



The Role of Nursing in the Presence of Modern Technology in the Field of Promoting and Maintaining Family and Community Health

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Abstract

Background: Recent advances in tele-health platforms, electronic health records (EHRs), mobile health (mHealth) applications, wearables, and artificial intelligence (AI) have transformed the scope of nursing. Such innovations allow nurses to assess and monitor chronic health conditions remotely, provide health education virtually, and become data-driven decision-makers. In this present study the researcher had tried to bring forth the role of nursing in the presence of modern technology and maintaining family and community health.

Study Objectives: The objective of the present study is to critically examine and synthesize existing literature on how modern technologies, are influencing the role of nurses in promoting and maintaining family and community health within the Saudi Arabian healthcare system.

Materials and Methods: This study uses a systematic review approach using the PRISMA 2020 guidelines and framework to maintain the continuity and transparency of the study. As the study mainly focuses on the aspects related to the integration of modern technology and impact of the same on the community and family healthcare in Saudi Arabia. This process of systematic review is undertaken with the considerations of exploratory research design and presents the narrative review of the studies conducted on the topic at hand. The respective timeline of the study shall be from 2014 to 2024.

Results: There will require strategic investment in education, policy, and community engagement to advance the use of technology in nursing practice in order to optimize technology-enabled or assisted nursing practice. Additionally, there will be a need to engage nurses as users of technology, but also engaged in actively leading the use of technology for and health with a culturally relevant approach.



Keywords: Nursing, Technology, Saudi Arabia, Telehealth, Ehealth, Community Nursing, Family Health Promotion, Digital Tools

Background and Introduction

The healthcare sector in the Kingdom of Saudi Arabia (KSA) is undergoing a profound structural and operational transformation, primarily guided by the ambitious targets set forth in the Healthcare Sector Transformation Program, a central component of Saudi Vision 2030. This program mandates comprehensive reform focused on innovation, financial sustainability, disease prevention, and the radical expansion of e-health services and digital solutions. Within this digital imperative, the professional nursing corps is experiencing a fundamental transformation of its practice, moving toward a model centered on technology-mediated care known as telenursing.

Despite the clear strategic direction and observed technological adoption, the scholarly literature concerning the specific implementation and efficacy of telenursing within KSA remains "loosely researched". This existing fragmentation necessitates a systematic synthesis of available evidence to inform policy, standardized practice, and educational strategies. As a result, this review aims to bring together what is known about the effects of technology in KSA nurses' (Kingdom of Saudi Arabia) community and family practice role, with frameworks for implementation, related literature currently published around chronic disease management, continued barriers (digital & cultural), and education and policy considerations necessary for quality digital health system that can be sustained in the community.

Strategic Implementation and Role

The Saudi government has put in place a comprehensive variety of digital health platforms that connects citizens with web-based health services to reach around 94% of the population. These platforms deliver routine patient care, which is also used for strategic management and quality assurance purposes. The SEHA Mobile Application has emerged as one innovation flagship, which is intended to reshape the existing health care system through virtual visits and directing primary triage. The SEHA application has clearly shown its worth as a tool to reduce workload for emergency departments (ED), as over the one quarter (over 24%) of the patients had re-evaluated their intention to present to ED after using the application. The SEHA Virtual Hospital (SVH) launched in 2022 further centralizes the development of specialized care.

The SVH is recognized as the largest of its kind globally. It integrates more than 150 hospitals and grants access to over 30 specialized health services. This system allows for unprecedented integrated capacity for complex care delivery, which ranges from remote surgeries by leading physician experts to virtual consultations so the provider may securely prescribe medications - all seamlessly connected. Most importantly for nursing, the SVH



understands the importance of using knowledge through the provision of virtual training where junior nurses and doctors can virtually share their learning experiences. Nurses have full access to a broad range of remote devices to clinically monitor their patients such as blood pressure monitors, glucometers, pulse oximeters and body analysis scales. Some mobile applications like RAHAH are integrated into this process, operating as methods for patients and providers to create and document personal health records and relay vital readings back and forth with the patient and the provider instantaneously,- which is imperative to allow for continuous monitoring of the patient. Remote patient monitoring, or RPM is an essential part for a nurse to continue monitoring, following up or working with patients in the home.

