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The Role of CPR Simulation in Nursing Adaptation Education: Comparison of the Effects of Traditional and Digital Approaches on Learning

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ABSTRACT

The importance of technological implementation in healthcare education cannot be understated when considering the enhancement of clinical proficiency and the assurance of patient safety. In the field of nursing education, the utilisation of simulation-based training has been identified as a pivotal pedagogical strategy for mitigating the discrepancy between theoretical knowledge and clinical practice. The advent of digital simulation tools has led to a re-evaluation of the efficacy of learning methods, particularly in critical skills such as cardiopulmonary resuscitation (CPR).

The objective of this study is to evaluate the comparative impact of digital and non-digital basic life support learning simulators on the outcomes of Cardiopulmonary Resuscitation (CPR) training among newly engaged nurses.

The study was conducted in 2025 with a sample of 97 nurses. Data were evaluated using descriptive statistics and paired t-tests. The study was conducted as a pilot within the scope of the EU- funded project "KA210-VET - Small- scale Partnerships in Vocational Education and Training (KA210-VET)-000175278." Based on the 2021 American Heart Association (AHA) guidelines, a CPR training module was developed. Participants underwent pre -test and post-test assessments and were evaluated through an application checklist. Two groups were formed: one received training via digital simulators, while the other used non-digital simulators.

The findings indicated that the group which trained with digital basic life support simulators demonstrated significantly enhanced CPR practical skills in relation to the group which trained with non-digital simulators. Digital simulation has been demonstrated to enhance the development of clinical skills, as evidenced by an improvement in simulated patient performance. Furthermore, the utilization of digital simulation has been shown to have a positive impact on the confidence levels of the participants. The utilisation of simulation-based learning, particularly in combination with digital technologies, has been demonstrated to positively influence the development of clinical skills within the context of nursing education. The integration of digital simulators within orientation programmes has been demonstrated to have a dual impact: firstly, it has been shown to enhance CPR performance, and secondly, it has been demonstrated to provide a safe and effective learning atmosphere. It is recommended that the use of digital simulation be expanded across a range of nursing procedures. This is expected to result in further enhancement of clinical competence and patient safety.

1. INTRODUCTION

The accelerated transformation experienced in technology today has profoundly impacted educational processes, as it has every aspect of life (Ergin Doğan & Aslan, 2024) . Technology has become an indispensable part of daily life; this has widespread use of new learning tools, simulation techniques, and digital applications in educational environments (Huang et al., 2021). Taking effective advantage of these opportunities offered by technology is of great importance not only in general education but also in areas that directly impact human life, such as healthcare (Erdem-Onder et al., 2022).

In the healthcare sector, the integration of technology and the opportunities it brings enable applications such as electronic health records, health information systems, and big data analytics to make clinical workflows more efficient, increase patient safety, and support decision-making processes (Bozkurt et al., 2021). These technological advances have also necessitated transformation in health education; particularly in clinical practice, the correct and effective use of technology in nursing education has become essential, and the need to ensure patient safety has come to the fore (Gungor et al., 2023). In applied professions such as nursing, because theoretical knowledge must be integrated with practical skills, simulations , virtual scenarios, standardized patients, and similar methods are used as important tools to develop students' cognitive and psychomotor competencies (Huang et al., 2021).

Significant changes have occurred in health education worldwide, particularly in clinical practice. The most important reason for this is the need to ensure patient safety during training (Gul, 2025) . The COVID-19 pandemic, in particular, has further strengthened the role of digital transformation and technological tools in education. The inadequacy of traditional methods in filling the gap between theoretical knowledge and clinical practice has necessitated the use of technological tools as bridges in nursing education. Nursing services encompass the process of making a nursing diagnosis, planning, implementing, and evaluating interventions, encompassing comprehensive evidence-based medical practices, requiring technical knowledge and skills, and relying on critical thinking skills (Sahin, 2021) . Nursing is a practical profession that requires the meaningful integration of theoretical content with practical skills. Various teaching tools and methods, such as simulators , virtual cases, scenarios , standardized patients, clinical practice, and so on, are used in nursing education to enhance students' cognitive and psychomotor skills learning activities (Yildirim et al., 2019).

