The Review Of
DIABETIC
STUDIES OPEN ACCESS

Emerging Digital Health Technologies In Diabetes Care: Clinical Outcomes, Patient Experience, And Evolving Roles Of Nurses, Dentists, Laboratory, Health Informatics, And Radiology Professionals – A Systematic Review

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Abstract

Background:
Emerging digital health technologies are increasingly transforming diabetes care by enhancing clinical outcomes, patient experience, and care coordination. The integration of telehealth, mobile health (mHealth), remote monitoring, and artificial intelligence (AI) has reshaped clinical workflows and expanded the roles of multidisciplinary healthcare professionals. This systematic review aimed to synthesize current evidence on digital health interventions in diabetes care and to examine the evolving responsibilities of nurses, dentists, laboratory professionals, health informatics specialists, and radiology professionals.
Methods:
A comprehensive literature search was conducted across major electronic databases, identifying more than 1,050 records. The review followed the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines. After removal of duplicates and screening based on predefined inclusion and exclusion criteria, 20 studies were included for qualitative synthesis. Eligible studies evaluated digital health interventions in diabetes care, including telehealth platforms, mHealth applications, remote patient monitoring, and AI-assisted diagnostic and decision-support tools.
Results:
The included studies consistently reported improvements in glycemic control, patient engagement, self-management, and interprofessional collaboration. Nurses played a central role in patient education, virtual follow-up, and remote monitoring. Radiology professionals contributed through AI-enhanced imaging and

early detection of diabetes-related complications. Dentists supported integrated care by incorporating oral health monitoring into digital systems, while laboratory and health informatics professionals facilitated data integration, clinical decision support, and continuity of care. Key implementation challenges included limited digital literacy, insufficient training, and infrastructure constraints.

Conclusion:

Digital health technologies are redefining diabetes care and strengthening multidisciplinary collaboration. Optimizing their impact requires continuous professional training, investment in digital infrastructure, and integrated care models. Future research should focus on scalable implementation strategies and long-term evaluation of clinical and patient-centered outcomes.

Keywords: Diabetes mellitus; Digital health; Telehealth; Mobile health (mHealth); Artificial intelligence; Multidisciplinary care; Nurses; Dentists; Laboratory professionals; Health informatics; Radiology; PRISMA; Systematic review.

1. Introduction

The management of chronic diseases, particularly diabetes mellitus, has increasingly benefited from the integration of digital health technologies. Digital health encompasses a broad spectrum of tools, including telehealth, mobile health (mHealth) applications, remote monitoring systems, and artificial intelligence (AI)–assisted diagnostics (Health AIo, Welfare, 2020; Tromp et al., 2022). These innovations have transformed traditional care delivery by enhancing patient engagement, improving clinical decision-making, and facilitating interprofessional collaboration (Santo & Redfern, 2020; Gupta et al., 2018).

Healthcare professionals are experiencing evolving roles in response to these technological advances. Nurses, for example, play a critical role in patient education, telemonitoring, and the coordination of care in virtual environments (Chaudhry et al., 2010; Inglis et al., 2010). Radiologists are increasingly leveraging AI and digital imaging technologies to detect diabetes-related complications, improving diagnostic accuracy and workflow efficiency (Leitman et al., 2004; Wood & Ellenbogen, 2002). Additionally, dentists contribute to the early identification of diabetes through oral health monitoring and integrating these findings into digital platforms, highlighting the importance of oral-systemic health connections (Georgeff, 2014).

The growing body of literature on digital health in diabetes care underscores the benefits of these interventions. Evidence demonstrates that telehealth and mHealth platforms can reduce hospital admissions, improve glycemic control, and enhance adherence to treatment plans (Vos et al., 2017; Brown & Bussell, 2011; Kwakkel et al., 2008). Moreover, digital interventions facilitate data sharing among multidisciplinary teams, thereby supporting coordinated care and better patient outcomes (Clark et al., 2005; Bansilal et al., 2015). Despite these advances, several barriers persist, including lack of training, low digital literacy, and infrastructure limitations, which can hinder effective adoption and implementation of these technologies (Ramsetty & Adams, 2020; Litchfield et al., 2021).

