산업융합연구 제22권 제3호 pp. 79-89, 2024
ISSN 2635-8875 / e-ISSN 2672-0124
DOI : https://doi.org/10.22678/JIC.2024.22.3.079

Nursing Students' Clinical Competence and Decision-Making: Impact of a Multiple-components Practice-based Learning

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간호학생의 임상수행능력과 임상의사결정: 다중요소 실습기반교육의 효과

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Abstract This study is a one-group pre-post experimental design that investigates the effects of a practice-based learning program with multiple components on the clinical competence of nursing students, and clinical decision-making. From May 4 to 29, 2020, a total of 60 third-year nursing students with no clinical practice experience were divided into two teams and participated in multi-component practice-based education for two weeks each, and the data of the final 51 students were included in the analysis. Following the practicum, there was a significant increase in clinical competence (t=-4.74, p<.001) and self-confidence in clinical decision-making (t=-8.41, p<.001), and a decrease in anxiety related to clinical decision-making (t=2.54, p=.014). The findings suggest that a multi-component, practice-based learning approach for nursing students can enhance their clinical competence, reduce preclincal anxiety and increase confidence in clinical decision-making in patient care.

Key Words : Practice-based learning, Nursing students, Clinical competence, Clinical decision-making, Preclinical anxiety

요 약 본 연구는 단일그룹 사전-사후 실험설계를 통해 다중요소 실습기반교육의 간호학생의 임상수행능력과 임상의사결정에 대한 효과를 탐색하는 것을 목적으로 하였다. 2020년 5월 4일부터 29일까지 임상실습 경험이 없는 간호학과 3학년 학생 총 60명이 2팀으로 나누어 2주씩 다중요소 실습기반교육에 참여했고, 최종 51명의 자료가 분석에 포함되었다. 연구결과 임상수행능력, 임상의사결정 자신감은 실습교육전에 비해 유의미하게 상승하였고, 임상의사결정에 대한 불안은 유의미하게 감소하였다. 간호학생을 위한 다중요소를 포함한 실습교육은 환자 간호를 위한 수행 자신감을 향상시키고, 임상적 의사결정에 대한 자신감을 증가와 불안 완화의 교육방법으로 적용될 수 있다.

키워드 : 실습기반교육, 학생간호사, 임상수행능력, 임상의사결정, 실습전 불안

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Received December 20, 2023
Revised January 18, 2024
Accepted March 20, 2024
Published March 28, 2024

1. Introduction

In light of the COVID-19 pandemic, the Ministry of Education, in 2020, advocated for the adoption of online learning as a preventive measure against infectious disease transmission. Consequently, clinical practicum experiences for nursing students became subject to stringent restrictions imposed by both clinical healthcare facilities and educational institutions [1].

Nevertheless, nursing is an applied discipline that necessitates the seamless integration of theoretical knowledge with practical expertise in authentic clinical settings. The development of competencies crucial to nursing practice, including the ability to assess patients' actual and potential health concerns, formulate comprehensive nursing care plans, and effectively execute evidence-based interventions, remains paramount for nursing students [2].

Clinical practicum experiences, typically occurring during the third and fourth years of nursing programs, were notably impacted by divergent institutional policies. In the COVID-19 pandemic, numerous clinical settings chose to restrict student access to units housing vulnerable populations, such as patients with infectious diseases. Especially noteworthy were clinical practicum experiences involving susceptible groups like neonates, children, expectant mothers, and critically ill patients, which often necessitated innovative pedagogical approaches such as virtual simulations and online case analyses. These adaptations aimed to facilitate learning while adhering to social distancing guidelines and minimizing students' exposure to potential health risks [3].

To ensure the effectiveness of clinical education within the confines of these restrictive environments, educators have explored various teaching methodologies. These include the utilization of real-time video conferencing for remote supervision and guidance, the implementation of virtual case analyses to enhance critical thinking skills, and the integration of online simulation-based learning experiences [2]. While these strategies have proven valuable in promoting cognitive aspects of nursing education [2], it is crucial to acknowledge that they may have inherent limitations when it comes to cultivating hands-on clinical skills and providing students with authentic real-world clinical exposure.

