S&S

Senses Sci 2020: 7 (1) 944-959
doi: 10.14616/sands- 2020-1- 944959

Article

Nursing simulations as learning strategy between fiction and reality: a narrative literature review

Chiara Zangari[1], **Andrea Gazzelloni**[2], **Giuliana D'Elpidio**[2], **Luisa Cirulli**[2], **Giuseppe La Torre**[3]

[1]Tor Vergata University of Rome – Italy
[2]Bambino Gesù Children's Hospital - Rome – Italy
[3]Sapienza University of Rome – Italy.

Correspondence: Dr. Andrea Gazzelloni, Ospedale Pediatrico Bambino Gesù, Roma Piazza di Sant'Onofrio 4 - 00165 ROMA. Tel. +39.06.68594426. E-mail: andrea.gazzelloni@opbg.net

Abstract. *Background*: Nursing simulation is a training method that allows students to anticipate or amplify real situations with guided experiences. It is a learning strategy that based on experience and allows to gain technical skills, develop critical thinking and clinical judgment, and to work on emotions and self-confidence. The simulation was born in the military field, in 1928, when Edward Albert Link invented the first flight simulator. Since the 1930s, simulation was applied to the health field to train and prepare health workers for a safer practice, without harming the patients.
Methods: A narrative review was conducted with the aim to verify the effectiveness of the use of simulation as a learning strategy in the nursing university degree, alongside traditional teaching methods, in terms of effects on students and his knowledge. The following databases were consulted: Pubmed, Cinahl, Embase, in the period from September 2019 to January 2020.
Results: 18 articles relevant to the research question were obtained. In these studies, the simulation was evaluated in different aspects. In particular, 10 articles dealed with the psychological aspect of simulation, 2 articles with the inter-professionalism issues and with the collaboration in a multidisciplinary team, 2 with the role of briefing, 2 with the differences between high and low fidelity simulation, 2 with the role of the tutor, and 2 with the topic of debriefing.
Conclusions: The studies analyzed encourage the use of active techniques such as simulation, useful for stimulating reasoning and practical skills. For this reason, universities should offer students a training path that includes simulation. Furthermore, the numerous and increasingly declared clinical errors in healthcare, due to the human factor, and an ever greater use of technology in the daily practice, could make it appropriate and desirable to invest in simulation as a strategy for improving care practice.

Keywords: Simulation, nursing, student, teaching, fidelity, manikin, review

Introduction

Nursing simulation is a learning strategy able to anticipate or amplify real situation with guided experiences. It is used in university nursing programs to train students in clinical health settings (1). It is a teaching method that supports and integrates students' learning, along with clinical internship and formal teaching, without overlapping or replacing them (2). Simulation, in a general sense, was born in the military field, particularly in the world of aeronautics. In 1928 Edward Albert Link created the first flight simulator, the Link Trainer also called "blue box". Simulation was not limited to the military field but was spread also in other fields (3), and, in particular, it was also applied in the branch of training and education of civil personnel (4). Its use occurs when it is expensive or simply too dangerous to allow trainees to use real equipment in the real world. In such situations, participants will spend time learning lessons in a "safe" virtual environment while having a realistic experience. For the same principle of "safety", the development of simulation was implemented in the health field for medical and nursing staff. Clinical errors due to the human factor are a real event and a phenomenon now increasingly recognized in world health care. Simulation could play a very important role in university education, especially, in order to guarantee patient safety through safe and standardized procedures, which can be acquired during a simulation scenario. In fact, simulation allows students to work in a safe environment, without harming the patient (5). Finally, to be effective, simulation needs to be well designed (6) in order to provide the basis for an active learning experience, which leads to the achievement of the objectives set and to obtain excellent results from students (7). Learning through simulation has become a highly discussed topic especially in the last 10 years when researches have started to examine the simulation in all its aspects such as building and designing every single moment of the simulation, comparing which is the best simulator to use, evaluating costs and benefits, but above all taking into account the perception and feedback of the students (8).