Family and Community Health Outcomes

According to the data, more than 24% of patients thought better and chose not to attend the Emergency Departments after their virtual consultation via the app. This functional success further helps align the nursing role with the Vision 2030 priority of preventative care. The tele-nurse can maintain a position as risk mitigator and gatekeeper for the community, elevating health care upstream in the health continuum. The utilization of virtual clinics and remote monitoring greatly reduced the number of required in-person visits for high-risk patients. In the diabetic group who experienced meaningful HbA1c improvements, 64% of patients required either one or two in-person visits over the 4-month period (a pain-free experience), compared to the typical schedule at an integration care program before the pandemic, which mandated one visit every one to two weeks. This demonstrates the technology provides effective monitoring without an excessive burden on patients or the health system. Telehealth further enhances nurse-patient communication, contributes to positive patient experience and transitions nursing care seamlessly, providing additional confirmation that technology can support patient-centered care by allowing them to be an active participant in their treatment.

Table 2: Clinical Outcomes of Technology-Enabled Interventions in KSA

Intervention Model/Platform	Target	Measured Outcome	Observed Change/Impact	Source(s)
Virtual Clinic / Telemedicine Care	High-Risk Diabetes Mellitus	Glycemic Control (HbA1c)	Significant decrease from 9.98% pre-intervention to 8.32% post-intervention (p <0.001)	Tourkmani et al (2023)
Team-Based Care (TBC) in PHCs	Diabetes	Glycemic Control	Mean reduction from 7.5% to	Alshaiti et al (2025)



		(HbA1c)	7.2%	
Team-Based Care (TBC) in PHCs	Hypertension	Systolic Blood Pressure (SBP)	Overall mean decrease from 134.3 mmHg to 131.2 mmHg	Al Baalharith et al (2022)
SEHA Mobile Application	Emergency Triage/Consultation	Emergency Department (ED) Visits	Over 24% of patients avoided visiting the ED after consulting via the app	Sherim et al (2022)

Source: Prepared by researcher conducting different studies

Recent advances in tele-health platforms, electronic health records (EHRs), mobile health (mHealth) applications, wearables, and artificial intelligence (AI) have transformed the scope of nursing. Such innovations allow nurses to assess and monitor chronic health conditions remotely, provide health education virtually, and become data-driven decision-makers. In the Arab Arabian environment where there are geographic differences and cultural considerations around access and delivery of healthcare, technology is a powerful tool to provide care to underserved communities and populations. Family and community health promotion, which was once limited to in-person engagements and manual approaches to outreach, is now largely supported through digital interventions. Nursing has an important contribution in implementing technology, guiding families on its use, and delivering care in a culturally appropriate way. However, with the opportunities, there may also come challenges with regard to level of digital literacy, ethical concerns, and training and policy development. This review study will explore the multiple roles of nursing in Saudi Arabia, particularly where nursing meets the integration of modern technology. It synthesizes current literature to assess how nurses contribute to promoting and maintaining health at the family and community levels, identifies barriers to effective technology adoption, and offers recommendations for enhancing nursing capacity in a digitally evolving healthcare landscape.

Research Gaps

The majority of current research on nursing and technology has focused on either a global or Western situated view. There has been little, if any, localized research on how nurses in Saudi Arabia engage and integrate digital tools into their practice in family health and community settings. Only a small number of studies have explored how normative cultural values, such as Islamic values, used in terms of their acceptance and use of tele-health interventions, AI, and mobile health applications in nursing practice. The experience nurses have in managing these types of sensitivities was also under-explored in the literature.



