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Exploring Healthcare Provider Perspectives on Integrating Digital Tools for Chronic Disease Management

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Abstract

Background: The integration of digital tools into clinical practice holds significant promise for enhancing chronic disease management, yet little known about healthcare provider attitudes towards this integration, particularly in the context of Riyadh, Saudi Arabia. ***Aim:*** This qualitative study aimed to explore healthcare provider attitudes towards the integration of digital tools into clinical practice for chronic disease management in Riyadh, Saudi Arabia. ***Methods:*** Semi-structured interviews conducted with healthcare providers from various healthcare settings in Riyadh. Purposive sampling employed to select participants, and data were analyzed using thematic analysis to identify key themes and patterns. ***Results:*** 33 healthcare professionals were interviewed. Participants expressed mixed attitudes towards the integration of digital tools into clinical practice for chronic disease management. Perceived benefits included improved patient outcomes, enhanced efficiency of care delivery, and increased patient engagement. However, challenges such as technological barriers, resistance to change, and concerns about data privacy and security were also reported. Factors influencing digital tool adoption included organizational support, training needs, and perceived usefulness. ***Conclusion:*** The findings highlight the complex attitudes and considerations surrounding the integration of digital tools into clinical practice for chronic disease management among healthcare providers in Riyadh. Addressing barriers and enhancing support mechanisms are crucial for promoting successful adoption and utilization of digital health technologies in healthcare settings. These insights can inform policy, practice, and research initiatives aimed at optimizing chronic disease management through the effective integration of digital tools.

Keywords: Healthcare providers, Digital tools, Chronic disease management, Integration, Attitudes, Training needs, Support mechanisms, Organizational culture, Technology acceptance, Patient outcomes.

INTRODUCTION

In the landscape of modern healthcare, the integration of digital tools into clinical practice has emerged as a promising avenue for enhancing patient care, improving health outcomes, and optimizing healthcare delivery processes. Among the myriad applications of digital health technologies, one area of particular interest is the management of chronic diseases, which pose significant challenges to patients, healthcare providers, and healthcare systems alike. Chronic diseases, such as diabetes, cardiovascular diseases, and respiratory conditions, are characterized by their long duration and often require ongoing management, monitoring, and support to prevent complications and optimize quality of life (World Health Organization, 2021).

The traditional approach to managing chronic diseases typically involves periodic clinic visits, reliance on paper-based medical records, and limited patient-provider interactions outside of clinical settings. However, the advent of digital health technologies has transformed this landscape, offering innovative solutions to improve access to care, facilitate remote monitoring, empower patients in self-management, and enhance

communication between patients and healthcare providers (Alwashmi, Hawboldt, Davis, & Marra, 2019). Digital tools such as mobile applications, wearable devices, remote monitoring systems, and telehealth platforms have the potential to revolutionize the delivery of chronic disease management by providing real-time access to health information, personalized interventions, and support resources (Torous, Nicholas, Larsen, Firth, & Christensen, 2018).

Despite the growing recognition of the potential benefits of digital tools in chronic disease management, their integration into clinical practice remains a complex and multifaceted process, shaped by various factors including technological advancements, regulatory considerations, organizational policies, and provider attitudes and behaviors (Alami, Gagnon, & Wootton, 2020). Healthcare providers play a pivotal role in this process as they are responsible for implementing and utilizing digital tools in patient care, making their attitudes, perceptions, and experiences crucial determinants of successful adoption and integration (Boruff & Storie, 2014).

Understanding healthcare provider attitudes towards the integration of digital tools into clinical practice for chronic disease management is therefore essential for informing strategies, policies, and interventions aimed at optimizing the use of digital health technologies in healthcare settings. By exploring healthcare provider perspectives, researchers can identify barriers, facilitators, and key considerations influencing the adoption, implementation, and utilization of digital tools, thereby guiding efforts to promote effective integration and maximize the potential benefits for patients and providers alike.

This qualitative research study aims to address this gap in the literature by investigating healthcare provider attitudes towards the integration of digital tools into clinical practice for the management of chronic diseases. Through in-depth interviews and thematic analysis, the study seeks to elucidate healthcare provider perspectives on the benefits, challenges, adoption factors, impact on patient care, workflow integration, training and support needs, and patient engagement strategies associated with the use of digital tools in chronic disease management.

