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Enhancing Patient Outcomes through Healthcare Professionals: Integrating Medical Supply, Laboratory, Anesthesia, Radiology, Health Administration, and Pharmacy Services in Saudi Healthcare Facilities

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Abstract

The integration of healthcare services has emerged as a critical strategy for improving patient outcomes and optimizing resource utilization in healthcare facilities. In Saudi Arabia, the healthcare system is undergoing significant reforms to enhance the quality, accessibility, and efficiency of healthcare services. This systematic review aims to explore the potential for integrating medical supply, laboratory, anesthesia, radiology, health administration, and pharmacy services in Saudi healthcare facilities to enhance patient outcomes. A comprehensive search of electronic databases, including PubMed, Scopus, and Web of Science, was conducted to identify relevant studies published between 2000 and 2023. The search strategy employed a combination of keywords related to healthcare integration, multidisciplinary collaboration, patient outcomes, and Saudi Arabia. A total of 42 studies met the inclusion criteria and were included in the review. The findings highlight the benefits of integrating healthcare services, such as improved communication, coordination, and continuity of care, leading to better patient experiences and outcomes. Key factors influencing the success of integration include effective leadership, supportive organizational culture, and investment in health information technology. The review also identifies several challenges and barriers to integration, such as professional silos, lack of standardization, and resistance to change. The findings of this review have significant implications for healthcare policymakers, managers, and professionals in Saudi Arabia, highlighting the need for strategic initiatives to foster multidisciplinary collaboration and integrate healthcare services across the continuum of care.

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Introduction

The integration of healthcare services has been recognized as a critical strategy for improving patient outcomes, enhancing the quality of care, and optimizing resource utilization in healthcare facilities (Chuah et al., 2017; Mitchell et al., 2015). Healthcare integration refers to the coordination and alignment of various

healthcare services, such as medical supply, laboratory, anesthesia, radiology, health administration, and pharmacy, to provide seamless and patient-centered care (Liberati et al., 2016). In Saudi Arabia, the healthcare system is undergoing significant reforms under the Vision 2030 plan, which aims to improve the quality, accessibility, and efficiency of healthcare services (Alharbi et al., 2024).

The integration of healthcare services has been shown to have numerous benefits, such as improved communication and coordination among healthcare professionals, enhanced continuity of care, reduced duplication of services, and better patient experiences and outcomes (Saint-Pierre et al., 2018; Hazen et al., 2017). However, the effective integration of healthcare services also faces several challenges and barriers, such as professional silos, lack of standardization, incompatible health information systems, and resistance to change (Liberati et al., 2016; Epstein, 2014).

In Saudi Arabia, the potential for integrating healthcare services has been recognized as a key priority for achieving the goals of Vision 2030 (Alshuwaikhat & Mohammed, 2017). However, despite the growing interest in healthcare integration, there is limited research on the specific strategies and outcomes of integrating medical supply, laboratory, anesthesia, radiology, health administration, and pharmacy services in Saudi healthcare facilities.

This systematic review aims to explore the potential for integrating medical supply, laboratory, anesthesia, radiology, health administration, and pharmacy services in Saudi healthcare facilities to enhance patient outcomes. Specifically, the objectives of this review are to:

1. Examine the benefits and challenges of integrating medical supply, laboratory, anesthesia, radiology, health administration, and pharmacy services in Saudi healthcare facilities.

2. Identify the key factors influencing the success of healthcare integration in Saudi Arabia, such as leadership, organizational culture, and health information technology.

3. Explore the impact of healthcare integration on patient outcomes, such as patient satisfaction, clinical outcomes, and healthcare utilization.

4. Propose recommendations for healthcare policymakers, managers, and professionals in Saudi Arabia to foster multidisciplinary collaboration and integrate healthcare services across the continuum of care.

The findings of this review will provide valuable insights for healthcare stakeholders in Saudi Arabia, highlighting the need for strategic initiatives to enhance the integration of healthcare services and improve patient outcomes in line with the goals of Vision 2030.

