

Simulation and novice nurses: A review[☆]



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Abstract

Objective: To identify the existing simulation session and the impact of simulation on novice nurse.

Method: The articles were searched through CINAHL, Scopus, Proquest, and OVID online database. Articles published from 2000, in English and among novice nurses were selected for review. Then, a narrative review was conducted guided by what are the existing simulation session been used and the impact on novice nurse.

Result: Total of 19 articles been selected for review out of 272 articles. The findings of the reviewed were divided into 3 main themes. The themes are the existing simulation session, simulation as a support tool in the transition program and the impact of simulation on novice nurses.

Conclusion: In summary, each simulation type has its learning domain. The effectiveness of the simulation will much depend on the appropriate simulation type selection.

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Introduction

Benner¹ has defined novice nurse as those nurses that have less than one year of clinical experience, and including student nurse. So, it is unrealistic to expect that a novice nurse will enter this profession as a 100% fully competent

practicing nurse, but some senior nurses still expected them to be so.² Over the last decade, there has been an increase in the use of clinical simulation as a training tool for health professionals.^{3–5}

A simulation is an education tool that allowed learners to make a mistake while practicing skills and knowledge in a safe environment and will not harm others life.⁶ Simulation is believed to be more effective in learning to make clinical decisions, acquiring technical skills, and working in teams than traditional teaching methods.^{7,8} This review aimed to identify the existing simulation package available in nursing practice, and the impact on novice nurse.

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Material and methods

The narrative review was conducted in a systematic process. The articles were searched through CINAHL, Scopus, Proquest, and OVID online database. The keywords involved in the searching process are; simulation, novice nurse, skill, knowledge retention, and self-confidence. The keywords were combined with 'AND' and/or 'OR' in ensuring the maximized searched results. The inclusion and exclusion criteria for the review are listed in [Table 1](#).

Thematic analysis was applied to scrutinize the findings. The review was done narratively. In the review, the definition of the novice nurse is based on the definition by Benner.¹

Result

The searched have resulted in 272 articles, and 20 articles were preceded for full-text retrieved. Besides, hand search skill from the references list also been applied, and 2 articles were selected for full-text retrieved. Finally, 19 articles were selected for the literature review after 2 articles excluded due to not an empirical or review paper ([Fig. 1](#) and [Table 2](#)).

The review was divided into three parts; existing simulation session, simulation as a support tool in the transition, and the impact of simulation on novice nurse.

Discussion

The existing simulation session/package

Nursing education has actively used simulation as learning tools since 2000.⁹ Simulation is believed to be more effective in providing positive learning outcome compared to the traditional method.^{10,11} There are several simulation types available such as high fidelity simulation (HFS), medium fidelity simulation (MFS), low fidelity simulation (LFS), standardized patient simulation (SPS), web-based simulation (WBS), and computer-assisted simulation (CAS).^{10,12} According to Kim et al.,¹¹ each simulation type has its advantage and disadvantages.

Relatively high usage of HFS (50%) and SPS (25%) been used in nursing education.¹¹ However, there is no concrete evidence saying that HFS is the best among other simulation because each type has its learning domain. According to Kim et al.,¹³ HFS offers better benefits over LFS. Studies said that HFS perceived better understanding of the material and the ability to transfer it to patient care,¹³ improved skills and knowledge,¹⁴ but promote low self-efficacy,¹⁵ and low self-confidence¹⁶ compared to other simulation. While web-simulation may effective in providing knowledge retention but it is less effective in providing effective skill and performance improvement.¹⁷

The use of simulation package is broad. Usually, the simulation was used for nursing students in nursing school. But, certain countries have used it in hospital-based too. For examples in Australia, Cooper et al.¹⁸ have established an E-simulation program that has been used globally at around 20 countries. The program was hosted on a server with free and

open access to all content. Singapore through Liaw et al.¹⁹ also has developed a web-based simulation program to be used by practiced nurses in recognition of and response to deteriorating patients in clinical settings.