Objective

Authors conducted a narrative literature review in order to evaluate the effectiveness and validity of the simulation, as a teaching tool for nursing students, in light of an increasingly widespread use. The objective was to assess whether learning through simulation really allows students to acquire confidence in health care techniques and procedures, and to develop problem solving skills, critical thinking, and decision making in complex care situations.

Methods

A narrative review of the literature was conducted by querying the following electronic databases: Pubmed, Cinahl, Embase, in the period between September 2019 and January 2020.

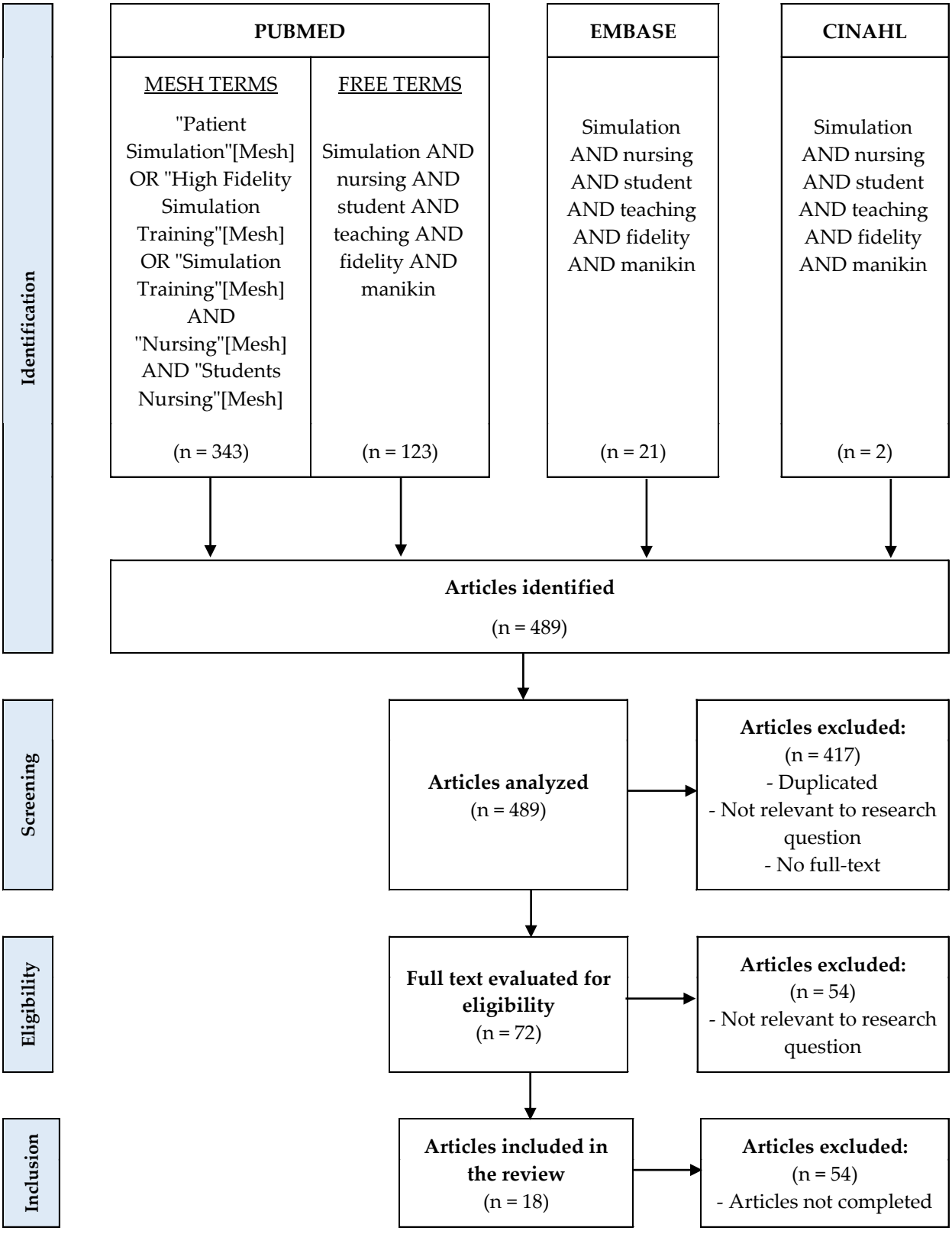
The keywords used are: "simulation", "nursing", "student", "teaching", "fidelity", "manikin", “review” combined with the Boolean operators "and" and "or".