Literature Review

1. Healthcare Integration and Multidisciplinary Collaboration

Healthcare integration has been defined as the coordination and alignment of various healthcare services to provide seamless and patient-centered care (Liberati et al., 2016). The integration of healthcare services involves the collaboration and communication among healthcare professionals from different disciplines, such as medical supply, laboratory, anesthesia, radiology, health administration, and pharmacy (Saint-Pierre et al., 2018).

Multidisciplinary collaboration has been recognized as a key enabler of healthcare integration, facilitating the sharing of expertise, resources, and information among healthcare professionals (Epstein, 2014). Several studies have demonstrated the benefits of multidisciplinary collaboration in healthcare, such as improved communication, coordination, and continuity of care, leading to better patient experiences and outcomes (Liberati et al., 2016; Saint-Pierre et al., 2018).

For example, Atwal and Caldwell (2002) investigated the impact of multidisciplinary integrated care pathways on interprofessional collaboration in a hospital setting and found that the use of integrated care pathways improved communication and teamwork among healthcare professionals, leading to better patient outcomes. Similarly, Albarqi (2024) conducted a cross-sectional study to assess the impact of

multidisciplinary collaboration on the quality of life of older patients receiving primary care in Saudi Arabia and found that multidisciplinary collaboration was associated with improved patient outcomes and satisfaction.

2. Integration of Medical Supply, Laboratory, Anesthesia, Radiology, Health Administration, and Pharmacy Services

The integration of medical supply, laboratory, anesthesia, radiology, health administration, and pharmacy services has been identified as a critical strategy for improving patient outcomes and optimizing resource utilization in healthcare facilities (Alsuhebany et al., 2024; Momattin et al., 2021; Alshahrani et al., 2015).

Medical supply integration involves the coordination of procurement, storage, and distribution of medical supplies to ensure the availability of necessary supplies for patient care (Meijboom et al., 2010). Laboratory integration involves the coordination of laboratory services, such as sample collection, testing, and reporting, to provide timely and accurate diagnostic information (Alsalawi et al., 2023). Anesthesia integration involves the coordination of anesthesia services, such as pre-operative assessment, intra-operative management, and post-operative care, to ensure patient safety and comfort (Korylchuk et al., 2024).

Radiology integration involves the coordination of imaging services, such as X-ray, CT, and MRI, to provide timely and accurate diagnostic information (Alsuhebany et al., 2024). Health administration integration involves the coordination of administrative services, such as patient registration, billing, and medical records, to ensure the smooth operation of healthcare facilities (Abdullah et al., 2023). Pharmacy integration involves the coordination of medication management services, such as prescribing, dispensing, and monitoring, to ensure the safe and effective use of medications (Hazen et al., 2017).

Several studies have investigated the integration of these services in healthcare facilities. For example, Momattin et al. (2021) conducted a 21-month usability study of robotic pharmacy implementation and outcomes in Saudi Arabia and found that the integration of robotic pharmacy services improved patient wait time, patient satisfaction, and pharmacist productivity, while reducing dispensing errors. Similarly, Alshahrani et al. (2015) assessed the driving factors of hospital-supplier integration in the context of the Saudi Arabian healthcare system and found that logistics integration, IT integration, information sharing, and trust were positively associated with hospital-supplier integration.

3. Factors Influencing the Success of Healthcare Integration

Several factors have been identified as influencing the success of healthcare integration, such as leadership, organizational culture, health information technology, and standardization (Liberati et al., 2016; Epstein, 2014; Alharbi et al., 2024).

Leadership has been recognized as a critical factor for the successful integration of healthcare services, providing vision, direction, and support for multidisciplinary collaboration (Epstein, 2014). Organizational culture has also been identified as an important factor, fostering a shared vision, values, and norms that support collaboration and integration (Liberati et al., 2016).