In response to the rapid development and advancement of science and technology, hospitals have encouraged innovations in the field of healthcare to develop highly efficient and economical patient-centered care environments (Gao et al., 2022). The importance of digital transformation has revealed many opportunities in the field of education (Bozkurt et al., 2021). In the changing and developing world, it is expected that technological methods will be used in nursing education, which serve as a bridge to fill the gap created by traditional methods between theoretical knowledge and clinical practice (Sahin, 2021) . Increasing quality expectations in healthcare services have highlighted the need for qualified nurses with high clinical competence (Sahin, 2021). In the developing and changing healthcare service delivery , the need for qualified nurses with professional competence within the healthcare workforce is increasing daily (MoH, 2021). In this context, orientation and orientation training provided at the institutional level to increase the professional competence of nurses has become mandatory in line with the Quality Standards in Healthcare (QSH) (MoH, 2020).

1.1. LITERATURE BACKGROUND

Rapid advances in education and technology have necessitated the redefinition of professional competencies and the development of appropriate educational approaches. In the present situation, professional members can only adapt to changing technology by updating educational methods and integrating these into curricula. This is made possible by integrating innovation competence into healthcare (Ozdemir, 2023) . The American Nurses Association (ANA) defines innovation competence in nurses as the ability to actively research, develop, and implement new methods, technologies, and tools to improve health, prevent disease, and improve the quality of care. This approach also includes nurses integrating innovations into healthcare through teamwork and institutional support channels (Gao et al., 2022) . Simulation initially emerged as a teaching method used in the aviation industry, and over time it began to be widely used in high-risk sectors such as nuclear energy, commerce and healthcare (Gul, 2025) .

Simulations are teaching techniques that realistically mimic the clinical environment through tools such as role-playing, standardized patient use, interactive videos, and mannequins (Arslan and Sobcalı, 2022) . This method allows theoretical knowledge to be combined with practical applications, thus facilitating the learner's connection to real life (Koukourikos et al., 2021; Ozdemir, 2023) . This technique allows nurses with clinical experience to acquire skills without exposing

patients to any risk (Koukourikos et al., 2021) .

Simulation, particularly in the healthcare field, allows students to acquire clinical skills in a safe environment without exposing patients to any risk. Simulation-based learning is generally effective in acquiring cognitive, affective , and psychomotor skills and has become an important component of nursing and medical education (Ozdemir, 2023) . Clinical simulations continue to evolve as an innovative methodology that supports the standardization of learning and the reinforcement of skills through fully interactive experiences (Herrera-Aliaga & Estrada, 2022).

In the field of nursing education, the utilisation of simulations that facilitate skill development through the provision of realistic application scenarios has been demonstrated to enhance the quality of education and training processes. In this context, it is imperative for nurses to acquire experience in scenarios that they may encounter in real-life settings with the utilisation of simulators in a laboratory environment (Ergin Dogan and Aslan, 2024; Ozdemir, 2023) . These environments, which do not pose a real patient risk, contribute positively to the cognitive, affective, and psychomotor development of the individual. Historically, Mrs. Chase, the first full-body mannequin used in England, was developed to teach skills in nursing education and serves as a pioneering example in this field (Ergin Dogan & Aslan, 2024) . Today, intravenous access, urinary tract. In addition to low-fidelity models developed for procedures such as catheterization, high-fidelity digital simulators are also used. The simulation-based learning approach is classified into levels in Alinier's (2013) model, progressing from basic knowledge to a stage where clinical applications are performed with high-fidelity simulations (Gungor, 2023) .

In addition to the full body mannequin used in nursing education, intravenous arm models for catheterization , urinary pelvic models for catheterization have long been used in skills training, as have simulators with low fidelity (Erdem-Onder, 2022). Skills acquired through practical use with a simulator are quite instructive and permanent. Figure 1 The framework for simulation- based learning is presented. In this pyramid, the lowest level (level 0) refers to knowing basic information and concepts; levels 1 and 2 refer to demonstrating knowledge , skills, and attitudes by applying them in an educational environment and under observation; levels 1-3-4 refer to applying the requirements of the profession in real-life conditions; and levels 3-4-5 refer to using clinical practices through simulation (Alinier, 2013; Arslan & Sobcalı, 2022) .

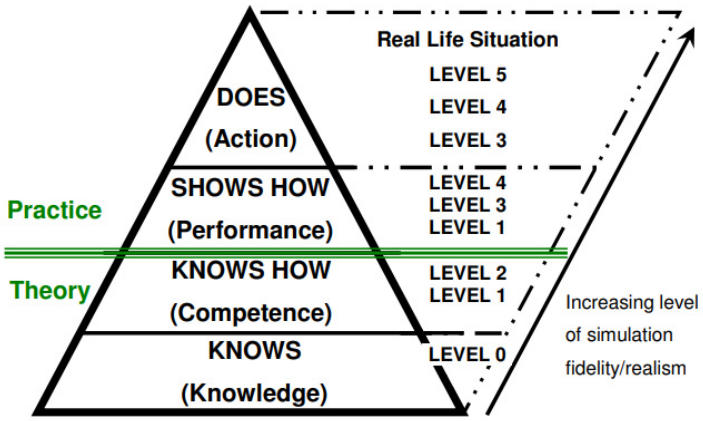


Figure 1: *Framework for acquisition of experience through practical and simulation based learning activities (Alinier, 2013)*