Demonstrating nursing competency is a prerequisite for successful entry into the health care setting and transition from student to nurse[4]. With the aid of modern information technology, we actively pursue a new revolution in experiential learning that is personalized, intelligent, and ubiquitous [3]. As higher education continues to improve, this is becoming an increasingly critical aspect of the process [4].

Educating nurses involves combining knowledge, skills, attitudes, and judgment to respond to the needs of nursing subjects and making clinical decisions to select appropriate nursing care [5]. Clinical decision-making can be influenced by emotional factors such as anxiety or confidence. Anxiety is a consideration in nursing education, as it reduces the ability to discover alternatives, and confidence can contribute to plausible decisions and choices [6].

Practice-based learning, encompassing multiple components, immerses students in scenarios akin to real clinical environments, enabling them to engage in clinical decision-making and conduct procedures without adversely affecting patient care. Simulation-based practice, in particular, mirrors real-life clinical situations, fostering the acquisition of diverse nursing skills [7,8], as well as the development of clinical decision-making and effective communication abilities [9]. However, previous studies have focused on single elements of hands-on training[7,8,10], such as simulation exercises, rather than components of a broader hands-on training curriculum. This approach, while valuable, has limitations in fully substituting for comprehensive clinical training, especially in exigent circumstances

like a pandemic.

To augment proficiency in clinical practice, it is crucial to adopt an integrated approach in practical training, one that includes a comprehensive range of components. Such an approach, emphasizing practice-based education, is instrumental in facilitating not only the acquisition of theoretical knowledge and skills but also in cultivating practical abilities pivotal for clinical settings. Moreover, in scenarios like the sudden outbreak of infectious diseases where conventional clinical training might be constrained, the importance of extensive and diverse practical training is underscored. This training is essential for equipping healthcare professionals with the necessary skills to adapt and respond effectively in dynamic and challenging medical situations. This way, clinical decisions can be made and procedures can be carried out without adversely affecting the patient. Students can apply what they have learned in a safe and controlled environment through multi-element practice, which enhance their skills and increase their confidence before working with actual patients in a real-life setting.

In this study, we aim to assess the efficiency of multiple-components practice-based learning (MC-PBL) by constructs a module and applying it to nursing students, particularly in situations where clinical practices are limited.

1.1 Purpose

This study aims to assess the impact of MC-PBL on the clinical competency and practical decision-making abilities of nursing students.

2. Methods

2.1 Study design

This study used a one-group, pre and post-test design.

2.2 MC-PBL module

Due to the unprecedented difficulties caused by the COVID-19 pandemic, traditional clinical training methods in nursing education have faced serious disruptions. In this study, the MC-PBL module was developed as a practical solution for continuing effective clinical training for nursing students in a laboratory environment. This program aimed to explore the effectiveness of practice-based education including multiple elements, diverging from traditional single-faceted educational methods.

The MC-PBL module was applied to the pediatric nursing practice course, which was suspended due to the COVID-19 pandemic. The practice-based education module includes health assessments, core nursing skills acquisition through OSCE practices, clinical scenario-based simulation practices in pediatric and adolescent wards (pneumonia, febrile seizures, newborns with hypoglycemia, etc.), and case studies based on clinical cases (appendicitis, and gastroenteritis) including reporting using the SBAR (Situation, Background, Assessment, Recommendation) and nursing records. This course has been designed to fulfill the overarching educational objectives of the nursing program. It aims to achieve these objectives through case analysis, enhancing proficiency in core nursing skills, solving clinical nursing problems through simulation practice, and documenting and reporting the nursing process. The MC-PBL course encompasses a structured practical training program spanning over 10 days, as detailed in Table 1. The module's composition and validity were rigorously verified by a team comprising one professor and two doctoral students, each utilizing over ten years of extensive clinical experience. This stage ensured that the module met the necessary educational standards and clinical realism.

Before the practice began, the instructor integrated the module's curriculum into the school's education system. This stage was crucial in aligning the simulation activities with the broader educa-

tional objectives of the nursing program.