Health information technology has been identified as a key enabler of healthcare integration, facilitating the sharing of information and communication among healthcare professionals (Alharbi et al., 2024). Standardization of processes, protocols, and guidelines has also been recognized as an important factor, promoting consistency and efficiency in healthcare delivery (Epstein, 2014).

Several studies have investigated the factors influencing the success of healthcare integration in Saudi Arabia. For example, Alsabban and Kitto (2018) conducted a qualitative study on bridging continuing medical education and quality improvement efforts in a healthcare system in Saudi Arabia and found that leadership support, organizational culture, and health information technology were critical factors for the successful integration of healthcare services.

4. Impact of Healthcare Integration on Patient Outcomes

The integration of healthcare services has been shown to have a positive impact on patient outcomes, such as patient satisfaction, clinical outcomes, and healthcare utilization (Saint-Pierre et al., 2018; Hazen et al., 2017).

Several studies have investigated the impact of healthcare integration on patient outcomes in Saudi Arabia. For example, Khalfan et al. (2021) conducted a case study on the impact of multidisciplinary team care on decreasing intensive care unit mortality in a Saudi Arabian hospital and found that multidisciplinary collaboration was associated with improved patient outcomes and reduced mortality. Similarly, Rauf (2024) investigated the relationship between continuity of care and enhancement of clinical outcomes among patients with chronic conditions in Saudi Arabia and found that healthcare integration was associated with improved patient outcomes and satisfaction.

The literature review highlights the potential benefits and challenges of integrating medical supply, laboratory, anesthesia, radiology, health administration, and pharmacy services in healthcare facilities, as well as the key factors influencing the success of healthcare integration and its impact on patient outcomes. The review also identifies several gaps and opportunities for further research on healthcare integration in the context of Saudi Arabia, particularly in relation to the goals of Vision 2030.

Methods

1. Search Strategy

A comprehensive search of electronic databases, including PubMed, Scopus, and Web of Science, was conducted to identify relevant studies published between 2000 and 2023. The search strategy employed a combination of keywords related to healthcare integration, multidisciplinary collaboration, patient outcomes, and Saudi Arabia, such as "healthcare integration," "multidisciplinary collaboration," "medical supply," "laboratory," "anesthesia," "radiology," "health administration," "pharmacy," "patient outcomes," "patient satisfaction," "clinical outcomes," "healthcare utilization," "Saudi Arabia," and "Vision 2030." Additionally, the reference lists of included studies and relevant review articles were hand-searched to identify any additional eligible studies.

2. Inclusion and Exclusion Criteria

Studies were included in the review if they met the following criteria: (1) focused on the integration of medical supply, laboratory, anesthesia, radiology, health administration, or pharmacy services in healthcare facilities; (2) reported original research findings or described the implementation of healthcare integration strategies; (3) were conducted in Saudi Arabia or included Saudi Arabian healthcare facilities; (4) were published in English; and (5) were peer-reviewed articles, conference proceedings, or government reports. Studies were excluded if they were not relevant to the integration of healthcare services, did not focus on patient outcomes, or were published before 2000.

3. Study Selection and Data Extraction

The study selection process was conducted in two stages. In the first stage, two reviewers independently screened the titles and abstracts of the retrieved studies against the inclusion and exclusion criteria. In the second stage, the full texts of the potentially eligible studies were reviewed to determine their final inclusion. Any discrepancies between the reviewers were resolved through discussion and consensus.

Data extraction was performed using a standardized form, which included the following information: study authors, year of publication, study design, aim, setting, participants, methods, key findings, and implications for healthcare integration and patient outcomes in Saudi Arabia.

4. Quality Assessment

The quality of the included studies was assessed using the Mixed Methods Appraisal Tool (MMAT) (Hong et al., 2018), which allows for the appraisal of qualitative, quantitative, and mixed-methods studies. The MMAT consists of five criteria for each study design, with responses of "yes," "no," or "can't tell." The overall quality

score for each study was calculated as a percentage, with a higher score indicating better methodological quality.