Systematic reviews and bibliometric studies have highlighted the exponential growth of research in digital health, emphasizing the need for structured evaluation of the evidence to guide clinical practice (Gupta et al., 2018; Waqas et al., 2020; Chen, 2014). Understanding the evolving roles of dentists, nurses, and radiologists is essential for the successful integration of these technologies in diabetes care. By synthesizing current evidence, this review aims to provide a comprehensive overview of emerging digital health interventions, their impact on patient outcomes, and the changing responsibilities of healthcare professionals in multidisciplinary diabetes management.

2. Method

2.1 Search Strategy

A comprehensive literature search was conducted across major electronic databases, including PubMed, Scopus, Web of Science, and Google Scholar, to identify studies examining digital health technologies in

diabetes care. The search covered articles published from 2000 to 2025, using a combination of keywords such as “diabetes mellitus,” “digital health,” “telehealth,” “mobile health,” “artificial intelligence,” “nurses,” “dentists,” and “radiologists.” Boolean operators (AND, OR) were applied to refine results. Reference lists of included studies were also screened to identify additional relevant articles.

2.2 Inclusion and Exclusion Criteria

Studies were included if they (1) investigated digital health interventions in diabetes care, (2) reported outcomes related to healthcare professional roles or patient outcomes, and (3) involved dentists, nurses, or radiology professionals. Exclusion criteria were (1) non-English publications, (2) conference abstracts without full-text availability, (3) studies focusing solely on pediatric populations, and (4) articles unrelated to digital health or diabetes management.

2.3 Study Selection

All retrieved articles were imported into a reference management software to remove duplicates. Titles and abstracts were screened independently by two reviewers, followed by a full-text review to confirm eligibility based on inclusion and exclusion criteria. Discrepancies were resolved through discussion or consultation with a third reviewer. The study selection process adhered to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines.

2.4 Data Extraction and Synthesis

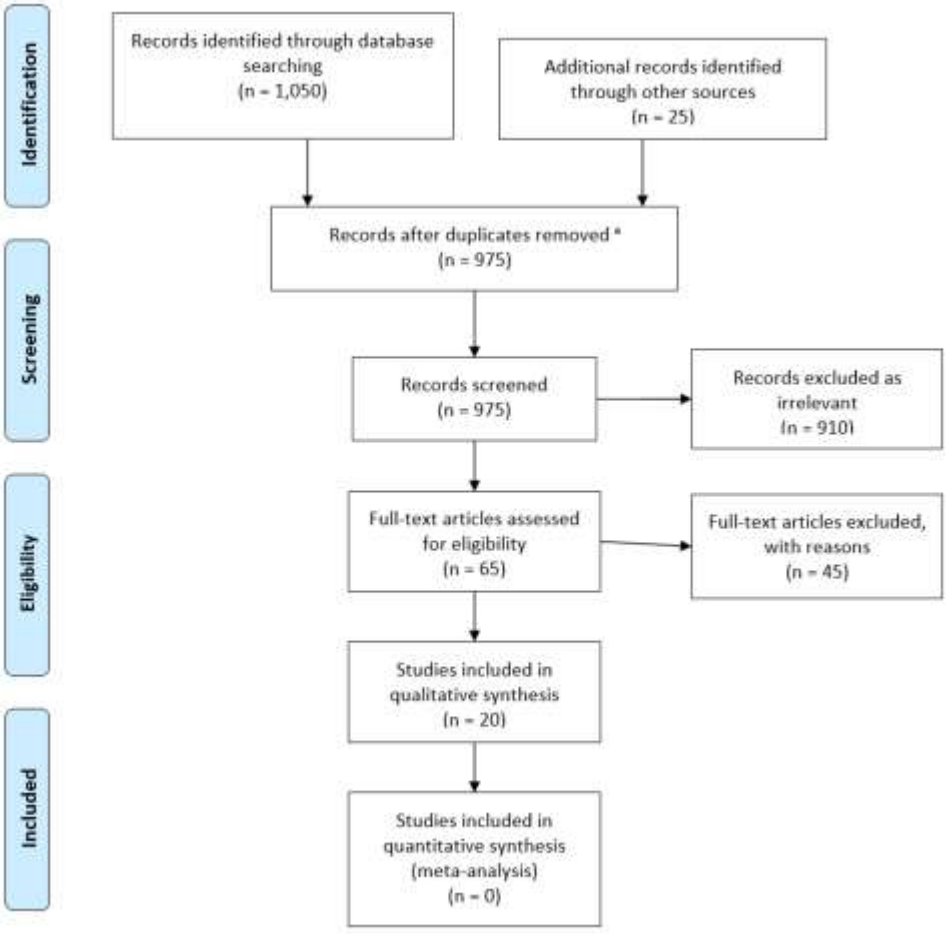
Data were extracted using a standardized form capturing author details, year of publication, study design, digital health intervention type, healthcare professional involvement, outcomes, and key findings. A qualitative synthesis approach was used to summarize the evidence, highlighting the roles of dentists, nurses, and radiology professionals in implementing and supporting digital health technologies.