Today's technological advances have also impacted education, bringing about the integration of these two fields. Improving the skills and competencies of nurses who can adapt to advancements in education and technology will only be possible through the integration of educational methods adaptable to changing technology into professional orientation training programs (Ozdemir, 2023) . The ability of nurses to administer injections, establish intravenous access, and respond to actions or interventions on a simulator during practice has a positive impact on learning (Koukourikos et al., 2021) and is frequently used in undergraduate and postgraduate healthcare training (Yildirim et al., 2019) . In this context, digital life support simulators were incorporated into the skills laboratory established within a training and research hospital in the Mediterranean region. To effectively use these simulators in nurse orientation training, a pilot program was initiated based on the AHA 2021 guidelines, creating content, pretest and posttest questions, and an implementation checklist for CPR training. This study fills a significant gap in both national and international literature by evaluating the effectiveness of digital simulation in nursing orientation training. While traditional training methods have been widely employed, there is a growing demand for innovative, technology-enhanced approaches that can bridge the divide between theory and

clinical practice. The innovative aspect of this project lies in its integration of digital simulators into the training of recently graduated nurses. The tangible outcomes of the study are expected to enhance nurses' clinical skills, improve patient safety, and raise the quality of care. In the long term, the findings will contribute to shaping curricula, informing policy decisions, and delivering sustainable improvements in healthcare education. This study fills a significant gap in both national and international literature by evaluating the effectiveness of digital simulation in nursing orientation training. While traditional training methods have been widely employed, there is a growing demand for innovative, technology-enhanced approaches that can bridge the divide between theory and clinical practice. The innovative aspect of this study lies in its integration of digital simulators into adaptation training of newly graduated nurses. The tangible outcomes of the study are expected to enhance nurses' clinical skills, improve patient safety, and raise the quality of care. In the long term, the findings will contribute to shaping curricula, informing policy decisions, and delivering sustainable improvements in healthcare education. The present study aims to comparatively reveal the effects of digital and non-digital life support simulators on learning.

2. METHODS

Type of Study: The study was planned as a prospective descriptive study.

Research Universe and Sample: The study was conducted in 2025, and study population consisted of nurses who had started working at a tertiary education and research hospital in Antalya province within the last year. Of the 97 nurses who had started working in the last year, 11 from different clinics were included in the study.

Data Collection: The data collection process employed multiple instruments: pre-test and post-test questionnaires to evaluate knowledge acquisition, and a structured skills application checklist adapted from the 2021 AHA guidelines to measure performance accuracy. The checklist provided objective criteria for evaluating CPR steps, including compression depth and frequency, airway management, defibrillation use, and overall adherence to protocol.

Statistical Analysis: Data were analyzed using SPSS Statistics 22,0 The mean, standard deviation, and frequency distributions of the data and the sample for the effectiveness of the training were used in the analysis. Paired t test was performed. Statistical significance was assessed at $p<0,05$.

Ethical Approval: Scientific, ethical, and citation rules were adhered to throughout the research process; no falsification was made to the collected data, and the study was not submitted for evaluation to any other academic publication. Because this research used a pre-existing dataset, it does not require an ethics committee approval.

3. RESULTS

Digital and non-digital skill life support simulators in CPR training, a pilot study was conducted with 11 nurses who had only received theoretical training at our hospital within the past year. Following the data collection, necessary improvement efforts were initiated. The training was conducted by a competent and certified emergency room nurse in charge. Figure 2. shows the digital and non-digital skill life support simulators used in the training.

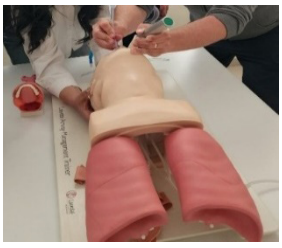
Non-digital skills life support simulator		Digital skills life support simulator	
			

Figure 2. *Digital and Non-Digital Skills Life Support Simulators*

A group of 11 people received CPR training using the traditional training method. This training lasted approximately two hours. The effectiveness of the training was monitored before and after the traditional training with pre-tests and post-tests. After the traditional training, the group was divided into two groups of 6 and 5. Six of the participants received non-digital skills life skills previously taught at our hospital. support The practice was performed on a simulator, and the

practice training was evaluated with a checklist. Table 1 presents the socio -demographic data of the nurses included in the study. All of the nurses included in the training had a bachelor's degree, 63,6% worked in surgical clinics, the majority had worked in both the profession and the hospital for 12-18 months, and all had previously received theoretical CPR training.

