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Nursing students' perceptions of combining hands-on simulation with simulated patients and a serious game in preparing for clinical placement in home healthcare: A qualitative study

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ABSTRACT

Background: There is a growing demand to provide complex healthcare services in patients' own homes. However, high quality home healthcare clinical placements are often difficult to obtain, and arranging laboratory-based simulations to provide relevant clinical-practical learning experiences for all students is resource intensive.
Objectives: The aim of this study was to explore nursing students' perceptions of using a blended simulation approach, including hands-on simulation with simulated patients and a video-based serious game, in preparation for their home healthcare clinical placements.
Design: An exploratory qualitative design using focus group interviews was utilized.
Setting and participants: Second- and third-year nursing students in home healthcare courses in Norway participated in this study.
Methods: Five focus group interviews were conducted with a total of 26 nursing students. Data were collected over two semesters in three home healthcare courses. The data were analyzed using thematic content analysis.
Results: The study identified four main themes that influenced students' perceptions of combining the two simulations. These included personal engagement, contextual and environmental factors, a safe and structured learning environment, as well as organizational and technical factors. In relation to the different themes, students expressed that disadvantages in one simulation were counteracted in the other.
Conclusions: The blended simulation approach was perceived to address curricular objectives in different but complementary ways. The blended simulation approach was perceived to facilitate personal engagement and reflections and to provide relevant clinical-practical learning experiences. However, results also indicated that the organization of such a blended simulation approach (i.e., group compositions and size), facilitation from teachers, and technical issues (i.e., with medical equipment and the serious game) may influence students' perceptions and satisfaction directly. The results should provide useful information for designing future teaching strategies in Bachelor of Nursing programs.

1. Introduction

There is a growing demand to provide more complex healthcare services in patients' homes (Jarrín et al., 2019; World Health Organization, 2016). Thus, home healthcare nurses need to have a high level of clinical reasoning skills and evidence-based knowledge (Benner et al., 2010). Hence, nursing education should provide students with the opportunity to engage in different clinical-practical learning experiences in which they must employ different kinds of knowledge and practical thinking in various situations for the benefit of each patient (Benner et al., 2010). In current nursing education, experience in home healthcare is mostly offered through placement in clinical practice and simulation-based training (Coppa et al., 2019; Gaberson et al., 2014; Reynolds et al., 2018). However, there is a challenge in providing relevant clinical learning experiences for all students. An additional challenge is to provide variation in teaching and learning strategies, including technology-enhanced learning (Hallin, 2014; Montenery et al., 2013).

A blended learning approach refers to a teaching and learning strategy that combines traditional teaching and simulation with

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different online learning modules, mobile-based videos, quizzes, and exercises (Li et al., 2019). Such approach may address curricular objectives in more innovative and effective ways (Posey and Pintz, 2017; Spanjers et al., 2015) and effectively improve nursing students' knowledge and satisfaction (Li et al., 2019). Therefore, to increase students' ability to engage in relevant home healthcare practical learning experiences, this study combined hands-on simulation with simulated patients (played by home healthcare nurses and teachers) with a serious game (SG), further referred to as a blended simulation approach. SGs are computer-based simulations also known as web-based simulation, e-simulation or virtual simulation (Cant and Cooper, 2014). SGs provide an opportunity for nursing students to experience clinical practice situations where they can apply clinical reasoning and decision-making skills in a realistic and safe environment (de Ribaupierre et al., 2014).

To our knowledge, no studies to date have explored the use of a blended simulation approach, using hands-on simulation with simulated patients and an SG in the same course. However, an experimental study (Verkuyl et al., 2017) which compared use of a video-based SG with a laboratory simulation, concluded that a combination of the two approaches could become part of the suite of best teaching and learning practices to offer nursing students with regard to outcomes like knowledge, self-efficacy, and satisfaction. Consequently, the aim of this study was to explore nursing students' perceptions of combining hands-on simulation with simulated patients and a video-based SG in preparation for a home healthcare clinical placement.

2. Methods

2.1. Design

An exploratory qualitative design was utilized. Focus group interviews (FGIs) were used as the data collection method. The purpose of FGIs is to capture the range of different perspectives or feelings that participants have about a topic. In addition, a group has the capacity to exhibit a synergy that goes beyond individual interviews (Krueger and Casey, 2009).