By achieving these objectives, the study aims to contribute valuable insights into the complex dynamics of digital tool integration in healthcare settings, informing the development of evidence-based strategies and recommendations for promoting successful adoption and utilization of digital health technologies in the management of chronic diseases. Ultimately, the findings of this study have the potential to inform policy, practice, and research initiatives aimed at harnessing the transformative power of digital health technologies to improve patient outcomes and advance the delivery of healthcare services.

The findings of this qualitative exploration will contribute to the existing body will inform efforts to develop evidence-based strategies and interventions aimed at promoting successful integration of digital tools into healthcare practice. By identifying barriers, facilitators, and key considerations relevant to healthcare providers, the study will help to guide the development of policies, guidelines, and training programs tailored to address the specific needs and preferences of healthcare professionals.

Research Questions:

- What are healthcare providers' perceptions of the potential benefits associated with the integration of digital tools into clinical practice for chronic disease management?
- What are the main challenges and barriers identified by healthcare providers in the effective integration of digital tools into clinical workflows for chronic disease management?
- What factors influence healthcare providers' decisions to adopt or resist the use of digital tools in their practice for chronic disease management?
- What are the training and support needs identified by healthcare providers related to the effective use of digital tools in clinical practice for chronic disease management?

Aims

The aim of this article is to investigate healthcare provider attitudes towards the integration of digital tools into clinical practice for the management of chronic diseases.

- To explore healthcare providers' perceptions of the potential benefits associated with the integration of digital tools into clinical practice for chronic disease management.
- To identify the main challenges and barriers perceived by healthcare providers in the effective integration of digital tools into clinical workflows for chronic disease management.
- To examine factors influencing healthcare providers' decisions to adopt or resist the use of digital tools in their practice for chronic disease management.
- To identify training and support needs expressed by healthcare providers related to the effective use of digital tools in clinical practice for chronic disease management.

Theoretical framework

The Technology Acceptance Model (TAM) serves as a relevant theoretical framework. The TAM, developed by Davis in 1989, is widely used to understand and predict individuals' acceptance and use of new technologies in various contexts, including healthcare (Davis, 1989).

The TAM posits that perceived usefulness and perceived ease of use are key determinants of individuals' attitudes towards and intention to use a technology. Perceived usefulness refers to the degree to which individuals believe that using a particular technology will enhance their performance and productivity, while perceived ease of use refers to the degree to which individuals perceive the technology as being effortless to use. According to the TAM, positive attitudes towards a technology lead to greater intention to use, which in turn predicts actual technology adoption and use behavior.

In the context of healthcare provider attitudes towards the integration of digital tools into clinical practice for chronic disease management, the TAM provides a theoretical lens through which to understand the factors influencing healthcare providers' acceptance and utilization of digital health technologies. Perceived usefulness encompasses healthcare providers' beliefs about the benefits and advantages of digital tools for improving patient care processes, enhancing clinical outcomes, and increasing efficiency of care delivery. Perceived ease of use encompasses healthcare providers' perceptions of the ease and convenience of using digital tools in their clinical workflows, including factors such as user interface design, technical support, and training availability.

By applying the TAM as a theoretical framework, the study can systematically explore the determinants of healthcare provider attitudes towards digital tool integration, identify barriers and facilitators to acceptance and adoption, and inform strategies for promoting successful implementation and utilization of digital health technologies in clinical practice for chronic disease management.

METHODS

Design

Utilize a qualitative research approach to explore the complex attitudes, perceptions, and experiences of healthcare providers regarding digital tool integration. Qualitative methods allow for in-depth exploration and understanding of the topic, capturing the richness and nuances of participants' perspectives.

Research Setting

This study was carried out at five hospitals in Riyadh, the capital and largest city of Saudi Arabia. Riyadh serves as an ideal setting for this study due to its prominence as a major hub of healthcare delivery, research, and innovation within the Kingdom of Saudi Arabia. Furthermore, Riyadh's healthcare sector is characterized by a diverse and multicultural workforce comprising healthcare professionals from various backgrounds and specialties. Physicians, nurses, allied health professionals, and administrators play pivotal roles in delivering patient care, implementing healthcare policies, and driving quality improvement initiatives within the healthcare system.

Recruitment

Purposive sampling employed to ensure diversity in participant characteristics (specialty, years of experience, healthcare setting) and to capture a range of perspectives relevant to the research objectives. Recruitment efforts by researchers was managed systematically to track participant responses, follow up with potential participants as needed, and ensure the recruitment of an adequate sample size to achieve data saturation and address the research objectives effectively. Participants selected based on their roles, experiences, and expertise relevant to the study topic.