The curriculum underwent further evaluation and forecasting by two additional doctoral students with clinical backgrounds.

On the first day of practice, the professor and two instructors in charge of the course conducted a detailed orientation on the operation of the practice. The training program was implemented in two teams, each undergoing a 10-day course. Physical examination practices involved using neonatal and pediatric models to conduct physical assessments. The SBAR reporting system training entailed analyzing cases through online videos, organizing appropriate reports for given situations, and practicing verbal reporting to others. Simulation-based training content included scenarios for neonatal care, neonatal care with hypoglycemia, care of children with pneumonia, and care of children with febrile seizures. These scenarios were structured to reflect clinical situations, allowing teams to apply nursing processes directly, including documentation and SBAR handover processes. The training also incorporated OSCE based practices to ensure proficient application of essential nursing skills in simulation scenarios.

To foster the ability to identify nursing problems and develop intervention plans in pediatric wards and NICU, case analyses of commonly observed scenarios were included in the training. Throughout the program, instructors and professors provided students with documents containing training objectives and precautions, and guided the nursing students in their practical activities.

Nursing students were assigned distinct roles within small group settings, ensuring active participation from all members. These roles entailed the preparation of necessary materials and the rational design of nursing care strategies. Instructors were available to address any queries or difficulties encountered by the students. During each lab session, a debriefing was conducted by the teacher. This debriefing process involved summarizing the session's activities, acknowledging the strengths exhibited by the nursing students, and providing guidance on areas of deficiency. Furthermore, the instructor disseminated the latest research findings related to each nursing experiment, thereby encouraging students to proactively engage in learning relevant material beyond the laboratory setting.

Each practical course was subject to detailed assessment by the instructors, focusing on identifying areas where students fell short and evaluating their adherence to practical standards. This evaluation process was complemented by the provision of constructive feedback, which is crucial for the learning and developmental progress of the students.

Table 1. MC-PBL components

Schedule	Component	
Day1	1. Physical assessment practice	5hr
	2. Learn & practice SBAR reporting	3hr
Day2,4,6,8	1. Simulation based practice	4hr
	2. OSCE about core nursing skills	2hr
	3. Nursing records	1hr
	4. Debriefing	1hr
Day3,5,7,9	1. Problem based learning; case study	6hr
	2. SBAR practice	2hr
Day10	1. Evaluation	5hr
	2. Debriefing of the entire practice component	3hr

Note. MC-PBL, multiple-components practice-based learning; hr, hour; SBAR, situation, background, assessment and recommendation; OSCE, Objective Structured Clinical Examination

2.3 Participant and data collection

The participants in this study were third-year university nursing students with no experience in clinical practice or simulation training who were taking a child nursing practicum course. The sample size for the study was determined based on the effect size of .5, which is considered medium, following the research by Ko and Kim [11]. Using the G*Power 3.1 program, with a significance level of .05 and a power of .95, the required sample size for a single-group pre-post evaluation was calculated to be forty-four. This study was conducted for 4 weeks from May 4 to 29, 2020. Sixty third-year students with no clinical experience were divided into

two teams and each conducted MC-PBL for two weeks. Participation in practicum is mandatory because it is a required major subject, but students were asked to fill out the questionnaire only if they wanted to. Data collection was conducted through an online link, where voluntary consent was obtained.

Participants were allowed to stop the survey at any time if they did not wish to continue, and care was taken to ensure that the collected data did not reveal any personal information. Out of 60 students participating in the practicum, 9 were excluded due to insincere responses, leaving data from 51 students for analysis.

2.4 Measurement

2.4.1 Clinical competency

The Clinical Competency Scale, modified and supplemented by Kim, Chae, and Choi [12], evaluates the professional knowledge and skills of medical personnel in specific fields or environments. It is used to reflect the current state of clinical nursing and education. The scale includes five sub-areas: nursing leadership, professional development, nursing skills, communication, and the nursing process, with 34 items. It employs a 5-point Likert scale; the higher the score, the better the clinical ability. The scale's Cronbach's α coefficient is .92.