Research Objective

The objective of the present study is to critically examine and synthesize existing literature on how modern technologies, such as telehealth, electronic health records, mobile health applications, and artificial intelligence are influencing the role of nurses in promoting and maintaining family and community health within the Saudi Arabian healthcare system.

Research Methodology

Research Design

This study uses a systematic review approach using the PRISMA 2020 guidelines and framework to maintain the continuity and transparency of the study. As the study mainly focuses on the aspects related to the integration of modern technology and impact of the same on the community and family healthcare in Saudi Arabia. This process of systematic review is undertaken with the considerations of exploratory research design and presents the narrative review of the studies conducted on the topic at hand. The respective timeline of the study shall be from 2014 to 2024.

Population: Unlike the cross-sectional studies, this present study shall consider the previous studies as population, i.e. the total number of studies conducted on the based on integration of modern technology and impact of the same on the community and family healthcare in Saudi Arabia from the perspective of nursing profession. This present study shall consider the studies conducted specifically in Saudi Arabia and MEA region. More than 120 studies were touched in the process and using the PRISMA framework many of them were screened out and only relevant studies were assessed.

Inclusion and Exclusion criteria

Criteria	Inclusion	Exclusion
Location	National or global studies focused on Saudi Arabia.	Studies not related to Saudi Arabia or MEA will be excluded
Scope of Technology	Studies based on the use of technological aspects in the current scenario and related to nursing profession.	Studies not considering nursing profession were rejected.
Type of Studies	Mostly review articles, reports from government and private agencies and white papers.	Any type of editorials, general opinions, non-peer reviewed articles will be excluded.
Language	Studies published or presented in English or Arabic will be	Studies in other languages (without translation) will be



	included.	excluded.
Time Line	Studies published between 2014 to 2024 will be included	Studies published before 2014 will be excluded.

Sources of Data and Keywords

Researcher has touched a number of sources for the collection of data. Some of the relevant sources are mentioned here:

- PubMed
- Cochrane Library
- EMBASE
- Saudi Medical Journal
- King Saud University Repository

Keywords for the study were decided in advance and only those studies were touched that have the following keywords using boolean operators (AND, OR):

“Nursing AND technology AND Saudi Arabia”, “Telehealth OR eHealth AND community nursing”, “Family health promotion AND digital tools”, “Mobile health applications AND nursing education”, “Artificial intelligence AND nursing practice”.

