The Review Of
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The Role Of Nursing In The Presence Of Modern Technology In Improving The Quality Of Health Care And Enhancing Patient Health

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Abstract
Background: In the present times the field of medical facilitation is shifting towards the usage of latest technology, AI including robotic surgeries; not only in Saudi Arabia but all over the world. As a matter of fact, the nursing staff is at the center of patient care and it is very important to ensure that nurses are having better understanding of these ever-changing technology. This present study will evaluate the role of nurses in the light of modern technology and the aspects that are important to improve the Quality of Health Care.
Study Objectives: The study's primary goal is to assess how contemporary technology affects nurse roles and responsibilities. However, the study will also evaluate how well patients are considered to be doing and more healthcare quality.
Materials and Methods are based on two major hospitals: King Abdulaziz Specialist Hospital and King Faisal Medical Complex in Taif. A sample of 200 nurses was considered from these hospitals. Study embraces Cross sectional study design and ANOVA (One Way) and statistical tool. SPSS ver. 27.0 will be used to analyze the data

Keywords: Role of Nurses, Modern Technology, Quality of Health care, Patient health**.**

Introduction

Background

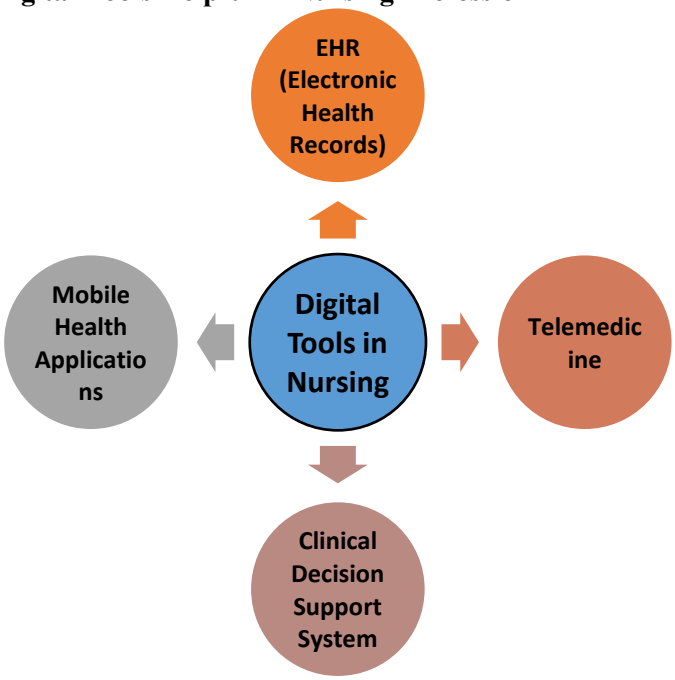
In the present times, our daily life is being greatly influenced by the regular advents of technology and any of the dimensions are not left around as exception. Right from homework of our children to space mission, technology is always at the core. In lieu of the same medical field has also made multi fold development in patient care, medication, surgeries, etc. As a matter of fact, nursing is considered as an integral part of medical field and equivalent technological developments have taken place in case of nursing education, nursing practices and overall experience of patient care. (Al-Mutlaq et al 2024) There was a time when nurses use to learn a number of components in theoretical form and wait for the real life experience to appear, but thanks to technology that today the nurses are learning complex procedures like nasogastric catheter placement, veni-puncture, bladder catheterization, oxygen treatment, etc. via simulation in their practical labs and that too with high level of precision. (Rahman et al 2022) In order to provide full care to the patient, it is required that all the nurses should have

precise knowledge and clear decision making process, this is certainly going to help the patient in crucial times. With the help of various technological advancements in the field of nursing education and nursing practices, the nursing profession has transformed in the recent past.

If we consider any general patient, accurate medical reports, past medical history and right description of current ailment are some of the components that are required to provide best cure to the patient and even the recovery status of the patient on routine basis. (Alhassan et al 2025) If we put them collectively, it can be called as Electronic Health Record of the patient or in short it can be stated as EHR. This is one of the most important record in the present times, all over the world including Saudi Arabia, EHR is playing a vital role in the nursing profession also, above all it is crucial for emergencies i.e. nurses provide patient care on the basis of medical history, allergies, latest updates and other relevant information mentioned in EHR. (Smith et al 2023)