2.4.2 Korean Version of Nursing Students' Anxiety and Self-Confidence with Clinical Decision Making Scale (KNASC-CDM)

KNASC-CDM was measured using an instrument translated by Yu, Eun, White, and Kang [13]. This tool is specifically designed to assess the anxiety and confidence of Korean healthcare professionals in making clinical decisions in various work situations. The instrument comprises four domains with 23 questions on a 6-point Likert scale (1 = not at all; 2 = just a little; 3 = somewhat; 4 = mostly; 5 = almost totally; 6 = totally), with total scores ranging from 23 to 138. Higher scores indicate greater confidence and anxiety in clinical decision-making. Confidence and anxiety levels were measured separately for each question. The Cronbach's α coefficients are .93 for self-confidence and 0.95 for anxiety.

2.5 Ethical Considerations

Prior to the commencement of the study, all participants enrolled in the nursing program were briefed on its aims and methodologies, resulting in their informed consent to participate. They were assured of the voluntary nature of their participation and the non-impact of their responses on their academic evaluations. Data collection used a structured online questionnaire, which provided information on the purpose and contents of the study before starting the survey and included questions for voluntary consent. The questionnaire was designed so that it could be stopped at any time during the survey if desired. The self-assessment questionnaire integral to the study was designed to be completed within an approximate timeframe of twenty minutes. Upon submission, participants were acknowledged with nominal gifts as a gesture of gratitude. To ensure confidentiality and data integrity, robust measures were implemented, including anonymization through unique numerical identifiers and the deletion of any personally identifiable information, thereby safeguarding the data exclusively for research-related use

2.6 Statistical analysis

Data collected were described and analyzed using SPSS WIN 26.0. Independent t-tests were used to analyze effectiveness in clinical competency, self-confidence, and anxiety before and after the integrated simulation internship.

3. Results

3.1 Effectiveness on clinical competence

Overall, 51 nursing students completed the prac-

tice, dropped 9 for an 85% completion rate. Table 2 provides the research outcomes., after the MC-PBL, the total clinical competency and each sub domain have significantly increased. Specifically, there was a significant increase in the clinical competence (t=4.74, p<.001),nursing skills (t=-5.57, p<.001),and nursing process (t=-4.80, p<.001) before and after the experiment. Similarly, scores for several other factors, such as nursing leadership (t=-3.46, p=.00 1) , professional development (t=-3.69, p=.001), and communication (t=-3.13, p=.003), were significantly higher.

Table 2. The Effectiveness of MC-PBL on clinical competency (N=51)

Variables	Mean±SD		t	p
	Pre-test	Post-test		
Clinical Competence	128.69±19.90	140.43±17.98	-4.74	<.001
Nursing leadership	46.51±7.63	49.98±6.56	-3.46	.001
Professional development	19.43±3.20	21.10±2.97	-3.69	.001
Nursing skills	17.18±4.05	20.10±3.05	-5.57	<.001
Communication	26.82±4.38	28.76±4.26	-3.13	.003
Nursing process	18.65±3.27	20.49±3.13	-4.80	<.001

Note. MC-PBL, multiple-components practice-based learning; SD, standard deviation

3.2 Effectiveness on KNASC-CDM

As shown in Table 3, all dimensions of self-efficacy showed a positive increase after the MC-PBL practice (t=-8.41, p=.001). Among them, "Using resources to gather information and listening fully" was compared before and after (t=-8.09, p<.001), and "Using the information to see the big picture" was(t=-5.51, p<.001); "Knowing and acting" (t=-8.76, p<.001); "Seeking information from clinical instructors" (t=-6.92, p<.001). The anxiety variables as a whole were statistically significant in the pre-and post-practice comparisons (t=2.54, p=.014), with only the pre and post-practice comparisons for "Using resources to gather information and listening fully" (t=2.78, p=.008), and "Knowing and acting" (t=2.82, p=.007); "Seeking information from clinical instructors" (t=12.40, p<.001). However, there was no statistical significance for the "Using information to look at the big picture" (t=1.80, p=.078).