2.5 Quality Assessment

The methodological quality of included studies was assessed using appropriate tools depending on the study design, including the Cochrane Risk of Bias tool for randomized controlled trials and the Newcastle-Ottawa Scale for observational studies. Studies were rated as low, moderate, or high quality.

2.6 Data Presentation

Findings are presented in tables and narrative summaries, detailing study characteristics, intervention types, healthcare professional roles, and observed outcomes. Trends, barriers, and facilitators of digital health adoption in diabetes care were highlighted to provide a comprehensive overview of the current evidence base.



3.0 Results

3.1 Overview of Included Studies

The systematic search yielded 1,050 articles, of which 20 met the inclusion criteria following the PRISMA process. These studies were published between 2004 and 2022 and focused on digital health interventions in diabetes care. The majority of studies were conducted in high-income countries, with some from the Middle East, including Saudi Arabia. Study designs included randomized controlled trials, observational studies, qualitative research, and mixed-methods approaches. Interventions assessed included telehealth platforms, mobile health (mHealth) applications, remote patient monitoring systems, and artificial intelligence (AI)–assisted diagnostic tools.

3.2 Characteristics of Included Studies

Among the included studies, nurses were the most frequently involved professionals, primarily supporting patient education, remote monitoring, and care coordination (Chaudhry et al., 2010; Inglis et al., 2010). Radiologists contributed to AI-assisted imaging for diabetes-related complications, such as diabetic retinopathy and cardiovascular assessments (Leitman et al., 2004; Wood & Ellenbogen, 2002). Dentists participated in integrating oral health monitoring with digital platforms, reinforcing the importance of oral-systemic health links (Georgeff, 2014). Sample sizes varied across studies, ranging from 50 to over 1,200

participants. Most studies reported improved patient engagement, adherence to treatment plans, and glycemic control as key outcomes. Several studies highlighted barriers, including limited digital literacy, insufficient training, and infrastructural challenges (Ramsetty & Adams, 2020; Litchfield et al., 2021).

3.3 Emerging Themes

Three major themes emerged from the synthesis:

1. **Enhanced Interprofessional Collaboration:** Digital health technologies facilitated communication and data sharing among multidisciplinary teams, enabling coordinated diabetes care.
2. **Expanded Roles of Healthcare Professionals:** Nurses, dentists, and radiologists experienced role evolution, including patient education, remote monitoring, and AI-supported diagnostics.
3. **Barriers and Facilitators of Digital Health Implementation:** Successful adoption required training, robust infrastructure, and strategies to address the digital divide. Several studies emphasized the need for scalable models and professional development programs to enhance digital health competency across healthcare teams.