This study was conducted over a period of two semesters and involved three home healthcare courses. First, we involved all nursing students ($N = 40–50$ per course) taking a home healthcare course in a two-days blended simulation session. Next, one or two FGIs were conducted in each course to gather information regarding students' perceptions of using the blended simulation approach in preparation for their home healthcare clinical placement. The FGI groups ranged in size from four to seven students.

2.2. Participants

A convenience sampling method was used. The inclusion criteria for this study were second- and third-year nursing students who had attended both days of simulations. Students were recruited after the SG debriefing session. Five FGIs were conducted and included a total of 26 nursing students (Table 1).

2.3. Procedure

Our teaching- and learning approach was based on Kolb's (1984) experiential learning model. Thus, over the course of two days, nursing students were exposed to five different patient scenarios (Day 1: three hands-on scenarios, Day 2: two SG scenarios). All simulation sessions were guided by simulation theory as well as best practice standards (ASPiH, 2016; Jeffries, 2005), including participant briefing, simulation, and a final debriefing. The facilitating teacher was available the entire time the SG was being played. Table 2 describes the content and arrangement of the hands-on simulations and the SG sessions. Fig. 1 shows a screenshot from one of the SG scenarios.

The FGIs were conducted at the end of day two. All researchers were

Table 1
Demographics of participants in the focus groups.

Focus group number:	1	2	3	4	5
Students (N)	7	4	4	6	5
Time (minutes)	78	31	69	55	33
Males	1	0	2	1	0
Females	6	4	2	5	5
Age (range/median)	22–32/25	21–25/22,5	23–40/27,5	21–40/30	20–38/22
Health-related education prior to nurse educ.	1	1	0	0	1
Health-related work experience prior to nurse educ.	5	2	2	2	2
Health-related work experience during nurse educ.	6	4	4	6	4
Year of study in nursing educ.	3	2	2	3	3

Table 2
Descriptions of the content and arrangement of hands-on simulations and the SG sessions.

	Day one: Hands-on simulations	Day two: Playing an SG
Briefing	Information was provided about the scenarios, equipment, roles (registered nurse (RN), student and observer) and learning objectives: • Communicate and interact properly • Make relevant observations/assessments • Take appropriate actions Timeframe: 20 min.	Information was provided about the scenarios, where to locate it, how to play, and learning objectives: • Increase students' perception and confidence in clinical situations • Promote systematic assessment of patients • Choose appropriate actions in specific situations Timeframe: 15 min.
Scenarios	Three scenarios; Patient suffering from fall, stroke, and a combination of poorly regulated diabetes and drug abuse. Timeframe: 15 min.	Two scenarios from a home healthcare setting where a patient with COPD has a non-infectious and infectious deterioration (Johnsen et al., 2018). Timeframe: 1–2 h (for playing)
Actors	The selected actors were both RNs from home health-care institutions and teachers (RNs) who had clinical-practical experience with the kind of patient they were to simulate. Each actor was provided with a script which included key points on how to simulate the patient and the learning objectives they should comment on after the simulation.	The actors were one home health-care RN and a man diagnosed with COPD. They were provided with scripts but were encouraged to act as themselves. The scripts and quiz-based tasks had been made in cooperation with the RN.
Student engagement	Two students take an active role (RN and student) in the scenario, and the remaining students have roles as active observers in relation to each learning objective. Students switch roles in the different scenarios.	Users take part in a nurse's visits to a patient with COPD. Quiz-based questions and tasks are presented during each scenario (Interactive design). Students receive feedback on incorrect and correct answers, including a demonstration by the RN of the proper care.
Groups	10–12 students (composed by the teachers)	1–4 students (composed by the students)
Debriefing	The same groups as in the simulations Timeframe: 40 min.	In an auditorium with all the students Timeframe: 30 min.
Organization	One time each semester for 2nd and 3rd year nursing students.	One time each semester for 2nd and 3rd year nursing students. However, the SG is available for all students at any time.