Table 1 : *Socio -Demographic Characteristics*

		N	%
Education	Licence	11	100,0
Unit	Internal Clinic	3	27,3
	Surgical Clinic	7	63,6
Professional Experience	11 Months and Under	1	9,1
	12-18 Months	10	90,9
Working in the Hospital	11 Months and Under	1	9,1
	12-18 Months	10	90,9
Previous Education	Yes	11	100,0

To determine the study analysis method, normal distribution was made and according to the result, Sample The effectiveness of the training was evaluated with the paired t test (Figure 3).

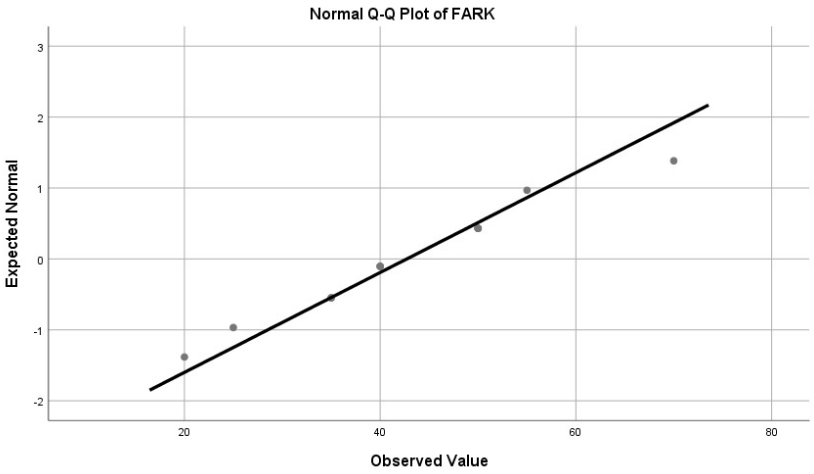


Figure 3. *Normality Tests*

The mean pretest score of the nurses included in the training was determined to be 47,64±10,61 and the post-test mean score was determined to be 87,27±7,54. The CPR training score averages of the nurses were quite high in the post-test and the pre-test-post-test mean difference was 39,64 and there was a statistically significant difference between the pre-test and post-test mean scores in the paired sample t-test analysis (p>0,05) (Table 2).

Table 2. *Pre - Test-Post-Test Results*

Paired Samples Statistics

	Mean	N	Std . Deviation	Std . Error Mean	t	df	p
Pre-Test	47,64	11	10,61	3,19736	-9,216	10	**0,000**
Final Test	87,27	11	7,54	2,27273			

p <0,005

As demonstrated in Table 3, the question-based distribution of the pre-test and post-test results of the training is presented. When the question-based distribution is examined, a statistically significant difference is found between the pre-test and post-test mean scores in the paired sample t-test analysis of questions 1-2-5-10-13-18-19-20 (p>0,05) (Table 3).

Table 3. *Pre-test Post-test Question-Based Distribution (n=11)*

	Paired Differences					t	df	p
	Mean	SD	Std . Error Mean	95% Confidence Interval of the Difference				
				Lower	Upper			
Question 1	-3,182	2,523	0,761	-4,877	-1,487	-4,183	10	**0,002**
Question 2	-2,727	2,611	0,787	-4,481	-0,973	-3,464	10	**0,006**
Question 3	-0.455	2,697	0,813	-2,266	1,357	-0,559	10	0,588
Question 4	-0.909	2,023	0,610	-2,268	0,450	-1,491	10	0,167
Question 5	-2,727	2,611	0,787	-4,481	-0,973	-3,464	10	**0,006**
Question 6	-1,000	4,123	1,243	-3,770	1,770	-0,804	10	0,440
Question 7	-0.455	1,508	0,455	-1.467	0,558	-1,000	10	0,341
Question 8	-2,727	2,611	0,787	-4,481	-0,973	-3,464	10	0,006
Question 9	-0.455	2,697	0,813	-2,266	1,357	-0,559	10	0,588
Question 10	-0.455	1,508	0,455	-1.467	0,558	-1,000	10	0,341
Question 11	-3,636	2,335	0,704	-5,205	-2,067	-5,164	10	**0,000**
Question 12	-2,273	3,438	1,037	-4,582	0,037	-2,193	10	0,053
Question 13	-2,273	3,438	1,037	-4,582	0,037	-2,193	10	0,053
Question 14	-2,727	2,611	0,787	-4,481	-0,973	-3,464	10	**0,006**
Question 15	-1,364	3,233	0,975	-3,536	0,809	-1,399	10	0,192
Question 16	-1,818	3,371	1,016	-4,083	0,446	-1,789	10	0,104
Question 17	-1,818	2,523	0,761	-3,513	-0,123	-2,390	10	0,038
Question 18	-3,182	3,371	1,016	-5,446	-0,917	-3,130	10	**0,011**
Question 19	-1,818	2,523	0,761	-3,513	-0,123	-2,390	10	**0,038**
Question 20	-3,636	2,335	0,704	-5,205	-2,067	-5,164	10	**0,000**

