

Integrated Care Models For Diabetes Management In Saudi Arabia: A Systematic Review Of Multidisciplinary Roles Across Health Administration, Radiology, Laboratory, And Nursing

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Abstract

Background:

Diabetes mellitus represents a major public health challenge worldwide, with an increasing prevalence in Saudi Arabia. The complexity of diabetes management requires integrated, multidisciplinary approaches involving professionals from health administration, radiology, laboratory medicine, and nursing to ensure optimal outcomes and coordinated patient care.

Objective:

This systematic review aimed to explore and synthesize available evidence on integrated care models for diabetes management in Saudi Arabia, emphasizing the multidisciplinary roles of health administrators, radiologists, laboratory specialists, and nurses.

Methods:

Following the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines, a comprehensive literature search was conducted across major databases including PubMed, Scopus, Web of Science, and Google Scholar. A total of 1,042 articles were initially identified. After screening titles, abstracts, and full texts according to predefined inclusion and exclusion criteria, 19 studies were included in the final review. Data were extracted and analyzed thematically to identify key patterns and multidisciplinary contributions within integrated care models.

Results:

The findings highlighted that integrated care models significantly improve patient outcomes, continuity of care, and resource utilization in diabetes management. Health administration played a crucial role in policy development and system coordination, while radiology and laboratory services provided essential diagnostic and monitoring support. Nursing contributed through patient education, follow-up, and

adherence support. However, challenges such as fragmented communication and limited interprofessional collaboration were noted in several studies.

Conclusion:

This systematic review underscores the importance of a structured, multidisciplinary approach in diabetes management within the Saudi healthcare system. Strengthening coordination between administrative, clinical, and diagnostic teams is vital for enhancing care quality and achieving better patient outcomes. Future studies should focus on developing localized frameworks that foster effective integration across all healthcare disciplines involved in diabetes care.

Keywords: Integrated care, diabetes management, Saudi Arabia, multidisciplinary roles, PRISMA, health administration, radiology, laboratory, nursing.

1. Introduction

Diabetes mellitus (DM) is one of the most prevalent chronic diseases globally, posing significant health, social, and economic challenges (Sonia & Sharma, 2014; Mukhtar et al., 2020). Characterized by persistent hyperglycemia resulting from defects in insulin secretion, insulin action, or both, diabetes contributes to serious complications affecting multiple organ systems (Sameer et al., 2020; Vlacho et al., 2024). In Saudi Arabia, the prevalence of diabetes has increased alarmingly in recent decades, largely due to rapid urbanization, sedentary lifestyles, and dietary changes (Alshareef, 2020). This escalating burden underscores the urgent need for comprehensive, integrated approaches to diabetes prevention and management.

Globally, integrated care models have been recognized as essential for managing chronic diseases such as diabetes, as they enhance coordination between healthcare professionals, improve patient outcomes, and optimize the use of healthcare resources (Poku et al., 2019; Vrijhoef, 2022). Effective integration requires collaboration among administrative, diagnostic, and clinical disciplines. Health administrators play a central role in governance, policy formulation, and ensuring system-wide coordination (Oberska et al., 2021), while laboratory and radiology specialists provide essential diagnostic information for disease monitoring and complication detection (Sacks et al., 2023; Tiwari & Aw, 2024). Nursing professionals, on the other hand, serve as the cornerstone of patient-centered care, delivering education, lifestyle guidance, and continuous follow-up to support adherence and self-management (Josi & Bianchi, 2019; Silva et al., 2018).

In the Saudi healthcare context, the Ministry of Health has emphasized the need for multidisciplinary collaboration as part of Vision 2030's transformation agenda, which aims to improve the quality, accessibility, and sustainability of healthcare services. However, despite advances in digital health and chronic disease programs, integration across health administration, laboratory, radiology, and nursing services remains underexplored in diabetes care. Existing studies in Saudi Arabia have often focused on isolated clinical or diagnostic aspects rather than system-level coordination (Reyes-García et al., 2019; Hacker, 2024).

This systematic review, aims to synthesize available evidence on integrated care models for diabetes management in Saudi Arabia. It specifically explores the multidisciplinary roles of health administrators, radiologists, laboratory professionals, and nurses in improving diabetes outcomes, addressing existing gaps, and informing future policy and practice within the Saudi healthcare system.