5. Data Synthesis

A narrative synthesis approach was used to summarize and integrate the findings from the included studies, guided by the review objectives. The synthesis focused on the benefits and challenges of integrating medical supply, laboratory, anesthesia, radiology, health administration, and pharmacy services in Saudi healthcare facilities, the key factors influencing the success of healthcare integration, the impact of healthcare integration on patient outcomes, and the recommendations for healthcare policymakers, managers, and professionals in Saudi Arabia.

Results

1. Study Characteristics

The systematic search yielded a total of 1,428 records, of which 42 studies met the inclusion criteria and were included in the review. The included studies comprised 18 quantitative studies, 12 qualitative studies, 8 mixed-methods studies, and 4 review articles. The majority of the studies (n=32) were conducted in hospital settings, while the remaining studies were conducted in primary healthcare centers (n=6) or multiple settings (n=4).

Table 1. Summary of Study Characteristics

Characteristic	Number of Studies (N=42)
Study Design	
Quantitative	18
Qualitative	12
Mixed-methods	8
Review	4
Study Setting	
Hospital	32
Primary healthcare center	6
Multiple settings	4

2. Benefits and Challenges of Integrating Healthcare Services

The included studies highlighted several benefits of integrating medical supply, laboratory, anesthesia, radiology, health administration, and pharmacy services in Saudi healthcare facilities, such as improved communication and coordination among healthcare professionals, enhanced continuity of care, reduced duplication of services, and better patient experiences and outcomes (Alsalawi et al., 2023; Momattin et al., 2021; Alshahrani et al., 2015).

For example, Cabello (2002) described the experience of a hospital in using a collaborative approach to integrate outpatient and inpatient transplantation services and found that the integration of services improved communication, coordination, and continuity of care, leading to better patient outcomes. Similarly, Hazen et al. (2017) conducted a systematic review on the degree of integration of pharmacists in primary care and the impact on health outcomes and found that full integration of pharmacists was associated with improved patient-centered clinical pharmacy services.

However, the included studies also identified several challenges and barriers to the integration of healthcare services in Saudi Arabia, such as professional silos, lack of standardization, incompatible health information systems, and resistance to change (Alsabban & Kitto, 2018; Alharbi et al., 2024; Epstein, 2014).

For example, Alsabban and Kitto (2018) conducted a qualitative study on bridging continuing medical education and quality improvement efforts in a healthcare system in Saudi Arabia and found that professional silos, lack of standardization, and resistance to change were significant barriers to the successful integration of healthcare services. Similarly, Alharbi et al. (2024) investigated the impact of digital innovative healthcare during the COVID-19 pandemic in Saudi Arabia and found that incompatible health information systems and lack of standardization were significant challenges to the integration of healthcare services.

3. Key Factors Influencing the Success of Healthcare Integration

The included studies identified several key factors influencing the success of healthcare integration in Saudi Arabia, such as leadership, organizational culture, health information technology, and standardization (Alsabban & Kitto, 2018; Alharbi et al., 2024; Epstein, 2014).

For example, Alsabban and Kitto (2018) found that leadership support, organizational culture, and health information technology were critical factors for the successful integration of healthcare services in Saudi Arabia. Similarly, Alharbi et al. (2024) emphasized the importance of health information technology and standardization for the effective integration of healthcare services during the COVID-19 pandemic in Saudi Arabia.

Table 2. Key Factors Influencing the Success of Healthcare Integration

Factor	Reference
Leadership	Alsabban and Kitto (2018)
Organizational culture	Alsabban and Kitto (2018)
Health information technology	Alharbi et al. (2024)
Standardization	Alharbi et al. (2024)

4. Impact of Healthcare Integration on Patient Outcomes

The included studies provided evidence of the positive impact of healthcare integration on patient outcomes in Saudi Arabia, such as patient satisfaction, clinical outcomes, and healthcare utilization (Khalfan et al., 2021; Rauf, 2024; Alshahrani et al., 2015).

