

Acquiring Clinical Skills for Work in the Intensive Care Unit Through the Education of Nurses in a Simulation Center

Katerina Lazareva, Daniela Damjanovska Todorovska, Valentina Goricanec, Natalija Decovski
International Balkan University, Skopje, Vocational medical school, North Macedonia

Abstract

Introduction: Nursing education is constantly evolving to meet the challenges of the modern healthcare environment. One of the biggest moments in the last decade has been the integration of simulation learning to enhance the educational experience for nursing students. Simulation centers offer a controlled and secure environment where students can hone clinical skills, make decisions, and develop critical thinking, all without the risk of affecting real patients. This approach to learning represents the connection between theoretical knowledge and practical application, where nurses will be prepared to respond to patient care. **Methods:** The study is designed in a descriptive survey model and aims to use the purposive sampling method. A purposive sampling approach allows for the selection and in-depth exploration of information situations depending on the purpose of the study. 40 students participated in the research, department Nursing, International Balkan University, Faculty of Vocational Medical School. A questionnaire survey - a data collection technique was used in December 2024 (after the completion of the practical training). The aim is to better understand nurses' experiences with simulation education and their perceptions of how well the simulation and practical clinical experiences have prepared them for their work as nurses in Intensive care unit. **Results:** (1) Repetition is essential for most participants, which implies that the simulation center might need to allow more time for practice. (2) Confidence in real-life applications is high, but there are a few respondents who feel less confident, suggesting the need for more hands-on experience. (3) Most students actively participated, but a few did not, which points to the importance of ensuring engagement from all participants. (4) Improvements in equipment or alignment with clinical practice could further enhance the realism of simulations and better prepare nurses for the ICU. **Conclusions:** The data reveals a diverse group of participants, ranging from varying age groups to different levels of previous education and work experience. A major takeaway is that most participants already possess a clinical background, which is essential for simulation training in the ICU context. This suggests that the simulation center plays a crucial role in refining or expanding existing skills to better prepare nurses for complex, real-world ICU scenarios.

Keywords: nursing education, simulation center, clinical skills, intensive care unit

INTRODUCTION

The need for highly skilled nurses in the Intensive Care Unit has never been more alarming. Nurses working in this high-stakes environment must be able to rapidly assess patients, perform complex procedures, and make critical decisions. The ability to perform effectively in the ICU is a learned skill that requires a strong foundation in both clinical knowledge and hands-on experience. For student nurses, acquiring these skills before entering real-world practice is of paramount importance.

To perform effectively in such environments, nurses must possess not only solid clinical knowledge but also the ability to make swift, informed decisions, perform technical procedures with precision, and collaborate seamlessly with multidisciplinary teams. However, the nature of ICU care presents challenges for traditional nursing education programs, where opportunities for students to gain hands-on experience in high-stress, high-risk settings may be limited. In recent years, simulation training in nursing education has expanded to include specialized training for high-intensity clinical settings, such as ICUs. These centers provide a variety of ways for students to practically conduct clinical procedures, problem-solving, and exercises with scenarios that replicate the pressure and complexity of ICU environments. Simulation training in ICUs typically includes high-fidelity mannequins, virtual reality, and standardized patient encounters, allowing nursing students to experience and respond to acute medical situations, complex patient management, and rapid decision-making—skills essential to successful ICU nursing. Simulation-based education has become the first choice of today's nursing education, especially for those preparing to work in specialized areas such as the ICU.

BACKGROUND

Simulation as an educational method has gained importance due to its ability to allow students to learn skills and practice in a realistic, but risk-free environment. Research consistently demonstrates that simulation provides an experiential learning opportunity where students can engage in active learning, practice psychomotor skills, and engage in clinical decision-making without direct patient consequences (Bristol et al., 2012).

Intensive care units require nurses with advanced skills, quick decision-making, and the ability to respond to life-threatening situations. Several studies have investigated the relevance of simulation in education for intensive care nurses. In a study by Cook (2013), it was found that practice in a simulation center improves critical care nursing practice, preparedness by improving their ability to respond to emergency situations, such as cardiac arrest, respiratory failure, and sepsis, thereby enhancing patient safety. More specifically, simulation in critical care nursing has been shown to improve students' technical skills (e.g., managing mechanical ventilation, inserting intravenous lines) and non-technical skills (e.g., communication, teamwork, and leadership) (Sexton et al., 2017). Simulated ICU scenarios, which replicate the high-pressure environment of intensive care, help students practice skills such as prioritizing care, logical thinking, and decision-making speed, which are crucial in a real ICU setting. (McCausland 2014). Simulation helps reduce anxiety and stress in students who will eventually transition into high-intensity care units. Studies indicate that students report feeling more confident in their ability to manage critical patients after participating in simulation exercises (Bland et al., 2011).