Only English-language articles available in full text and published during 2000-2020 period have been considered, because, after an initial extensive research, no relevant articles emerged prior to the 2000s, as learning through simulation is a highly discussed topic especially in the last 15 years.

In addition, inclusion criteria were applied such as: English, Italian, and Spanish language, nursing subjects, articles aimed at graduate and non-general, or pediatric students, articles concerning the various types of simulators, including the difference between high and low fidelity simulator.

Incomplete articles were excluded. After setting the limits, a first reading of the titles was made, excluding those not pertinent with the research question, those without full text and those present in other databases. After that, each abstract was read and the non-pertinent articles were excluded from the research. Finally, the reading of full texts lead to select the articles relevant to the research question and to consider them for review. Articles were analyzed by two researchers and critically evaluated according to fundamental points such as key results, limitations, methods, quality of the results and impact of the conclusions in the field (**Figure 1**). In case of conflict, a third author would be involved, to evaluate the article as third impartial party.

Figure 1 - Flow Chart of the review



Results

From the initial 489 publications identified, after an analysis of titles and abstracts as well as the reading of the full text, 18 were considered suitable for revision (**Table 1**). The types of studies examined were: observational (qualitative and quantitative) studies, experimental studies, pilot studies, meta-analysis, articles, clinical cases, case-study. In particular, the 18 articles include: 1 observational study (10); 2 experimental studies (15,31); 6 qualitative studies (20, 19, 24, 18, 30, 23); 1 pilot study (27); 1 clinical case (13); 1 meta-analysis (12); 1 cost–utility analysis (16); 1 case-study (22); 3 quali-quantitative studies (26, 30, 21); 1 article (24).

Table 1 – Articles reviewed

Authors and year	Country of publication	Aim	Sample	Study design	Results
Amanda Reilly et al. 2007 (DOI:10.1016/j.nedt.2006.08.015)	Tasmania	Perception of nursing students about the use of high-fidelity simulators	41 Second year nursing students and professors	Qualitative clinical case	Students believe that simulation is an innovative strategy that promotes active learning and has great potential to develop clinical competence and increase self-confidence
Brian C. Parker et al. 2009 (DOI:10.1016/j.nedt.2008.10.012)	Canada	To explore the application of behaviorist and constructivist pedagogy applied to simulation based on high fidelity scenarios	Various studies available in the literature	Descriptive Observational study	Simulations based on behaviorist pedagogy is more effective in developing both psychomotor and practical skills. Instead those based on constructivist pedagogy contribute to the development of clinical judgment, problem solving, collaboration and teamwork. The aim is therefore to consider both philosophies to maximize students' ability
Moira Stewart et al. 2010 (DOI:10.1111/j.1743-498X.2010.00351.x)	Belfast, Ireland	To develop, implement and evaluate the inter-professional program for university students using high fidelity pediatric simulation to learn clinical skills,	46 Medical students of fourth year and 49 nursing students of third year	Qualitative, Quantitative study	High fidelity pediatric simulation is effective for interprofessional teaching in medical and nursing field. Students' satisfaction is high.