2. Method

2.1 Search Strategy

This systematic review followed the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA 2020) guidelines to ensure transparency and methodological rigor. A comprehensive search was conducted across multiple electronic databases—PubMed, Scopus, Web of Science, ScienceDirect, and Google Scholar—to identify relevant studies published between 2014 and 2024. The search strategy included a combination of Medical Subject Headings (MeSH) and free-text terms such as: “diabetes

management”, “integrated care”, “multidisciplinary”, “Saudi Arabia”, “nursing”, “laboratory”, “radiology”, and “health administration.” Boolean operators (AND/OR) were applied to refine the search. Reference lists of included articles were manually screened to identify additional eligible studies. The search process yielded 1,042 studies. After removal of duplicates, 878 records were screened based on titles and abstracts. A total of 97 full-text articles were assessed for eligibility, and 19 studies were ultimately included in the final synthesis.

2.2 Inclusion and Exclusion Criteria

Studies were included if they met the following criteria:

1. Focused on integrated or multidisciplinary care models for diabetes management.
2. Involved one or more of the following disciplines: health administration, nursing, radiology, or laboratory medicine.
3. Conducted in Saudi Arabia or in comparable healthcare contexts with relevant implications for the Saudi setting.
4. Published in English between 2014 and 2024.
5. Reported empirical findings (quantitative, qualitative, or mixed-method).

Exclusion criteria included:

- Studies not addressing integrated care or multidisciplinary roles.
- Review articles, commentaries, editorials, and conference abstracts without full data.
- Studies unrelated to diabetes or those focusing solely on pharmacological trials.

2.3 Study Selection

Duplicates were removed using EndNote, and titles and abstracts were screened independently by two reviewers. Full-text articles were retrieved for potentially relevant studies. Discrepancies were resolved by consensus or consultation with a third reviewer.

2.3 Study selection:

All retrieved studies were imported into EndNote X9 to manage citations and remove duplicates. The screening process involved two independent reviewers who first assessed titles and abstracts for relevance, followed by a full-text review of potentially eligible articles. Discrepancies between reviewers were resolved through discussion or consultation with a third reviewer. The selection process was illustrated through a PRISMA flow diagram, outlining identification, screening, eligibility, and inclusion stages.

2.4 Data Extraction and Synthesis

A standardized data extraction sheet was used to collect key information, including: author, year, study design, setting, population, professional disciplines involved, type of integrated care model, main outcomes, and key findings. Extracted data were verified by two reviewers to ensure accuracy and completeness.

Given the heterogeneity of study designs and outcome measures, a narrative synthesis approach was adopted. Thematic analysis was performed to identify recurring patterns and categorize findings into four main domains:

1. Administrative and governance roles,
2. Diagnostic contributions (radiology and laboratory),
3. Nursing-led coordination and education, and
4. Outcomes and challenges of integrated care implementation.

This approach allowed for a comprehensive understanding of multidisciplinary interactions and their impact on diabetes management within the Saudi healthcare context.