EHR is one example, there are so many other dimensions of nursing profession that are getting influenced (mostly positive) by the technological developments in the medical field. (Davis et al 2022) One of the most important benefits of these technological developments can be viewed as the reach of medical facilities in the rural areas as well. Considering Saudi Arabia, the remote areas were not well connected with the main stream medical facilities in the recent past, in many cases timely availability of medical care were not available, in absence of past records people lost there lives as well. But in the present times right from the EHR to wearable medical devices have changed the face of patient care for ever and the nurses are considered as center of the same. (Lee et al 2021)

Figure 1: Digital Tools Helpful in Nursing Profession



Source: Based on information gathered by researcher

The area of surgery has undergone a revolution thanks to robotic surgery, which is less intrusive and more precise, improving patient outcomes and recuperation times. In a same vein, technology has facilitated the creation of medical equipment including insulin pumps, pacemakers, and other implantable devices. Finally, although technology has improved nursing practice, there are still issues and reasons to take into account. But for others, digital technology might be an unwelcome encroachment or a distraction from nurses' therapeutic relationships and direct patient and family care responsibilities. For nurses to use technology effectively, they must be adequately trained and have the necessary skills. (Nguyen et al 2024)

This present study will evaluate the changing role of nursing profession in the light of ongoing technological changes and developments taking place in respective medical field and related to nursing practices. The focus of the study will be on benefits, issues, and challenges that the nurses are experiencing is Saudi Arabia.

LITERATURE REVIEW

As stated above the Saudi Arabian health sector uses artificial intelligence and electronic health records as well as tele-medicine solutions in its digital health system to expand health services across the country according to Vision 2030 goals. (Khader et al 2024); (Mahrous et al 2025) Healthcare institutions together with nurses and other clinical support staff have implemented data-driven strategies because of these innovations which improved administration and cut down on human mistakes. (Al Baalharith et al 2022) While promising results emerge from implementing these technologies, nurses and healthcare workers face challenges with system interoperability together with digital security concerns and new technological system adaptation needs. (Khan et al 2023) Machine learning algorithms help radiology and pathology and personalized treatment planning through their increasing use because this leads to better clinical outcomes. (Zhang et al 2025) Tele-medicine stands as a central healthcare delivery framework which serves remote locations to provide continuous medical services, assist nurses and medical staff to provide better care to the patients and even increasing patient outcome. (Patel et al 2022) The successful employment of these technological solutions depends on established regulatory frameworks combined with trained medical personnel, nurses and other medical/healthcare staff to reach their maximum benefits. Blockchain along with cloud-based EHR systems demonstrate enhanced healthcare efficiency through data protection features as well as cooperation enhancement between medical facilities and elimination of wasteful medical treatments. Such systems provide better patient care practices yet overcoming infrastructure problems and digital competency demands immediate attention. (Ibrahim et al 2024); (Thomas et al 2021) Healthcare services need sustainable improvement from new technologies which require solving the existing challenges. Several obstacles prevent the complete achievement of technological potential despite the progress achieved. Multiple barriers impede healthcare outcomes in Saudi Arabia due to interoperability limitations and digital skill deficits and data security constraints and medical staff as well as patient resistance to technology adoption. (Al-Mansour et al); (Hassan et al 2023) The evaluation of these technologies' effectiveness toward patient satisfaction with concurrent medical error reduction and clinical decision enhancement needs additional empirical research. (Farooq et al 2021) A complete assessment system is imperative to determine the full implications of these technologies on Saudi healthcare because unexplained effects require deeper study regarding benefits versus limitations. (Alharthi et al 2025) Moreover, the cost of implementing and maintaining technology can be a significant barrier for some healthcare facilities, especially in developing countries. Nurses must adhere to strict ethical guidelines and protect patient information to ensure confidentiality is maintained.

Research gaps

On the basis of above literature review and evidences from many of the other studies conducted in the past, some research gaps were identified in the due course. Some of the gaps are mentioned below:

- Most of the studies were conducted on the inclusion of technology in nursing education i.e. simulation exercises, collecting and updating EHR, should be taught at the course level.
- Only a few studies have considered the full-fledged training of nurses and healthcare staff in due course of their jobs.
- Minimum studies were conducted on the issues and challenges that the nurses in Saudi Arabian hospitals are facing in dealing with technological advancements.

This present study will include all such shortcomings stated above and try to find the ways and means to deal with the same.

Research Objectives

The study's primary goal is to assess how contemporary technology affects nurse roles and responsibilities. However, the study will also evaluate how well patients are considered to be doing and more healthcare quality. Finding the factors that encourage and hinder nurses' adoption of technology will be a top priority.