The reason why web-based simulation is commonly used by the hospital setting is due to the high cost needed to establish the HFS lab. The cost of establishing a simulation laboratory can range from greater than USD100,000 for a basic setup to millions for advanced centers.¹⁹ However, according to Boling et al.,²⁰ similar results could be achieved with low-fidelity means. This would involve the instructor reading the scenario and writing patient data on a whiteboard. There are a number of drawbacks to this method, chiefly a loss of realism. In addition, with the computerized manikin and monitors, the simulator can display subtle changes in a patient's status without the instructor calling attention to the change. This would be impossible if the instructor were required to write everything on a whiteboard.

However, web-based simulation appeared to be a more cost-effective training method compared to the mannequin-based simulation.¹⁷ In Singapore, a web-based simulation using a virtual patient, known as e-RAPIDS (Rescuing a Patient in Deteriorating Situations), was developed at the National University of Singapore (NUS) by Liaw et al.¹⁹ for undergraduate nursing training to enhance student nurses' clinical performance in assessing and managing deteriorating patients. Through randomized controlled trial (RCT), web-based simulation has been found to produced a better outcome compared to manikin-based simulation.²¹

Recently, Boling et al.²⁰ had done an intervention study to describe one center's experience with designing and implementing a high fidelity simulation training program as part of a novice nurse internship program. In the study, Boling et al.²⁰ have highlighted some points which are the use of high-fidelity simulation training in the orientation of novice ICU nurses is a highly effective training tool if managed correctly and even custom scenarios take time to create, but it is may be more valuable than using stock scenarios. The findings from Boling et al.²⁰ somehow does not touch regarding the measurements of the long-term effects of this type of training on nurse performance, improvements in future training, nurse satisfaction and retention, and overall patient outcomes. This issue also not been touch by the previous study such as the study by Liaw, Rethans, Scherpbier, and Piyanee²² and Kim et al.¹⁹

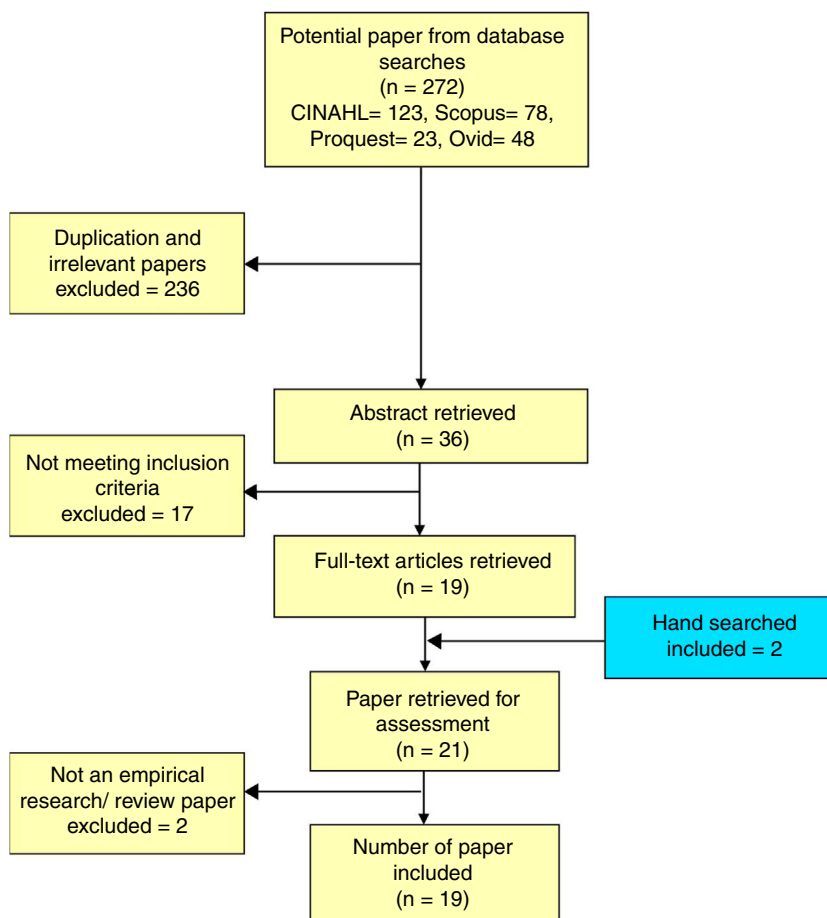
The impact of simulation to novice nurses

Through simulation, the popular outcomes been measure are novice nurses' knowledge and self-confidence.^{20,23-25} Bruce et al.,²³ Corbridge et al.,²⁶ Haut et al.²⁴ and Johnson et al.¹⁴ have reported that simulation has indicated an improvement in novice nurses' knowledge level. However, LeFlore et al.¹⁵ and Scherer et al.¹⁶ founded that there is no significant difference in knowledge level with simulation. It is because Norman⁹ has reported that simulation only helps in the synthesis and apply the knowledge and not to gain new knowledge.