Information Extraction

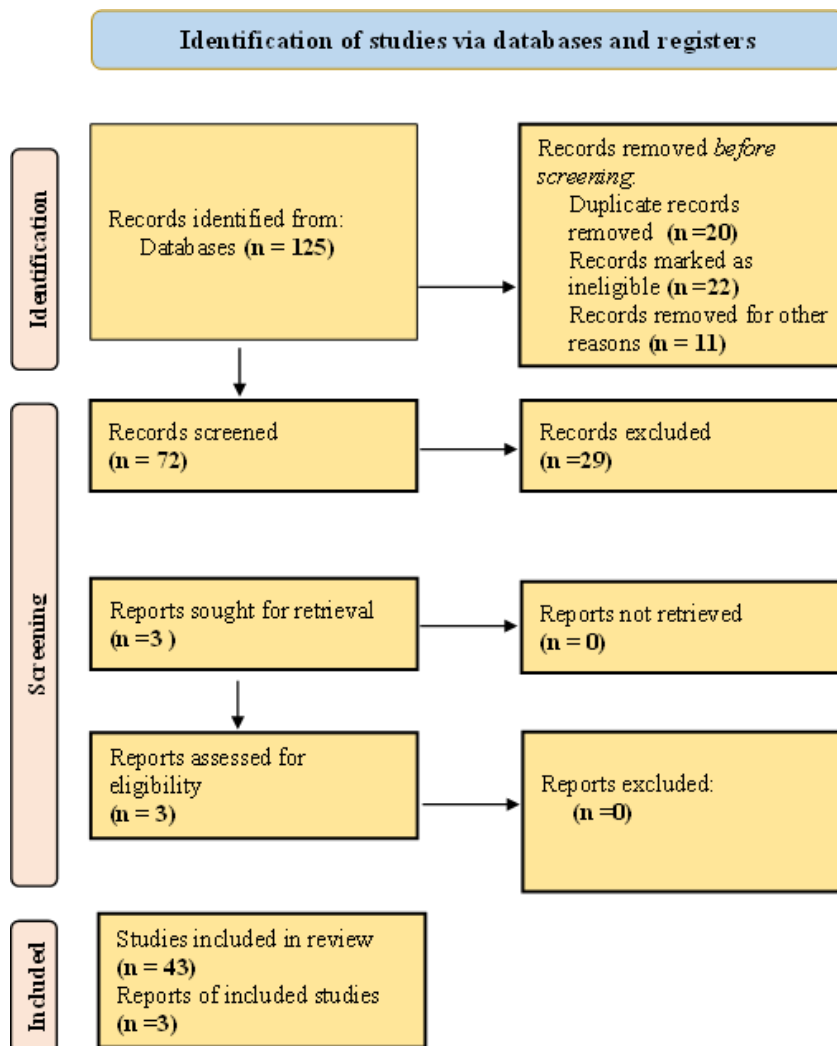
Researcher had prepared a format for recording the relevant information, main heading include, design of study and location, demographics of the respondents and number, specific measures of outcome, like role and impact of nursing in the presence of modern technology peripherals, application of these technologies and significance of the same in family and community health.

Results

A total of 125 research studies and 3 reports were identified, all of them were based on the role, impact, significance of the peripherals of modern day technology and usage of the same in maintaining family and community health related aspects. These aspects were evaluated from the perspective of nurses working in Saudi Arabia and MEA region. Out of these identified studies, 20 were removed because of duplication of records, references and location and 22 studies were marked as ineligible, on the basis of targeted profession (not considering nursing profession) and 11 for some other unavoidable conditions. Further 72 records were saved for screening, then in the screening process 29 records were further removed on the basis of exclusion criteria stated above. Total studies finalized for review were 43. Then three reports were also included in the study and none of them were excluded.



Virtual consultations for chronic disease management and maternal health have significantly bolstered access to care in rural and underserved communities in Saudi Arabia. Nurses reported enhanced efficiency and family satisfaction while engaging in telehealth using platforms such as Seha and Tetamman. While EHRs supported care co-ordination, helped to decrease document inaccuracies, and provided a strong evidence-based decision-making resource for nurses. Barriers included lack of interoperability of data transfer and limited confidence in digital literacy from some nursing staff. mHealth apps aided families to self-manage chronic conditions, such as diabetes and hypertension, and document schedule childhood immunizations. ‘My’ work as an educator in program coordination with an emphasis on the utilization of apps and interpreting health data, was visibly valuable to nurses in community service initiatives.



Source: Page MJ, et al. *BMJ* 2021;372:n71. doi: 10.1136/bmj.n71
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Programs that afforded opportunities for ongoing professional development increased confidence and engagement with technology, and developed digital competencies. Simulation-based training and e-learning platforms also bolstered clinical decision-making, while reducing self-reported anxiety in nursing students prior to technology engagement during their development. Technology has shown to have potential to increase family and community health outcomes in Saudi Arabia.

Discussion

The implementation of cutting-edge technology into nursing practice has been a revolutionary movement across the Saudi Arabian health care system, specifically in family and community health. This review shows how digital devices, from telehealth to artificial intelligence, engage nurses in the role of health facilitators, therefore shifting the identity of a nurse from a caregiver. While the evidence supports technology can help expedite care engagement, the results of the care provided rely on the readiness of the system, cultural connectivity, and nurse competence. The use of telehealth has been transformative in providing fair access to care where geography or logistics is a barrier.