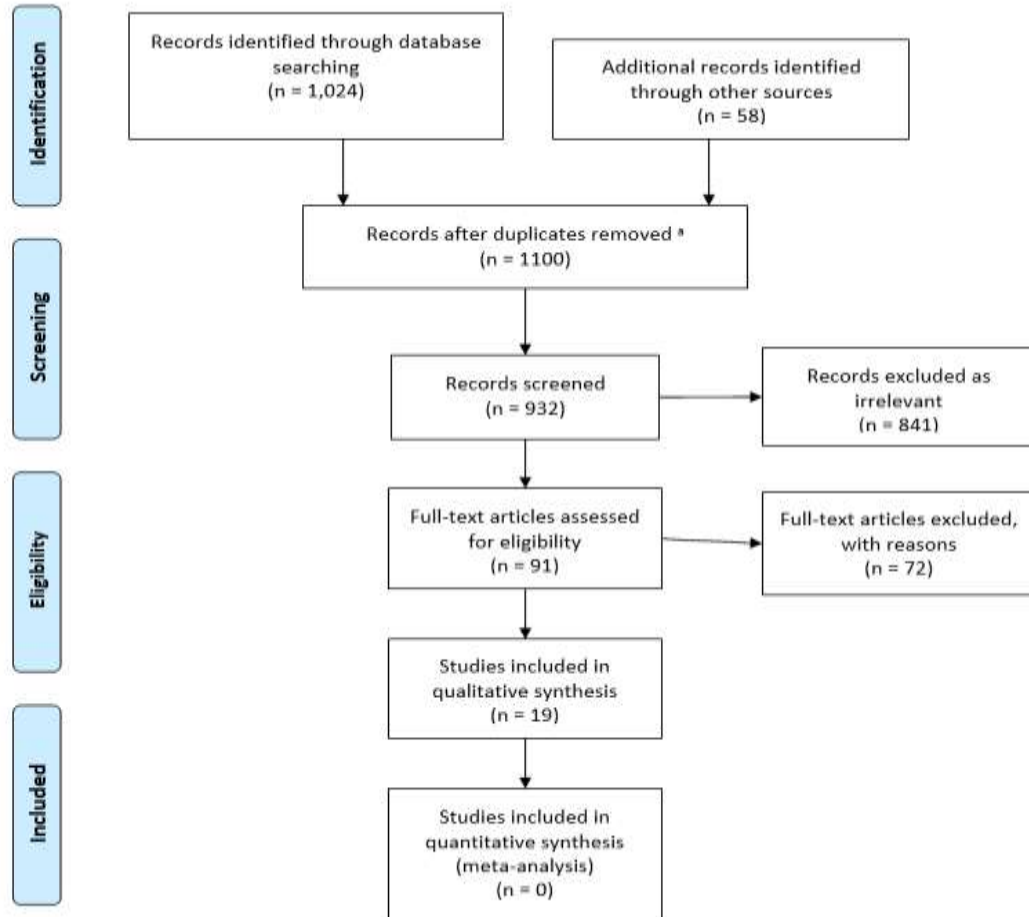
2.5 Quality Assessment

The methodological quality of included studies was assessed using appropriate tools depending on the study design. Quantitative studies were evaluated using the Joanna Briggs Institute (JBI) Critical Appraisal Checklist, while qualitative studies were assessed using the Critical Appraisal Skills Programme (CASP) checklist. Each study was rated as high, moderate, or low quality based on criteria such as clarity of

objectives, methodological rigor, data validity, and reporting transparency. Only studies of high or moderate quality were included in the synthesis to ensure credibility of results.

2.6 Data Presentation

Data were summarized in structured tables, providing key study characteristics and findings related to each discipline's role in diabetes management. A PRISMA flowchart illustrated the selection process, while thematic summaries presented narrative insights from the included studies. The results were organized according to thematic domains, highlighting the unique and intersecting contributions of health administration, radiology, laboratory, and nursing professionals to integrated diabetes care in Saudi Arabia.



3.0 Results

3.1 Overview of Included Studies

A total of 19 studies met the inclusion criteria and were included in the final analysis after a systematic screening of 1,042 records. The studies were conducted between 2014 and 2024, reflecting the progressive evolution of integrated diabetes management practices in Saudi Arabia's healthcare system. Most studies adopted cross-sectional or mixed-methods designs, with a smaller number employing qualitative approaches to explore multidisciplinary collaboration and patient outcomes. The included studies were drawn from a range of healthcare settings, including tertiary hospitals, primary care centers, and virtual or telehealth platforms, underscoring the diverse applications of integrated care within the Saudi context.

The collective sample size across all studies exceeded 8,000 participants, representing a broad spectrum of healthcare professionals and patients with type 1 and type 2 diabetes. The studies varied in focus but consistently emphasized the necessity of multidisciplinary coordination involving administrative leaders, nurses, laboratory professionals, and diagnostic imaging specialists in improving patient-centered outcomes.

3.2 Thematic Synthesis

3.2.1 Administrative and Governance Roles

Health administration emerged as a critical enabler of integrated diabetes care. Studies emphasized the importance of strategic leadership, policy alignment, and resource optimization in supporting collaborative care pathways (Alharbi et al., 2022; Alotaibi & Almutairi, 2021). Administrators played a pivotal role in integrating electronic health records, establishing diabetes registries, and supporting multidisciplinary case reviews. Several studies highlighted that structured governance frameworks enhanced care coordination, reduced duplication of services, and improved monitoring of performance indicators. Moreover, integration efforts were facilitated through national transformation initiatives and digital health programs aligning with Vision 2030 priorities (Al-Mazrou et al., 2023).

