

The Role Of Nursing And Laboratory Professionals In Improving Screening Accessibility And Quality: A Systematic Review Of Saudi Arabia's Vision 2030 Implementation

Bader Mutla Gazi Al-Otaibi¹, Sami Mohammed Satr Aljuaid², Mulhi Dughaylib Al-Otaibi³, Latifah Khalid Aldawoud⁴, Rasha Ali Alyamani⁵, Manal Selmi Alsadi⁶, Madreyah Mueid Alqurashi⁷, Meshal Yousef Hameed Alzaidi⁸, Wrood Saeed Al-Zahrani⁹, Rashed Abdullah Rashed bin Felaih¹⁰, Laith Saleh Aljohani¹¹, Abdulwahab Abdullah Khobzan¹²

¹Laboratory Consultant, Al-Dawadmi Hospital, Saudi Arabia.

²Laboratory Specialist, Al-Dawadmi Hospital, Saudi Arabia.

³Laboratory specialist, Dawadmi General Hospital, Saudi Arabia.

⁴Lab tech, Soud AlBabtain Candice center, Saudi Arabia.

⁵Midwife, 937 Reporting Unit, Saudi Arabia.

⁶Nurse Technician, Public Health Management and Preventive Medicine, Saudi Arabia.

⁷Nursing technician, Haradh Primary Health Care Center, Saudi Arabia.

⁸Teshnician Laboratory, Armed Forces Hospital in Al Hada, Saudi Arabia.

⁹Nursing specialist, King Abdullah Medical Complex, Saudi Arabia.

¹⁰Laboratory technician, Almithnab General Hospital, Saudi Arabia.

¹¹LABORATORY SPECIALIST, Al-Muthnib General Hospital, Qassim Cluster, Saudi Arabia.

¹²Lab technician, King fahad hospital Al Baha, Saudi Arabia`.

Abstract

Background

Laboratory technicians play a crucial role in advancing precision medicine by performing diagnostic tests, analyzing biomarkers, and interpreting results. Nursing technicians, also known as practical nurses or vocational nurses, are healthcare professionals who have completed a diploma or certificate program in nursing and are licensed to practice under the supervision of registered nurses. They perform various patient care tasks, such as measuring vital signs, administering medications, collecting specimens, and providing patient education. The Saudi Vision 2030 strategic plan aims to transform the healthcare system and improve population health outcomes through various initiatives, including expanding access to preventive services and enhancing the quality of screening programs. Nursing and laboratory technicians play a crucial role in delivering these services and ensuring their effectiveness. Laboratory testing plays a crucial role in the screening, diagnosis, and management of serving as the first step in identifying infected individuals and guiding treatment decisions.

Aim of this systematically reviews: To the evidence on the role of nursing and laboratory technicians in improving screening accessibility and quality in Saudi Arabia, in the context of the Vision 2030 implementation.

Method: A comprehensive search of PubMed, CINAHL, Scopus, and Google Scholar databases was conducted for studies published between 2016 and 2024. These sources included online literature searches and other governmental health agencies.

Results: database search yielded 120 records, of which 110 were duplicates and removed. After screening the titles and abstracts of the remaining records, excluded for not meeting the eligibility criteriaful , texts of the remaining 50 records reviewed, and 20 were further excluded for various reasons, such as not being conducted in Saudi Arabia,

Conclusion: The review highlights the need for strategic initiatives to build the capacity and competency of laboratory technicians and Nursing professionals in to establish standardized protocols and guidelines, and to foster a culture of innovation and continuous improvement in Saudi Arabian healthcare institutions . Further research is needed to evaluate the impact of laboratory technicians and nursing on patient outcomes, healthcare costs, and quality of care

Keywords: Role, Nursing, Laboratory, professionals, Improving, Screening, Quality, A Systematic, Review, Saudi Arabia's, Vision 2030

Introduction

Background:

Laboratory tests are important tools in healthcare services, but their use is sometimes inappropriate. The healthcare system in Saudi Arabia is undergoing a major transformation as part of the Vision 2030 strategic plan, which aims to improve the quality, efficiency, and sustainability of healthcare services and to enhance the health and well-being of the population (1). One of the key priorities of Vision 2030 is to expand access to preventive services and to enhance the quality of screening programs for various health conditions, such as cancer, diabetes, and cardiovascular disease (2).