Nurse led telehealth alerts for chronic conditions or maternal health education are utilized effectively to provide care to rural and underserved areas within Saudi Arabia, while providing mental health screening and education. These interactions improved access to care and shifted the burden of care demand from tertiary care institutions. The success of telehealth is ultimately determined by the competence of the nurse to navigate the technology, and the healthcare system's access to the internet, which continues to be piloted across the Kingdom. Lastly, Electronic Health Records (EHRs) continue to help streamline documentation and continuum of care, while allowing nurses to utilize the documented data in making decisions, and provide collaborative care with health care professionals. In addition, ethical clarity and cybersecurity are needed for the issues around data privacy and patient confidentiality—especially in culturally conservative environments.

Mobile health (mHealth) applications have provided families with the opportunity to engage with their health. A critical role for nurses will be to educate users, interpret data from the applications, and assimilate that knowledge within their care plan. For instance, applications that monitor glucose levels or vaccines, have been valuable applications used within community outreach programs. Differences in access to smartphones and digital fluency, especially among older adults and low-income populations, will inhibit the scalability and reach of these technologies.

The review also highlights the need to revise the nursing curriculum to meet new technologies. For instance, simulation-based activities, virtual labs, and Artificial Intelligence (AI) diagnostic skills building, have become ubiquitous in nursing colleges in Saudi Arabia. These curricula will allow students to be truer to life, enhance clinical reasoning skills, and



mitigate students' anxiety towards real practice. However, the integration of technology in nursing school curricula has been inconsistent, and supportive faculty development programs will eventually be needed to develop adequate use of technologies.

Cultural and religious factors are another critical component of technology acceptance in health care contexts. Providers should be aware of cultural and religious factors, e.g., gender expectations, privacy expectations, and achieving equity in language, when using technology-based communication systems for health care and health promotion. In order to achieve equity and trust in using the technology platforms, providing culturally relevant implementations (e.g., Arabic-language options) is essential. It can be stressed upon that while technology provides a powerful, modern approach for nurses to promote and support family and community health in Saudi Arabia, the consequences of technology for nursing practice will depend upon leveraging the infrastructure, education, and culturally-responsive strategies to use the technology in practice. Further, nurses have to be positioned not only as the users of technology, but as leaders in the ethical and effective use of technology across the continuum of care.

Conclusion

The use of modern technology in nursing practice has greatly enhanced the ability of nurses to engage and promote and sustain health of families and communities in Saudi Arabia. For example, telehealth, electronic health records, mobile health apps, and artificial intelligence offer unique access to health care, information, and prevention approaches. Nevertheless, the effectiveness of successfully incorporating technologies in nursing practice will depend on addressing barriers related to cultural aspects, digital literacy, infrastructure, and ethical governance. There will require strategic investment in education, policy, and community engagement to advance the use of technology in nursing practice in order to optimize technology-enabled or assisted nursing practice. Additionally, there will be a need to engage nurses as users of technology, but also engaged in actively leading the use of technology for and health with a culturally relevant approach. This can be done in order to further align nursing practice with Vision 2030.

Scope for Future Studies

The dynamic landscape of health technology in Saudi Arabia opens up numerous avenues for future research directed at nursing practice, education, and policy. This article recognizes identified trends and problems, but some of the issues are less known and warrant further inquiry. Future research should assess the long-term effect of nurse-led and digitally-enabled interventions on family and population-based outcomes, as well as chronic health problems, maternal-child health, and patient engagement in preventive care. Research should evaluate the role of technology on the practice of nurses in remote areas of Saudi Arabia where access



to health care is impacted by either infrastructure or socio-cultural issues. There is merit in developing qualitative research that explores how nurses operationalize practice through the lens of culturally competent practice, paying particular attention to how religious constructs and ethical considerations inform nursing practices related to family health, health technologies, and in-person practices.

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