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Research Article

Nursing Student Perception of Different Simulation Methodologies Applied to Help First-Year Students Integrate Knowledge Acquired: A Cross-Sectional Study

Olga Masot, RN, PhD[a,b], Elena Paraíso-Pueyo, RN, PhD[a,*], Ana Lavedán-Santamaría, RN, PhD[a,b], Teresa Botigué, RN, PhD[a,b], Laia Selva-Pareja, PhD[a,b,c], Eva Barallat-Gimeno, RN, PhD[a,b], Rosa Mar Alzuria-Alós, RN, PhD[a,c,d], Anna Espart, RN, PhD[a,b,c]

[a] *Department of Nursing and Physiotherapy, University of Lleida, Lleida, Spain*
[b] *Health Education, Nursing, Sustainability and Innovation Research Group (GREISI), Lleida, Spain*
[c] *Development of Healthy and Sustainable Organizations and Territories (DOTSS), Lleida, Spain*
[d] *Multidisciplinary Research Group on Therapeutics and Interventions in Primary Care (RETICAP), Lleida, Spain*

KEYWORDS
Student perception;
Simulation;
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Nursing assessment;
Standardized patient

Abstract

Background: Standardized patient simulations are an effective method for acquiring skills and knowledge. The purpose of this study was to explore nursing students' perceptions of the learning methods used in clinical simulation.

Methods: A cross-sectional study was conducted evaluating two different clinical simulations: 1) basic simulations, where the actor/patient was the teacher, the simulations were performed in pairs, and the rest of the students were present in the same classroom; and 2) simulation-based peer-assisted learning, where the actors/patients were third-year students, the simulations were performed individually, and the rest of the students watched them from another classroom via a video recording system.

Results: In terms of their perceptions, both types of simulation scored 4.4 out of 5 on the Student Perception of Clinical Simulation tool (SD ±0.7 and ±0.8, respectively). In addition, the results of the characteristics of each simulation are presented.

Conclusions: Basic simulations helped students to internalize theoretical knowledge and gain confidence. Peer-assisted learning based on simulations increased their self-confidence and ability to predict clinical changes in patients. As a result, they felt better prepared to care for real patients. The use of both simulation modalities is a flexible method that can be adapted to educational needs.

* Corresponding author: elena.paraiso@udl.cat (E. Paraíso-Pueyo).

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Introduction

Simulation allows students to practice what they have learned in a 'simulated scenario' that is safe for the patient. It is a teaching method that can be used to help nursing students acquire both the technical and non-technical skills they need. The main goals of simulation are to improve patient safety and to help students apply their theoretical knowledge to clinical practice (Koukourikos et al., 2021; Unver et al., 2018). Performing simulations improves students' confidence when they have to care for patients. It also enables students to develop assessment skills, critical thinking, and decision-making in a safe learning environment and with professional support (from the nursing faculty) (Krishnan, Keloth, & Ubedulla, 2017).

There are several modalities of clinical simulation. On the one hand, it is possible to use simulators equipped with hardware (high-fidelity simulation). These usually consist of life-size mannequins and use specific software that makes it possible to simulate different clinical scenarios (Handeland, Prinz, Ekra, & Fossum, 2021). In other modalities, the patients are external 'actors' known as standardized patients. These are placed in simulation environments (clinical case) and students work with them to practice performing examinations, making diagnoses, and making decisions. The latter approach leads to high levels of satisfaction and helps students to significantly improve their communication skills (Blackmore, Kasfiki, & Purva, 2018).

Theoretical Framework

The Metodología de Aprendizaje en Entornos Simulados (MAES©) or Learning Methodology in Simulated Environments (in English) method plays an important role in simulations with standardized patients (Díaz Agea, Megías Nicolás, García Méndez, Adánez Martínez, & Leal Costa, 2019). It includes six elements that allow students to acquire competencies autonomously. These are: 1) the selection of work teams and the establishment of a group identity; 2) the voluntary choice of the subject of study; 3) the establishment of basic competencies through brainstorming and then programming how to develop them; 4) the design of a scenario for a clinical simulation by the students; 5) the execution of the simulated clinical experience; and 6) the execution of a debriefing session after the simulation.

In this sense, Simulation Peer Learning (SPL), in which the cases are designed by third-year students and in which they are the actors carrying out the simulation scenarios for first-year students, can offer a complement to this methodology. This has been observed in simulations based on the collaborative clinical simulation model, in which students are given the responsibility of designing scenarios for their peers, which are then reviewed by the responsible teachers to ensure the accuracy of the cases (Guinez-Molinos et al., 2017). According to Vidal-Villa (2021), the acquisition and reinforcement of knowledge through simulation is perceived not only by the students who receive this type of training but also by the person responsible for providing this teaching methodology.