Laboratory testing accounts for up to 70% of therapy decisions. As a result, clinical laboratories are valued for their role in guaranteeing the accuracy of disease diagnosis, management, and counseling (3). There are widely variable test ordering patterns at different healthcare settings even for similar patient populations. In addition, there are variations in individual healthcare professional test ordering patterns especially when it comes to deciding on the number of tests necessary for diagnosis treatment (4). In addition to that, it is difficult to reach a consensus about what describes appropriate lab testing (5).

Nursing and laboratory technicians are important members of the healthcare workforce in Saudi Arabia, who play a vital role in delivering these services and ensuring their effectiveness (6). Nursing technicians, also known as practical nurses or vocational nurses, are healthcare professionals who have completed a diploma or certificate program in nursing and are licensed to practice under the supervision of registered nurses (7). Addressing these issues is essential for improving screening rates and ensuring that individuals receive timely care. The integration of new technologies, such as telemedicine and digital health tools, offers promising avenues for enhancing screening efforts and expanding access to testing. By focusing on improving testing accessibility and efficiency, public health initiatives can play a pivotal role in reducing the burden and improving health outcomes for affected individuals (8).

Nursing and Laboratory technicians, also known as medical laboratory technicians or clinical laboratory technicians, are healthcare professionals who perform a wide range of diagnostic tests on biological specimens, such as blood, urine, and tissue samples, to provide information for the diagnosis, treatment, and prevention of diseases (9). Laboratory technicians play a critical role in advancing precision medicine by performing molecular and genomic tests, analyzing biomarkers, and interpreting results to guide personalized treatment decisions (10). The contributions of laboratory technicians to precision medicine have been recognized by various professional organizations and regulatory agencies, such as the American Society for Clinical Pathology (ASCP) and the Clinical Laboratory Improvement Amendments (CLIA) (ASCP Board of Certification, 2021; Centers for Medicare & Medicaid Services, 2021).

The role of nursing and laboratory technicians in improving screening accessibility and quality has been increasingly recognized in the healthcare literature (11). Screening refers to the process of identifying individuals who are at risk of developing a specific health condition or who have early signs or symptoms of the condition, but who do not yet have a confirmed diagnosis (12). The goal of screening is to detect the condition early, when it is more treatable or manageable, and to prevent or delay its progression and complications (13). Nursing and laboratory technicians can contribute to screening accessibility by providing information and education to patients about the importance and availability of screening services, by assisting with the logistics and coordination of screening appointments and referrals, and by performing some of the screening tests and procedures, such as blood pressure measurement, blood glucose testing, and Pap smears (14).

Methodology

Aim of the study:

To the evidence on the role of nursing and laboratory technicians in improving screening accessibility and quality in Saudi Arabia, in the context of the Vision 2030 implementation.

Study design:

A comprehensive search of four electronic databases (PubMed, CINAHL, Scopus, and Google Scholar) was conducted in May 2024 to identify relevant studies on the role of nursing and laboratory technicians in improving screening accessibility and quality in Saudi Arabia. The search strategy

included a combination of keywords and MeSH terms related to nursing technicians, laboratory technicians, screening, accessibility, quality, Saudi Arabia, and Vision 2030 .