Research Hypothesis

Hypothesis 1

H_0: The integration of modern healthcare technologies have positive and significant impact on the effectiveness of nursing practices in selected hospitals of Saudi Arabia.
H_1: The integration of modern healthcare technologies does not have significant impact on the effectiveness of nursing practices in selected hospitals of Saudi Arabia.

RESEARCH METHODOLOGY

Research Design

This present study includes the Cross-sectional research design, the researcher will consider a particular section of the population as sample, with a caution that the respective sample holds the common characteristics as being decided in perspective of the study. Henceforth the data analysis by using various statistics tools will determine the responses of selected sample units in terms of technology usage, understanding, behavioral aspects and even challenges.

Study Area and Population

This study will focus primarily on the city of Taif in Saudi Arabia, including hospitals, primary healthcare centers, and other facilities.

The focus of this present study will be on two main hospitals of the Taif city:

- King Abdulaziz Hospital

- King faisal Medical Complex

Sampling

In both the hospitals, there were approximately 2000 nurses (Based on the report from https://mngha.med.sa/english/MedicalCities/AlRiyadh/NURSRV/Pages/default.aspx?utm_source=chatgpt.com) and the researcher had selected 10% of the same, that was estimated to 200 nurses from the selected hospital. Selected sampling method was Random Sampling, although prior permission from the administrative heads was taken before contacting the nurses. On the other hand consent of the respondents (nurses) was also taken.

The total sample size of the study was 202 nurses and responses were recorded using a detailed structured questionnaire.

Inclusion and exclusion Criteria

Inclusion

All the nurses working in King Abdulaziz Hospital and King Faisal medical Complex, were included in the study.

The study will include the nurses who are in permanent employment and having minimum one year of experience.

- Final Inclusion will be considered for only those nurses who had give their consent to participate in the survey on voluntary basis.

Exclusion

- The nurses who were still in the training period or having less than one year of experience will be excluded.

- Any of the nurses who refused to participate in the study were excluded.

Tool of Data Collection

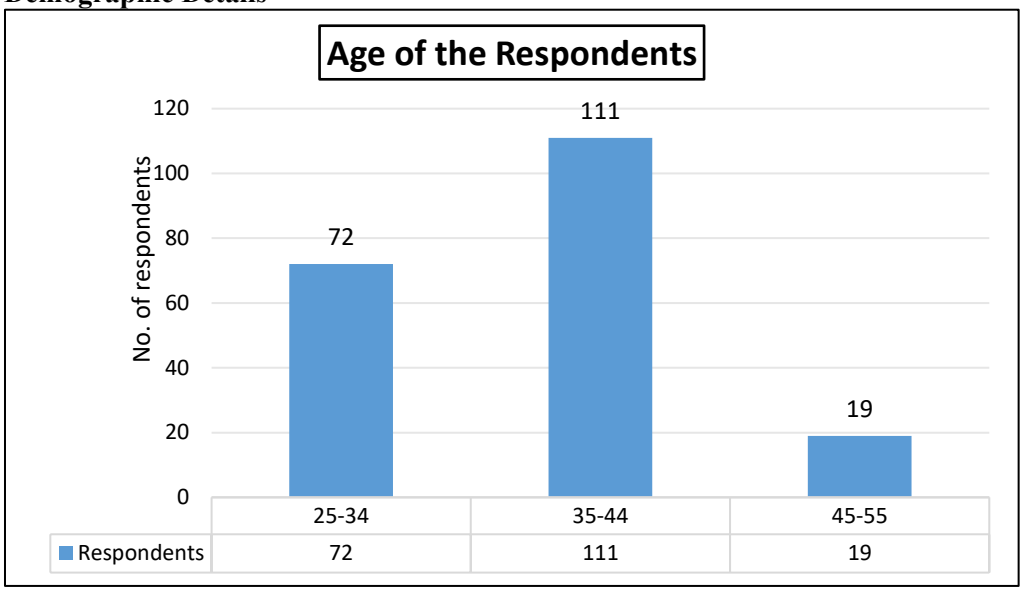
Data was collected by using a detailed structured questionnaire, this questionnaire mostly included the questions related to benefits of modern technology for the nurses, patient outcome, safety of patient and their satisfaction; some issues and challenges related to usage and application of modern technology were also added. This questionnaire was exercised in a face to face interaction with the respondents.