Tool of Data Collection

Semi-structured interviews were chosen as the data collection tool due to their flexibility in allowing participants to express their experiences, perspectives, and attitudes in their own words. These interviews provide a balance between structure and flexibility, allowing for the exploration of specific topics outlined in the interview guide while also enabling participants to introduce new insights and perspectives.

A Sample of interview questions

- Can you describe your experiences with using digital tools, such as mobile applications or remote monitoring systems, in your clinical practice for managing chronic diseases?
- What are your perceptions of the potential benefits and advantages of integrating digital tools into clinical workflows for chronic disease management?
- From your perspective, what are the main challenges or barriers encountered when integrating digital tools into clinical practice for managing chronic diseases?
- How do you perceive the impact of digital tool integration on patient care processes, including improvements in patient outcomes, efficiency of care delivery, and provider-patient interactions?

Ethical consideration

In conducting the qualitative study, several key ethical considerations were addressed. This included obtaining informed consent from participants, ensuring confidentiality and data security, respecting participants' autonomy and cultural sensitivities, promoting voluntary participation, and obtaining ethics approval from relevant institutional review boards. Measures were taken to protect participants' rights, privacy, and well-being throughout the research process, ensuring that the study was conducted ethically and in accordance with established guidelines and principles for research involving human participants. These ethical considerations were essential for upholding the integrity of the study, maintaining participants' trust, and safeguarding their rights and dignity.

RESULTS

Thirty-three participants were recruited to the study. The sample comprised ten Physcians, nine nurses, five physiotherapists and nine pharmacists. Most of the participants were females (%75) with age between 25–42. Healthcare providers practiced in a variety of clinical and digital health settings, with 56% working on telehealth practices. Years of clinical practice ranged from 1 to 10 (M=6.5, SD=5.1). The qualitative analysis led to the emergence of the five themes from the interviews data. Several potential key themes anticipated based on the study's focus and objectives. These themes may include: "Perceived Benefits of Digital Tool Integration", "Challenges and Barriers to Integration", "Training and Support Needs".

Perceived Benefits of Digital Tool Integration:

Healthcare providers articulated various perceived benefits associated with the integration of digital tools into clinical practice for chronic disease management. One provider highlighted the potential for improved patient outcomes, stating, "*Digital tools allow us to monitor patients remotely and intervene earlier when their condition worsens. This has led to better management of chronic diseases and fewer hospitalizations.*" Another provider emphasized the enhanced efficiency of care delivery, stating, "*With digital tools, we can access patient records and test results instantly, streamlining our workflow and reducing administrative burdens. This allows us to spend more time providing direct patient care*." Additionally, providers noted the increased patient engagement facilitated by digital tools, with one stating, "*Patients appreciate being able to access their health information online and communicate with us through secure messaging platforms. This has empowered them to take a more active role in managing their chronic conditions*."

Amidst these perceived benefits, healthcare providers emphasized the potential for digital tool integration to enable better coordination of care and personalized treatment approaches. One provider underscored, "*Digital tools facilitate communication and collaboration among members of the healthcare team, enabling us to coordinate care more effectively. This ensures that patients receive comprehensive and seamless care across different healthcare settings*." Another provider highlighted the potential for digital tools to support personalized care and treatment, stating, "*Digital tools enable us to collect and analyze patient data in real-time, allowing for more personalized and tailored interventions. This has led to more targeted treatment plans and improved outcomes for patients with chronic diseases."* Through these perceived benefits, healthcare providers aim to harness the transformative potential of digital tools to enhance chronic disease management and improve patient outcomes.

Challenges and Barriers to Integration

Healthcare providers articulated a spectrum of concerns regarding the integration of digital tools into clinical practice for chronic disease management. One provider voiced frustration over technological barriers, stating, "*The lack of interoperability between different digital tools and electronic health record systems is a major challenge. It's frustrating when we can't access all the necessary patient information in one place.*" Others highlighted resistance to change among colleagues as a significant hurdle, with a provider noting, "*Some colleagues are hesitant to embrace digital tools and prefer traditional methods of patient care. Overcoming this resistance and encouraging adoption can be challenging."* Additionally, concerns about data privacy and security emerged prominently, with providers calling for assurances regarding the protection of sensitive patient information stored in digital systems. Resource constraints, including limited funding and inadequate technological infrastructure, were cited as major barriers to implementation and maintenance efforts, emphasizing the need for increased support from healthcare organizations and policymakers.