Conducting simulations with standardized patients provides an effective method for acquiring skills and knowledge. However, there is a need to understand how students perceive the usefulness of different teaching approaches that can be used in this type of simulation with actors. Therefore, our study aimed to investigate students' perceptions of the different teaching methods used in clinical simulations carried out in the subject "Evidence-Based Practice in Integral Care 1 (PBECIP1), which is taught in the first year of the Degree in Nursing at the University of Lleida (UdL).

Material and Methods

Study Methods

A cross-sectional study was carried out in a population of 96 students who had enrolled for the subject PBECIP1 in the first year of the nursing degree, at the UdL. The data were collected from the students who completed the subject in June 2022. The variables considered were sociodemographic (age, gender, and whether they worked in the health sector), and a tool related to different characteristics provided by the methodologies used in the simula-

tions. The last scale is the Student Perception of Clinical Simulation tool (SPCST). It was self-administered and its design was based on the learning needs identified by the teachers of the subject, as well as on a previous study carried out in another subject that is part of the same degree (Botigué et al., 2016). The scale consisted of nine questions, with Likert-type responses (1 = strongly disagree and 5 = strongly agree). The items examined whether the simulations helped students by 1) improving their knowledge and ability to correctly perform patient assessments; 2) giving them confidence and helping them to recognize changes in patient conditions; 3) increasing their ability to predict clinical changes; 4) helping them to internalize theoretical knowledge; 5) preparing them to care for real patients; and 6) helping them to develop reflective and decision-making skills. It was also evaluated whether 7) the questions and suggestions provided by the instructor during debriefing helped students to think critically; 8) students learned by both observing their peers and performing their simulations; and 9) students enjoyed learning through the use of simulations. The average estimated time to complete the self-assessment questionnaire was approximately five minutes. To facilitate the registration and management of the responses, the questionnaire was transferred to Google Forms®, a program for processing questionnaires (Google LLC, Mountain View, CA, EUA). Before the survey was sent to all students, the purpose of the project was explained to them face-to-face in class. Students were recruited using three reminders sent to them in the form of electronic messages through the space reserved for their subject in the virtual campus. The survey was closed after the three simulations were completed.

For the statistical analysis, a descriptive analysis of the study variables was performed. In the case of bivariate analysis, the Kolmogorov-Smirnov normality test was applied first. Bivariate analyses were then performed using either the Chi-square test or the Student's t-test, depending on the nature of the variables. The reliability of the scale concerning the different characteristics presented by the methods used in the simulations was determined using Cronbach's alpha coefficient. The data were processed with the IBM® SPSS® statistics program for Macintosh, version 24 (IBM Corp., Armonk, NY, US), using a significance level of $p < 0.05$.

Description of the Subject and the Teaching Methods Used

PBECIP 1 is a 6 ECTS (European Credit Transfer System) subject taught in the second semester of the first year of the nursing degree at the UdL. It is a subject that combines knowledge taught in various other subjects and has continuity throughout the first three years of the degree. PBECIP 1 is taught with different dynamics, but always in small groups and with a 100% attendance requirement. In total, the course includes 30 hours of classroom activities (10 of which are in groups of no more than 25 students and 20 in smaller groups of no more than 12 students) and another 120 hours of independent work done by the student on an individual basis. The seminars incorporate a variety of teaching methods and strategies that focus on nursing as the basis for the acquisition of theoretical and practical knowledge based on evidence and patient safety. This encourages active student participation and promotes both individual and teamwork through project-based learning related to the various topics covered. Within the subject, three programmed activities include clinical simulations.

PBECIP1 is taught concurrently with the student's first exposure to nursing. By the time the students do their first simulation, they have had only four days of clinical practice; and by the time they do their second simulation, they have had only seven. For this reason, we call these basic simulations (BS). On the other hand, the third simulation is done at the end of the subject, when students have had much more contact with the reality of healthcare. These cases are therefore more complex. All types of simulations last about 10 minutes. Before entering the scenario, each case is contextualized and after each simulation, there is a short (5-minute) debriefing session. Third-year students do the third type of simulation and the following week time is devoted to watching the recordings and a more in-depth form of debriefing. The other differences between the different simulations are explained in Table 1.

