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Effectiveness of simulation on nursing education based on evidence-based reviews.

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Abstract
Simulation-based nursing education is an increasingly popular pedagogical approach. One of the major problems of nursing education is the lack of coordination between theory and practice. The use of simulation as an educational tool is becoming increasingly prevalent in nursing education, and a variety of simulators are utilized. The objective of the present paper is to review and present the modern concept related to simulation on nursing education bases on evidenced reviews. Using a search strategy including the search terms "nursing," "simulation," and "simulator," we identified some of the important relevant articles to discusses the concepts & application of simulation in nursing education. In the conclusion research evidences were strongly concludes that integrated learning, critical thinking, and optimal decision-making skills help nurses to provide quality health care. This can be achieved through the inclusion of simulation in the education process.

Keywords: simulation, education, nursing, quality health care.

Introduction

Simulation-based nursing education is an increasingly popular pedagogical approach. One of the major problems of nursing education is the lack of coordination between theory and practice.[1]

The realistic clinical scenarios simulation based educational intervention in nursing can train novice as well as experienced nurses helping them develop effective non-technical skills, practice rare emergency situations and providing a variety of authentic life threatening situations.[2]

The use of simulation as an educational tool is becoming increasingly prevalent in nursing education, and a variety of simulators are utilized.[1]

What is simulation?

A simulation is a model that mimics the operation of an existing or proposed system providing evidences for decision making by being able to test different scenarios. [4]

A model of a set of problems or events that can be used to teach someone how to do something or the process of making such a model.[5]

A simulation is a form of experiential learning. It is a strategy that fits well with the principles of student centered and constructivist learning and teaching; that is, learning and teaching that gives students power over what they learn and how they learn it, and that allows students to build their understanding of what they're learning through their experiences and interactions, rather than just passively receiving information.[6]

Simulations take a number of forms. They may contain elements of:

- a game
- a role-play
- a tabletop exercises
- an activity that acts as a metaphor.

Simulations are characterized by their non-linear nature and by their deliberate ambiguity, which encourages students to think independently as they make decisions. The inventiveness

and commitment of the participants usually determines the success of a simulation.

Why use simulations?

Simulations promote the use of critical and evaluative thinking. Because they are ambiguous or open-ended, they encourage students to contemplate the implications of a scenario. The situation feels real, and thus leads students to engage with the activity more enthusiastically and interactively.

Simulations help students learn both concepts and how to apply them in a nuanced way in an unforeseen situation. Students often find them more deeply engaging than other activities, as they experience the activity first-hand.

Simulations help students appreciate more deeply the management of the environment, politics, community and culture. For example, by participating in a resource distribution activity, students might gain an understanding of inequity in society. Simulations can reinforce other skills indirectly, such as a debating and research skills.[7]

Common issues using simulations

Resources and time are required to develop a quality learning experience that uses simulations. Assessment of student learning through simulation is often more complex than with other methods.

Simulated experiences are more realistic than some other techniques and they can be so engaging and absorbing that students forget the educational purpose of the exercise.

If your simulation has an element of competition, it is important to remind the students that the goal is not to win, but to acquire knowledge and understanding.

How to achieve effective teaching with case studies

In a simulation, guided by a set of parameters, students solve problems, adapt to issues arising from their scenario and gain an awareness of the unique circumstances that exist within the parameters.

Some simulations require only a few minutes to an hour, while others may extend over weeks. Scope and content vary greatly. However, similar principles apply to all simulations.[8, 9]

1) Prepare as much as possible

- Know what you want to accomplish. Even a brief simulation activity should have clearly written learning outcomes.
- Develop evaluation criteria along with the learning outcomes, and ensure that students are aware of the specific outcomes expected of them in advance. You might find it best to use simulations as part of the process of learning rather than as a summative measure of it.
- Design the simulation as simply as possible, eliminating everything that does not clearly contribute to the students' achieving the learning objectives. It's better to have the simulation too simple than too complex, even if that means sacrificing some of the realism.
- Ensure that students understand the procedures before beginning. Frustration can arise when too many uncertainties exist. Develop a student guide and put the rules in writing.
- Try to anticipate questions. Some simulations are fast-paced, and ready responses help maintain a sense of reality.

2) Monitor the process closely

Teachers must monitor the simulation process to ensure that students both understand the process and benefit from it. Ask yourself:

- Does this simulation offer an appropriate level of realism for my group of students?
- Do the students understand the learning outcomes?
- Is the level of ambiguity manageable for this group?
- Do the students demonstrate an understanding of their roles?
- Are they using problem-solving techniques?
- Are they working together?
- Are they achieving the goals of the simulation?
- Do they provide meaningful answers to probing questions?
- Will follow-up activities be necessary to help them solidify their learning or resolve difficulties?