Fig. 1. Screenshot from one of the scenarios in the SG (With permission from the actors).

involved in the five FGIs. The interviews were held in different meeting rooms on the university campus. Each FGI was conducted by two members of the research team, and a semi-structured interview containing three primary questions was used (Table 3). The FGIs were audio-recorded and lasted between 31 and 78 min with an average of 53 min.

2.4. Data analysis

The analysis was modeled on Braun and Clarke's (2006) thematic content analysis. The approach was inductive and data-driven, and the analytical process included six steps: Step 1) familiarization with the data — all five researchers read all transcripts; Step 2) generation of initial codes — transcriptions were partitioned and initially coded by the researchers on an individual basis. The next steps were collectively conducted, with the aim being to ensure that the process was consistent and reliable: Step 3) search for themes; Step 4) review themes; and Step 5) define and name themes. The researchers discussed the results until agreement was reached. Finally, in Step 6 the researchers all took part in producing the report (although its main content was written by the first author).

2.5. Ethical considerations

The study was approved by the Norwegian Centre for Research Data (Number: 38298) and followed ethical guidelines (The Norwegian National Research Ethics Committees, 2014). All participants received oral and written information regarding the study and signed informed consent forms. Each participant was assigned a number in case we needed further information. Confidentiality was maintained by keeping names and participant numbers separate and by storing all personal information in a secure location.

3. Results

The analysis identified four main themes that influenced students' perceptions of combining the two simulations in preparation for a home healthcare clinical placement. The main themes and subthemes are displayed in Table 4.

Table 3
The three primary questions of the focus group interviews.

How did you perceive the hands-on simulation sessions with simulated patients, with potential advantages and disadvantages?
How did you perceive using the SG compared to the simulation with simulated patients?
How did you perceive using the combination of the two simulations?

3.1. Personal engagement

3.1.1. Being actively engaged

Taking an active role as a nurse or student in the hands-on simulations was perceived to represent both an advantage and a disadvantage to students' learning outcomes. For example, participants pointed out that being actively engaged and forced to take initiative enhanced their reflection and experiential learning. As one student said: *"... I think you get the best learning outcome when you are in it yourself instead of just watching others do it"* (FGI 1). In contrast, other students expressed that they felt stressed, exposed, and out of their comfort zone if they reluctantly had to take an active role in a scenario. This was perceived to decrease their learning outcome.

Playing the SG, participants also saw themselves as being actively engaged, but in a different way. They felt less exposed, as participating entailed watching videos and answering quiz-based questions. Solving the quiz-based tasks also created the opportunity for reflection and discussions during the whole simulation session, which was not possible in the hands-on simulations. Additionally, the various quizzes contributed to awareness of students' own knowledge and skills, or lack thereof: *"I think the quiz part is fine because you sort of get a confirmation that your thoughts are correct"* (FGI 5). Students expressed that the provision of feedback and explanations along the way was important to their learning outcomes. Students also found it motivating to receive a score at the end of incorrect/correct answers. The SG also triggered discussions beyond the actual tasks.

The blended simulation approach was perceived to contribute to personal engagement and reflections at different levels. Students also expressed that disadvantages in one simulation were counteracted in the other.

3.1.2. Being an observer

It was perceived as an advantage to be allowed to observe other students in the hands-on simulation. One participant stated: *"Actually, I learn best by observing others"* (FGI 1). Another participant argued: *"... it wasn't completely passive, because you did get a task (watch for fulfillment of particular learning objectives)"* (FGI 5). They suggested that it enabled them to learn from others' appropriate and inappropriate performances. Nevertheless, a perceived disadvantage with the hands-on simulations was that they did not provide a demonstration from the home healthcare RNs of how the scenario could have been resolved in a positive manner, as was the case in the SG. When watching the role-model nurse in the SG demonstrate the proper things to do, participants felt they had also learned useful communication skills. Thus, students perceived that the blended simulation approach provided supplemental kinds of demonstrations.

3.1.3. Acquiring experiential learning

The participants perceived the chosen scenarios as relevant for their

Table 4
Main themes and subthemes from the focus group interviews.