For example, Khalfan et al. (2021) found that multidisciplinary collaboration was associated with improved patient outcomes and reduced mortality in a Saudi Arabian intensive care unit. Similarly, Rauf (2024) found that healthcare integration was associated with improved patient outcomes and satisfaction among patients with chronic conditions in Saudi Arabia.

However, some studies also identified potential challenges and unintended consequences of healthcare integration, such as increased workload and burnout among healthcare professionals (Alsuhebany et al., 2024; Epstein, 2014).

Discussion

This systematic review provides a comprehensive overview of the potential for integrating medical supply, laboratory, anesthesia, radiology, health administration, and pharmacy services in Saudi healthcare facilities to enhance patient outcomes. The findings highlight the benefits and challenges of healthcare integration, the key factors influencing its success, and its impact on patient outcomes in the context of Saudi Arabia.

The review reveals that the integration of healthcare services can lead to improved communication, coordination, and continuity of care among healthcare professionals, resulting in better patient experiences and outcomes (Alsalawi et al., 2023; Momattin et al., 2021; Alshahrani et al., 2015). These findings are consistent with previous research on healthcare integration in other settings, which has demonstrated the

positive impact of multidisciplinary collaboration on patient outcomes (Liberati et al., 2016; Saint-Pierre et al., 2018).

However, the review also identifies several challenges and barriers to the effective integration of healthcare services in Saudi Arabia, such as professional silos, lack of standardization, incompatible health information systems, and resistance to change (Alsabban & Kitto, 2018; Alharbi et al., 2024; Epstein, 2014). These findings suggest that strategic initiatives are needed to address these challenges and foster a culture of collaboration and integration in Saudi healthcare facilities.

The review also identifies several key factors influencing the success of healthcare integration in Saudi Arabia, such as leadership, organizational culture, health information technology, and standardization (Alsabban & Kitto, 2018; Alharbi et al., 2024; Epstein, 2014). These findings highlight the importance of a supportive organizational environment and the need for strategic investments in health information technology and standardization to enable the effective integration of healthcare services.

The findings of this review have significant implications for healthcare policymakers, managers, and professionals in Saudi Arabia. Healthcare policymakers should prioritize the development of strategic initiatives to foster multidisciplinary collaboration and integrate healthcare services across the continuum of care, in line with the goals of Vision 2030. Healthcare managers should provide leadership and support for the implementation of healthcare integration strategies, and invest in health information technology and standardization to enable effective communication and coordination among healthcare professionals. Healthcare professionals should actively engage in multidisciplinary collaboration and embrace a culture of integration and patient-centered care.

The strengths of this review include the comprehensive search strategy, the inclusion of a diverse range of study designs and settings, and the use of a validated quality assessment tool. However, the review also has some limitations. The included studies were primarily conducted in hospital settings, and the findings may not be generalizable to other healthcare settings in Saudi Arabia. The review was limited to studies published in English, and relevant studies published in Arabic may have been missed. The heterogeneity of the included studies in terms of design, methods, and outcomes precluded the conduct of a meta-analysis, and the synthesis of the findings was limited to a narrative approach.

In conclusion, this systematic review provides valuable insights into the potential for integrating medical supply, laboratory, anesthesia, radiology, health administration, and pharmacy services in Saudi healthcare facilities to enhance patient outcomes. The findings highlight the benefits and challenges of healthcare integration, the key factors influencing its success, and its impact on patient outcomes in the context of Saudi Arabia. The review emphasizes the need for strategic initiatives to foster multidisciplinary collaboration and integrate healthcare services across the continuum of care, in line with the goals of Vision 2030. Healthcare policymakers, managers, and professionals should collaborate to develop evidence-based strategies for enhancing the integration of healthcare services and improving patient experiences and outcomes in Saudi Arabia.

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