The main focus of research in simulation-based practice-based education is on the acquisition of new clinical skills. Simulation education in nursing was particularly beneficial for skills that are more difficult to implement in hospital settings due to their rarity or complexity. These include advanced cardiac life support (ACLS), management of acute respiratory distress, and the operation of ICU-specific equipment, all of which are crucial for working in the ICU. Studies by Solomons (2016), Koivisto (2018) emphasize how simulation prepares nursing students for these high-acuity situations by offering scenarios where they can practice without fear of harming patients. Despite the overwhelming benefits, simulation-based education is not without challenges. One of the major barriers is cost. The high-tech equipment required for advanced simulations (e.g., high-fidelity mannequins, simulation software) can be prohibitively expensive, which limits the accessibility of simulation for many nursing programs (Cantrell et al., 2017). Furthermore, the time required to properly conduct simulations and debriefings often competes with other aspects of the nursing curriculum, requiring careful planning and resource allocation.

Debriefing and feedback are major components of simulation learning. Research suggests that immediate, constructive feedback following simulation exercises is essential for reinforcing skills and improving performance. A study by Rudolph et al. (2007) indicates that debriefing after simulation is one of the most impactful aspects of the learning process. Students who receive feedback on their interventions during the simulation can spot errors and apply lessons learned to future clinical practice. Debriefing allows students to discuss what they did well during the simulation, identify areas for improvement, and ask questions about scenarios they found difficult to understand. This process encourages self-reflection, promotes critical thinking, and improves knowledge and skills in the hospital work environment by Sitner (2015).

Moreover, peer feedback during debriefing sessions can also be highly effective. Studies have shown that peer-to-peer communication helps nursing students develop collaborative skills and the ability to offer constructive criticism in clinical teams (Lasater et al., 2013). Another challenge is faculty training. Research by Ferro et al. (2013) highlights the need for faculty to be adequately equipped and organized on how to facilitate and assess simulation exercises. Effective simulation requires skilled educators who can guide students through realistic clinical scenarios while also providing the necessary feedback and reflection opportunities.

Finally, some students report difficulties in translating skills learned in simulation to real-world clinical settings. Studies such as those by Mills et al. (2016) suggest that while simulation improves students' technical skills, there may still be gaps in applying these skills when facing real patients in the ICU, where unpredictability and stress levels are much higher.

Aim of the study

This study aims to demonstrate how simulation education can improve nursing students' ability to hone and advance the skills necessary for working in the ICU. The study explores the efficacy of simulation centers and the education of students in authentic intensive care situations, allowing them to develop essential skills such as patient assessment, decision-making, technical procedures in a controlled, safe, and organized environment before beginning clinical practice.

METHODS

The study is designed in a descriptive survey model. The study was conducted by 40 students. Data was collected by using structured questionnaire with 12 questions. The data were collected in International Balkan University, Faculty of Vocational Medical School, Department of Nursing, from 23 -27 December 2024 (after the completion of the lecturing and practical training). The sample of the study consists of 40 students.

FINDINGS

1. Gender

- Findings regarding the gender of the participants

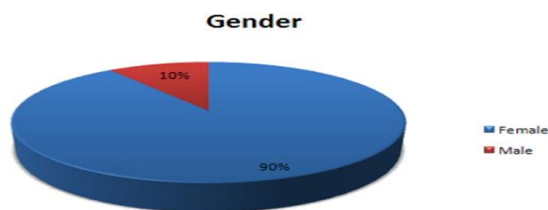


Figure 1. Gender of nurses in the survey

As it shown in Figure 1, most respondents are female. This could indicate that the nursing profession in this context, particularly within the ICU, has a strong female representation, which is consistent with the general demographic trends in healthcare, especially nursing.

2. Age

- Findings Regarding Age Distribution of Participants

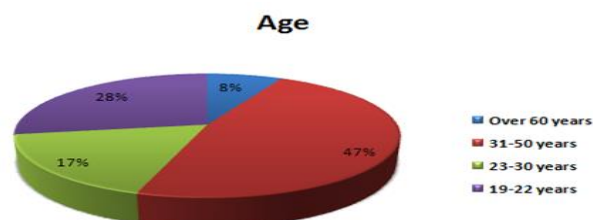


Figure 2. Age of Nurses in the Survey

The largest group of respondents (47.5%) is in the 31-50 years age range, which could reflect nurses with more experience who might be seeking to improve or refine their ICU clinical skills. The presence of respondents in the younger (19-22) and older (over 60) age groups suggests that there is interest in ICU simulation training across different levels of career development, from fresh graduates to more seasoned nurses.

