relieved with more preparation. P7 stated, "I was pretty nervous because I didn't know what to expect."

It was the first time many of the students participated in HFS, so this increased these emotions. Hallin et al.[8] stated that this inexperience also contributed to underperformance in HFS. Several students found that being watched by peers and instructors heightened the stress of the situation. They felt they were being scrutinized and that there would be consequences for performing poorly. "Uncomfortable" and "awkward" were terms used many times during the interviews. These words were used to describe being in the simulation room, being watched, and working through the scenario. Along with the nervousness of participating in HFS, some students were also excited about what they might be doing during the HFS.

Theme 3: Though similar in many ways, HFS was different than real patient scenarios

One of the main questions surrounding HFS in learning is how similar it is to the real scenarios. This is important for nursing schools to consider because they invest a lot of money and time into acquiring HFS labs and developing HFS curriculum. Most participants in this study described HFS as being different from the hospital in many ways. Some of the items described as similar or different included the room setup, available resources, the scenarios, and the patient. P2 stated, "The biggest similarity I think is that the [mannequin] is able to communicate with you. They have real questions just like in the hospital."

One item that HFS provides that participants seemed to like is the autonomy they felt during the scenarios. Participants said as a student, this was not something they often get to practice, as they always go back to the instructor or the nurse for help. P9 described it as such, "… We have the authority in the Sim lab that we wouldn't have in a clinical setting so we can feel freer to act as the primary nurse while working within our scope of practice. To have that authority and be the primary nurse for once, I think it's cool, and I think that you feel safer to make mistakes."

Even though practicing skills in a nonthreatening environment was expected to be a stress-free experience, interestingly, HFS was described by the participants as a high-pressure situation twice as much as it was described as a low-pressure situation. Cantrell et al.[3] also found that HFS increased students' stress despite the goal of HFS being a low-stress environment to build confidence. In regards to communication, the overall feeling of the

participants seemed to be that they preferred to practice on human patients. Although it was expressed that the mannequins' ability to respond was beneficial to the simulation process, participants did not feel comfortable.

Theme 4: Need more preparation and orientation prior to HFS

All of the participants had only participated in one or two simulations, but they had quite a bit to say in regards to improvements or changes that could be made. The most talked about item in this category was preparation and orientation. Students would like to have more preparation in the future. This included explaining roles and expectations and providing a more thorough orientation to the room. Participants felt they were not prepared enough to complete the simulation, both because of their skill level and of the lack of information they received prior to the simulation exercises.

Another frequently discussed item was that participants wanted to play the nursing role, and that role wasn't always available. Participants felt the nursing role provided the best opportunity to practice critical thinking. HFS may be more beneficial than other methods for practicing critical thinking in a safe environment.[5] Students suggested running the simulations quicker to allow more students through, or creating more nursing roles. P18 stated, "I felt like it should have been they go, then we go and switch, so we could all get a turn with how to interact with the patient. I think I would have learned more because in the back [of the room] I was just kind of looking. I learned stuff, but if it was hands-on, it would have been better." The initial understanding of HFS among these participants seemed to be that they thought everyone would have a direct patient care role, but they were disappointed when this was inaccurate.

Participants also suggested creating scenarios that include more skills and challenges. Many participants believe that HFS is better suited for higher acuity situations, such as those seen in senior nursing classes such as the critical care rotation. Nevertheless, one participant said she would rather see HFS used for head-to-toe assessments and medication administration to practice these skills on a patient who will interact and communicate.

Most participants felt that there was not enough instruction prior to starting their simulations. Participants felt they lacked enough information both about how HFS works and about the scenario they were given. P14 stated, "We didn't feel we had enough information to know what to do." Several other participants described a lack of guidance and direction as the

problem. Many of the scenarios started with an overview of the situation or something similar to a shift report. A few times the report was described as being too fast. Some described the preparation they had was helpful. One of the essential criteria suggested by INASCL[13] is participant preparation and briefing.

Theme 5: Challenges related to unfamiliar technology and its malfunction

There are always challenges with learning experiences, and HFS is no different. The biggest challenge for participants seemed to be the use of technology. Participants described many examples of malfunctioning, such as the mannequin displaying the wrong symptoms and the microphone not working well. P5 stated, "The microphones weren't working well," and, "all the responses were awkward and slower." As noted by Davis et al.,[14] some of the recurring technology problems may be because of faculty's low self-confidence in using the technology.

Despite all of the technology that HFS uses to mimic a real hospital and patients, participants still found it was lacking. P11 stated, "It is acting instead of using your skills." According to P7, "It would have been more beneficial for me to be at the bedside and to see multiple patients. A lot of time was wasted waiting. It was taking away an observation being at the bedside and taking care of a patient and learning their background and implementing. I feel it would have been more beneficial not to have done it."

Role confusion and inadequate communication were also cited as challenging factors. HFS is a new addition to the curriculum for this particular nursing program, and the newness was described as a challenging factor. According to P1, the nursing program still needs to "figure out the kinks."

Theme 6: Teamwork was very effective and beneficial

In the simulations, participants worked in groups with their peers. Roles were assigned among the group members. Almost all of the descriptions provided for teamwork were positive. Participants found that there was an element of teamwork in each scenario and a majority of the time it was effective and beneficial. P17 reported, "It really teaches you to work with other nurses to collaborate and find the best treatment plan." Participants also mentioned that participating in HFS helped build trust between peers. Jeffries,[16] in the logic theory, had indicated that once the simulation experience begins, it must be characterized by

being learner-centered, collaborative, interactive, experiential, and have an environment of trust. This collaboration was very beneficial for the participants.