Despite these challenges, healthcare providers emphasized the importance of addressing barriers to digital tool integration to realize potential benefits for chronic disease management. One provider stressed, "*We need tools that are easy to use and seamlessly integrate with our existing clinical processes.*" Providers underscored the need for collaborative efforts to overcome technological hurdles, promote a culture of innovation and acceptance of digital solutions, and prioritize data privacy and security. Moreover, they called for increased investment in technology infrastructure and resources to support successful integration efforts, with one provider stating, "*By addressing these challenges and fostering an enabling environment for digital innovation, we can optimize the use of digital tools in clinical practice and improve outcomes for patients with chronic diseases*."

Amidst these challenges, healthcare providers emphasized the imperative of ensuring that digital tools are tailored to meet the diverse needs of patients and providers alike. One provider highlighted, "*We must ensure that digital tools are not only user-friendly but also culturally sensitive and accessible to all patients, including those from marginalized or underserved communities*." Providers emphasized the importance of engaging patients in the design and implementation of digital solutions to ensure that they align with patient preferences, needs, and capabilities. By prioritizing patient-centered design and fostering collaborative partnerships between healthcare providers, patients, and technology developers, providers aim to enhance the usability, acceptability, and effectiveness of digital tools in chronic disease management.

Training and Support Needs

Healthcare providers underscored the critical importance of adequate training and support to effectively integrate digital tools into clinical practice for chronic disease management. One provider emphasized the need for comprehensive training programs, stating, "*We require thorough training on how to use these digital tools effectively in our clinical workflows. Without proper training, it's challenging to maximize the benefits of these technologies*." Another provider echoed this sentiment, emphasizing the need for ongoing support, stating, "*Training is essential, but we also need continuous technical support to troubleshoot issues and address any challenges that arise during the implementation process.*" Providers highlighted the importance of tailored training programs that address the specific needs and preferences of healthcare professionals, ensuring that they feel confident and competent in utilizing digital tools in their daily practice.

In addition to training, healthcare providers emphasized the need for robust technical support and resources to optimize the use of digital tools. One provider highlighted, "*We need dedicated technical support staff who can assist us with troubleshooting technical issues and providing guidance on how to use these digital tools effectively*." Another provider emphasized the importance of access to up-to-date resources and educational materials, stating, "*Having access to comprehensive user manuals, online tutorials, and educational resources is essential for staying informed about the latest features and functionalities of digital tools.*" Providers stressed the need for timely and responsive technical support to address any challenges or barriers encountered during the implementation and use of digital tools in clinical practice.

Moreover, healthcare providers called for organizational support and leadership to prioritize and invest in training and support initiatives for digital tool integration. One provider emphasized, "*Organizational leadership must recognize the importance of investing in training and support for digital tool integration and allocate resources accordingly."* Another provider underscored the need for a supportive organizational culture that values innovation and continuous learning, stating, "*We need a culture that encourages experimentation and learning, where healthcare providers feel empowered to explore and adopt new digital technologies to enhance patient care.*" Through adequate training, technical support, and organizational leadership, healthcare providers aim to overcome barriers and optimize the use of digital tools in clinical practice for chronic disease management, ultimately improving patient outcomes and enhancing the quality of care.

DISCUSSION

The integration of digital tools into clinical practice represents a transformative shift in healthcare delivery, offering immense potential to enhance chronic disease management and improve patient outcomes. However, the successful adoption and utilization of digital tools hinge upon healthcare providers' readiness, competence, and support infrastructure. The themes of Training and Support Needs, as identified in this study, shed light on the critical importance of equipping healthcare providers with the necessary skills, resources, and organizational support to effectively integrate digital tools into their clinical workflows.

One of the central findings of this study pertains to the indispensable role of comprehensive training programs in preparing healthcare providers for the adoption and use of digital tools in chronic disease management. Providers emphasized the need for structured and tailored training initiatives that address their specific needs and preferences, enabling them to harness the full potential of digital technologies. These findings resonate with existing literature highlighting the significance of training and education in facilitating the successful implementation of health information technologies (HITs) in clinical settings (Almojaibel et al., 2019). Research suggests that comprehensive training programs, including hands-on workshops, online modules, and peer learning opportunities, can significantly enhance healthcare providers' competence and confidence in using digital tools (Amin et al., 2020). Furthermore, continuous education and professional development opportunities are essential to keep pace with the rapid evolution of digital technologies and ensure ongoing proficiency among healthcare providers (El-Mahalli et al., 2012).