3. Completed Secondary Education

- Findings Regarding completed Secondary Education

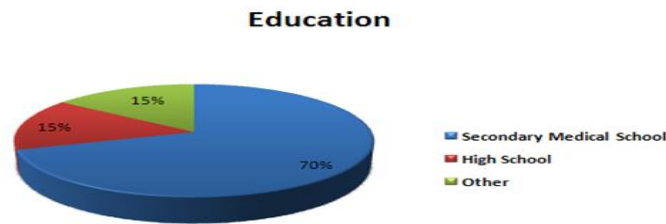


Figure 3. Education Levels of Nurses in the Survey

A significant 70% of respondents have completed secondary education in a medical school, indicating that most participants are already familiar with the basics of healthcare and nursing. The remaining 30% either completed a general high school or another form of secondary education, which suggests varying levels of preparation and prior knowledge.

4. Findings Regarding about Employment Status of the students

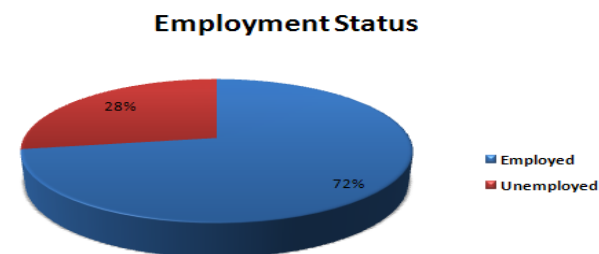


Figure 4. Employment Status of Respondents

The majority of respondents are employed, which suggests that a significant portion of the participants are actively practicing in nursing care interventions. The 28% who are unemployed. The employed group likely represents nurses who may be more familiar with clinical practices and could be engaging in the simulation center to enhance or refresh their ICU skills.

5. Findings Regarding Pre-existing Knowledge of Clinical Skills Before the Semester Began



Figure 5. Pre-existing Knowledge of Clinical Skills Before the Semester Began

Most of the participants (60%) possessed some level of knowledge about clinical skills prior to the start of the semester. This indicates that most participants have a foundational understanding of basic clinical practices, though they may not have had direct ICU-specific skills. The 30% who had partial knowledge could have experience in other areas of healthcare that is somewhat transferable to ICU settings. Only 10% of respondents had no prior knowledge.

Table 1: "During the clinical exercises, I found that I had to repeat the procedure several times"

Response	Frequency (Observed)
Strongly Agree	7
Agree	20
Disagree	9
Strongly Disagree	4
Total	40

$$\chi^2 = 14.6, df=3 \text{ the p-value} = 0.0022.$$

The answers regarding the need to repeat the procedure multiple times showed a statistically significant difference. A notable number of respondents (20) conquered that repetition was essential for understanding the procedures. This suggests that some participants found it beneficial to practice multiple times to feel confident in performing the procedures. The respondents who disagreed or strongly disagreed (13 combined) might have either had prior knowledge or found the initial practice sufficient to master the procedures.

Table 2: "To acquire clinical skills, more hours are needed in the simulation center"

Response	Frequency (Observed)
Strongly Agree	15
Agree	15
Disagree	6
Strongly Disagree	4
Total	40

$$\chi^2 = 10.2, df=3 \text{ the p-value} = 0.017.$$

Given that the p-value (0.017) is lower than 0.05, this indicates that there is a **statistically significant difference** in the responses regarding the necessity for additional hours in the simulation center. The majority (30 respondents) agree that more hours are needed in the simulation center, with 15 strongly agreeing. This indicates that most participants feel they could benefit from additional practice time in the simulation center to further develop their ICU clinical skills. The remaining respondents (10 combined) seem satisfied with the current duration of simulation exercises.

Table 3: "All students actively participated in the exercises"

Response	Frequency (Observed)
Strongly Agree	20
Agree	13
Disagree	5
Strongly Disagree	2
Total	40

$$\chi^2 = 19.8, df=3 \text{ the p-value} = 0.002.$$

Most participants (33 respondents) expressed agreement or strong agreement that all students were actively involved in the exercises, indicating a positive level of engagement and collaboration within the simulation center. Conversely, a small number (7 respondents) disagreed or strongly disagreed, indicating that a few students may have been less engaged or had varying levels of participation in the exercises. Additionally, there is a statistically significant difference in how the responses were distributed.