Development of professional confidence is a dynamic process that occurs throughout the first year of practice. Ortiz²⁷

Table 1 Inclusion and exclusion criteria for articles selection.

Inclusion criteria	Exclusion criteria
<ul style="list-style-type: none"> • Published from 2000 • In English • The study among nurses with clinical experience less than one year, and including student nurse • The study focused on simulation among novice nurse 	<ul style="list-style-type: none"> • The study among other healthcare personnel • Articles in other than the English language

**Figure 1** Articles search flow for simulation among nurses.

in a semi-structured interview among 12 novice nurses from 2 hospitals in the United States of America have concluded that feelings of professional confidence among novice nurses fluctuated throughout the first year on the job. Novice nurses also stated that making mistakes and poor communication experiences with colleagues decreased their lack of professional confidence. Moreover, Ortiz²⁸ believed that novice nurses must experience both positive and negative circumstances in order to move forward on the professional confidence continuum. But, the study by Ortiz²⁸ only focused on new novice nurses in the hospital setting and did not account for novice nurses who begin their career in other healthcare settings such as nursing homes or physician offices. Therefore, the findings may not be reflective of novice nurses' experiences in other hospitals in the county, state, or nation.

Besides, researchers have reported that novice nurses' self-confidence may increase after gone through simulation session.^{23,25,26} In a study done by Bruce et al.²³ found that the simulation session has improved novice nurses' self-confidence to identify shockable rhythm and indication for a defibrillator for cardiac arrest patient. But, Kaplan et al.²⁵ found that self-confidence level only increased among advanced nurse practitioner student and not an undergraduate student. It is parallel with finding by Haut et al.²⁴ whereby in a study done among advanced nurse practitioner student showed that self-confidence would improve through clinical experience.

From the review, novice nurses' self-confidence seems to have positive feedback from the participants. Most of the participants have highlighted how simulation has improved their self-confidence in relation to their practice and skills.

Table 2 An overview of the included studies.

No	Author(s) & context	Population	Method	Simulation tool(s)	Result
<i>The existing simulation session/package</i>					
1.	Norman USA (2012)	Published studies N = 17	Systematic review	Human patient simulators High fidelity simulation	<ul style="list-style-type: none"> • Simulation helps to develop communication skills and adherence to safety guidelines by nursing students • There was a significant increase in knowledge and skills • Simulation helps in synthesize and apply knowledge • Simulation improve self-confidence
2.	Franklin USA and Lee (2014)	Published studies N = 43	Meta-analysis	Manikin simulation Standardized patient simulation Computer-based simulation Low fidelity simulation High fidelity simulation	<ul style="list-style-type: none"> • Simulation is effective in increasing self-efficacy compared to the traditional learning method • Nurse practitioner preferred simulation compared to lecture and vice versa for undergraduate nursing student
3.	Kim, South Korea Park, and Shin (2016)	Published studies N = 40	Meta-analysis	High fidelity simulation Standardized patient simulation Low fidelity simulation	<ul style="list-style-type: none"> • Simulation-based nursing education is effective • HSF offers benefits over LFS • Satisfaction levels are high among novice nurse participating in simulation learning that utilizes human simulators or SP • PBL's emphasis on reasoning based on problems and cases, compared to the actual clinical practice emphasized in simulation-based learning • HFS and SP are effective in producing cognitive and affective outcomes

Table 2 (Continued)