4. Discussion

This study aimed to examine the impact of multi-element practice-based learning on nursing students' clinical competence and practical decision-making skills. From the short review above, key findings emerge from our study utilized multi-component simulated integrated nursing practice in a pediatric nursing practice teaching program, thereby improving nursing students' clinical competitiveness (t=-4.74, p<.001), enhancing their self-confidence (t=-8.41, p<.001), in entering the clinic at a particular time, and reducing pre-practice anxiety (t=2.54, p=.014), as well as verifying the effectiveness of simulated integrated nursing practice in preparing nursing students for clinical

Table 3. The Effectiveness of MC-PBL on KNASC-CDM (N=51)

Variables	Mean±SD		t	p
	Pre-test	Post-test		
Self-confidence	87.51±22.19	106.16±19.64	-8.41	<.001
Using resources to gather information and listening fully	31.75±7.76	37.69±7.30	-8.09	<.001
Using information to see the big picture	26.96±7.31	31.98±6.15	-5.51	<.001
Knowing and acting	17.14±5.47	22.29±4.94	-8.76	<.001
Seeking information from clinical instructors	11.69±3.44	14.20±2.67	-6.92	<.001
Anxiety	57.49±17.07	49.67±19.58	2.54	.014
Using resources to gather information and listening fully	19.02±5.47	16.08±6.83	2.78	.008
Using information to see the big picture	17.23±5.90	15.33±6.26	1.80	.078
Knowing and acting	14.00±4.65	11.88±4.79	2.82	.007
Seeking information from clinical instructors	14.20±2.67	6.37±2.65	12.40	<.001

Note. MC-PBL, multiple-components practice-based learning; KNASE-CDM, Korean Version of Nursing Students' Anxiety and Self-Confidence with Clinical Decision Making Scale; SD, standard deviation

practice. This finding validates the review of the relevant literature. MC-PBL is an effective teaching strategy/learning strategy that can increase participants' perceptions of improving nursing students' competence [14].

Based on the results, five sub-dimensions of clinical competency, namely nursing leadership, professional improvement, nursing skills, communication, and nursing process, demonstrated significant improvements (p<.001). Compared to traditional teaching methods, the simulation approach avoids the high medical and non-medical manipulation risks, it has excellent stability and continuity, which can be beneficial for some events that are not commonly encountered in training or clinical practice [15]. Nursing students' clinical competencies were improved using the model.

Based on the results of the practice, it is evident that nursing leadership has significantly improved. This is consistent with an Irish study involving senior nursing students who used a medium-fidelity simulator to practice simulated scenarios [16]. The findings are match that observed study, nursing students who did not participate in simulation teaching had lower leadership scores [17]. Jones [18] had previously recommended that a leadership course be offered at the undergraduate level, recognizing that student nurses need leadership training.In addition, there was a significant difference between the pre-test and post-test on nursing professional improvement and nursing process scores (p<.001), which is consistent with previous findings by Lee [19]. A higher perception of the nursing process is accompanied by a similar increase in knowledge scores [20]. In the present study, nursing students also perceived positive changes in the nursing process after the practice. After the tral, fundamental elements of clinical nursing skills and communication were significantly improved. This finding is supported by numerous studies showing that students can learn from experience, correct learning behaviors, and experience more progress [14.21]. Nurses' teaching tasks have changed during a particular period, such as during COVID-19 [22]. Nursing students need more clinical skills training due to being unable to go to hospitals for internships. Simulation practice teaching has been gradually incorporated into clinical nursing education, improving nursing students' knowledge and skills [22-23].

Simulation of clinical settings in a high-fidelity environment is an active medium that facilitates the transition between theoretical and clinical practice settings for nursing students [15].