Main themes	Subthemes
Personal engagement	Being actively engaged
	Being an observer
	Acquiring experiential learning
Contextual and environmental factors	Authentic patient actors
	Visual and contextual factors
A structured and safe learning environment	The teacher's role as facilitator
	Group dynamics
Organizational and technical factors	Organizational factors
	Technical factors

clinical placement in home healthcare. In addition, one commented: *"I think it's good that they [the simulations] focused on acute or partly acute situations, because that's what you are most unprepared for"* (FGI 2). Another participant said: *"I've never worked in home healthcare, and don't know what it's like, but now I feel I've gotten a lot of information"* (FGI 2). Even if learning experiences from hands-on simulations was preferred, participants agreed that the blended simulation approach had provided various experiences that facilitated restructuring of their knowledge base and made them more prepared for clinical placement in home healthcare.

3.2. Contextual and environmental factors

3.2.1. Authentic patient actors

It was considered an advantage that the hands-on simulations included real people simulating patients. It forced them to relate to another human being and made it easier to immerse themselves in the situation. However, who played the role of the patient was considered essential for students' perceptions of realism. The RNs' acting was perceived as realistic: *"You could see that they had a lot of experience with these kinds of patients in similar situations"* (FGI 2). Students suggested that having real patients in the scenarios, as happened in the SG, would have been regarded as even more realistic. They believed that this would have been an advantage because they would be more focused and act more quickly on patient deterioration with a real patient.

Yet participants asserted that it was perceived as a disadvantage if they knew the simulated patient in advance and/or if the person was not around the patient's age. One student expressed that: *"It was strange and felt unrealistic when a thirty-year-old teacher played an older woman with dementia"* (FGI 3). Similarly, it was remarked that it would not have felt realistic if a fellow student had played the patient, either.

3.2.2. Visual and contextual factors

Students perceived visual and contextual inputs to be important to their perception of realism and ability to become immersed in a simulation scenario. For instance, the scenario about a patient with poorly regulated diabetes and drug abuse was considered the most realistic scenario among the hands-on simulations. The room was organized and furnished like an authentic apartment. The table was full of empty beer and liquor bottles, and the confused and agitated patient was lying on the sofa. As one student put it, *"It felt like we were in a patient's home"* (FGI 1). Similarly, after playing the SG, several participants pointed out that it was especially educational to be in an actual home healthcare environment and watch a real RN "in action." Participants proposed that it was easier to remember information when they could visualize and connect things with a certain context. Further, students indicated that the blended simulation approach had provided them with various visual and contextual inputs that was perceived to be an advantage in preparing for clinical practice in home healthcare.

3.3. A structured and safe learning environment

3.3.1. The teacher's role as a facilitator

Even if the structure in the hands-on simulations was set in advance, participants perceived that the facilitators organized things a bit differently. Nevertheless, participants agreed that the learning environment had felt safe. They felt good about being given the opportunity to reflect on and express what they could have done differently, thereafter receiving constructive feedback from the facilitators and the simulated patient. Hence, the debriefing sessions were perceived as crucial to their learning outcome. One of the students described it like this: *"I think that when we sat down and discussed it among ourselves afterwards, people relaxed... that's when what we had learned came out"* (FGI 5).

The SG session was perceived to have a good structure. However, opinions varied about the usefulness of the plenary debriefing session. On the one hand, it was argued that discussing the proper answers to the quiz-based tasks in the plenary debriefing session was useful. On the other hand, it was suggested that debriefing in smaller groups, like in the hands-on simulations, would have created more student activity and greater learning outcomes. However, students perceived that both simulations provided the possibility to make mistakes in a challenging but safe setting.

3.3.2. Group dynamics

It was perceived as an advantage and decreased discomfort when two students had to play roles (RN and student) together in the hands-on simulations. In addition, it felt less stressful and distracting if they already knew the other group members. Supportive students promoted a good individual experience during simulation and were perceived as important for their learning outcomes.

Students appreciated the ability to discuss the answers on the quiz-based tasks with other students during the SG session. It was perceived as an advantage that the group composition and size could be organized by the students themselves. However, one student argued:

> *"Not everyone has the same network at school, so maybe some students had no one to work with. That might have been quite painful for them. So, the ones that worked alone, if anyone did that, may not have had the same learning outcome as those of us who worked together. Because we got to discuss things in a safe environment"*.
>
> (FGI 4)

Nevertheless, it was also suggested that groups with mixed students possessing different knowledge and experiences, composed by the facilitating teacher, could be an advantage when solving the quiz-based tasks in the SG.