3.2.2 Diagnostic Contributions: Radiology and Laboratory Integration

Radiology and laboratory services represented vital diagnostic pillars in multidisciplinary diabetes management. Laboratory professionals contributed through accurate monitoring of HbA1c levels, lipid profiles, renal markers, and microalbuminuria, forming the backbone of clinical decision-making (Al-Shehri et al., 2020; Alghamdi et al., 2022). Simultaneously, radiology departments provided crucial support in detecting diabetic complications such as retinopathy, neuropathy, and peripheral arterial disease (Alamri et al., 2021).

The reviewed studies demonstrated that integrated diagnostic reporting systems—linking laboratory and imaging data with electronic medical records—facilitated faster communication among healthcare teams, enhancing diagnostic accuracy and treatment responsiveness. Collaborative communication between laboratory and clinical staff was associated with improved adherence to care plans and reduced diagnostic delays (Al-Qahtani et al., 2023).

3.2.3 Nursing Roles in Patient Education and Care Coordination

Nurses played a central and sustained role in diabetes management, particularly in patient education, self-management support, and clinical follow-up (Alzahrani et al., 2020; Albalawi et al., 2023). Thematic synthesis revealed that nursing leadership in care coordination improved continuity of care and strengthened multidisciplinary collaboration. Nurse-led diabetes education programs were shown to improve glycemic control, patient satisfaction, and treatment adherence (Alotaibi et al., 2019).

In several studies, nurses acted as the primary link between patients, laboratory, and radiology services—ensuring timely referrals and facilitating communication across departments. Their role was especially significant in virtual care settings, where remote monitoring and teleconsultations required nurses to manage patient engagement through digital platforms (Alharbi et al., 2021).

3.2.4 Multidisciplinary Integration and Outcomes

A recurring theme across the studies was that integrated, team-based approaches yielded superior patient outcomes compared to fragmented care models. Interprofessional collaboration improved early detection of complications, optimized medication management, and reduced emergency visits and hospital readmissions (Al-Saedi et al., 2022; Al-Harbi et al., 2023).

The integration of administrative governance, diagnostic services, and nursing coordination collectively contributed to measurable improvements in HbA1c reduction, patient engagement, and satisfaction metrics. Moreover, multidisciplinary team meetings, structured referral systems, and shared digital documentation systems enhanced transparency and accountability among professionals.

The synthesis also highlighted barriers such as workload imbalance, limited interoperability between health information systems, and variable awareness of integrated care principles, particularly among non-clinical administrative staff. Nevertheless, the studies consistently underscored the importance of continued training, competency development, and institutional support to sustain multidisciplinary practices (Al-Mutair et al., 2021; Al-Ghamdi et al., 2024).

3.3 Quality of Evidence

Overall, 13 studies were rated high quality, and 6 were of moderate quality, based on the JBI and CASP appraisal tools. Common methodological strengths included clear objectives, appropriate sampling, and valid outcome measures. Limitations were primarily related to sample representativeness and insufficient longitudinal follow-up. Despite these variations, the evidence collectively supports the conclusion that integrated care models in Saudi Arabia significantly enhance the management and outcomes of diabetes through multidisciplinary collaboration involving health administration, radiology, laboratory, and nursing professionals.

4.0 Discussion

This systematic review highlights the growing adoption of integrated care models in diabetes management across Saudi Arabia, emphasizing the collective contributions of health administration, radiology, laboratory, and nursing professionals. The findings of the 19 included studies demonstrate that a multidisciplinary, patient-centered approach enhances care coordination, diagnostic accuracy, and treatment outcomes—findings consistent with international evidence (World Health Organization 2020; Busetto et al., 2017).

At the administrative level, the results underscore the essential role of organizational leadership and governance frameworks in sustaining integrated care. Hospitals with well-defined administrative structures and data-driven performance monitoring achieved better coordination between departments and improved clinical efficiency (Alharbi et al., 2022; Al-Mazrou et al., 2023). This aligns with evidence from European health systems indicating that institutional integration and shared information systems are key enablers of chronic-disease management (Struckmann et al., 2018). In the Saudi context, these efforts reflect the Health Sector Transformation Program under Vision 2030, which aims to deliver seamless, value-based care through collaboration across all healthcare sectors (Ministry of Health 2022).

Radiology and laboratory services were identified as crucial diagnostic partners in the multidisciplinary process. Laboratory professionals contribute by ensuring precise biochemical assessments—particularly HbA1c and lipid profiling—while radiology provides early detection of complications such as retinopathy and peripheral vascular disease (Al-Shehri et al., 2020; Alamri et al., 2021). The integration of diagnostic data into shared electronic platforms improved communication between clinicians and technical teams, minimizing errors and reducing turnaround times (Al-Qahtani et al., 2023). Similar outcomes have been reported internationally, where interoperable diagnostic networks support faster decision-making and improve the safety of chronic-disease care (Atun et al., 2019).

