

The Impact Of Modern Technology On Developing Nursing Skills

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Abstract

Background: In the present times the field of medical is shifting towards the usage of latest technology, and this is a well-known fact that nurses are the center of patient care and supervision, hence it is required that the nursing staff should be versed with the present systems and tools of modern technology. This present study will evaluate the impact of modern technology on the development of skills in nurses in Saudi Arabia.

Study Objective: This study is based on the assessment of the impact of modern technology on nursing skills, hence the main objective of the study will be to find the extent of learning based on modern technology and usage of the same by nurses at professional level.

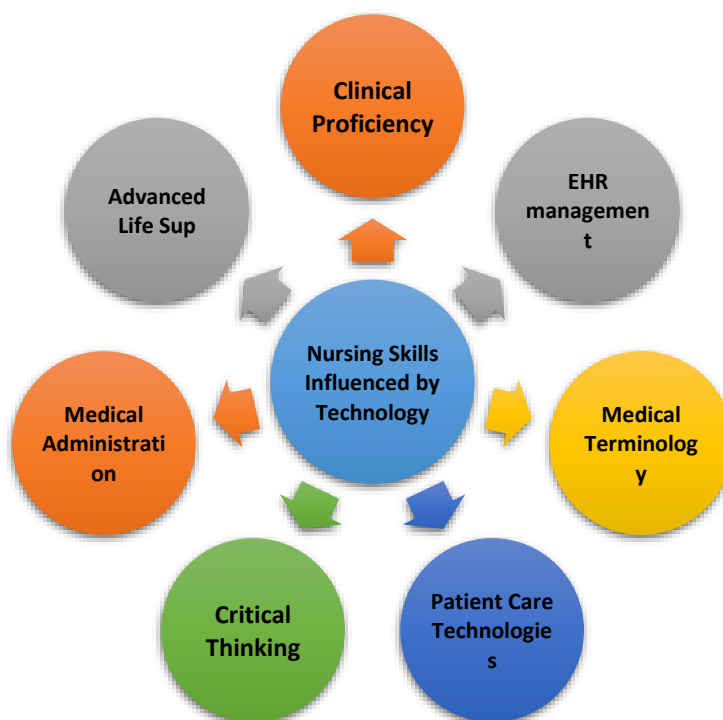
Materials and Methods: Study is based on two cities of Saudi Arabia i.e. Jeddah and Taif. The researcher has selected 5 hospitals (3 in Jeddah and 2 in Taif) for working nurses and 3 nursing colleges (2 in Jeddah and 1 in Taif) for final year students of nursing course. The sample of the study was 300 respondents. Study includes Descriptive Cross sectional study design and uses correlation analysis as statistical tool. SPSS ver. 27.0 will be used to analyze the data.

Keywords: Nurses, Modern Technology, EHR, Simulation, Impact on nurses, Skill development.

Introduction

By offering nurses and other learners interesting, easily accessible, and efficient educational experiences, technology has become a vital component of today's learning environment and may help them stay current with the newest trends and best practices in their industry. (Alqahtani et al 2022) With the widespread use of personal digital assistants (PDAs) and other technical tools, technology-supported learning in the nursing industry has changed. Through the use of visual, aural, and tactile techniques, technology enables interactive learning experiences that interest students. For example, virtual reality experiences, interactive simulations, and movies are frequently incorporated into online nursing courses to give students practical, immersive learning opportunities. (Bahari et al 2022) Technology usage for educational purposes has increased at an unprecedented rate as a result of the COVID-19 epidemic and social distancing tactics. As a result of the pandemic, nursing schools and other higher education institutions worldwide have been forced to switch to online learning. Technology use plays a critical role in facilitating learning across higher education institutions. Recently, technology has become an essential component in teaching and learning. Technology can significantly improve learning for nurse researchers by offering resources and technologies that make information access, networking, and collaboration easier. Research has indicated that nurse researchers can enhance their information access and stay current with the most recent discoveries by utilizing internet databases, search engines, and electronic health records. (Innab et al 2022). A fully immersive digital environment is produced via virtual reality, whereas augmented reality superimposes digital data on the real world. Nurse researchers can practice clinical skills and