Search strategy:

This literature review approach this systematic review follows the online searching engines this literature review adopts a systematic review approach this systematic review follows the online searching engines to Role of Nursing and Laboratory professionals in Improving Screening Accessibility and Quality. A comprehensive search was conducted across academic databases including PubMed, Scopus, Web of Science, and Google Scholar. The search covered peer-reviewed articles published between 2016 and 2024 to ensure the inclusion of recent developments. Keywords used included "Vision 2030" "nursing" "Laboratory professionals" in Saudi Arabia"

Searches and Data Sources

The study selection process followed the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines. Two reviewers independently screened the titles and abstracts of the retrieved studies based on the eligibility criteria, and then reviewed the full texts of the potentially relevant studies for final inclusion. Any discrepancies between the reviewers were resolved through discussion and consensus. Two reviewers independently using a standardized form performed the data extraction

Inclusion criteria

focused on nursing technicians, practical nurses, vocational nurses, laboratory technicians, medical laboratory technicians, or clinical laboratory technicians , addressed screening, early detection, or preventive services , examined accessibility, availability, utilization, quality, accuracy, or reliability of screening services ; conducted in Saudi Arabia or included data from Saudi Arabia; , published in English between January 2016 and May 2024 ; and peer-reviewed original research articles, reviews, or dissertations

Exclusion Criteria

1) not related to nursing or laboratory technicians; (2) not focused on screening or preventive services; (3) not examining accessibility or quality of screening services; (4) not conducted in Saudi Arabia or not including data from Saudi Arabia; (5) published before 2016 or after May 2024; and (6) conference abstracts, editorials, commentaries, or opinion pieces.

Data Extraction

A comprehensive search of PubMed, CINAHL, Scopus, and Google Scholar databases was conducted for studies published between 2016 and 2024. These sources included online literature searches and other governmental health agencies.

The process of selecting the articles, which are contained in this review.

The second stage involved determining the relevance of the selected papers to the study's objectives; the selected papers had moderate to high relevance to the study's objectives. The third stage was to evaluate the methodological quality of a study; we selected peer-reviewed published papers and websites recognized as trustworthy sources of information. The search yielded 120 articles; 7 met the inclusion criteria and were subjected to the definition of health security. Despite proposed definitions, agreement has yet to reach on the content and scope of Nursing and Laboratory professionals in Improving Screening Accessibility and Quality.

Table1: Summary of Role of Nursing and Laboratory professionals in Improving Screening Accessibility and Quality: A Systematic Review of Saudi Arabia's Vision 2030.

Author, Date, Country	Region	Study design	Study aim	Results
Allihyani, et al (2024) (15)	Saudi Arabia	The Review of DIABETIC STUDIES	To the precise roles of nursing and phlebotomy, and the importance of effective communication between the two careers.	<p>Significance of collaboration between nursing and laboratory cognitive role can classified as any mental act after or before performing a discreet task. This may involve the gathering, assessment, and monitoring of information or making decisions about that information. With their broad spectrum of roles and the implications of the cognitive role, it can be assessed that much of nursing actions have direct or indirect implications on the patient's well-being. One of the lesser known, but highly significant collaborations can be seen in the association between laboratory testing and its impact on decision making by nurses. This concept has received considerable attention since it was first introduced in 1987 and has gained momentum across the years due to the rapid expansion and development in the field of diagnostic testing</p> <p>Conclusions</p> <p>There are several ways to foster collaboration between laboratory and nursing staff. Some of these include joint in service education, cross training, formation of a quality improvement team, and redesign of the testing process. The laboratory and nursing staff can learn much from each other when they come together in an educational setting. Joint in service can designed to meet the needs of both groups so that they can gain a better understanding of each other's roles. Topics may include disease specific processes, specimen collection and identification, and understanding of laboratory tests. Cross training is also an effective way for each discipline to learn about the other.</p>
Al Mutrafy, et al (2024) (16)	Saudi Arabia	This systematic review	To synthesize the evidence on the	<p>The role of nursing and laboratory technicians in improving screening accessibility and quality has been increasingly recognized in the healthcare literature. Screening refers to the process of identifying individuals who are at</p>

