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

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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 dealt 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.
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

**Identification**
- **PUBMED**
  - **MESH TERMS**
    - "Patient Simulation"[Mesh]
    - OR "High Fidelity Simulation Training"[Mesh]
    - OR "Simulation Training"[Mesh]
    - AND "Nursing"[Mesh]
    - AND "Students Nursing"[Mesh]
  - **FREE TERMS**
    - Simulation AND nursing AND student AND teaching AND fidelity AND manikin
  - (n = 343)
- **EMBASE**
  - Simulation AND nursing AND student AND teaching AND fidelity AND manikin
  - (n = 123)
- **CINAHL**
  - Simulation AND nursing AND student AND teaching AND fidelity AND manikin
  - (n = 21)
  - (n = 2)

- **Articles identified**
  - (n = 489)

**Screening**
- **Articles analyzed**
  - (n = 489)
  - Articles excluded:
    - (n = 417)
      - Duplicated
      - Not relevant to research question
      - No full-text

**Eligibility**
- **Full text evaluated for eligibility**
  - (n = 72)
  - Articles excluded:
    - (n = 54)
      - Not relevant to research question

**Inclusion**
- **Articles included in the review**
  - (n = 18)
  - Articles excluded:
    - (n = 54)
      - Articles not completed
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

<table>
<thead>
<tr>
<th>Authors and year</th>
<th>Country of publication</th>
<th>Aim</th>
<th>Sample</th>
<th>Study design</th>
<th>Results</th>
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<tbody>
<tr>
<td>Amanda Reilly et al. 2007 (DOI:10.1016/j.nedt.2006.08.015)</td>
<td>Tasmania</td>
<td>Perception of nursing students about the use of high-fidelity simulators</td>
<td>41 Second year nursing students and professors</td>
<td>Qualitative clinical case</td>
<td>Students believe that simulation is an innovative strategy that promotes active learning and has great potential to develop clinical competence and increase self-confidence</td>
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<tr>
<td>Brian C. Parker et al. 2009 (DOI:10.1016/j.nedt.2008.10.012)</td>
<td>Canada</td>
<td>To explore the application of behaviorist and constructivist pedagogy applied to simulation based on high fidelity scenarios</td>
<td>Various studies available in the literature</td>
<td>Descriptive Observational study</td>
<td>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</td>
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<tr>
<td>Moira Stewart et al. 2010 (DOI:10.111/j.1743-498X.2010.00351.x)</td>
<td>Belfast, Ireland</td>
<td>To develop, implement and evaluate the inter-professional program for university students using high fidelity pediatric simulation to learn clinical skills,</td>
<td>46 Medical students of fourth year and 49 nursing students of third year</td>
<td>Qualitative, Quantitative study</td>
<td>High fidelity pediatric simulation is effective for interprofessional teaching in medical and nursing field. Students’ satisfaction is high.</td>
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<tr>
<td>Researcher(s)</td>
<td>Country</td>
<td>Objective</td>
<td>Participants</td>
<td>Methodology</td>
<td>Findings</td>
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<tr>
<td>Tracy Levett-Jones et al. 2011</td>
<td>Australia</td>
<td>To report the development and psychometric tests of student satisfaction, calculated with the Experience Scale</td>
<td>268 second year students and 76 third year Nursing students</td>
<td>Literature review</td>
<td>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.</td>
</tr>
<tr>
<td>Eloise Pearson et al. 2011</td>
<td>United Kingdom</td>
<td>To explore the use of simulations as a strategy for learning non-technical skills in nursing students</td>
<td>187 nursing students of the last year</td>
<td>Qualitative study</td>
<td>Analysis of these data revealed that most students agree that the simulation is effective and allows them to show their non-technical skills</td>
</tr>
<tr>
<td>Jane Warland et al. 2011</td>
<td>Australia</td>
<td>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</td>
<td>Various studies available in the literature</td>
<td>Literature review</td>
<td>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</td>
</tr>
<tr>
<td>Elizabeth Diener et al. 2012</td>
<td>USA</td>
<td>To examine the disconnections created by the use of technology in simulation. Research question: “Can learning about human care be facilitated in simulation classrooms?”</td>
<td>Various studies available in the literature</td>
<td>Article</td>
<td>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</td>
</tr>
<tr>
<td>B. Nicole Harder et al. 2013</td>
<td>Canada</td>
<td>Research question: How instructors should engage in simulations?</td>
<td>22 instructors with less than 5 years of experience as a trainer</td>