procedures in a safe and controlled setting with simulation technology, which helps them hone their abilities and build confidence before dealing with actual patients. Virtual patient simulators and task trainers are two examples of simulation technology that has been shown to be an effective means of improving nurses' skill development. According to studies, decision-making and clinical skills can be enhanced by simulation training. From time-saving software to life-saving equipment, nursing technology plays a critical role in enhancing patient care and outcomes, encouraging nursing innovation, and guaranteeing patient safety. (Alqahtani 2023). Nurses can manage more work, streamline procedures, and enhance teamwork with today's technology. The best thing about nursing technology is that it allows nurses to spend more time with patients and engage them in their care and treatment. Technology is transforming numerous healthcare professions, including nursing. Digital tools like electronic health records and Skype are improving patient care and altering the way nurses treat patients. This study examines the various digital tools that nurses use on a daily basis and how technology is transforming the way that nurses care for patients from the moment of diagnosis until they recover. Technology's role in nursing has become more and more significant in the setting of the ever-evolving healthcare landscape. (Alammar et al 2022)



Technological developments are changing how nurses interact with patients, plan care, and navigate intricate healthcare networks. Digital nursing tools and telemedicine platforms are examples of these developments. Incorporating these technology advancements produces a number of challenges, such as moral dilemmas and the need for specialized training, in addition to increasing production. Technology has the ability to enhance patient outcomes and care delivery, according to some, while others argue that it could potentially compromise nursing's compassionate nature. With an emphasis on how modern tools can either support, empower, or challenge nursing practitioners in their daily job, this study aims to explore the various ways that technology has impacted nursing. This research aims to explore both the advantages and challenges that technology will provide in order to provide a comprehensive knowledge of the role that technology will play in nursing in the future. (Innab et al 2023). This study is especially important since the use of technology in nursing practice has transformed healthcare. The paper examines the advantages of contemporary tools including digital monitoring devices, telehealth platforms, and electronic health records (EHRs), highlighting how these developments improve patient care, expedite workflows, and lower errors. The significance of preserving compassionate care in addition to technological competence is further clarified by this study, providing insightful information for nursing education. The creation of thorough training

programs that strike a balance between interpersonal and technical abilities can be aided by these findings. The paper also discusses wider policy implications by pointing out methods for integrating technologies in ways that put patient-centered outcomes and ethical behavior first. Ultimately, this study advances a comprehensive understanding of the potential and difficulties that contemporary nursing technology presents, pointing practitioners, educators, and politicians in the direction of long-term improvements in healthcare.

Review of Literature

Technology has revolutionized nursing education and training by enabling online learning and modeling scenarios that nurses might face in the real world. These digital tools allow nurses to practice and hone their skills without putting patients in danger, providing them with a risk-free learning environment. (Oh KM et al 2023) The quality of care that nurses give patients gradually improves because technology allows them to receive training at their own leisure and at their own pace. Finding the Right Balance Between Human Interaction and Technology in Nursing As the digital world progresses, it becomes increasingly difficult to maintain the human aspect of nursing while incorporating technology into patient care. (Pascua et al 2024) A crucial aspect of being a nurse is developing a human connection with patients. There is more to becoming a nurse than only handling information or performing medical treatments. It is feasible to achieve a balance between the technological and human elements of the profession by using effective communication techniques, sympathetic patient interactions, and appropriate technology use. (Tail STS et al 2024) When used properly, technology can actually enhance empathy and comprehension. Digital tools may facilitate communication and help illustrate concepts that are hard to understand when presented orally. (AlSadah et al 2025) For example, showing a patient the results of a scan or X-ray on a tablet and calmly going over the results can help the patient better understand their health. It's critical to stay current on any technological advancements. Always remember that empathy is a critical nursing skill that requires a good balance. (Lee et al 2023) Your touch, your words, and your friendly, professional manner can all be used to reassure your patients. Using mobile devices has also made administrative work much easier. Numerous medical applications provide instantaneous vital sign documentation, drug administration, and other nursing duties. As a nurse, you have the ability to enter information into a patient's record right at the patient's bedside, eliminating the need to recall and record it later. (Smith et al 2022). Systems for automated administration, such as bar-coded patient identification and automated medicine distribution, have taken the role of labor-intensive, manual tasks. (Wang et al 2022) These technologies lessen the possibility of mistakes by ensuring that the right medication is given to the right patient at the right time. For this reason, you will be able to spend less time on administrative duties and more time on delivering high-quality care. It has been discovered that integrating technology into therapeutic settings fosters creativity and makes sound decision-making easier. (Martinez et al 2021); (Brown et al 2023) Even while technology-assisted teaching and learning in nursing school has many advantages, there are still barriers preventing this quickly evolving teaching approach from progressing further. Even though technology can improve nursing education, some educators and nurse managers question its effectiveness and see it as disruptive, particularly in clinical settings. Sixteen Even today, some teachers still choose conventional teaching and learning strategies over those that rely on technology. (Tanaka et al 2024)