		communication and teamwork			
Tracy Levett-Jones et al. 2011 (DOI:10.1016/j.nedt.2011.01.004)	Australia	To report the development and psychometric tests of student satisfaction, calculated with the Experience Scale	268 second year students and 76 third year Nursing students	Literature review	High scores were obtained in debriefing, reflection, reasoning and clinical learning. The results of this study indicate that the simulation is highly appreciated by students, regardless of the level of fidelity to real patient. This raises questions about the value of the investment in expensive simulation modes.
Eloise Pearson et al. 2011 (DOI:10.1016/j.nepr.2011.03.023)	United Kingdom	To explore the use of simulations as a strategy for learning non-technical skills in nursing students	187 nursing students of the last year	Qualitative study	Analysis of these data revealed that most students agree that the simulation is effective and allows them to show their non-technical skills
Jane Warland. 2011 et al (DOI:10.1016/j.nepr.2010.08.007)	Australia	To evaluate how simulation can help students to organize work and manage people, as well as learn practical skills. To review students' evaluation about simulation exercise	Various studies available in the literature	Literature review	The involvement of students with this type of simulation and their feedback suggest that the skills acquired during the simulation can be transferable and useful for their clinical practice
Elizabeth Diener et al. 2012 (DOI:10.1111/j.1744-6198.2011.00250.x)	USA	To examine the disconnections created by the use of technology in simulation. Research question: "Can learning about human care be facilitated in simulation classrooms?"	Various studies available in the literature	Article	Technology does not deny the care of the human being. Health care professionals are called to create a new paradigm for nursing education that blends Nightingale's vision with the promise of technology
B. Nicole Harder et al. 2013 (DOI:10.1016/j.nedt.2012.09.003)	Canada	Research question: How instructors should engage in simulations?	22 instructors with less than 5 years of experience as a trainer	Qualitative study	The attitude of the instructor during the simulation is fundamental as it influences the perception and learning process of students
Ashley E. Darcy Mahoney et al. 2013	USA	To explore how Benner's key recommendations (integration of the	131 nursing students	Qualitative, Quantitative study	Quantitative data revealed that learning objectives were achieved over 80% of

(DOI:10.1016/j.nedt.2012.01.005)		Theoretical component with the clinical component and shift of education from emphasis on critical thinking to emphasis on clinical reasoning) could be achieved by integrating simulation into a pediatric curriculum			cases and qualitative ones revealed positive students' experience in simulations
Eun-Ho Ha et al. 2014 (DOI:10.1016/j.nedt.2014.01.003)	Republic of Korea	To identify attitudes towards video-assisted debriefing after a simulation	44 students in the third year of nursing degree	Qualitative, Quantitative study	Three characteristics of the assisted video debriefing emerged: strategic vision that helps self-reflection, reluctant vision (students are ashamed to be seen in public, feel humiliated) and advanced vision that increases self-confidence. Results could be used as a cornerstone for applying the personalized debriefing method to university nursing students. In addition, debriefing techniques must take into account the individual learning style of students
Tulay Basak, Vesile Unver et al. 2015 (DOI:10.1016/j.nedt.2015.07.020)	Turkey, USA	To examine the differences between the use of low and high fidelity maninkins in beginner and advanced students	66 students (34 in the first semester, 32 in the third and fourth semester) of the Bachelor of Science in Nursing program	Quasi experimental study	Students' satisfaction with using high-fidelity manikins is greater than that when using low-fidelity manikins
Sujin Shin et al. 2015 (DOI:10.1016/j.nedt.2014.09.009)	Republic of Korea	To identify in literature the best available evidence on the effects of simulation in nursing education	Various studies available in the literature	Quantitative study: meta-analysis	Significant improvements were found for post-simulation participants in various sectors. Simulation learning has a medium to high quality and could guide nurse

					educators to think that it is more effective than traditional learning methods
Mary Ann Shinnick et al. 2015 (DOI:10.1016/j.nedt.2014.05.013)	USA	To establish the impact of various learning styles after a simulation experience	161 students from 3 different American Nursing schools	Qualitative study	These results confirm that the knowledge gained is put into practice in simulations and provide evidence that simulation is an effective teaching methodology for nursing students.
Annelie J. Sundler et al. 2015 (DOI:10.1016/j.nedt.2015.04.008)	Sweden	The purpose of this study was to explore the experiences of university nurse students during the exam on knowledge, skills and competences learned in clinical simulation laboratories with high-fidelity patient simulators and to evaluate their learning level	23 second year nursing students (17 women and 6 men)	Qualitative study	The results have shown that the exam was a valuable assessment of the students' knowledge and skills. Although the students felt the exam was challenging, they described it as a learning opportunity. During the exam, students were able to integrate theory with previously established practice and knowledge. Additionally, study results suggest that tests in clinical simulation labs may be a useful teaching strategy in nursing education
Mio Leng Au et al. 2016 (DOI:10.1016/j.nedt.2016.01.015)	China	To explore the perception of university nursing students in the use of high fidelity simulators within the course of study	39 Nursing students of the first year of the University of Macau, China	Qualitative study	85% of students consider learning by simulation a "resourceful" strategy, drawing benefits and "positive feelings". They also shared the importance of having a safe place to act in total safety and the possibility to be adequately prepared for emergencies
Karin Page-Cutrara et al. 2017 (DOI:10.1016/j.nedt.2016.09.012)	Canada, USA	To examine the structured pre-briefing intervention about the effects that it can have on nursing care, students' skills,	76 students in the fourth year of nursing in Canada	experimental study	Structured theory-based pre-briefing influences nursing student performance, skills, clinical judgment and their