*** SD: Std. Deviation**

3.1. Application Results

After theoretical training, the group was divided into two, and the participants received practical training. The CPR application was evaluated by the trainer using a checklist as "Applied Correctly, Partially I Applied, or no Applied". Table 4 presents the evaluation of the effectiveness of the digital and non-digital skill life support simulators. While the number of participants performing CPR correctly with the non-digital skill life support simulator was high, the number of those not performing correctly was also substantial. Furthermore, when examining the CPR application results with the digital skill life support simulator, it was observed that the majority performed correctly, with only one participant making an error in one of the steps. The digital simulator provides audible responses (cough and groan sounds), a VF scenario is entered on the simulator-specific tablet, visually displaying rhythms, demonstrating effective depth and correct location of CPR, normal patient data (such as BP and respiratory rate), and normal pulses on the tablet are believed to positively motivate nurses and contribute to learning. The feedback received from participants supports our views. The feedback received from the participants at the end of the training is listed below.

- I learned how to perform CPR on the patient completely and effectively.
- I learned the importance and interval of chest compressions and the importance of continuous cardiac compressions in effective CPR practice.
- More comfortable, better practice-oriented, feeling the pulse or seeing if I was doing CPR correctly had a positive impact on learning.

Table 4 . *Non-Digital Simulator Application Results*

	Non-digital skills life support simulator						Digital skills life support simulator					
Questions	**Applied Correctly**		**Partially Implemented**		**No apply**		**Applied Correctly**		**Partially Implemented**		**No apply**	
	n	%	n	%	n	%	n	%	n	%	n	%
Ensuring the safety of oneself and the patient/injured	6	100,0					5	100%				
Checking the state of consciousness by verbal warning or tapping on the shoulder	5	83,3			1	16,7	5	100%				
Activating code blue	4	66,7			2	33,3	5	100%				
Requesting emergency equipment	4	66,7			2	33,3	4	80%			1	20%
Placing the patient/injured in a supine position	6	100,0					5	100%				
Breathing control: Monitor breathing for 5-10 seconds Check pulse (not longer than 10 seconds; carotid pulse).	4	66,7	1	16,7	1	16,7	5	100%				
Starting heart massage; determining the center by determining the lower and upper end of the sternum , determining the lower half of the midpoint, and placing the hand in the correct position on the chest	2	33,3			4	66,7	5	100%				
Compression depth: 5-6 cm (adult)	4	66,7			2	33,3	5	100%				
Full chest recoil: Monitoring complete relaxation between compressions	5	83,3			1	16,7	5	100%				
30:2 compression- ventilation ratio (compression only if untrained)	6	1000					5	100%				
Correcting head-chin position	5	83,3			1	16,7	5	100%				
Checking whether the air is coming back by observing, feeling and listening to the breath	5	83,3			1	16,7	5	100%				
soon as the AED/ defibrillator arrives , turn on the AED and attach the electrodes to the patient.	4	66,7			2	33,3	5	100%				
If shock is recommended, remove all persons from the patient and	4	66,7			2	33,3	5	100%				
Continuing CPR immediately after the shock	5	83,3			1	16,7	5	100%				
IV/IO access: Establishing vascular access (for medications)	4	66,7			2	33,3	5	100%				
Drug administration: - Epinephrine: 1 mg IV/IO, repeated every 3-5 minutes. - Amiodarone: 300 mg IV/IO (followed by 150 mg) in VT/ VF . / - Lidocaine: Alternative if amiodarone is not available.	4	66,7			2	33,3	5	100%				
Defibrillation (shockable rhythms: VF/VT): - Biphasic AED: 120-200 J (device dependent).	6	100,0					5	100%				
Immediately continue CPR after shock	6	100,0					5	100%				
Airway management: - Endotracheal tube or supraglottic airway (IGEL/LMA) insertion	6	100,0					5	100%				
Fixation of the endotracheal tube	4	66,7			2	33,3	5	100%				
with a bag valve mask every 5-6 seconds	6	100,0					5	100%				
Apply pressure 100-120 times per minute	5	83,3			1	16,7	5	100%				
Carbon dioxide monitoring (verify tube position with EtCO2, target: 35-40 mmHg).	3	50,0			3	50,0	5	100%				
Checking whether the air is coming back by observing, feeling and listening to the breath	6	100,0					5	100%				