<td>Qualitative study</td>
<td>The attitude of the instructor during the simulation is fundamental as it influences the perception and learning process of students</td>
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<tr>
<td>Ashley E. Darcy Mahoney et al. 2013</td>
<td>USA</td>
<td>To explore how Benner’s key recommendations (integration of the experience) were achieved</td>
<td>131 nursing students</td>
<td>Qualitative, Quantitative study</td>
<td>Quantitative data revealed that learning objectives were achieved over 80% of</td>
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<tr>
<td>Reference</td>
<td>Country</td>
<td>Objective</td>
<td>Method</td>
<td>Sample Size</td>
<td>Data Collection</td>
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<tr>
<td>Eun-Ho Ha et al. 2014 (DOI:10.1016/j.nedt.2014.01.003)</td>
<td>Republic of Korea</td>
<td>To identify attitudes towards video-assisted debriefing after a simulation</td>
<td>Qualitative, Quantitative study</td>
<td>44 students in the third year of nursing degree</td>
<td>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.</td>
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<tr>
<td>Tulay Basak, Vesile Unver et al. 2015 (DOI:10.1016/j.nedt.2015.07.020)</td>
<td>Turkey, USA</td>
<td>To examine the differences between the use of low and high fidelity manikins in beginner and advanced students</td>
<td>Quasi experimental study</td>
<td>66 students (34 in the first semester, 32 in the third and fourth semester) of the Bachelor of Science in Nursing program</td>
<td>Students’ satisfaction with using high-fidelity manikins is greater than that when using low-fidelity manikins.</td>
</tr>
<tr>
<td>Sujin Shin et al. 2015 (DOI:10.1016/j.nedt.2014.09.009)</td>
<td>Republic of Korea</td>
<td>To identify in literature the best available evidence on the effects of simulation in nursing education</td>
<td>Quantitative study: meta-analysis</td>
<td>Various studies available in the literature</td>
<td>Significant improvements were found for post-simulation participants in various sectors. Simulation learning has a medium to high quality and could guide nurse</td>
</tr>
<tr>
<td>Authors</td>
<td>Country</td>
<td>Study Type</td>
<td>Population Details</td>
<td>Methods</td>
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<tr>
<td>Mary Ann Shinnick et al. 2015</td>
<td>USA</td>
<td>Qualitative study</td>
<td>161 students from 3 different American Nursing schools</td>
<td>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.</td>
<td></td>
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<tr>
<td>Annelie J. Sundler et al. 2015</td>
<td>Sweden</td>
<td>Qualitative study</td>
<td>23 second year nursing students (17 women and 6 men)</td>
<td>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.</td>
<td></td>
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<tr>
<td>Mio Leng Au et al. 2016</td>
<td>China</td>
<td>Qualitative study</td>
<td>39 Nursing students of the first year of the University of Macau, China</td>
<td>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.</td>
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<tr>
<td>Karin Page-Cutrara et al. 2017</td>
<td>Canada, USA</td>
<td>Experimental study</td>
<td>76 students in the fourth year of nursing in Canada</td>
<td>Structured theory-based pre-briefing influences nursing student performance, skills, clinical judgment and their</td>
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</tbody>
</table>
Nursing simulations as learning strategy between fiction and reality

<table>
<thead>
<tr>
<th>Authors</th>
<th>Country</th>
<th>Study Details</th>
<th>Methodology</th>
<th>Findings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cheryl D. Cropp et al. 2018 (DOI:10.3390/pharmacy603007)</td>
<td>USA</td>
<td>To examine students' perception in interprofessional collaboration with other health figures (pharmacists)</td>
<td>Pilot study</td>
<td>Results have shown an important students' satisfaction in terms of communication, teamwork, respect for the various roles, recognition of their skills, learning through simulation.</td>
</tr>
<tr>
<td>H. Zhang et al. 2019 (DOI:10.1016/j.nedt.2019.05.001)</td>
<td>Sweden, Singapore, Australia</td>
<td>To explore experiences and perspectives of nursing students on video-assisted debriefing after a high-fidelity simulation</td>
<td>Qualitative study</td>
<td>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.</td>
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</table>

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 their'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.

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Conflict of interest

None

References

4. Shenan H. Transfer of training from simulation in civilian and military workforces perspectives from the current body of literature. 2010
29. Kolb D. Learning Style Inventory. Boston: Hay/McBer; 1999