3) Consider the need for follow-up activities

Use follow-up activities such as discussions, journal entries or other reflective activities to determine how well the students understood what the simulation was designed to teach. Using reflection as the assessable component of the activity, rather than participation in the simulation itself, can be a useful way of determining students' understanding.

Objective: To review and present the modern concept related to simulation on nursing education.

Reviews on effectiveness of Simulation on nursing education:

Lin HH. (2015) conducted study on Effectiveness of simulation-based learning on student nurses' self-efficacy and performance while learning fundamental nursing skills. This study was conducted to provide a shared experience to give nurse educators confidence and an insight into how simulation-based teaching can fit into nursing skills learning. A pilot study was completed with 50 second-year undergraduate nursing students, and the main study included 98 students where a pretest-posttest design was adopted. Data were gathered through four questionnaires and a performance assessment under scrutinized controls such as previous experiences, lecturers' teaching skills, duration of teaching, procedure of skills performance assessment and the inter-rater reliability. The results showed that simulation-based learning significantly improved students' self-efficacy regarding skills learning and the skills performance that nurse educators wish students to acquire. However, technology anxiety, examiners' critical attitudes towards students' performance and their unpredicted verbal and non-verbal expressions, have been found as possible confounding factors. The simulation-based learning proved to have a powerful positive effect on students' achievement outcomes. Nursing skills learning is one area that can benefit greatly from this kind of teaching and learning method.[10]

Warren JN, Luctkar-Flude M, Godfrey C, Lukewich J. (2016) discusses a systematic review of the effectiveness of simulation-based education on satisfaction and learning outcomes in nurse practitioner programs. To synthesize the best available evidence about the effectiveness of HFS within NP education programs worldwide. The specific review question was: what is the effect of HFS on learner satisfaction, knowledge, attitudes, and skill performance in NP education? Joanna Briggs Institute systematic review methodology was utilized. The following databases were searched: Medline, Cinahl, Embase, Epistemonikos,

Prospero, Health Star, Amed, Cochrane, Global Health and PsycINFO. Studies were included if they were quantitative in nature and reported on any aspect HFS within a NP program. Ten studies were included in the review. All studies were conducted in the United States and published between 2007 and 2014. Outcomes explored included: knowledge, attitudes, skills and satisfaction. The majority of studies compared HFS to online learning or traditional classroom lecture. Most study scenarios featured high acuity, low frequency events within acute care settings; only two studies utilized scenarios simulated within primary care. There is limited evidence supporting the use of HFS within NP programs. In general, HFS increases students' knowledge and confidence, and students are more satisfied with simulation-based teaching in comparison to other methods. Future studies should explore the effectiveness of simulation training within NP programs in reducing the theory to practice gap, and evaluate knowledge retention, transferability to real patient situations, and impact of simulation on patient outcomes.[11]

Kim E.(2018) reported in the study on Effect of simulation-based emergency cardiac arrest education on nursing students' self-efficacy and critical thinking skills: Role-play versus lecture. This study investigated the effects of simulation education on nursing students' self-efficacy and critical thinking skills in emergency cardiac arrest situations. A quasi-experimental research approach with a crossover design was used to compare two types of simulation instruction methods. This study was conducted with 76 nursing students divided into two groups by order of instruction methods, in November and December 2016. Both groups of participants experienced a simulation lesson based on the same emergency scenario. Group A first completed a roleplay of an emergency cardiac arrest situation in a clinical setting, while Group B first listened to a lecture on the procedure. After ten days, Group A repeated the simulation exercise after listening to the lecture, while Group B completed the simulation exercise after the roleplay. The students' self-efficacy and critical thinking skills were measured using a questionnaire before and after each session. In the first session, self-efficacy and critical thinking skills scores increased greatly from pretest to posttest for Group A in comparison to Group B; no statistically significant difference was found between the two groups. In the second session, Group B showed a significant increase between pretest and posttest, while Group A showed no significant difference. Conducting the simulation exercise after the roleplay was a more effective teaching method than conducting it after the lecture. Moreover, having the nursing students assume various roles in realistic roleplay situations combined with simulation exercises led to a deeper understanding of clinical situations and improved their self-efficacy and critical thinking skills.[12]