Ethical Aspects

The study was approved by the UdL Data Protection Office, which is responsible for approving studies conducted at the university. Students were informed of the purpose of the study at the beginning of the course. Participation was voluntary. Students who refused to participate did not receive the participation questionnaire, but participated in the different simulations, as they were part of the activities programmed in the subject. All data included in the study were kept anonymous.

Results

In the descriptive analysis of the sample (Table 2), it was observed that the total number of students was 86 (89.58% of the study population) with an average age of 20.27 (SD ±4.36), of which the majority were female (86.0%). They were asked about the difficulties they encountered in preparing and carrying out simulations one, two, and three and how much they learned from them. Simulation 3, which involved SPL, had the greatest perceived difficulty with a score of 3.16 out of 5. It was also recognized as the simulation that provided the most learning (4.29 points).

Table 1 – Main Characteristics of the Different Types of Simulations Conducted With Standardized Patients

Characteristics	BS		SPL
	Simulation 1	Simulation 2	Simulation 3
Objective	1. Make an appropriate assessment through an interview using Marjory Gordon patterns. 2. Then make a nursing record of the case.		
Student tasks	Patient interview and observation	Interview, observation and taking of vital signs and anthropometric measurements.	Interview, observation and collection of vital signs and anthropometric measurements.
Simulation carried out:	In pairs		Individually
Location of the remaining students	In the same classroom as the simulation scenario.		In another room, view the simulation with the instructor via a recording system.
Standardized patient	The evaluating teacher		Third course students*
Case design	The PBECIP1 teaching team		Third course students*,†

BS = basic simulations; SPL = simulation-based peer-assisted learning.
* Adapted MAES© method (Díaz Agea et al., 2019).
† under the supervision of the teachers from the PBECIP1 and three courses.

Table 2 – Sample Characteristics and Differences Between Students Who Worked in Health Care and Those Who did not

Variables		Total		Health Care (n = 17)		Non-health Care (n = 69)		*p*
		Mean	SD	Mean	SD	Mean	SD	
Age		20.27	4.36	23.82	6.03	19.39	3.35	**<0.001***
Sex*	Female	74	86.0	13	76.50	61	88.40	0.20
	Male	12	14.0	4	23.50	8	11.60	
Difficulty of simulation 1		2.91	0.94	2.82	0.95	2.93	0.94	0.69
Difficulty of simulation 2		2.84	0.87	3.00	1.00	2.80	0.83	0.39
Difficulty of simulation 3		3.16	1.0	3.18	1.90	3.16	0.96	0.95
Learning from simulation 1		4.09	0.82	4.12	0.93	4.09	0.80	0.89
Learning from simulation 2		4.13	0.87	4.18	0.95	4.12	0.85	0.80
Learning from simulation 3		4.29	0.75	4.18	0.95	4.32	0.70	0.50
Total means of the SPCST provided by simulations 1 and 2		4.37	0.70	4.54	0.60	4.33	0.72	0.27
Total means of the SPCST provided by simulation 3		4.36	0.76	4.75	0.56	4.30	0.78	**0.02**†

SD = standard deviation; SPCST = Student Perception of Clinical Simulation tool;
* number of the population and percentage.
† $p < 0.05$.

In the case of the total means of the scale used to evaluate the different characteristics analyzed in the simulated learning methods (the items shown in Table 3), no statistically significant differences were observed between simulations 1 and 2 (4.7 points (SD ±0.70). In comparison, for simulation three there was a score of 4.36 points (SD ±0.76) out of a maximum score of 5. Finally, Table 2 shows that the students who were already working in the health sector were the oldest ($p < 0.001$) and that they were also the ones who valued the features provided by the simulations with SPL the most ($p = 0.02$). However, the fact that they did not specify in which areas of the health sector they worked did not allow us to relate their perceptions to their previous health experiences.

Concerning the results of the SPCST, a bivariate analysis was performed to see if there were differences between the students' perceptions of the clinical simulation after using both methods: BS and SPL (Table 3). The results show that there were statistically significant differences in all responses.