Table 4: 'The implementation of the procedure was identical in clinical practice, as in the simulation center'

Response	Frequency (Observed)
Strongly Agree	16
Agree	16
Disagree	6
Strongly Disagree	2
Total	40

$\chi^2 = 15.2$, $df=3$ the p -value= 0.002.

This suggests that there is a statistically significant difference between the responses regarding the application of the procedure in a clinical setting compared to the simulation center. While most respondents (32 out of 40) felt that the procedures performed in the simulation center closely mirrored real clinical practice, the significant difference suggests that a smaller group (8 respondents) may have noticed some discrepancies between the simulated and actual clinical environments.

Table 5: "I am confident that I have fully learned the procedure to perform on a real patient"

Response	Frequency (Observed)
Strongly Agree	17
Agree	13
Disagree	6
Strongly Disagree	4
Total	40

$\chi^2=11$, $df=3$, the p -value= 0.011.

Because the p -value (0.011) is lower than the typical significance threshold of 0.05, there is a statistically significant difference in the responses related to mastering the procedure for working with a real patient. The majority (30 respondents) are confident in their ability to transfer the learned skills to real-life patient care. This is a positive outcome indicating that the simulation center is effectively preparing nurses for the practical application of their clinical skills. A smaller group (10 respondents) expressed some uncertainty about their preparedness, indicating that while they feel somewhat capable, they may need more experience or further practice before feeling fully confident in working with real patients.

Table 6: 'The exercises in the simulation center were well organized'

Response	Frequency (Observed)
Strongly Agree	12
Agree	20
Disagree	7
Strongly Disagree	1
Total	40

$\chi^2=19.4$ $df=3df$, the p -value= 0.0003.

Regarding the organization of exercises in the simulation center there is a statistically significant difference in the responses. Most respondents (32) felt that the exercises were well organized, which is crucial for the smooth operation of a simulation center and the effectiveness of the learning experience. A small number of respondents (8) disagreed or strongly disagreed, which could be attributed to logistical challenges, timing, or other factors that impacted their perception of the organization.

Table 7: 'The equipment of the simulation center meets the criteria for practical teaching''

Response	Frequency (Observed)
Strongly Agree	15
Agree	16
Disagree	6
Strongly Disagree	3
Total	40

$\chi^2=12.6, df=3df$, the p -value=0.005.

There is a statistically significant variation in the responses regarding whether the equipment at the simulation center meets the standards for effective practical teaching. The largest number of respondents (31 out of 40) believe the equipment is sufficient, the significant difference suggests that the smaller group (9 respondents) may have experienced issues with the equipment (e.g., availability, functionality, or realism), which could have impacted on their perception of the simulation center's adequacy in preparing them for practical teaching.

DISCUSSION

The findings from this research on acquiring clinical skills for work in the ICU through the nursing education in a simulation center provide valuable insights into the participants' demographic characteristics, prior clinical knowledge, and their perspectives on simulation-based training. This discussion will examine these findings in nursing education, particularly in critical care settings, and explore potential implications for improving intensive care unit (ICU) training programs.

1. Demographic Trends and Their Impact on ICU Training - The majority of respondents in this study were female (90%), which is consistent with the gender distribution commonly observed in the nursing profession. This suggests that the training programs in the simulation center are largely catering to women, who represent the predominant workforce in healthcare settings. In contrast, Johnson et al. (2021) found that gender did not significantly affect learning outcomes in their study of ICU simulation training, which is consistent with our finding that gender is not a determinant of clinical skill development. However, they also noted that age and years of clinical experience did influence learners' perceptions of training effectiveness, with younger, less experienced nurses feeling that they needed more foundational practice. This is similar to our study's observation that younger nurses may benefit from more structured, foundational training.

The age distribution of respondents revealed a strong presence of nurses in the 31-50 years age group (47.5%), with a substantial representation from younger (19-22 years) and older (over 60 years) nurses. The presence of older nurses, though a small group (7.5%), is particularly noteworthy. This suggests that the simulation center's training may be effective for nurses at various stages of their careers. The younger age group, which may have less clinical experience, could benefit from more structured and foundational simulation exercises. In contrast, the older group, possibly with more experience, may require more advanced or specialized scenarios to refine their skills.