Research Gaps

With the reviews mentioned above it was found that many good studies have been conducted in the past, that are either review based studies or have included primary data. There were some research gaps identified, that are mentioned below:

- There were separate studies that were focused on the learning of technology at course level and application of technology at job level; a very few studies have included both the aspects.
- Then only a few studies have given importance to enhancement of nursing skills specifically in Saudi Arabia, rather studies were more focused on work culture, job satisfaction, job challenges, etc. but the impact of technology on nursing skills was least covered.

This present study will evaluate the scenario of nursing skills and impact of technology on the same. Researcher will try to include both the aspects i.e. learning of technology at course level and

application of technology at job level. This process will certainly clarify the impact of modern technology on the nursing skills.

Research Objective

This study is based on the assessment of the impact of modern technology on nursing skills, hence the main objective of the study will be to find the extent of learning based on modern technology and usage of the same by nurses at professional level.

Hypothesis

H₀: There is a significant and positive relationship between the advent of technology and usage of the same by nurses in Saudi Arabia, at professional level.

H₁: There is no significant relationship between the advent of technology and usage of the same by nurses in Saudi Arabia, at professional level.

Research Methodology

Research Design

As this present study is based on primary data hence the researcher has used descriptive cross sectional research design. As the topic of this present study is to assess the impact of modern technology on nursing skills, hence it is being divided in two parts:

- Firstly evaluating the state of technology adoption at course level and learning outcomes.
- Secondly application of modern technology tools at professional level.

The researcher has considered some final year students from nursing colleges in selected cities of Saudi Arabia and then some of the working nurses from selected hospitals to carry out the study. These sample units will present the clear impact of modern technology on nursing skills.

Study Area and Population

The main focus of this present study will be on Jeddah and Taif cities of Saudi Arabia. There are around 19 multi-speciality hospitals in these cities and about 10 nursing colleges. The researcher has selected 5 hospitals (3 in Jeddah and 2 in Taif) for working nurses and 3 nursing colleges (3 in Jeddah and 2 in Taif) for final year students of nursing course. It was taken care of that the selected nursing colleges are having the facilities of simulation labs, e-learning platforms, and digital assessments for practical learning of the students; then hospitals were chosen where the nurses were having exposure to Electronic Health records (EHR), AI-based decision support, telehealth, and mobile health apps.

Sampling

Stratified Random sampling procedure was used to carry out this study.

Considering the limitation of time and resources the researcher has selected 300 respondents from the above mentioned nursing colleges and hospitals. The bifurcation of the sample is as follows:

- Nursing students in the final year of their course. The number of such nursing students will be 200.
- Then 100 of the working nurses were chosen with a condition that each of them must have minimum one year of working experience in the same hospital.

Tool of Data Collection

Data was collected by using a detailed structured questionnaire, that will include the following parts:

- Demographic details
- Practical learning of tools related to modern technology
- Awareness about the technological aspects
- capability of using the modern day technology for better patient care
- Details of Challenges and barriers if any.

The questionnaire included the scale based questions, multiple choice questions, open ended questions, etc. This questionnaire was exercised in a face to face interaction with the respondents.