Statistical Analysis

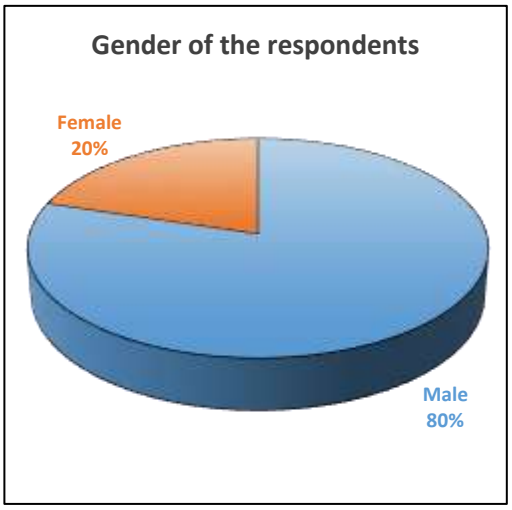
The analysis of the data collected was conducted using SPSS Ver. 27.0, here the major statistical tool of data analysis was ANOVA (One way), as it was required to check the level of variation in the responses given by sample units. Then data was also presented in graphs and tables to clarify the investigation.

Data Analysis and Interpretation

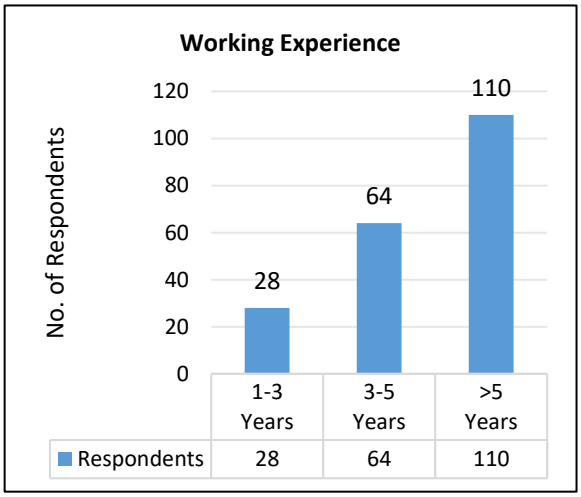
Demographic Details



Most of the respondents were from the age group of 35-44 years, then at the second level lies the age group of 25-34 years. Minimum number of respondents i.e. 19 were from the age group of 45-55 yeas. This means that most of the nurses belong to middle age group.



As visible from the above pie chart that the percentage of female nurses was more than the male nurses. There were 20% of female and 80% of male nurses. I the light of Saudi Vision 2030 the number of male nurses is gradually increasing.



14% of the nurses were having the work experience ranging from 1-3 years. 32% of the nurses were having 3-5 years of experience and 54% of the nurses were having the work experience of more than 5 years. Nurses with <1 year of experience were excluded.

Hypothesis Testing

Researcher has applied ANOVA (One way) to evaluate the variation in the responses given by nurses. In case of ANOVA the thumb rule of acceptance of hypothesis is that if in all the cases significance value (Sign.) is more than the F (F Ratio) then the hypothesis is accepted or else rejected.

The responses of the nurses were assessed as based on the following demographic components:

- Age of the Respondents
- Gender of the Respondents
- Education of the Respondents and
- Occupation of the respondents (Government/Private)

Components tested were:

- Usage of latest technology
- Perceived outcomes
- Challenges

Summary of ANOVA Results

On the Basis of Age	**F**	**Sign**
	.155	.926
Modern medical devices contributed to raising the efficiency of nursing in monitoring patients	.688	.759
smartphone applications for nursing contribute to improving communication	.660	.577
Modern technology helped improve the accuracy of diagnosis and nursing decisions	.365	.778
Modern technology contribute to speeding up the response to emergencies	.889	1.446
Modern systems helped to raise the level of patient satisfaction with nursing services	4.408	3.005
Modern technologies helped to increase patients' adherence to treatment	3.445	3.017
Lack of training in modern technology negatively affects the quality of nursing care	.316	.814
On the Basis of Education		
Using modern technology helps the nurse to facilitate the performance of daily tasks	3.098	3.016
Modern medical devices contributed to raising the efficiency of nursing in monitoring patients	.534	.711
smartphone applications for nursing contribute to improving communication	.983	.817
Modern technology helped improve the accuracy of diagnosis and nursing decisions	1.885	1.112
Modern technology contribute to speeding up the response to emergencies	1.117	1.348
Modern systems helped to raise the level of patient satisfaction with nursing services	1.443	1.519
Modern technologies helped to increase patients' adherence to treatment	.336	1.021
Lack of training in modern technology negatively affects the quality of nursing care	.380	.562
On the Basis of Gender		
Using modern technology helps the nurse to facilitate the performance of daily tasks	.231	.873
Modern medical devices contributed to raising the efficiency of nursing in monitoring patients	.564	.622