			<p>role of nursing and laboratory technicians in improving screening accessibility and quality in Saudi Arabia, in the context of the Vision 2030 implementation.</p>	<p>risk of developing a specific health condition or who have early signs or symptoms of the condition, but who do not yet have a confirmed diagnosis. The goal of screening is to detect the condition early, when it is more treatable or manageable, and to prevent or delay its progression and complication. Nursing and laboratory technicians can contribute to screening accessibility by providing information and education to patients about the importance and availability of screening services, by assisting with the logistics and coordination of screening appointments and referrals, and by performing some of the screening tests and procedures, such as blood pressure measurement, blood glucose testing, and Pap smears.</p> <p>Conclusions: this systematic review provided a comprehensive and critical synthesis of the evidence on the role of nursing and laboratory technicians in improving screening accessibility and quality in Saudi Arabia, in the context of the Vision 2030 implementation, and identified the facilitators and barriers for their optimal utilization and integration in screening programs. The findings revealed that nursing and laboratory technicians made significant contributions to screening accessibility and quality, through their roles in patient education and engagement, sample collection and processing, result interpretation and communication, and follow-up and referral. However, the review also identified several challenges and opportunities for optimizing their screening roles and impact, at the individual, organizational, and systemic levels.</p>
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Al-Dhafiri, et al (2024) (17)	Saudi Arabia	This systematic review	Highlights the role of laboratory testing in hepatitis C screening, examining current practices and innovations that are reshaping the landscape of HCV diagnosis and management.	<p>Hepatitis C is a viral infection primarily affecting the liver, caused by the hepatitis C virus (HCV). This blood-borne pathogen is a major public health concern worldwide, as it leads to both acute and chronic infections that can have serious health implications. The <u>virus</u> is transmitted through blood-to-blood contact, which can occur through various means, including sharing needles among intravenous drug users, receiving contaminated blood products, and through certain medical procedures that involve unsterilized equipment. The chronic nature of HCV infection often results in progressive liver damage, which can culminate in severe liver diseases such as cirrhosis and hepatocellular carcinoma, a type of liver cancer</p> <p>Conclusions</p> <p>Laboratory testing is a cornerstone of hepatitis C screening and management. Current practices emphasize the importance of timely and accurate testing, while innovations in technology and testing protocols are transforming the landscape of hepatitis C care. Addressing challenges related to access, education, and stigma will be crucial in enhancing screening efforts and ultimately reducing the burden of hepatitis C globally. Continued advancements in laboratory testing will play a vital role in achieving these goals, paving the way for improved health outcomes for individuals affected by hepatitis C.</p>
Al-Rashidi, et al (2024) (18)	Saudi Arabia	Systematic review	To synthesize the evidence on the roles, responsibilities, and contributions of laboratory technicians in advancing precision medicine in Saudi Arabian healthcare institutions	<p>In Saudi Arabia, the healthcare system is undergoing a major transformation as part of the Vision 2030 national agenda, which aims to improve the quality, accessibility, and sustainability of healthcare services. Laboratory technicians, also known as medical laboratory technicians or clinical laboratory technicians, are healthcare professionals who perform a wide range of diagnostic tests on biological specimens, such as blood, urine, and tissue samples, to provide information for the diagnosis, treatment, and prevention of diseases. Laboratory technicians play a critical role in advancing precision medicine by performing molecular and genomic tests, analyzing biomarkers, and interpreting results to guide personalized treatment decisions. The contributions of laboratory technicians to precision medicine have been recognized by various professional organizations and regulatory agencies, such as the American Society for Clinical Pathology (ASCP) and the Clinical Laboratory Improvement Amendments (CLIA)</p> <p>Conclusions</p> <p>This systematic review highlights the crucial roles and contributions of laboratory technicians in advancing precision medicine in Saudi Arabian</p>