Statistical Analysis

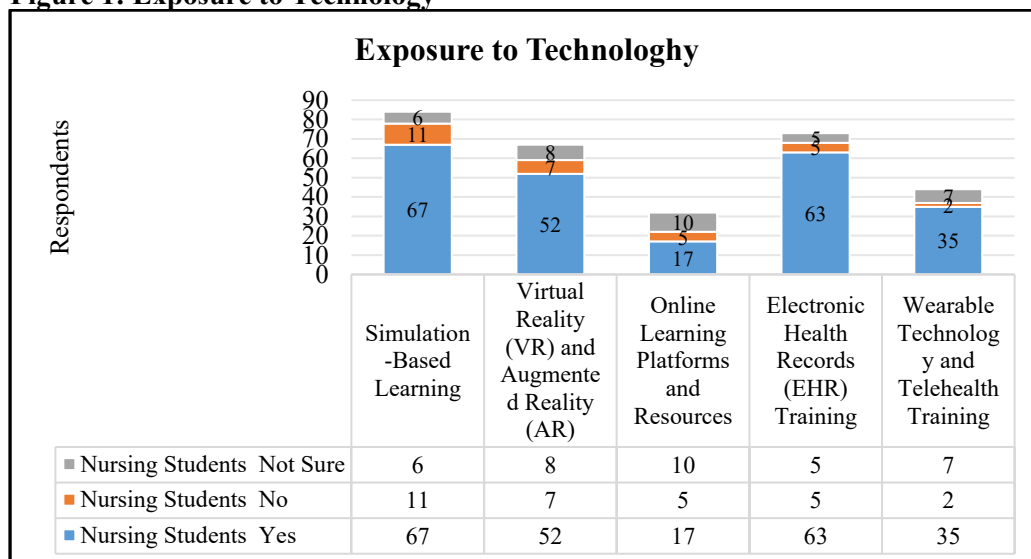
The data collected by the use of above questionnaire was analyzed using SPSS Ver. 27.0, where the major statistical tool of data analysis was Chi Square test. The main aim of using Chi Square tests was to determine the level of variation in the responses of all type of respondents and reach the conclusion to accept or reject the hypothesis.

Data Analysis and Interpretation

Table 1: Exposure to technology

Technology	Nurses and Nursing Students			Total
	Yes	No	Not Sure	
Simulation-Based Learning	67	11	6	84
Virtual Reality (VR) and Augmented Reality (AR)	52	7	8	67
Online Learning Platforms and Resources	17	5	10	32
Electronic Health Records (EHR) Training	63	5	5	73
Wearable Technology and Telehealth Training	35	2	7	44
	234	30	36	300

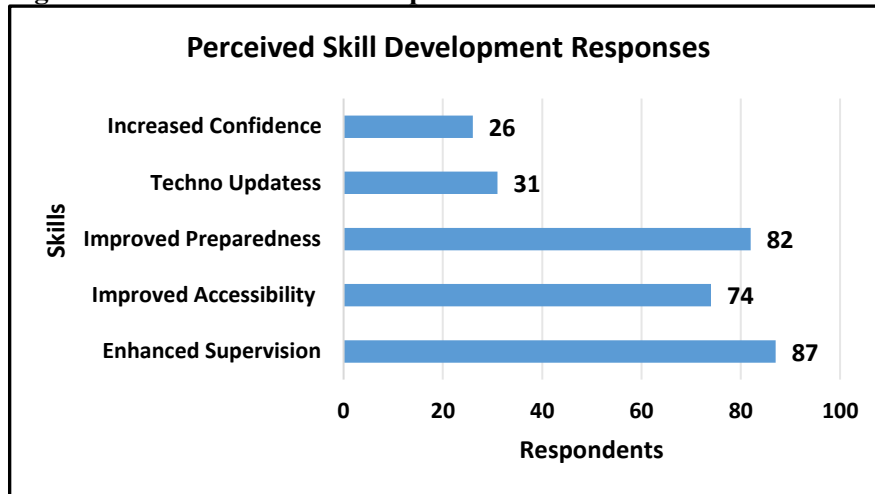
Figure 1: Exposure to Technology



As can be seen from the above table 1 and figure 1, most of the nurses and nursing students were found to be aware about the usage and application of modern technology in nursing profession and the

usefulness of the same in developing their skills for patient care to the next level. As far as nursing education is concerned, simulation based exercises and recording & accessing the HER (Electronic health records) are the major platforms that have given edge to the nurses at their educational level. Although a few of them never get a chance to access these tools at their educational level and they learned the same at the time of their professional tenure. Then some of the nurses have learn about the wearable devices capable of health supervision and surveillance of the patients. A few of them got a chance at their educational level and most of them got to know about the wearable devices (practical application) at professional level.