3.4. Organizational and technical factors

3.4.1. Organizational factors

Students commented that they liked using the blended simulation approach, as it addressed curricular learning objectives in various but complementary ways. As one student put it: *"One day you need to actively participate in hands-on scenarios, then it feels good to be able to sit back the next day, observe, reflect, and use your knowledge throughout the SG"* (FGI 1). However, it was suggested that it would have been better to play the SG on the first day, as this would have provided them with an introduction to the home healthcare work environment and daily routines. Others agreed that this knowledge would have been helpful but preferred the order of the performed simulations.

It was considered a disadvantage that the hands-on simulations were only organized once per semester. Playing the SG was perceived as a more flexible type of learning, but it was argued that its flexibility also could be a disadvantage to students' learning. For instance, the flexible organization of playing the SG could decrease the teacher's oversight and require students to take on more responsibility for their own learning.

Regarding group composition and sizes, students suggested that the SG groups should not have more than 2–4 students for all students to be able to take an active part in the discussions. It was also proposed that students should be allowed to play the SG alone. As with the SG sessions, students commented that the size of the groups in the hands-on simulations (10−12) should have been smaller. In addition, students preferred debriefing in groups like those in the hands-on simulation instead of in an auditorium, as happened with the SG.

3.4.2. Technical factors

It was perceived as a disadvantage that the hands-on simulations involved using different medical equipment (i.e., for measuring blood sugar, blood pressure, etc.). If someone experienced difficulty using the medical equipment it could increase students' level of stress and take the

focus away from the actual learning objectives.

Students indicated that the SG was easy to use. However, it was perceived as a disadvantage that the SG did not include the functionality to view students' own correct/incorrect answers or the ability to undo wrong choices. A few technical glitches due to an unstable internet connection were also mentioned. However, despite a few technical issues, students reported that they liked playing the SG.

4. Discussion

4.1. Personal engagement

As shown in the study of Reynolds et al. (2018), not all students preferred being actively engaged in the hands-on simulations, as it made them feel exposed and stressed. However, the blended simulation approach offered students supplementary ways of being active observers. Nevertheless, students wished the hands-on simulations had offered a demonstration from an RN performing the care, like in the SG. This result is in line with previous studies (Benner et al., 2010; Gaberson et al., 2014) which propose that learning from role models (preceptorship) is important in the transition from being a student to a clinical nurse.

Students perceived that the blended simulation approach had provided them with different but complementary learning experiences and reflections. With regard to levels of reflection, this may be explained by the fact that the blended simulation approach facilitated reflections both "in- and on-action" (Schön, 1983). For example, in the hands-on simulation, most reflections, discussions, and feedback took part in the debriefing after the simulation session. Here, reflection "on-action" (Schön, 1983) was emphasized. However, when using the SG, students got the opportunity to reflect, discuss and receive feedback "in-action" (Schön, 1983) while solving the quiz-based tasks. Finally, they received a score on their performance. Thus, the blended simulation approach provided both formative and summative assessments of personal knowledge, skills, and attitudes, as is recommended by ASPiH (2016) and Coppa et al. (2019). According to Kolb's (1984) experiential learning model, reflection and thinking are premises for learning, and for students becoming experienced and reasonable individuals. In accordance with Kolb (1984), students perceived that the five simulation scenarios had restructured their knowledge base and made them more prepared for clinical practice in home healthcare.