		clinical judgment and to evaluate their pre- briefing experience			pre-briefing perceptions. It can also significantly improve their learning during the simulation
Cheryl D. Cropp et al. 2018 (DOI:10.3390/pharmacy603007)	USA	To examine students' perception in inter-professional collaboration with other health figures (pharmacists)	54 University nursing students and 91 pharmacy students in their second year	Pilot study	Results have shown an important students' satisfaction in terms of communication, teamwork, respect for the various roles, recognition of their skills, learning through simulation
H. Zhang et al. 2019 (DOI:10.1016/j.nedt.2019.05.001)	Sweden, Singapore, Australia	To explore experiences and perspectives of nursing students on video-assisted debriefing after a high-fidelity simulation	27 student nurses from Singapore	Qualitative study	Results have shown that video-assisted debriefing supports verbal debriefing by offering objective evidence and improving students' attitudes and behaviors. Students should be desensitized to fear of videos.

This literature narrative review was conducted taking into consideration the following topics:

Simulation as a learning strategy

As stated by David Kolb, the simulation is based on experiential learning theory, in which the construction of knowledge takes place through the observation and transformation of experience and not through the passive acquisition of notions, concepts and relationships (9). In fact, simulation has a behaviorist and constructivist pedagogy at its base (10). According to this study, behavioral pedagogy allows the development of psychomotor and practical skills. Behaviorism, a psychological approach developed since the early twentieth century by John Watson, has an associationist concept at its base, that is, learning is the result of new associations between stimuli and behaviors in response to the stimuli themselves. In fact, behavior is simply the result of an environmental stimulus.

During simulations, the stimulus comes from a clinical environment that requires skills. On the contrary, constructivist pedagogy affirms that important skills for the development of clinical judgment, problem solving, collaboration and teamwork need to be constructed. Constructivism, developed since the 1950s by the American psychologist George Kelly, questions the possibility of "objective" knowledge. Knowledge is not independent of the subject it knows, cannot be received passively but results from the relationship between an active subject and reality. Knowledge is a subjective construction of meaning starting from a complex internal reworking of sensations,

knowledge, beliefs, emotions. Reality, as an object of our knowledge, would therefore be created by our continuous "experience" of it (11).

From these theories it can be derived the educational power of the simulation, which not only allows students to act, but also to reason and to arrive at the solution through theirs's inner world, theirs's emotions and experiences. In doing so, students will be ready to face the employment world and enrich their personal background, but above all to live an active experience, which sees them personally involved (12). The acquisition of notions will therefore remain more impressed because through a personal reworking, the student will have made the simulation as his own experience. The goal for Brian C. Parker and Florence Myrick, authors of the above-mentioned study, is therefore to consider both philosophies to maximize the student's ability to learn. Simulation is therefore seen as an innovative strategy that promotes active learning, with great potential to develop clinical competence and increase self-confidence (13). In fact, the Experience Scale, an evaluation scale validated through psychometric tests to evaluate the satisfaction of the students exposed to simulation manikins of medium and high fidelity to human patients, showed how students were satisfied with the experience, regardless of the level of fidelity to reality, although high-fidelity manikins always offer much more performance (14,15). This evidence raises questions about the value of the investment in expensive simulation resources, as high levels of satisfaction, development of clinical reasoning and acquisition of knowledge can be achieved even with medium fidelity rather than high fidelity manikins (16).