Figure 2: Perceived Skill Development of Nurses



As can be seen from the above figure 2, most of the nurses and nursing students have stated that their skills have improved by the usage and application of modern technology tools in nursing education and in nursing profession. They stated that as of now they are prepared to supervise (29%) the patients better and handle the emergency cases with more efficiency. Then secondly they found themselves prepared well (27%) for patient care and saving lives. In the present times the medical record keeping is more online as compare to offline and the modern technology tools have provided them ground to understand and interpret them. Then some of the nurses stated that their confidence for patient care has improved and other stated that modern technology had helped them in getting update to the recent technological development in the field of patient care.

Hypothesis Testing

Correlations: Modern Technology and Skill Development

Here the researcher has conducted correlation analysis to find the relationship between learning and acquiring of skill. Learning is based on following tools of modern technology:

- Simulation-Based Learning
- Virtual Reality (VR) and Augmented Reality (AR)
- Online Learning Platforms and Resources
- Electronic Health Records (EHR) Training
- Wearable Technology and Telehealth Training

a. Simulation Based Learning

Descriptive Statistics			
	Mean	Std. Deviation	N
Learning	68.00	7.538	300

Skill Development	49.00	3.051	300
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Correlations			
		Learning	Skill Development
Learning	Pearson Correlation	1	.472
	Sig. (2-tailed)		.528
	Sum of Squares and Cross-products	231.000	499.000
	Covariance	77.667	33.333
	N	300	300
Skill Development	Pearson Correlation	.472	1
	Sig. (2-tailed)	.528	
	Sum of Squares and Cross-products	47.000	48.000
	Covariance	33.333	16.667
	N	300	300

- As can be seen from the above output of the correlation between the learning and skill development, there is a moderate degree of positive correlation which shows that considering the learning as the independent factor and the skill development as the dependent factor, on learning we can say that direction and degree of the (Increase or decrease) skill development is moderately dependent on the learning of the above said skill of simulations.
- It can be inferred that the skill development of the said respondents is dependent on factors other than learning also.

B. VR and AR

Descriptive Statistics			
	Mean	Std. Deviation	N
Learning	39.00	8.635	300
Skill Development	27.25	7.743	300

Correlations			
		Learning	Skill Development
Learning	Pearson Correlation	1	-.963*
	Sig. (2-tailed)		.037
	Sum of Squares and Cross-products	178.000	-126.000
	Covariance	23.000	-31.003
	N	300	300
Skill Development	Pearson Correlation	-.963*	1
	Sig. (2-tailed)	.037	
	Sum of Squares and Cross-products	-126.000	59.750
	Covariance	-21.333	34.917
	N	300	300

*. Correlation is significant at the 0.05 level (2-tailed).

- As can be seen from the above output of the correlation between the Learning and skill development of 'AR and VR', there is a high degree of negative correlation between the Learning and skill development, which shows that considering the Learning as the independent factor and the skill development as the dependent factor, we can say that direction and degree of

the (Increase or decrease) skill development is not dependent on the learning of the AR and VR technology.

- It can be inferred that the skill development of the said technology of AR and VR is totally dependent on factors other than learning, this means that most of the nurses have learned the skill at their professorial level and at the educational level the exposure was not sufficient.