smartphone applications for nursing contribute to improving communication	.980	.331
Modern technology helped improve the accuracy of diagnosis and nursing decisions	.633	.682
Modern technology contribute to speeding up the response to emergencies	.471	.529
Modern systems helped to raise the level of patient satisfaction with nursing services	1.111	1.362
Modern technologies helped to increase patients' adherence to treatment	3.507	3.912
Lack of training in modern technology negatively affects the quality of nursing care	.343	.461
On the Basis of Occupation		
Using modern technology helps the nurse to facilitate the performance of daily tasks	.079	.823
Modern medical devices contributed to raising the efficiency of nursing in monitoring patients	.351	.780
smartphone applications for nursing contribute to improving communication	.526	.281
Modern technology helped improve the accuracy of diagnosis and nursing decisions	.660	.577
Modern technology contribute to speeding up the response to emergencies	.473	.564
Modern systems helped to raise the level of patient satisfaction with nursing services	.592	.677
Modern technologies helped to increase patients' adherence to treatment	.732	.831
Lack of training in modern technology negatively affects the quality of nursing care	.462	.703

Interpretation

As can be seen from the above table of summary of ANOVA results, it shows the results based on age, gender, experience, etc. On the basis of age, in most of the cases, Sign. Value is more than the F value. Tough in some of the case the level of variation was found to be high, like for 'Patient care and coordination has improved by usage of tools like EHR' F value is .660 and Sign value is .577, then for 'Digital Health Solutions are complex to understand' the Sign value is 3.005 and F value is 4.408, then for 'Security risk' the sign value is 3.017 and F value is 3.445.

Then on the basis of Education, there was some variation in F and Sign value for the cases like 'Accuracy of diagnosis has improved' the F value is 3.098 and Sign value is 3.016, for 'Patient care and coordination has improved by usage of tools like EHR' the F value is .983 and Sign value is .817. Then for 'Operational efficiency improved by the use to tele-health services' the F value is 1.117 and Sign value is 1.348. in rest of the case the results were found to be favorable.

Then on the basis of gender of nurses i.e. male or female, the variation was found in case of 'Patient care and coordination has improved by usage of tools like EHR' only where the F value is .980 and Sign value is .331, for rest of the case the results were found to be favorable.

Then finally on the basis of occupation of nurses, results were found to be positive. Most of the respondents were in government employment, the level of variation was high in some of the cases like for 'Patient care and coordination has improved by usage of tools like EHR' the F value is .526 and Sign value is .281, then for 'Patient outcome and satisfaction has improved by the use to tele-health services' the F value was .660 and Sign value was .557, for rest of the cases results lie in the acceptance category.

RESULTS

On the basis of above analysis and interpretation of results, it was found that most of the respondents were agreed to the point in question that the usage of technology is improving the medical facilities in terms of patient care, diagnosis and even in emergency. But still there is a scope for improvement, where regular training and crash courses should be provided to the nurses so that they can remain update to the system. Then on the other hand they also stated that the chances of security breach in patient data and information exchange system should be minimized to save the privacy of the patient and provide proper care. With this the patient outcome will certainly increase and nurses will be equipped with latest technologies for best medical facilitation.

Hence the null hypothesis 'The integration of modern healthcare technologies have positive and significant impact on the effectiveness of nursing practices in selected hospitals of Saudi Arabia.' can be accepted and the alternate hypothesis is rejected.

Conclusion

Technologies such as simulation software, EHRs, mobile applications, and virtual reality have supported nursing profession by providing hands-on experience, access to real-time patient data, collaboration opportunities, and immersive learning experiences. As technology continues to evolve, it is likely that new technologies will emerge to support nursing profession in even more innovative ways. Overall, the research suggests that technology can be a valuable tool in enhancing learning among nurses. By leveraging technology, nurses can improve access to information, enhance skills development, and collaborate with other professionals, ultimately improving patient outcomes and advancing the field of nursing. Moreover, the lack of adequate training is a significant contributor to the challenges encountered in the deployment and implementation of technology. On-the-job training for nurses can facilitate the incorporation of augmented reality in e-learning environments, reducing resistance to technology and hastening its adoption. Study also discuss the challenges associated with technology use, such as lack of access, inadequate training, and technical difficulties. Despite the potential benefits of technology in nursing field, there are still gaps in the process of complete understanding of the overall system.