4. DISCUSSION AND CONCLUSION

This study aimed to determine the learning effects of using digital and non-digital skill life support simulators in CPR training. The study found that the digital skill life support simulator was more effective in CPR training than the standard simulator.

The nursing profession is a discipline that integrates theoretical knowledge and clinical practice skills (Arslan and Sobcalı, 2022) . The increasingly complex structure of healthcare services necessitates the adoption of innovative and up-to-date approaches in the education of healthcare professionals (Özdemir, 2023) . In this context, nurses are one of the fundamental building blocks of the healthcare system, and improving the quality of care depends on both educational processes and continuous training throughout the professional life (Gao et al., 2022; Gungor, 2023; Herrera-Aliaga & Estrada, 2022)) .

The importance of scientific knowledge is increasing and healthcare practices are changing rapidly (Yildirim et al., 2019) . In line with this change, the holistic use of theories and theories in nursing education is becoming prominent (Arslan & Sobcalı, 2022) . Simulation-based learning theory is widely used in nursing education, as in other health professions, and is based on a learner-centered, interactive, and experiential approach (Yildirim et al., 2019) . While the simulation method aims to develop students' critical thinking skills, it facilitates the integration of theoretical knowledge and clinical skills (Arslan & Sobcalı, 2022) . Since knowledge and skills in cognitive, affective , and psychomotor domains must be acquired in nursing education, the use of current teaching methods together with traditional methods is inevitable. These methods support active learning in learners and enable the development of higher-level cognitive skills (Koukourikos et al., 2021) , and skills training through simulation methods is becoming increasingly widespread (Ozdemir, 2023).

Nursing education focuses on cognitive, affective , and psychomotor domains. Therefore, it is inevitable to use current teaching methods in conjunction with traditional/classical teaching methods. Current teaching methods and techniques are important for developing active learning and higher-order thinking (Ergin Dogan & Aslan, 2024). The integration of digital learning tools into the educational process both increases the quality of teaching and makes learning more efficient (Atanı & Kocasarac, 2022). In this context, the study in question observed that the use of digital simulators had positive effects on learning outcomes. Simulation is an important educational technique that aims to develop the knowledge, skills, and attitudes of healthcare professionals and to disseminate these gains, and it minimizes the risk of errors by providing students with a realistic learning environment (Koukourikos et al., 2021).

highlights the increasing use of simulation applications in the field of nursing. Postgraduate theses in the field of nursing fundamentals in Türkiye have indicated an increase in simulation- related studies over the years (Erdem-Onder et al., 2022). A study on the effects of innovative technology use on nursing in infectious diseases and infection control has indicated that methods such as artificial intelligence, information and communication technology, simulation technology, and e-learning are frequently used and have a positive impact on learning (artificial intelligence, information and communication technology, simulation technology, and e- learning)(Huang et al., 2021) . Promoting innovative nursing skills can improve the quality of medical services, increase work efficiency, enhance treatment effectiveness, reduce healthcare costs while meeting patient needs, increase the effectiveness of care services, improve access to healthcare services, and simplify the process involved in providing such services (Gao et al., 2022) . Simulation -based medical teaching and learning techniques are among the most popular methodologies for improving the quality of education in the field of healthcare in recent years. It has been observed that the use of simulation in women's health nursing education has increased in recent years, but is not sufficient (Er Korucu & Uslu Şahan, 2021). The Ministry of Health has published a guideline outlining the core competencies expected of nurses responsible for general care in healthcare service delivery and to standardize these competencies into national standards (MoH, 2021).

The findings of this study emphasize the unique role of digital simulation in improving CPR skills during nursing orientation. Compared to traditional methods, digital simulators not only enhanced clinical competence but also boosted learners' confidence levels. Incorporating these findings into nursing curricula could help increase patient safety and lead to better long-term clinical practice outcomes. However, the study has limitations: the small sample size from a single institution restricts how broadly the results can be applied. Future research should involve larger, more diverse groups, assess different nursing skills, and include long-term follow-up to evaluate the lasting impact of digital simulation training. Addressing these points will strengthen the evidence base and support wider adoption of simulation technologies in nursing education.