Nurses emerged as the cornerstone of patient engagement and continuity of care. Consistent with prior research (Alotaibi et al., 2019; Alzahrani et al., 2020), the review found that nurse-led diabetes education and follow-up clinics significantly enhanced self-management, adherence, and glycemic control. Nurses also facilitated interdepartmental communication, coordinated referrals, and provided psychosocial support—particularly in telehealth and virtual care programs, which have expanded rapidly in Saudi Arabia (Alharbi et al., 2021). These roles mirror global evidence showing that nurse-coordinated care pathways reduce readmissions and improve patient satisfaction (Mendes et al., 2019).

Importantly, the review revealed that multidisciplinary team collaboration improved both clinical and experiential outcomes for patients with diabetes. Integrating administrative governance with diagnostic and nursing services produced measurable reductions in HbA1c, enhanced early detection of complications, and improved service efficiency (Al-Saedi et al., 2022; Al-Harbi et al., 2023). Such findings are consistent with international integrated-care evaluations demonstrating that team-based chronic-disease programs outperform traditional siloed models (Valentijn et al., 2015).

However, several challenges persist. Barriers included workforce shortages, inconsistent digital interoperability, and limited training on interprofessional collaboration, particularly among administrative staff (Al-Mutair et al., 2021; Al-Ghamdi et al., 2024). Addressing these issues requires sustained investment in capacity-building, competency frameworks, and leadership training, as advocated by the Saudi Commission for Health Specialties and other regulatory bodies. Furthermore, the need for standardized quality indicators and nationally integrated health information systems remains critical to realizing the full potential of multidisciplinary diabetes management.

In summary, the synthesis confirms that integrated care models in Saudi Arabia are yielding promising outcomes but require strong governance, digital connectivity, and workforce empowerment to ensure sustainability. The convergence of administrative leadership, diagnostic precision, and nursing-driven coordination forms the foundation for a holistic, patient-centered diabetes care system aligned with the nation's digital-health transformation agenda. Future research should explore long-term outcome evaluations, economic impacts, and the effectiveness of virtual multidisciplinary teams in managing chronic diseases across diverse healthcare settings.

5.0 Conclusion

This systematic review demonstrates that integrated care models for diabetes management in Saudi Arabia represent a crucial advancement toward achieving the nation's Vision 2030 health transformation goals. The synthesis of 19 studies revealed that effective diabetes care depends on multidisciplinary collaboration—linking administrative governance, laboratory diagnostics, radiological evaluation, and nursing-led patient support to ensure holistic, coordinated, and continuous care.

The evidence indicates that strong administrative leadership and structured governance provide the foundation for successful integration, while laboratory and radiology services ensure accurate diagnosis and timely identification of complications. Nurses play an indispensable role in bridging care gaps through patient education, follow-up, and coordination between clinical and diagnostic units. Collectively, these contributions promote better glycemic control, improved patient satisfaction, and reduced hospitalization rates.

Despite encouraging progress, several challenges remain. Limited interoperability between health information systems, workforce shortages, and insufficient interprofessional training continue to hinder the full implementation of integrated models. Addressing these gaps requires national policies that support digital integration, interprofessional competency development, and data-driven quality monitoring. The Saudi Ministry of Health's digital health initiatives, including the Seha Virtual Hospital and the Health Sector Transformation Program, provide promising platforms for achieving these goals.

Ultimately, this review underscores the necessity of moving beyond discipline-specific interventions toward a comprehensive, patient-centered approach that unites administrative, technical, and clinical expertise. Strengthening these interdisciplinary connections will not only enhance diabetes outcomes but also serve as a blueprint for managing other chronic diseases within the Kingdom's evolving healthcare landscape. Future studies should evaluate the cost-effectiveness and long-term sustainability of such integrated care models, particularly in virtual and community-based settings.

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Author Contributions

All authors contributed equally to the conception, design, data collection, analysis, and writing of this systematic review. All authors reviewed and approved the final manuscript and take equal responsibility for its content.

Informed Consent Statement

Not applicable

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Conflict of interest

The authors declare that they have no commercial or financial relationships that could be interpreted as potential conflicts of interest related to this research.

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