No	Author(s)	Context	Population	Method	Simulation tool(s)	Result
4.	Corbridge, Robinson, Tiffen, and Corbridge (2010)	USA	Advance nurse practitioner student N = 20	Quasi-experimental	Online narrated power point presentation vs. high fidelity simulation (HFS)	<ul style="list-style-type: none"> • Both groups improved in knowledge, but no significance between group • HFS group perceived a better understanding of the material and their ability to transfer it to patient care • HFS group agreed to recommend the teaching style to other, but online group disagreed
5.	Johnson et al. (2014)	USA	Advanced nurse practitioner student N = 32	Randomized control study	High fidelity simulation manikin vs. Web-Simulation	<ul style="list-style-type: none"> • Both groups improved in knowledge and skills • No significance in attitude changes
6.	LeFlore, Anderson, Michael, Engle, and Anderson (2007)	USA	Advanced nurse practitioner student N = 16	Quasi-experimental	High fidelity simulation	<ul style="list-style-type: none"> • No significance different for knowledge • Control group scored lower in self-efficacy • Significance difference between the group in behavior performance
7.	Scherer, Bruce, and Runkawat (2007)	USA	Advanced nurse practitioner student N = 23	Randomized control study	High fidelity simulation vs. case study presentation	<ul style="list-style-type: none"> • No significance difference in knowledge score between both group • HFS group score lower in confidence level compared to case study presentation
8.	Liaw et al. (2016)	Singapore	Nurse practitioner N = 99	Randomized control trial	Web-based simulation	<ul style="list-style-type: none"> • Simulation increase motivation to learn, knowledge, the transferability of knowledge, and ability in recognizing a deteriorating patient

Table 2 (Continued)

No	Author(s)	Context	Population	Method	Simulation tool(s)	Result
9.	Cooper et al. (2017)	Australia	Practiced novice nurses N = 2971	Quasi experimental	Web-based simulation	<ul style="list-style-type: none"> • E-simulation may enhance novice nurses' preparation for practice and improve novice nurses' management of deteriorating patients
10.	Boling, Hardin-pierce, Jensen, and Hassan (2018)	USA	Critical care novice nurses N = 12	Intervention study	High fidelity simulation	<ul style="list-style-type: none"> • The use of high-fidelity simulation training in the orientation of new graduate ICU nurses is a highly effective training tool if managed correctly • The use of a guiding framework is essential to ensure maximal benefit
11.	Liaw, Chi, Gee, Chuan, and Chiang (2014)	Singapore	Undergraduate nursing student N = 57	Randomized control trial	Virtual patient simulation	<ul style="list-style-type: none"> • Both experimental and control groups demonstrated significant improvements ($P < .001$) in first and second post-test scores. • Simulations have demonstrated to be effective refresher learning strategies for improving nursing students' clinical performance.
12.	Liaw, Rethans, Scherpbier, and Piyanee (2011)	Singapore	Undergraduate nursing student N = 31	Randomized control study	High fidelity simulation	<ul style="list-style-type: none"> • Simulation improve self-confidence, decision-making skills and competency • The simulation allowed the implementation of skills and knowledge
<i>Simulation as support tool in transition program</i>						
13.	Jung, Hee, Jung, and Kim (2017)	South Korea	Practiced Novice nurses N = 24	Mixed method		<ul style="list-style-type: none"> • The study results support the use of simulation as an effective educational tool for use with both novice nurses and nursing students • Implementation of simulation learning could enhance the readiness of novice nurses

Table 2 (Continued)

No	Author(s)	Context	Population	Method	Simulation tool(s)	Result
14.	Thomas and Mraz (2017)	USA	Practiced novice nurses N = 14	Descriptive phenomenological approach		<ul style="list-style-type: none"> • Novice nurse used simulation experiences during the training period to assist with the transition into the professional role and continued to implement debriefing or continued growth
<i>The impact of simulation to novice nurses</i>						
15.	Bruce et al. (2009)	USA	Advance nurse practitioner student and undergraduate student N = 118	Quasi-experimental	Computer-assisted simulator	<ul style="list-style-type: none"> • Improved participant's knowledge
16.	Haut, Fey, Akintade, and Klepper (2014)	USA	Advanced nurse practitioner student N = 10	Quasi-experimental	High fidelity simulation	<ul style="list-style-type: none"> • Experienced increased student's confidence to recognized patient status changes
17.	Kaplan, Holmes, Mott, and Atallah (2011)	USA	Undergraduate nursing student and Advance nurse practitioner student N = 55	Quasi-experimental	High fidelity simulation	<ul style="list-style-type: none"> • Simulation is agreed to increase knowledge, ability to function in a clinical setting, level of team work among advanced nurse practitioner student
18.	Corbridge et al. (2008)	USA	Advance nurse practitioner student N = 7	Randomized control study	High fidelity simulation	<ul style="list-style-type: none"> • Improved knowledge, confidence, critical thinking, and fun learning experience
19.	Ortiz (2016)	USA	Novice nurses N = 12	Semi-structured interview		<ul style="list-style-type: none"> • Novice nurses must experience both positive and negative circumstances in order to move forward on the professional confidence continuum