Consequently, acquiring and developing the skills necessary for new graduate nurses to effectively integrate into the clinical environment is crucial. This study has demonstrated that the use of innovative digital technology-based educational tools, in addition to traditional teaching methods, contributes positively to the learning process. The development of clinical skills and professional competencies is as crucial as the theoretical knowledge of novice nurses. In this regard, not only in CPR practices, but also in establishing intravenous access, injections (intramuscular and subcutaneous), and urinary tract infections, is crucial. The use of digital simulators will also make significant contributions to basic nursing practices such as catheter insertion, pressure sore care, and patient mobilization. Digital simulation -based health education provides learners with a safe, structured, and risk-free learning environment, supporting both individual development and contributing to patient safety.

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5. REFERENCES

Alinier, G. (2013). Effectiveness of the use of simulation training in healthcare education, University of Hertfordshire, https://uhra.herts.ac.uk/id/eprint/16475/.

Arslan, S., Sobcalı, S. (2022). The Use of Simulation in Nursing Education. In S. Akalın, A., Arslan (Ed.), Simulation in Nursing Education. Academician Bookstore.

Atanı, F., Kocasarac, H. (2022). Digital Learning And Teaching Tools. Civilization Education and Research Journal, 6(2), 1–17.

Bozkurt, A., Hamutoglu, NB., Liman Kaban, A., Taşçi, G., Aykul, M. (2021). Digital information Age: Digital society, digital transformation, digital education and digital competencies. AUAd , 7(2), 35–63. https://doi.org/10.51948/auad.911584

Er Korucu, A., Uslu Şahan, F. (2021). Proceedings Of The National Congress On Simulation In Health Education. Examination Of Graduate Theses Based On Simulation In The Field Of Women's Health Nursing In Turkiye, Ses, 6.

Erdem-Önder, H., Taşkiran, N., Sari, D. (2022). A Systematic Analysis of Thesis Made Related to Simulation in the Field of Fundamentals of Nursing in Turkey. Ordu University Journal of Nursing Studies, 5(3), 440–452. https://doi.org/10.38108/ouhcd.1020511.

Ergin Doğan, S., Aslan, H. (2024). Current Learning Methods and Techniques Using in Nursing Education. Bingöl University Health Journal, 5(1), 224–235. https://doi.org/10.58605/bingolsaglik.1448021.

Gao, L., Lu, Q., Hou, X., Ou, J., & Wang, M. (2022). Effectiveness of a nursing innovation workshop at enhancing nurses ' innovation abilities: A quasi-experimental study Nursing Open, 9(1), 418–427. https://doi.org/10.1002/nop2.1080.

Gül, DU (2025). The Use of Simulation-Based Methodologies in Health Education. In M. Dalkılıc (Ed.), New Developments in Health and Life Sciences. Duvar Publications.

Gungor, DC., Ozkutuk, N., Orgun, F. (2023). Reflections of Changing and Developing Technologies in Nursing Education. Health Resort Academician Journal, 10(1), 146–152. https://doi.org/10.52880/sagakaderg.1120307.

Herrera-Aliaga, E., Estrada, L. D. (2022). Trends and Innovations of Simulation for Twenty First Century Medical Education. Frontiers in Public Health, 10:1–7. https://doi.org/10.3389/fpubh.2022.619769.

Huang, F., Brouqui, P., Boudjema, S. (2021). How does it innovative technology impact nursing in infectious Diseases and infection control? A scoping review. Nursing Open, 8(5), 2369–2384. https://doi.org/10.1002/nop2.863.

Koukourikos , K., Tsaloglidou , A., Kourkouta , L., Papathanasiou, IV, Iliadis , C., Fratzana , A., Panagiotou, A. (2021). Simulation in clinical nursing education. Acta Informatica Medica, 29(1), 15–20. https://doi.org/10.5455/AIM.2021.29.15-20.

Ozdemir, B. (2023). Use of Hybrid Simulation in Nursing Education. TUSBAD, 6(3), 86–93.

Sahin, B. (2021). A Technological Approach To Nursing Education: E-Learning. Turkish Journal of Health Sciences and Research, 5(1), 31–41.

MoH. (2020). Quality Standards in Healthcare (QHS)-Hospital-Version 6. https://dosyamerkez.saglik.gov.tr/Eklenti/41258/0/skshastane-seti-s-61--09082021pdf.pdf.