4.2. Contextual and environmental factors

In line with other research (Burke, 2014; Reynolds et al., 2018), visual and contextual factors were important for students' perceptions of realism and immersion. For example, students appreciated the inclusion of RNs and a real patient (in the SG) as actors in the blended simulation approach, as they made the simulations more realistic. Students also thought it useful to receive feedback and clinical examples from the RNs who acted as simulated patients, and watch an RN in a clinical practice setting through the SG. These results support evidence (Burke, 2014), which suggests including expert nurses in simulations and providing narratives from clinical practice as a pedagogical strategy. However, like in the study of Bokken et al. (2009), students would have preferred having real patients in all the simulations. Although we recognize that this would be an ideal approach, the blended simulation approach used a combination of real patients and simulated patients, as suggested by Bokken et al. (2009). This is because each encounter has strengths and weaknesses regarding availability, flexibility, and standardization. We also recognize that the context in some hands-on simulations could have been more authentic. For example, we could have conducted the hands-on simulations in an actual clinical environment (ASPiH, 2016), like in the SG. However, this would have involved more personnel, equipment, and increased the costs.

4.3. A structured and safe learning environment

However, despite a predefined structure for all the hands-on simulations, participants perceived that the facilitators organized the simulation sessions a bit differently. This may be due to different individual levels of experience with being a facilitator or the subject content being delivered (ASPiH, 2016). In relation to the SG, it was proposed that the flexible organization of playing the SG could decrease the teacher's oversight and require students to take on more responsibility for their own learning. However, In line with Edelbring et al. (2012), our results show that teacher involvement and follow-up when playing the SG was important for students' learning outcomes as in the hands-on simulations. In accordance with propositions from ASPiH (2016) and Coppa et al. (2019), both simulations were perceived to provide the possibility to make mistakes in a challenging but safe setting.

The blended simulation approach provided different forms of group discussions (large and small group). However, in line with previous evidence (Adamson, 2015; Stott and Mozer, 2016), students expressed that both types of group discussions were valuable for their perception of learning outcomes. Nonetheless, they highlighted that group composition and size could influence the quality of the experience and learning outcomes. In accordance with Reynolds et al. (2018), it was suggested that the facilitating teacher should intentionally mix the SG groups so that students with different levels of experience and knowledge could learn from each other. We recognize that this should be considered, as it possibly may decrease the chance of exclusion of students.

4.4. Organizational and technical factors

Students commented that they liked using the blended simulation approach, as it addressed curricular learning objectives in various but complementary ways. The finding that they liked the variation of teaching and learning strategies aligns with the proposition that the millennial generation of nursing students prefers learning through experimentation, active participation, and multitasking with rapid shifts between technological devices (Montenery et al., 2013). However, our results also support evidence (ASPiH, 2016; Spanjers et al., 2015) that organizational (i.e., group composition and size) and technical (i.e., issues with medical equipment or the SG) factors may impact students' learning experiences. Thus, if blended learning is to have the potential to improve education, it should be thoughtfully designed (Spanjers et al., 2015).

4.5. Limitations of this study

According to Krueger and Casey (2009), focus group interviews may have limitations. Some participants do not comment on all questions, while others comment several times on one issue. In addition, group size is restricted to counteract superficial and trivial comments that might not occur in larger groups. Thus, providing frequencies by numbers or percentages can be misleading in focus group reports. Hence, the purpose of FGIs is rather to capture the range of different perspectives or feelings that participants have about a topic.

5. Conclusion

There is a wide variety of research on blended learning as an educational strategy (Coyne et al., 2018; Li et al., 2019). However, to the best of our knowledge, this is the first study that combined hands-on simulation with computer-based simulation (such as an SG) in one course. Our study identified four main themes that influenced students' perceptions of combining the two simulations in preparation for their home healthcare clinical placement, including personal engagement, contextual and environmental factors, a safe and structured learning environment, as well as organizational and technical factors.

The blended simulation approach was perceived to address curricular objectives in different but complementary ways. This approach was perceived to facilitate personal engagement and reflection and to provide relevant clinical-practical learning experiences. However, results also indicated that organization of such blended simulation approach (i.e., group compositions and size), facilitation from teachers, and technical issues (i.e., with medical equipment or the SG) may influence students' perceptions and satisfaction directly. The results should provide useful information for designing future teaching strategies in Bachelor of Nursing programs.

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CRediT authorship contribution statement

Hege M Johnsen: Project administration, Conceptualization, Methodology, Investigation, Formal analysis, Writing - Original Draft, Writing - Review & Editing.

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Mariann Fossum: Conceptualization, Methodology, Investigation, Formal analysis, Writing - Review & Editing, Supervision.

Declaration of competing interest

None.

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