Finally, in terms of learning methodology, students were asked whether they learned more when the simulation was conducted with the rest of their colleagues present in the same classroom (BS) or not (SPL). About 69.8% answered that they learned more when they were alone with the actors in the classroom. The students were also asked in which of the two conditions they felt more comfortable doing the simulations. The majority (65.1%) answered that

Table 3 – Evaluation of the Different Characteristics that the Two Types of Simulations Provided for Students

SPCST		BS		SPL		*p*
		n	%	n	%	
Increased knowledge for a proper evaluation	Strongly disagree	2	2.3.	2	2.3	**0.001***
	Disagree	0	0.0	2	2.3	
	Indecisive	2	2.3	2	2.3	
	Agree	27	31.4	23	26.7	
	Strongly agree	54	62.8	55	64.0	
Confidence in recognizing changes in patient status	Strongly disagree	2	2.3	2	2.3	**<0.001***
	Disagree	1	1.2	4	4.7	
	Indecisive	5	5.8	6	7.0	
	Agree	39	45.3	31	36.0	
	Strongly agree	36	41.9	40	46.5	
Increase students' ability to predict clinical change	Strongly disagree	2	2.3	2	2.3	**<0.001***
	Disagree	3	3.5	2	2.3	
	Indecisive	9	10.5	5	5.8	
	Agree	37	43.0	41	47.7	
	Strongly agree	33	38.4	33	38.4	
Internalization of theoretical knowledge	Strongly disagree	2	2.3	2	2.3	**<0.001***
	Disagree	0	0.0	1	1.2	
	Indecisive	2	2.3	3	3.5	
	Agree	29	33.7	25	29.1	
	Strongly agree	51	59.3	53	61.6	
Preparing to care for real patients	Strongly disagree	2	2.3	2	2.3	**<0.001***
	Disagree	4	4.7	3	3.5	
	Indecisive	6	7.0	5	5.8	
	Agree	34	39.5	35	40.7	
	Strongly agree	37	43.0	39	45.3	
Developing reflective and decision-making skills	Strongly disagree	2	2.3	2	2.3	**<0.001***
	Disagree	1	1.2	1	1.2	
	Indecisive	3	3.5	5	5.8	
	Agree	37	43.0	32	37.2	
	Strongly agree	42	48.8	44	51.2	
The teacher's questions and suggestions helped me develop my critical thinking.	Strongly disagree	2	2.3	2	2.3	**<0.001***
	Disagree	1	1.2	1	1.2	
	Indecisive	5	5.8	8	9.3	
	Agree	31	36.0	25	29.1	
	Strongly agree	44	51.2	47	54.7	
Learning both by observing my peers and through my own simulation	Strongly disagree	2	2.3	2	2.3	**<0.001***
	Disagree	1	1.2	1	1.2	
	Indecisive	3	3.5	4	4.7	
	Agree	24	27.9	28	32.6	
	Strongly agree	52	60.5	48	55.8	
Enjoy learning	Strongly disagree	2	2.3	4	4.7	**<0.001***
	Disagree	6	7.0	8	9.3	
	Indecisive	12	14.0	10	11.6	
	Agree	36	41.9	30	34.9	
	Strongly agree	26	30.2	33	38.4	

BS = Basic Simulations; n: number of population; SPCST = Student Perception of Clinical Simulation tool; SPL = simulation-based peer-assisted learning; %: percentage;

* $p < 0.05$.

they preferred not to have their teachers and peers present in the classroom and to watch everything through a video recording system.

Regarding the internal consistency of the nine-item scale defined in Table 3 and used to evaluate the different characteristics of the two types of simulation (the SPCST), a level of reliability of 0.92 was obtained for BS and one of 0.94 for SPL.

Discussion

This study has analyzed the perceptions of students concerning the different teaching methods used in the simulation testing environments carried out in the PBECIP1 subject given in the first year of the nursing degree at the UdL. The demographic characteristics of the study sample were comparable to those of studies carried out by other authors and involving nursing students: a female-dominated sample with an average age of around 20 years (Hernández-Martínez et al., 2021; Reverté-Vilarroya et al., 2021).

When asked about the difficulty and simulation-based learning experiences, the SPL was perceived as the most difficult, with a score of 3.16 out of 5. It was also recognized as the simulation that contributed the most to the learning capacity (4.29 points). Confirming the work of Díaz Agea (2019), students attributed a higher level of performance to learning with simulations based on a MAES©-type method than to learning based on more traditional simulation methods. In addition, authors such as Moabi and Ntombifikile (2022) and Zapko et al. (2018) assure that performing simulations throughout the academic training period is a valuable methodology for teaching technical and non-technical skills to future nurses. This is especially true when simulations involve actors/actresses. First, it provides students with resources that enhance their self-awareness and instill a sense of confidence. Second, it provides an environment that closely mirrors real-life healthcare scenarios.