C. Online Learning Platforms and Resources

Descriptive Statistics			
	Mean	Std. Deviation	N
Learning	62.00	6.216	300
Skill Development	88.50	7.836	300

Correlations			
		Learning	Skill Development
Learning	Pearson Correlation	1	.190
	Sig. (2-tailed)		.810
	Sum of Squares and Cross-products	167.000	178.000
	Covariance	22.667	39.000
	N	300	300
Skill Development	Pearson Correlation	.190	1
	Sig. (2-tailed)	.810	
	Sum of Squares and Cross-products	178.000	91058699581.000
	Covariance	39.000	30.333
	N	300	300

- As can be seen from the above output of the correlation between the learning and skill development of 'Online learning platform and resources', there is a low degree of positive correlation between the learning and skill development, which shows that considering the learning as the independent factor and the skill development as the dependent factor, we can say that direction and degree of the (Increase or decrease) skill development is not totally dependent on the learning of the skill.
- It can be inferred that the skill development of the said tool of modern technology is dependent on few factors other than learning but major reason for change in skill development is learning.
- This states that the at some level the nurses have gained advantage from learning from online sources, but at the professional level they acquired the same with more precision.

D. Electronic Health Records (EHR) Training

Descriptive Statistics			
	Mean	Std. Deviation	N
Learning	85.00	8.849	300
Skill Development	79.00	7.728	300

Correlations			
		Learning	Skill Development
Learning	Pearson Correlation	1	.534
	Sig. (2-tailed)		.466
	Sum of Squares and Cross-products	169.000	116.000
	Covariance	56.000	38.333
	N	300	300

Skill Development	Pearson Correlation	.534	1
	Sig. (2-tailed)	.466	
	Sum of Squares and Cross-products	116.000	183.000
	Covariance	38.333	39.333
	N	300	300

- As can be seen from the above output of the correlation between the learning and skill development of 'EHR', there is a more than moderate degree of positive correlation between the learning and skill development, which shows that considering the learning as the independent factor and the skill development as the dependent factor, we can say that direction and degree of the (Increase or decrease) skill development is dependent on the learning of EHR up to a certain extent.
- It can be inferred that the skill development of the said tool of modern technology is dependent on learning at the educational level and also at the professional level.

E. Wearable Technology and Telehealth Training

Descriptive Statistics			
	Mean	Std. Deviation	N
Learning	69.00	13.501	300
Skill Development	67.75	9.678	300

Correlations			
		Learning	Skill Development
Learning	Pearson Correlation	1	.994**
	Sig. (2-tailed)		.006
	Sum of Squares and Cross-products	166.000	1045240461750.000
	Covariance	25.000	348413487250.000
	N	300	300
Skill Development	Pearson Correlation	.994**	1
	Sig. (2-tailed)	.006	
	Sum of Squares and Cross-products	104.000	184.750
	Covariance	34.000	39.250
	N	300	300

** . Correlation is significant at the 0.01 level (2-tailed).

F. As can be seen from the above output of the correlation between the learning and skill development of 'Wearable Technology and Telehealth Training', there is a high degree of positive correlation between the learning and skill development, which shows that considering the learning as the independent factor and the skill development as the dependent factor, we can say that direction and degree of the (Increase or decrease) skill development is dependent on the learning of the said tool of modern technology.

Result

Based on the above analysis and interpretation it can be stated that most of the nurses have acquired the said skills for usage and application of tools of modern technology at their educational level or at the professional level. But as of now they are able to use those skill and save the patients. Hence the null hypothesis 'There is a significant and positive relationship between the advent of technology and usage of the same by nurses in Saudi Arabia, at professional level' can be accepted and the alternate hypothesis can be accepted.

Conclusion

The integration of technology into nursing practice presents both significant opportunities and significant challenges. On the one hand, technological advancements like digital nursing tools, electronic health records, and telehealth systems have revolutionized healthcare delivery by increasing efficiency, reducing errors, and improving access to care, allowing nurses to focus on critical thinking and patient-centered care. Current research highlights the importance of implementing a well-rounded approach, where technology is used as an additional tool rather than as a substitute for the interpersonal and compassionate functions that are central to nursing.

Prioritizing education and training can enable healthcare systems to enable nurses to use technology while upholding the core values that characterize the profession. Nursing will advance through the use of this well-balanced integration without jeopardizing its fundamental role as the healthcare delivery system's guardian of humanity.

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