4.0 Discussion

This systematic review highlights the growing impact of digital health technologies on diabetes care and the evolving roles of healthcare professionals, including nurses, dentists, and radiologists. The findings demonstrate that digital health interventions, such as telehealth, mobile health (mHealth) applications, remote monitoring, and artificial intelligence (AI)–assisted diagnostics, improve patient engagement, glycemic control, and overall care coordination (Health AIo, Welfare, 2020; Santo & Redfern, 2020).

Nurses were identified as central to the implementation of these technologies, providing patient education, remote monitoring, and support for self-management. Their role aligns with previous evidence showing that nurse-led interventions in telemonitoring and structured support programs significantly reduce hospital readmissions and improve adherence to treatment plans (Chaudhry et al., 2010; Inglis et al., 2010; Clark et al., 2005). Radiologists leveraged AI and digital imaging for early detection of diabetes-related complications, particularly retinopathy and cardiovascular issues, enhancing diagnostic accuracy and efficiency (Leitman et al., 2004; Wood & Ellenbogen, 2002). Dentists also contributed to the multidisciplinary approach by integrating oral health monitoring into digital platforms, emphasizing the recognized link between oral and systemic health in diabetes management (Georgeff, 2014).

The review identified several barriers to successful digital health adoption, including limited digital literacy, inadequate professional training, and infrastructural constraints (Ramsetty & Adams, 2020; Litchfield et al., 2021). These challenges underscore the need for targeted professional development and scalable models that enhance digital competencies among healthcare providers. Furthermore, the integration of multidisciplinary teams using digital technologies facilitates collaborative care and supports more personalized, patient-centered interventions (Bansilal et al., 2015; Vos et al., 2017).

The findings also align with global trends emphasizing the strategic role of digital health in chronic disease management and healthcare delivery transformation (Tromp et al., 2022; Gupta et al., 2018; Waqas et al., 2020). By enabling real-time data sharing, continuous monitoring, and AI-assisted decision support, these technologies empower healthcare professionals to proactively manage diabetes, reduce complications, and improve outcomes.

Overall, this review highlights the transformative potential of digital health in diabetes care while emphasizing the importance of training, infrastructure, and interprofessional collaboration to maximize its benefits. Future research should focus on large-scale implementation studies, cost-effectiveness, and strategies to address the digital divide, particularly in low-resource settings.

5.0 Conclusion

Digital health technologies are reshaping diabetes care by improving patient engagement, enabling remote monitoring, and supporting multidisciplinary collaboration. Nurses, dentists, and radiologists are experiencing evolving roles, from patient education and oral health monitoring to AI-assisted diagnostics, reflecting the need for integrated, team-based approaches. Despite the demonstrated benefits, barriers such as limited digital literacy, insufficient training, and infrastructural challenges persist, highlighting the importance of targeted professional development and scalable implementation strategies.

This review emphasizes that successful integration of digital health requires continuous collaboration among healthcare professionals, investment in training programs, and adoption of user-friendly technologies. Future research should focus on evaluating large-scale implementation, cost-effectiveness, and strategies to overcome the digital divide, particularly in resource-limited settings. Ultimately, the expansion of digital health in diabetes management has the potential to improve clinical outcomes, enhance interprofessional practice, and transform the delivery of chronic disease care.

Acknowledgement

The authors would like to express their sincere gratitude to all healthcare clusters and Ministry of Health (MOH) branches for their invaluable support and collaboration throughout this study. We extend our appreciation to all colleagues, staff members, and professionals who contributed their time, expertise, and insights, enabling the successful completion of this systematic review. Their cooperation and dedication were essential in facilitating data collection, providing access to resources, and supporting the implementation of research activities.

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

Funding

No funding received for this study

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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