Responsibility of educators

Educators are responsible for the simulation, from its design to the final evaluation, especially in the moment of the debriefing, to facilitate students in moments of reflection. Despite this, serious concern and distrust emerge from educators who are facing new and perhaps unknown situations. In fact, about 40-60% of universities have an important age difference between educators and students, which means that educators could have less knowledge and familiarity in technology (17). The lack of knowledge and shyness in the use of simulators influences their teaching. Therefore, it is essential and important to have well-educated and informed trainers on the use of the simulation, as their work will influence the student's learning (18).

Psychological aspect

Analyzing simulation from a psychological point of view, there are numerous studies that claim that it is an effective and "resourceful" strategy (19, 20, 21, 22, 23): allows students to act in total safety, gain greater self-confidence, learn from the error without harming others. In addition, simulation scenarios, especially if they are equipped with high fidelity manikins, reproduce an environment emotionally similar to reality, such as emergency situations, home care, end of life assistance or simple assistance procedures. Staying closed in a simulation room with a patient or manikin who goes into cardiac arrest, certainly triggers something in the student. Even if he knows he is not in reality, he is struck by fear, anxiety, stress, indecision. Even if he knows he has a plastic manikin in front of him, he is still pushed to make the same gestures that he would do to a real patient, like a caress or words of reassurance.

Do treatment behaviors risk to become a fortuitous event or no longer perceived as an essential feature of nursing care due to the technology progress? Technology does not deny the care of the human being. Health care professionals are always driven by sensitive and human attitudes towards other people in difficulty. They could never be replaced by technology. Therefore, simulation fits into this issue, allowing students to be able to experience not only the most human feelings but also to experience emotions similar to those he would feel in the ward (24).
Furthermore, it can be used as an examination tool for assessing students' knowledge and skills, and despite the difficulty it is well appreciated by students, because it allows them to integrate theory with previously acquired practice and knowledge. Often, classic oral exams can lead students to passively learn the topics, unlike learning through simulation that actively stimulates students, who have to reason, use critical thinking and integrate the topics among them (25).

Collaboration with the multi-professional team

Other studies show that simulation offers the opportunity to practice in collaboration with other professional figures, to learn the right communication, (such as closed communication in an emergency) and recognize and respect one's roles within a team (26, 27). In these studies, students were also satisfied to learn clinical skills, communication and teamwork. This aspect should not be underestimated since this is an important part in a hospital environment because you never work alone, but always in collaboration with other team figures.

Briefing and Debriefing

In the past years the role of debriefing had not been taken into consideration, but in recent years it has received much more importance (28). Debriefing is the final part of a simulation scenario. It is an effective and powerful tool to encourage students to reflect on what has been done and learn from mistakes. In fact, it is at this stage that much of the experiential learning takes place (29). The debriefing can be done in two ways: verbal, with a group reflection led by the tutor, or assisted by a video recording of the simulation scenario. Two qualitative studies (30,31) examined the video-assisted debriefing and it is shown how advantageous it is because, although it can cause anxiety and shame, it still offers objective evidence of what has been done, improving the students' attitude and behavior, helping them to correct the mistakes made. The assisted video debriefing provides three different visions: the first is strategic, because it helps self-reflection, the second is reluctant because students are ashamed to be seen in public, and feel humiliated, and the last one is an advanced vision as it integrates the previous components with the increase in self-confidence. In addition to the debriefing, particular attention is paid to the briefing which, if structured and based on theory, can positively influence the performance, skills of nursing students and clinical judgment. Since it adequately prepares the student for the scenario, briefing can significantly improve the learning during the simulation (32).

Discussion

This narrative literature review aimed to evaluate the advantages and peculiar aspects of simulation as a learning strategy for nursing students.

Psychological studies about learning affirm the validity of the expositive method, that is the frontal lesson between teacher and student, as a teaching tool, but at the same time encourage the use of active techniques, useful to stimulate reasoning and to see the student act rather than listen.
The integration of both methods could be perfect. This concept has therefore allowed to open the way to simulation as a strategy for teaching. Several European and Italian nursing programs have accepted this challenge by incorporating the active simulation technique into their academic activities.