MoH. (2021). Basic Competencies in Nursing Guide, (2021). https://ekutuphane.saglik.gov.tr/Yayin/587.

Yildirim, D., Ozer, Z., Kocaagalar, E., & Pinar Bölüktaş, R. (2019). Innovation in Education: Simulation Usage in Health Education. Journal of Information Economics and Management, 14(1), 33–41.

ANNEX 1: Pre-test and post-test question list

1. How deep should chest compressions be during adult CPR?

A) 2-3 cm

B) 3-4 cm

C) 4-5 cm

D) 5-6 cm

E) 6-7 cm

2. What should be the rate of chest compressions during CPR?

A) 60-80/minute

B) 80-100/minute

C) 100-120/minute

D) 120-140/minute

E) 140-160/minute

3. AED (Automatic External Which of the following should not be done when using a defibrillator ?

A) Not touching the patient

B) Applying shock when shock is recommended

C) The patient is on a wet surface

D) Listening to AED instructions

E) Continuing CPR

4. What is the chest compression and breathing rate during adult CPR?

A) 15:2

B) 20:2

C) 30:2

D) 50:2

E) 5:1

5. How many seconds should each breath last during respiratory support in adults?

A) 0.5 seconds

B) 1 second

C) 2 seconds

D) 3 seconds

E) 5 seconds

6. What are the shockable rhythms?

A) Asystole and PEA

B) Ventricular Fibrillation (VF) and Ventricular Tachycardia (VT)

C) Sinus tachycardia and Atrial fibrillation

D) Bradycardia and Atrial flutter

E) None

7. What is the dosage and frequency of adrenaline administration?

A) 0.5 mg IV/IO every 5-10 minutes

B) 1 mg IV/IO every 3-5 minutes

C) 2 mg IV/IO every 10 minutes

D) 0.1 mg IV/IO every 1 minute

E) 5 mg IV/IO every 15 minutes

8. Antiarrhythmic drugs used in IKYD ?

A) Adrenaline

B) Atropine

C) Amiodarone

D) Dopamine

E) All

9. In which situation should CPR be started?

A) If the patient is unconscious and not breathing

B) If the patient is unconscious and breathing

C) If the patient is conscious and not breathing

D) If the patient is conscious and breathing

E) None

10. What is the main duty of the team leader in IKYD?

A) Perform CPR

B) Preparing the medicines

C) Managing the algorithm and ensuring coordination

D) Using the defibrillator

E) None

11. How long should chest compressions be interrupted during CPR?

A) Less than 5 seconds

B) Less than 10 seconds

C) Less than 15 seconds

D) Less than 20 seconds

E) Less than 30 seconds

12. Which of the drugs used in IKYD is used in the treatment of bradycardia ?

A) Adrenaline

B) Amiodarone

C) Atropine

D) Lidocaine

E) All

13. Ventricular in IKYD What should be done first in case of fibrillation (VF)?

A) Adrenaline application

B) Immediate defibrillation

C) Continue CPR

D) Amiodarone administration

E) None

14. How much air should be given with each breath during respiratory support in adults?

A) 400-500 ml

B) 500-600 ml

C) 600-700 ml

D) 700-800 ml

E) 800-1000 ml

15. Which is the most important consideration during advanced cardiac life support (ACLS) according to the AHA 2020 guidelines?

A) Endotracheal rapid intubation

B) Maintaining the target body temperature

C) High-quality cardiopulmonary performing resuscitation (CPR)

D) Using vasopressin instead of epinephrine

E) Defibrillation should be performed only after 5 minutes.

16. According to the AHA 2020 guidelines, what is the most important first aid in out-of-hospital cardiac arrest ?

A) Checking the pulse

B) Delaying defibrillation

C) Initiate high-quality CPR

D) Endotracheal lavage intubate

E) Administering amiodarone

17. Which of the following is a recommended method for advanced airway management?

A) Nasogastric tube insertion

B) Using only the jaw thrust maneuver

Endotracheal grafting to ensure advanced airway security intubation

D) If the patient is conscious, oropharyngeal airway insertion

E) Postponing airway management

18. Which medication is not recommended during cardiac arrest ?

A) Atropine

B) Epinephrine

C) Amiodarone

D) Lidocaine

E) Magnesium sulfate

19. Requires emergency defibrillation during ACLS ?

A) Asystole

B) Pulseless ventricular tachycardia

C) Bradycardia

D) Hypotension

E) Atrial fibrillation

20. When vascular access cannot be provided in IKYD, which of the following methods should be preferred as the second?

A) Intraosseous

B) IM

C) Intradermal

D) Endotracheal

E) SC