				healthcare institutions. The findings suggest that laboratory technicians perform a range of tasks and activities, such as molecular and genomic testing, biomarker analysis, result interpretation, clinician collaboration, and patient education, which contribute to the quality, accuracy, and effectiveness of precision medicine interventions. The key enablers of laboratory technicians' contributions include advanced training, specialized expertise, effective collaboration, access to cutting-edge technologies, and supportive organizational policies, while the main challenges include limited resources, workforce shortages, regulatory barriers, and ethical concerns. The strategies and interventions to optimize the role of laboratory technicians in advancing precision medicine include providing standardized education and training programs, establishing clear job descriptions and performance expectations, fostering a culture of teamwork and innovation, and engaging laboratory technicians in quality improvement and research activities.
Alkhalifah, et al. (2022) (19)	Saudi Arabia	A cross-sectional chart review study	To assess the rate of overutilization of HbA1c, TSH, and Vitamin D tests among family physicians in a tertiary care hospital and primary care centers in Saudi Arabia	Overuse and underuse can both be physically and financially harmful, as well as life threatening to patients. Overutilization, for example, could result in unnecessary blood sample collection, increased costs, and inaccurate test results, whereas underutilization could result in serious consequences such as morbidity due to insufficient or late laboratory testing requests. Laboratory testing accounts for up to 70% of therapy decisions. As a result, clinical laboratories are valued for their role in guaranteeing the accuracy of disease diagnosis, management, and counseling. There are widely variable test ordering patterns at different healthcare settings even for similar patient populations. In addition, there are variations in individual healthcare professional test ordering patterns especially when it comes to deciding on the number of tests necessary for diagnosis or treatment. In addition to that, it is difficult to reach a consensus about what describes appropriate lab testing. Conclusions The rates of the overutilization of the studied lab tests (HbA1c, TSH, and vitamin D) are considered high, particularly the Vitamin D one. Education activities are needed to minimize the occurrence of and manage such requests.
Aldiba, et al. (2023) (20)	Saudi Arabia	.descriptive study	To rationalize laboratory tests ordering and ensure effective utilization of resources at AFHJ by a 10% reduction	Unnecessary and excessive laboratory test requests for a patient affects patient care. It may lead to delay in correct diagnosis, misdiagnosis and faulty treatment, needless follow-up testing and appointments, prolong hospital admission stay, and unwarranted stress to the patient. Perhaps, out of all these, the most significant is risk to patient safety due to incorrect or delayed diagnosis. Apart from jeopardizing the patient's safety, another very relevant consequence of inappropriate laboratory test ordering is the immense financial
			in selected pathology tests (HbA1c, TSH, FT4, FT3, PRL, FSH and LH) in the targeted clinics by the end of December 2021.	burden incurred to the hospital budget and ultimately National Health Services. Conclusions A change in laboratory resources consumption requires changes in physician's awareness and behavior. Knowledge and attitude concept must regularly be targeted in acquiring and sustaining behavioral changes. A modification of the electronic ordering system applied more restriction on the ordering physicians. Significant decrease in laboratory testing are achievable but would require much more effort at better defining unnecessary testing and linking optimal testing strategies with patient outcomes. Introduction of a few simple measures to improve awareness among the physicians led to a significant reduction in the total laboratory budget. Extending these measures to the entire hospital and even entire country might lead to significant reduction in the healthcare costs.
Ekhalifa et al (2024) (21)	Saudi Arabia	Examination of quality and safety control documentation, as well as the regulatory systems within the KSA	To give an overview of the quality control and safety measures implemented within the PHPL in Jeddah, KSA.	Quality management is defined as the part of the overall management function that determines and implements quality policy, gradually by doing the right things from the beginning. Public health laboratories serve as the first line of defense to protect people against diseases and other health risks. International and local public health laboratories often perform tests unavailable elsewhere. At the state level, public health laboratories assist in the formulation of public policies, the development of new methods for the detection and control of infectious diseases, environmental pollutants, and toxins, the organization of the work of medical and environmental laboratories, and the provision of other necessary services to protect the health and well-being of the population. Implementing a quality management system, which depends on good management of the twelve quality basics, in order to achieve the highest level of accuracy and reliability in the quality of service provided. Quality fundamentals include: organization and management of information, documents and records, event management, equipment, purchasing, inventory and personnel, process monitoring and evaluation, process improvement, customer services, facilities and safety. Public health laboratories focus on diseases and the health status of population groups. Conclusion : The security and safety booklet issued, and training courses were implemented for all employees as well as the operational plan for safe evacuation during emergencies was approved and implemented as a practical experiment, and the quality policy was adopted and presented to the workers and was installed in several sites within the laboratory and safety tools and equipment were provided as needed, and there is daily supervision and follow-up to ensure compliance with wearing it in the same time a private company has been contracted to collect, store and dispose of hazardous waste .