Especially in recent years, there has been a more careful consideration of this innovative teaching method, promoted by technological and digital evolution. The articles and studies taken into consideration in this review work deal with the simulation in an almost completely homogeneous way from psychological and educational points of view, focusing in particular on students' perception as a starting point. Simulation is very advantageous for various reasons. Training through simulation offers students opportunities to learn or improve manual skills, technical skills, gain confidence in the execution of care procedures and organize their work. At the same time, it helps students to reason, use critical thinking, develop problem solving and decision-making skills in more complex care situations and learn to manage and recognize their emotions.
After following lessons and learning the necessary knowledge, students will be able to implement them in a simulation scenario and combine theory and practice. It is an opportunity to train them completely, but above all to prepare them for the professional future. In fact, several studies have shown that after simulation sessions students felt more confident, both in terms of theoretical knowledge and in awareness and self-confidence.

Furthermore, thanks to a good design of the simulation scenario, students can be educated to collaborate with other team figures and thus also to learn teamwork, the right communication and the tasks of their role. All these advantages emerge only in the debriefing, when students retrace their experience.

Debriefing is the most important part of the whole process. Learning ends at this stage. In fact, it is precisely during the debriefing that students deal with everything that they have done: the procedures are examined and evaluated, but above all, unconsciously, the student is pushed to self-reflection.

The immediate feedback is the secret, in fact, errors and strengths are analyzed and corrected, emotions emerge while they are still alive and present in students' mind, and advices and tips to improve are provided. In this moment, experiential learning takes place: the acquisition of knowledge through an intellectual procedure that derives from the experience lived and that is personally modified according to one's cultural background. Student will be enriched with a new experience, metabolized with his own tools.

Limit of study

This review presents typical limitations of the non-systematic methodology of a narrative review and a lack of qualitative evaluation of the selected studies.

Conclusions

The studies analyzed encourage the use of active techniques such as simulation, useful for stimulating reasoning and practical skills. For this reason, universities should offer students a training path that includes simulation. Furthermore, the numerous and increasingly declared clinical errors in healthcare, due to the human factor, and an ever greater use of technology in the daily practice, could make it appropriate and desirable to invest in simulation as a strategy for improving care practice.

Funding

No funding has been received to conduct the study

Conflict of interest

None

References

1. Murray C, Grant MJ, Howarth ML, Leigh J. The use of simulation as a teaching and learning approach to support practice learning. Nurse Education in Practice. 2008; 8 (1): 5–8.
2. Sponton A, Iadeluca A. La simulazione nell'infermieristica- Metodologie, tecniche e strategie per la didattica. Roma: Ambrosiana; 2014
3. Simulation. (Accessed December 28, 2019, at https://en.wikipedia.org/wiki/Simulation#cite_note-4)
4. Shenan H. Transfer of training from simulation in civilian and military workforces perspectives from the current body of literature. 2010
5. Kohn LT, Corrigan JM, Donalson MS. To err is human: building a safer health system. Washington: National Academy Press; 2000
6. Bartlett JL. A Simulation Template for a New Simulation Program. Clinical Simulation in Nursing. 2015; 11 (11): 479–81.
7. Moran V, Wunderlich R, Rubbelke C. Simulation: Best Practices in Nursing Education. Cham: Springer International Publishing; 2018
8. Hayden J, Smiley R, Alexander M, Kardong-Edgren S, Jeffries P. The NCSBN national study: a longitudinal, randomized, controlled study replacing clinical hours with simulation in prelicensure nursing education. J Nurs Regul. 2014; 5 (2): S3-S64.
9. Kolb D. Learning Style Inventory. Boston: Hay/McBer; 1999
10. Parker BC, Myrick F. A critical examination of high-fidelity human patient simulation within the context of nursing pedagogy. Nurse Education Today. 2009; 29 (3): 322–9.
11. Costruttivismo. (Accessed 19 January 2020 at: https://nuovadidattica.lascuolaconvoi.it/teorie/costruttivismo/)