Not to forget that not all studies are saying that novice nurses' self-confidence will automatically improve through simulation because different simulation type has different learning domain. Therefore, it is important to identify the outcome needed before decided to implement any simulation session.

Moreover, simulation has improved the fun of learning and critical thinking of the novice nurses as reported by Corbridge et al.²⁶. It is parallel with the study done by Haut et al.²⁴ that has said fun learning provide by simulation session has encouraged novice nurses to the accomplished majority of the required responses in the simulation session. Another study that agreed with the finding is a study done in Singapore by Liaw et al.¹⁷ saying that the simulation session has increased the novice nurses' motivation to learn.

Even though Norman⁹ said that simulation is not a learning tool that can be used to gain new knowledge, but the effectiveness of the simulation session in ensuring knowledge retention is better compared to traditional learning method need to be considered. Nursing is a profession that has a close relationship with cause and causal effect. Each action taken by nurses will cause either a positive or negative impact on the patient's health condition. With simulation, the negative impact can be minimized since novice nurses will practice their skills in a controlled and safer environment.

Simulation as a support tool in the transition program

Transition program should be established for the novice nurses to help them adjust effectively to the new situations. Simulation is suggested to be used as a support tool for novice nurses during their transition period. Novice nurses are exposed to transition shock as they need to adapt to the challenges in the new working environment. In a study done by Jung, Hee, Jung, and Kim²⁹ among novice nurses at 4 teaching hospitals in South Korea, findings showed that simulation is known as an effective educational tool to be used by both novice nurses and nursing students. While Thomas and Mrasz²² concluded that novice nurses would use simulation experiences during the training period to assist them in adapting to the transition into the professional role.

Jung et al.²³ have developed the simulation package to be used by novice nurses. However, the good academic background of the novice nurses involved in the study does not represent the general population of novice nurses in Korea in terms of competency levels. The participants' involved in the study had scored a cumulative grade point average (CGPA) of 3.0 and above only during the training period. In addition, recall bias, social desirability bias, and intrinsic self-rating scales may have affected the validity of the study findings.

Also, Jung et al.²³ have reported findings gained from the pre-development phase of the simulation package. According to Jung et al.,²³ a novice nurse felt not prepared and proficient to administer medications and care of pre and post diagnostic tests. Besides that, the novice nurse has been identified to have a lack of communication skills. But, through simulation develop by Jung et al.,²³ it was effective

in facilitating the development of novice nurses' communication skills.

Besides, Cooper et al.¹⁸ in a study among 2971 novice nurses in a global setting have reported that E-simulation may enhance novice nurses' preparation for practice and improve novice nurses' management of deteriorating patients. In a Web-based interactive simulation training program on patient deterioration developed by Cooper et al.,²¹ an increase in nurses' knowledge and self-reported competence and confidence have been founded. Plus, the knowledge of novice nurses has improved after simulation and the novice nurses perceived that their confidence has improved. However, this study is built on the trustworthiness of screen-based simulations that make the experiences which may not completely match the reality of nursing work.

Therefore, the implementation of simulation learning could enhance the readiness of novice nurses. Health-care settings should consider adopting clinical simulation for novice nurses as an effective transitional education strategy.²⁹ Continuing study of the transition program for novice nurses should be considered. Future research could focus on developing simulation scenarios that include various clinical settings to enable novice nurses to adjust to clinical settings. In addition, further research is needed on how simulation can fill the gaps left from school clinical experiences to help prepare novice nurses for professional practice.²²

Conflict of interests

The authors declare no conflict of interest.

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