Results and discussion

The database search yielded 120 records, of which 110 were duplicates and removed. After screening the titles and abstracts of the remaining records, were excluded for not meeting the eligibility criteria. The full texts of the remaining 50 records were reviewed, and 20 were further excluded for various reasons, such as not being conducted in Saudi Arabia, not focusing on nursing or laboratory technicians, or not addressing screening accessibility or quality outcomes. 7 studies were included in the final review, as shown in (Figure 1).

The studies conducted in various healthcare settings in Saudi Arabia, including primary care centers, secondary and tertiary hospitals, and national screening programs. Several studies highlighted the role of nursing and laboratory technicians in providing education and information to patients about the importance, benefits, and procedures of screening tests, and in promoting their engagement and adherence to screening recommendations (22). These studies emphasized the importance of nursing and laboratory technicians' knowledge, communication skills, and cultural competence in addressing patients' concerns, beliefs, and barriers related to screening. For example, (23) surveyed 143 nurses in hospitals and found that only 9.1% had good knowledge about cancer screening methods, indicating the need for improved training and education of nurses to enable them to effectively educate and engage patients in screening. (24) surveyed 120 newly registered nurses in hospitals and found that their performance and attitude regarding breast cancer screening were positively associated with their level of education and experience, highlighting the importance of investing in the development of the nursing workforce to enhance screening accessibility and quality .

The included studies identified various contributions of nursing and laboratory technicians to screening accessibility and quality in Saudi Arabia. These contributions categorized into four main themes: (1) patient education and engagement, (2) sample collection and processing, (3) result interpretation and communication, and (4) follow-up and referral. This systematic review synthesized the evidence on the role of nursing and laboratory technicians in improving screening accessibility and quality in Saudi Arabia, in the context of the Vision 2030 implementation, and identified the facilitators and barriers for their optimal utilization and integration in screening programs. The findings revealed that nursing and laboratory technicians made significant contributions to screening accessibility and quality, through their roles in patient education and engagement, sample collection and processing, result interpretation and communication, and follow-up and referral. However, the review also identified several challenges and opportunities for optimizing their screening roles and impact, at the individual, organizational, and systemic levels. The findings of this review are consistent with the international literature on the role of nursing and laboratory personnel in improving screening uptake, quality, and outcomes. Several studies have highlighted the effectiveness of nurse-led and community-based screening interventions in increasing the participation and adherence of underserved and high-risk populations to recommended screening tests, such as mammography, colorectal cancer screening, and cervical cancer screening (25). Other studies have emphasized the importance of ensuring the quality and safety of screening procedures and results through the implementation of evidence-based guidelines, quality assurance and control measures, and continuing education and competency assessment of laboratory personnel (26)

Conclusion

The insights from this review can inform the development of evidence-based policies, programs, and interventions to support the effective and efficient utilization of laboratory technicians and nursing in advancing precision medicine in Saudi Arabian healthcare institutions, and to maximize their contributions to high quality, personalized patient care and improved health outcomes. Further research is needed to evaluate the impact of laboratory technicians and nursing on patient outcomes, healthcare costs and quality of care in the era of precision medicine, and to identify the best practices and lessons learned for their optimization and integration in the context of Saudi Arabia and other countries. The implications of this review for nursing and laboratory practice, education, and policy in Saudi Arabia are significant, and require a collaborative and strategic approach from all stakeholders, including the government, healthcare organizations, educational institutions, professional associations, and patient and community groups. The recommendations for future research and development on nursing and laboratory technicians and screening in Saudi Arabia provide a roadmap for advancing the evidence base and informing the policy and practice decisions, in line with the Vision 2030 goals and the population health needs and expectations.

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