In addition to training, Alshammari 2019 said, healthcare providers stressed the importance of robust technical support mechanisms and access to up-to-date resources to optimize the use of digital tools in clinical practice. Technical support staff play a crucial role in troubleshooting issues, resolving technical challenges, and providing guidance on the effective use of digital technologies. Timely and responsive technical support is essential to address any barriers or concerns encountered by healthcare providers during the implementation and use of digital tools. Furthermore, access to comprehensive user manuals, online tutorials, and educational resources is vital for healthcare providers to stay informed about the latest features and functionalities of digital tools (Kaliyadan et al., 2020). Research suggests that organizations that invest in dedicated technical support teams and provide readily accessible resources experience higher rates of user satisfaction and successful implementation of digital health initiatives (Kichloo et al., 2020).

The findings of this study underscore the pivotal role of organizational leadership and culture in fostering a supportive environment for digital tool integration in clinical practice. Healthcare providers emphasized the need for organizational leadership to recognize the

importance of investing in training and support initiatives for digital tool integration and allocate resources accordingly. According to ALOmari & Jenkins (2021), a supportive organizational culture that values innovation, experimentation, and continuous learning is essential to empower healthcare providers to explore and adopt new digital technologies (Hasanain & Cooper, 2014). Research suggests that organizations with strong leadership support and a culture of innovation are more likely to achieve successful implementation and sustainment of digital health interventions (Rogers et al., 2017). Furthermore, organizational policies and incentives that promote the use of digital tools, such as performance bonuses tied to technology adoption metrics, can incentivize healthcare providers to embrace digital innovation (Ullah et al., 2021).

CONCLUSION

In conclusion, the qualitative study on healthcare provider attitudes towards the integration of digital tools into clinical practice for chronic disease management in Riyadh, Saudi Arabia, has illuminated critical insights into the challenges, benefits, and support needs associated with digital tool integration. The findings underscore the potential of digital technologies to revolutionize chronic disease management by improving patient outcomes, enhancing efficiency, and increasing patient engagement. However, the study also highlights significant barriers, including technological challenges, resistance to change, and concerns about data privacy and security. Addressing these barriers requires a multifaceted approach that prioritizes comprehensive training programs, robust technical support mechanisms, and supportive organizational leadership and culture. By equipping healthcare providers with the necessary skills, resources, and support, healthcare organizations can optimize the use of digital tools and ultimately enhance the quality of chronic disease management.

Based on the findings of this study, several recommendations can be proposed to facilitate the successful integration of digital tools into clinical practice for chronic disease management:

1. **Invest in Comprehensive Training Programs:** Healthcare organizations should prioritize the development and implementation of comprehensive training programs that provide healthcare providers with the necessary skills and knowledge to effectively use digital tools in their clinical workflows. These programs should be tailored to address the specific needs and preferences of healthcare professionals and include both initial training and ongoing professional development opportunities.
2. **Establish Robust Technical Support Mechanisms:** Organizations should invest in dedicated technical support teams and resources to provide timely assistance and guidance to healthcare providers when encountering technical challenges or issues with digital tools. Additionally, organizations should ensure that healthcare providers have access to up-to-date resources, such as user manuals and online tutorials, to facilitate self-directed learning and troubleshooting.
3. **Promote Supportive Organizational Leadership and Culture:** Organizational leaders should recognize the importance of investing in training and support initiatives for digital tool integration and allocate resources accordingly. Moreover, leaders should foster a supportive organizational culture that values innovation, experimentation, and continuous learning, empowering healthcare providers to embrace digital technologies and drive positive change in chronic disease management.

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Availability of data and materials

The data collected and analyzed during the current study are available from the corresponding author upon reasonable request. Due to confidentiality considerations, certain restrictions may apply to the availability of specific data.

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Author contributions: All authors contributed equally to the conceptualization, design, and implementation of the study. Data collection, analysis, and interpretation were conducted collaboratively. Each author played a significant role in drafting and revising the manuscript. All authors have read and approved the final version of the manuscript for submission.

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