2. Educational Background and Its Influence on Simulation Training - The significant proportion of participants (70%) who completed secondary education in a medical school indicates that many of the respondents have a solid foundation in healthcare and nursing. This is important because simulation-based training in an ICU setting often requires participants to have a basic understanding of clinical practices. However, the 30% of participants with general high school or other forms of secondary education may face challenges in fully engaging with the simulation training if their foundational knowledge is less specialized. This highlights the need for simulation programs to differentiate between various levels of prior knowledge and experience, offering tailored instruction that supports both novice and more experienced nurses.

3. Prior Clinical Knowledge and Its Role in Simulation Training - The fact that 60% of participants reported having prior clinical knowledge before the semester began indicates that many nurses already have a baseline understanding of healthcare practices. This prior knowledge likely facilitates their ability to engage in simulation training more effectively. These nurses may already be familiar with fundamental clinical procedures and protocols, allowing them to focus on refining specific ICU skills, such as patient monitoring, critical decision-making, and emergency response. On the other hand, the 10% of respondents who reported having no prior

knowledge may require more introductory training before they can fully benefit from the simulation center's ICU-focused modules.

4. Simulation Center Effectiveness and Training Needs - Respondents' feedback on their experiences during simulation exercises provides useful insights into existing and potential areas for improvement in the simulation center's training program.

- **Repetition of Procedures:** Many participants (20 respondents) agreed that they had to repeat procedures several times to master them. This highlights the importance of hands-on practice for acquiring complex clinical skills. Simulation-based training, which allows for repeated practice in a controlled environment, is vital for building confidence and competence in performing critical care procedures. Baker's (2019) study investigated the effectiveness of simulation in improving the clinical skills of ICU nurses, finding similar benefits in terms of improved procedural knowledge and confidence. Like this study, their research suggested that repetition of critical care procedures in a simulated environment leads to greater mastery of skills, as participants report increased confidence in real-world clinical scenarios.
- **Need for More Hours:** A significant number of participants (15) felt that more hours were needed in the simulation center to acquire clinical skills. This reflects a common challenge in medical and nursing education—balancing theory with practical experience. This finding emphasizes the need for longer and more intensive simulation training sessions to better prepare nurses for real-world ICU challenges. Moreover, the need for increased simulation hours was also a key finding in other studies. Miller et al. (2020) reported that ICU nurses felt the time allocated to simulation-based education was insufficient for mastering the necessary skills, supporting our observation that many participants felt more time was necessary. Their study emphasized that the complexity of ICU care requires not just knowledge but substantial hands-on practice to foster confidence in real clinical settings.
- **Active Participation:** A high number of respondents (20) strongly agreed that all students actively participated in the exercises, suggesting that the simulation environment fosters engagement and collaboration. Active participation is key to the success of simulation-based training, as it allows students to apply theory to practical scenarios and interact with peers in real-world settings.
- **Simulation vs. Real-World Implementation:** Most respondents (16) felt that the implementation of procedures in the simulation center was identical to what they would experience in clinical practice. This is a positive outcome, indicating that the simulation center's training scenarios are realistic and reflective of the actual demands of ICU care. The realism of simulation exercises was highlighted as a critical factor in the effectiveness of training programs. As Tanner et al. (2022) found, simulations that closely mirror real-world conditions improve the transfer of learning to clinical practice. Our study echoes this sentiment, with most participants reporting that the simulation environment closely mirrored what they would encounter in clinical settings, thereby boosting their confidence in applying learned skills to real patients.
- **Confidence in Mastering Procedures:** A significant majority (17) felt confident that they had mastered the procedures for working with real patients after participating in the simulation exercises. This serves as a compelling sign of the simulation center's success in preparing nurses for roles in the ICU. However, it is important to continue assessing whether this confidence translates into performance in actual clinical settings

CONCLUSION

The results of this research highlight the significance of simulation-based training in preparing nurses with the crucial skills necessary for working in intensive care unit settings. Simulation offers a safe and controlled environment that allows nurses to practice high-risk procedures without putting patients at risk. Considering the complexity and demands of ICU care, simulation is a crucial method for developing the necessary competencies, particularly in high-pressure scenarios.

However, the research also highlights areas for potential improvement. Specifically, increasing the duration of training sessions, differentiating the curriculum based on participants' prior knowledge and experience, and ensuring that simulation scenarios are as realistic as possible are critical areas for enhancing the overall effectiveness of the simulation center's program.

Further research could explore the long-term impacts of simulation training on nurses' real-world performance in ICU settings and the potential benefits of ongoing simulation-based education throughout their careers.

ETHICAL STATEMENT

Permission to conduct the study was obtained from the Research Ethics Committee of the International Balkan University in December 2024.

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