Kang D, Zhang L, Jin S, Wang Y, Guo R. (2021) reported in their study on Effectiveness of palliative care simulation in newly hired oncology nurses' training. The aim of the study was to evaluate the effectiveness of palliative care simulations with standardized patients in improving the knowledge, skill performance, and critical thinking of newly hired oncology nurses.By convenience sampling, 59 newly hired oncology nurses in 2019 were enrolled as control group and 50 in 2020 as simulation group at a grade-A tertiary cancer hospital. Simulation group accepted theory (3 sessions) and simulation teaching includes three representative scenarios (6 sessions) in palliative care: pain management, special scenario communication, and turn over. Control group accepted traditional theory and skill teaching (9 sessions). Then both groups underwent four weeks clinical practice. The knowledge score was assessed by knowledge questionnaires, skill performance by standardized clinical evaluations, and critical thinking by the California Critical Thinking Disposition Inventory in both groups before and after intervention. The satisfaction of two groups was assessed by the learning satisfaction scale. Analysis of variance was conducted among the two groups by SPSS20.0. A difference was considered significant when $P < 0.05$. After intervention, the simulation group was significantly greater in knowledge of pain management ($t = -7.560$, $P < 0.001$), and knowledge of special scenario communication ($Z = 5.031$, $P < 0.001$), as well as the skill score of turnovers ($Z = 2.808$, $P = 0.005$) than the control group. The critical-thinking score was also significantly greater in the simulation group ($Z = 6.229$, $P < 0.001$). The simulation group had higher satisfaction ($Z = 5.144$, $P < 0.001$). Palliative care simulation with standardized patients can improve newly hired oncology nurses' knowledge, skill performance, and critical thinking and satisfaction of teaching. It would be an effective strategy to train newly hired oncology nurses.[13]

Chen HW, Cheng SF, Hsiung Y, Chuang YH, Liu TY, Kuo CL. (2024) conducted study on Training perinatal nurses in palliative communication by using scenario-based simulation: A quasi-experimental study. This study aimed to assess the impact of two educational modules on enhancing the communication confidence, competence and performance of perinatal nurses in the context of palliative care. This study used a quasi-experimental design employing a two-group repeated measure approach. It involved a purposive sample of 79 perinatal nurses from a hospital in northern Taiwan. A palliative communication course specifically designed for registered nurses in perinatal units was developed. Participants were allocated to either the experimental group (Scenario-Based Simulation, SBS) or the control group (traditional didactic lecture). Communication confidence and competence were assessed before and immediately after the course through structured questionnaires. Learning satisfaction was collected post-intervention and participants underwent performance evaluation by standardized parents one week later. A significant training gap in palliative care exists among nurses in OB/GYN wards, delivery rooms and neonatal critical care units, highlighting the need for continuing education. All 79 participants completed the training course. Following the intervention, nurses in the SBS group (n=39) exhibited significant improvements in self-reported confidence ($p < 0.05$), competence ($p < 0.01$) and performance ($p < 0.001$) in neonatal palliative communication compared with the traditional didactic lecture group (n=40). The SBS group also received higher satisfaction ratings from nurse learners ($p < 0.001$). The research findings support scenario-based simulation as a more effective educational approach compared with traditional didactic lectures for enhancing communication confidence and competence. These results were further reinforced by evaluation from standardized patients, highlighting the value of direct feedback in enhancing nurses' performance. Tailoring SBS designs to diverse nursing contexts and incorporating a flipped approach can further enrich the overall learning experience.

Given its high effectiveness and positive reception, we recommend integrating this educational module into palliative care training programs for perinatal nurses.[14]

Application of Simulation in Nursing Education

- ✓ In nursing science, simulation is used for teaching theoretical and clinical skills, while focusing on the promotion of the critical thinking of students.
- ✓ An increase in the use of simulation is due to the lack of clinical structures for student training, lack of professors, and also due to the increased quality of training provided through this method.
- ✓ Simulation helps to address any limitations related to the clinical setting (including availability of patients, security issues etc.)
- ✓ Simulation helps to develop different scenarios requiring the use of both clinical skills and critical thinking skills by nurses, in order to solve problems.
- ✓ Currently, simulation-based training as an educational tool in nursing science has multiple uses.
- ✓ Currently, simulation-based training as an educational tool in nursing science has multiple uses. The most recent applications include continuing vocational training, just-in-time training, and development of a team spirit.

Limitation on Use of Simulation in Nursing Education

- ➢ It is impossible to approach a patient as a whole, as a bio-psychosocial human being.
- ➢ Limitation of simulation training is that sometimes not all variables related to an emergency in a live environment are included.
- ➢ Simulation is a process trying to resemble real life, but it is not real.
- ➢ Training of professors in simulation processes and technological issues are of the concern.
- ➢ Training is achieved by means of simulation, is not a low-cost effort, the equipment and operation of a modern laboratory demand quite large expenses.

Conclusion

The objective of nursing education, apart from the acquisition of solid theoretical knowledge, is the acquisition of clinical skills, which are necessary for graduate nurses to be promptly integrated into the workforce.

Integrated learning, critical thinking, and optimal decision-making skills help nurses to provide quality health care. This can be achieved through the inclusion of simulation in the education process.

Further development of simulation, along with other educational methods may be of great assistance in the attempt made by students to become integrated and successful healthcare professionals.

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