12. Shin S, Park JH, Kim JH. Effectiveness of patient simulation in nursing education: Meta-analysis. Nurse Education Today. 2015; 35(1): 176-82.
13. Reilly A, Spratt C. The perceptions of undergraduate student nurses of high-fidelity simulation-based learning: A case report from the University of Tasmania. Nurse Education Today. 2007;27(6):542–50.
14. McCoy M, Lapkin S, Noble D, Hoffman K, Dempsey J, Arthur C, et al. The development and psychometric testing of the Satisfaction with Simulation Experience Scale. Nurse Education Today. 2011;31(7):705–10.
15. Basak T, Unver V, Moss J, Watts P, Gaioso V. Beginning and advanced students' perceptions of the use of low- and high-fidelity mannequins in nursing simulation. Nurse Education Today. 2016; 36: 37–43.
16. Lapkin S, Levett-Jones T. A cost–utility analysis of medium vs. high-fidelity human patient simulation manikins in nursing education. Journal of Clinical Nursing. 2011;20(23–24):3543–52.
17. Mangold K. Educating a new generation: teaching baby boomer faculty about millennial students. Nurse Educator. 2007; 32 (1): 21–23.
18. Harder BN, Ross CJM, Paul P. Instructor comfort level in high-fidelity simulation. Nurse Education Today. 2013; 33 (10): 1242–5.
19. Au ML, Lo MS, Cheong W, Wang SC, Van IK. Nursing students' perception of high-fidelity simulation activity instead of clinical placement: A qualitative study. Nurse Education Today. 2016; 39: 16–21.
20. Sundler AJ, Pettersson A, Berglund M. Undergraduate nursing students' experiences when examining nursing skills in clinical simulation laboratories with high-fidelity patient simulators: A phenomenological research study. Nurse Education Today. 2015; 35 (12): 1257–61.
21. Darcy Mahoney AE, Hancock LE, Iorianni-Cimbak A, Curley MAQ. Using high-fidelity simulation to bridge clinical and classroom learning in undergraduate pediatric nursing. Nurse Education Today. 2013; 33 (6): 648–54.
22. Warland J. Using simulation to promote nursing students' learning of work organization and people management skills: A case-study. Nurse Education in Practice. 2011; 11 (3): 186–91.
23. Pearson E, McLafferty I. The use of simulation as a learning approach to non-technical skills awareness in final year student nurses. Nurse Education in Practice. 2011;11(6):399–405.
24. Diener E, Hobbs N. Simulating Care: Technology-Mediated Learning in Twenty-First Century Nursing Education. Nursing Forum. 2012; 47 (1): 34–8.
25. Shinnick MA, Woo MA. Learning style impact on knowledge gains in human patient simulation. Nurse Education Today. 2015; 35 (1): 63–7.
26. Stewart M, Kennedy N, Cuene-Grandidier H. Undergraduate interprofessional education using high-fidelity paediatric simulation. The Clinical Teacher. 2010; 7 (2): 90–6.
27. Cropp CD, Beall J, Buckner E, Wallis F, Barron A. Interprofessional Pharmacokinetics Simulation: Pharmacy and Nursing Students' Perceptions. Pharmacy (Basel). 2018; 6 (3). (Accessed 25 January, 2020 at: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6163764/)
28. Hall K, Tori K. Best practice recommendations for debriefing in simulation-based education for Australian undergraduate nursing students: an integrative review. Clin. Simul. Nurs. 2017; 13 (1): 39–50.

29. Kolb D. Learning Style Inventory. Boston: Hay/McBer; 1999
30. Ha EH. Attitudes toward Video-Assisted Debriefing after simulation in undergraduate nursing students: an application of Q methodology. Nurse Educ Today. 2014; 34 (6): 978–984.
31. Zhang H, Goh SHL, Wu XV, Wang W, Mörelius E. Prelicensure nursing students' perspectives on video-assisted debriefing following high fidelity simulation: A qualitative study. Nurse Education Today. 2019; 79: 1–7.
32. Page-Cutrara K, Turk M. Impact of prebriefing on competency performance, clinical judgment and experience in simulation: An experimental study. Nurse Education Today. 2017; 48: 78–83.