Theme 7: Debriefing and feedback were very beneficial

All participants in the study had positive comments about the debriefing process and the feedback they received. "Positive" and "beneficial" were used most frequently in this theme. P2 described the importance of debriefing best, "I think we learned more [in debriefing] than we did in the simulation. It was helpful talking about what you would do in a real situation, and how that difficult patient might be a real patient and how you should handle that."

Participants found that the debriefing process helped improve their learning. The debriefing helped connect classroom material to the clinical setting. It also helped "solidify" what the students had been learning. According to P11, "I don't think the Sim itself would be as beneficial without the debriefing."

Kirkbakk-Fjaer et al.[11] found in their study that the debriefing time was needed for the simulation to be effective. The safe and non-judgmental environment of the debriefing allowed the students to be open with self-reflection and to realize that they could learn from their mistakes. This is a time for them to process the experience and what they might be feeling. It is also an opportunity for questions to be answered.[11] Based on the theory, once completed, the simulation must be evaluated from the perspective of the patient, participant, and the system to see if each of their outcome was met.[16] This was accomplished with debriefing.

DISCUSSION

The research sought to examine the initial experiences of pre-licensure BSN students with high-fidelity simulations. As predicted, the participants reported several benefits with HFS; however, their feelings of negative emotions during the scenarios were overwhelming (see Figure 3). These results are in line with Cant and Cooper[5] who found an increase in knowledge, critical thinking, and confidence; and Hallin et al.[8] who stated that inexperience contributed to underperformance and emotional lability in HFS. The components of the logic model are *resource/inputs, activities, outcomes,* and *impact*.[17] The theory aligns well with the findings in that what is fed into the HFS system is what will be put out. The scenarios need to

be planned, and faculty and students need to receive thorough orientation and practice with the HFS to become comfortable.

The use of simulation is increasing throughout nursing education programs in the United States. It is a new technology that could potentially advance the profession of nursing in numerous ways. As schools assess the most effective use of HFS, it is important to take into account the experiences of the student. This research indicates HFS has its place in nursing school curricula, but improvements need to be made for the process to be used effectively. As nursing schools replace some hospital clinical hours with simulation hours, it is necessary to ensure the quality of the experience for nursing students. Research regarding the students' experiences will help nursing schools better tailor their use of HFS, so students value their learning experience. As this technology becomes more prevalent, taking all perspectives into consideration is essential. This study may help nursing schools best utilize their simulations for optimal learning and effectiveness, getting the greatest return from the experience.

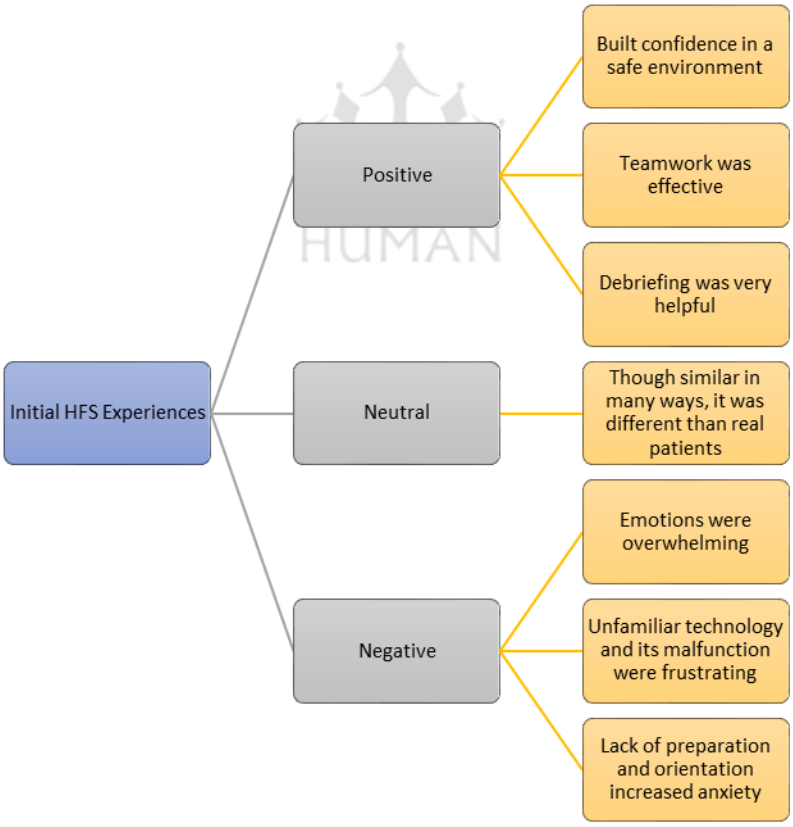

Figure 3. **Positive, neutral, and negative characteristics of initial HFS experiences of BSN students.**

Limitations

This college is a private, liberal arts, faith-based institution, which limited the demographics of students interviewed. There was homogeneity evident throughout the participants. All participants were female. The small sample size could also be a factor. Participants experience with HFS was in a program that only implemented HFS within the previous year before the interviews. This limited their number of interactions with HFS technology. This inexperience could contribute challenges not seen in a more established program.

CONCLUSIONS AND RECOMMENDATIONS

HFS is increasing in prevalence and popularity as a learning tool among nursing schools. It is important that this technology is used effectively for students to benefit from the experience. One recommendation is that students receive a thorough orientation to the process of HFS scenarios and the HFS lab at the beginning of their nursing program. Another recommendation is that students are given adequate time to debrief the experience and receive feedback, which aligns with previous research studies. Further studies, which include participants from a variety of nursing programs, would be beneficial. Studies should also be conducted from the perspective of the nursing professor and administrative roles.

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