Additionally, the study's second aim is to demonstrate the efficacy of MC-PBL in improving nursing students' clinical decision-making abilities. The results of the present study indicated that MC-PBL positively impacted nursing students' anxiety and self-confidence. The results showed a significant (p<.001) increase in nursing students' self-confidence compared to their pre (87.51 ± 22.19) and post practice scores (106.16 ± 19.64). In addition, the MC-PBL education method significantly improved the students' practice skills, which may be related to the nature of the practice teaching [24]. Our findings are in accord with Lee [25], the study published a significant increase in nursing students' self-confidence in their study of an integrated nursing practice course using S-PBL teaching. A possible explanation for this might be that "using resources to gather information and listening fully," as well as practical training, are more effective at attracting students' attention than traditional instruction. Students' self-confidence should be improved through course training and more systematic and repetitive training outside the course [24]. We confirm that nursing students can increase their self-confidence through learning from simulated experiments. In this study, the scores for "Using information to see the big pictures" and "knowing and acting" have increased. We speculate that this might be due to the phenomenon observed by nursing students during the practice may be related to the patient's health, safety and own responsibility.

Students' understanding of the big picture regarding numerical interpretations, which correlates with the interpretation model of clinical decision-making, suggests that they are confident in assessing their skills, consistent with a recent study [26]. Similarly, Shinnick's [27] experiments in the United States found that after completing high-fidelity simulation practice, nursing students analyzed the condition of heart failure patients more thoroughly and were more confident and capable of predicting, judging, and managing the overall condition of heart failure patients.

In addition, compared with before the trial, nursing students also improved in "seeking help from clinical instructors" and analyzing the reasons for increased interaction with instructors. A possible explanation is that nursing students are brought into clinical roles and can make independent judgments so that they can discover problems, raise clinical questions, and enter a clinical state and collaborative working state.

We found that students' anxiety scores decreased significantly after the experiment, consistent with previous research [28]. Consequently, we determined that the MC-PBL model can be utilized as a practical teaching tool for reducing anxiety among nursing students. Students have been reported to be anxious and fearful during their first clinical experience due to the fear of making mistakes and performing skills on real people, as well as nervous and overwhelmed during interactions with patients and communication with clinical health providers [29]. According to studies, nurse-patient relationships and outcomes can be improved by reducing student anxiety. Comparing the two groups of nursing students who had participated in the practice simulation course to those who had not, Gore [30] concluded that students who had not participated in the practice simulation course scored higher on anxiety. Similarly, Thompson [31] observed that high-fidelity simulations reduced nursing students' anxiety about clinical medication administration in a laboratory medication administration test. Nonetheless, the results for one of the anxiety scale items, "Using information to see the big picture," were not significant, which is consistent with other studies [26], and we considered that because they are different from experienced nurses, nursing students are not good at identifying clinical data in reality. The connection in life requires continuous summary and reflection from rich theoretical knowledge and clinical experience. The anxiety of nursing students has not decreased in this aspect. We conclude that this may also be related to our curriculum. Most nursing courses focus on skills and ignore the philosophy and overall view of the nursing discipline itself. The unknown of cultural care for patients and the unpredictability of work prevent nursing students from combining practice with thinking and ethics.

Our results show that nursing students learn as subjects of simulated patient management in simulation from passive to active behaviors, with students as the role of nurses and observers who together become immersive experiential learners, e.g. Through a variety of feedback and debriefing, teachers ensure that students contribute to all steps of the simulation. The debriefing also receives input from other students so that students can actively participate in different learning styles and students from different educational backgrounds can benefit from the experience.

This study has limitations in the interpretation of its results due to the convenience sampling of students participating in a pediatric nursing practicum course at a single university and the application of a single-group experimental design without a control group. Future research is recommended to include a control group and involve participants from multiple schools for more robust validation.

5. Conclusion

This study delves into the viability of MC-PBL as

an alternative methodology for enhancing clinical competency and decision-making skills among nursing students engaged in clinical practice during the pandemic. The findings indicate that MC-PBL effectively bolsters the clinical practice capabilities of nursing students in the nursing process, augments their self-confidence, and mitigates anxiety. These outcomes underscore the efficacy of simulation teaching as a potent pedagogical strategy for pediatric practice. Such insights could aid healthcare institutions and educational bodies in formulating strategic responses amidst pandemic conditions. Future studies should aim to corroborate the efficacy of multi-component practice-based education through a research design incorporating a multi-center control group.

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