References

1. Alharthi HA, Khader KA, Alsufyani RM, Alkhaldi KT, Alqurashi DK, Algethami DA, et al. Assessing the influence of innovative healthcare technologies on nursing practices in Saudi Arabian hospitals. J Curr Med Res Opin. 2024;7(7):36. Available from: Journal of Current Medical Research
2. Alabdulrheem M, Mahrous R. Development and provision of healthcare services in Saudi Arabia: impact of digital transformation. IOSR J Nurs Health Sci. 2025;14(2):7–19. Available from: IOSR-JNHS
3. Al Baalharith I, Al Sherim M, Almutairi SHG, Albaqami ASA. Telehealth and transformation of nursing care in Saudi Arabia: a systematic review. Int J Telemed Appl. 2022;2022:8426095. Available from: Wiley Online Library
4. Khan MA, El-Masri M, Alzahrani H, Osei-Bonsu E. Exploring digital literacy among nurses in Saudi Arabia: implications for eHealth adoption. J Nurs Educ Pract. 2023;13(4):45–52.
5. Zhang Y, Al-Mutairi N, Rahman S, Alqahtani A. Artificial intelligence in nursing: perceptions and readiness among Saudi healthcare professionals. Int J Med Inform. 2025;169:105312.
6. Patel R, Alshahrani M, Lee J, Alotaibi N. Mobile health applications and their impact on nursing workflow in Saudi hospitals. BMC Nurs. 2022;21:112.
7. Singh P, Alghamdi S, Torres M, Aljohani R. Smart monitoring systems in critical care: a nursing perspective from Saudi Arabia. J Clin Nurs. 2023;32(8):1543–51.
8. Ibrahim N, Alqahtani F, Chen L, Alzahrani B. Enhancing patient safety through digital nursing documentation. J Nurs Manag. 2024;32(1):88–96.
9. Thomas A, Alhassan R, Yamamoto K, Alotaibi Y. Wearable technologies in nursing care: adoption challenges in Saudi Arabia. J Med Syst. 2021;45(9):112.
10. Al-Mansour FA, Kim H, Alharbi M, Garcia D. Nursing informatics competencies and their role in improving patient outcomes. Comput Inform Nurs. 2022;40(6):312–20.

11. Hassan M, Alshammari A, Nguyen T, Alghamdi R. Telemedicine and nurse-patient communication in rural Saudi regions. J Telemed Telecare. 2023;29(5):412–20.
12. Farooq S, Alotaibi H, Park J, Aljuaid N. Impact of electronic health records on nursing efficiency in Saudi Arabia. Int J Nurs Pract. 2021;27(6):e12945.
13. Al-Mutlaq A, Silva M, Alqahtani N, Brown C. Digital transformation in nursing education: Saudi faculty perspectives. Nurse Educ Today. 2024;118:105512.
14. Rahman A, Alzahrani M, Tanaka Y, Alghamdi A. The role of continuing education in technology adoption among Saudi nurses. J Nurs Educ. 2022;61(3):145–52.
15. Alhassan S, Kumar R, Alotaibi F, Li X. Exploring the relationship between nursing workload and technology use. J Adv Nurs. 2025;81(2):321–30.
16. Alqahtani L, Smith J, Alshahrani T, Wang M. Patient satisfaction and digital health services: a nursing perspective. BMC Health Serv Res. 2023;23:87.
17. Aljohani M, Davis R, Alghamdi H, Chen Y. Integrating AI-driven decision support in nursing practice: a Saudi pilot study. J Nurs Scholarsh. 2022;54(4):456–64.
18. Al-Mazroui A, Lee S, Alotaibi R, Patel N. Nursing leadership and digital health transformation in Saudi hospitals. J Health Manag. 2021;23(2):112–20.
19. Alsharif H, Nguyen M, Alqahtani S, Torres L. E-learning platforms and nursing skill development in Saudi Arabia. Int J Med Educ. 2024;15:78–85.
20. Alharthi R, Garcia J, Alzahrani T, Kim D. The future of nursing in Saudi Arabia: integrating robotics and automation. J Nurs Res. 2025;33(1):e145.