Another significant finding was that students who had already worked in the healthcare sector rated their participation in the peer-assisted learning simulations more positively ($p = 0.02$). The standardized patient simulation was judged to provide both good training for healthcare professionals and relevant interprofessional skills. Simulation is a teaching strategy that is highly valued by healthcare professionals for promoting reflective thinking skills, learning, and confidence (Almeida et al., 2021; Jung, Lee, Kang, & Kim, 2017).

Regarding the characteristics that simulations can offer to first-year students, it should be noted that BS are organized when they begin real clinical practice. Until then, these students have only received a more theoretical type of learning. Therefore, BS contributes knowledge that helps them to make correct assessments, gives them more confidence in recognizing changes in the patient's condition, and helps them to internalize theoretical knowledge and develop reflective and decision-making skills (Bland, Topping, & Wood, 2011; Shin, Park, & Kim, 2015). This situation changes as they gain more clinical experience. With this experience, they can internalize all the procedures and theoretical content. This may explain why simulation three helped them improve their ability to predict clinical changes. This practice may have made them feel better prepared to care for real patients. These findings are consistent with those of other recent studies (Roca, Reguant, Tort, & Canet, 2020; Tamilselvan, Chua, Chew, & Devi, 2023).

The fact that no differences were observed in the satisfaction scores for the two different simulation methods (4.4, for SB with an SD of ± 0.7 and one of ± 0.8 for SPL) could have several different explanations. On the one hand, clinical simulation uses dynamic participation, which is a factor in creating an effective simulation-based learning experience (Wong, 2018). In addition, the use of innovative methods such as clinical simulation increases student motivation (Gómez-Urquiza et al., 2019; Mano et al., 2019; Warren, Luctkar-Flude, Godfrey, & Lukewich, 2016) because it actively engages students in their learning. According to Bloom's Taxonomy (1969), these students reach level 5 - "evaluating", where the student decides, prioritizes, evaluates, and justifies the decisions made to deal with the simulated case. On the other hand, this result can be explained by the fact that the students carried out real clinical practice in parallel with the development of these simulations. All this could explain the high level of student satisfaction. These could be important considerations in the design of new simulations within any of the nursing degree programs. In addition, the similarities in student satisfaction between the simulations could be considered a good finding. It shows that each of the simulations was well adapted to the exact stage of educational development that the students had reached. The student's educational needs were therefore adequately met.

Finally, the reliability of the instrument used to assess students' perceptions of the two simulation methods was determined and compared. The level of reliability, calculated with Cronbach's alpha, is similar to the previous study (0.9) (Botigué et al., 2016). The aim of the study was not only to evaluate the level of satisfaction of the students with the simulations but also to find a tool to evaluate the characteristics conveyed by the simulations. The results showed excellent internal consistency (George & Mallery, 2003; Vaske, Beaman, & Sponarski, 2017). In this regard, it is necessary to have instruments that can be used for this purpose and that guarantee the assessment of the necessary aspects. Future studies should compare this scale with existing, more comprehensive validated scales (Alconero-Camarero, Gualdrón-Romero, Sarabia-Cobo, & Martinez-Arce, 2016) to obtain a new, validated, comparable, and easier-to-use instrument. This would provide an

additional tool to quickly measure students' perceptions and satisfaction with simulations, allowing for adaptation to any pedagogical needs that may arise during the course.

Limitations

To enhance the findings, it would have been valuable to capture the perspectives and experiences of the third-year students involved in the SPL. Another potential limitation of the study is that the actors/actresses playing the role of the standardized patient did not provide feedback to the students who were simulating. Whether they were practicing health care professionals or students, receiving feedback from more experienced individuals may have enhanced the learning experience of the study participants.

Finally, another limitation of the study was that the group of participants included both inexperienced students and students with work experience in healthcare. The fact that we have not previously characterized the healthcare experience of these students may mean that the results may differ between them. In future studies, it would be interesting to record what work experience they have in the healthcare field.

Conclusions

In recent years, the integration of simulations into the PBECIP1 course has been observed, using both a basic methodology and peer-assisted learning. Overall, first-year students expressed a high level of satisfaction with this approach. The results suggest that each simulation method effectively addressed the learning needs that emerged during the semester. In addition, the scales used demonstrated internal consistency in assessing the constructs of interest.

In conclusion, the use of simulation can be proposed as a flexible educational methodology that can be adapted to the specific needs of nursing education. It provides an effective means of preparing future professionals to provide safe and competent patient care. And because peer-to-peer simulation is as valid as standardized patient simulation, it could be used more routinely.

Declaration of competing interest

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