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Exploration of Healthcare Workers' Experiences in Using Wearable Technology for Chronic Disease Monitoring in Hospitals: A Phenomenological Exploration

Mohammad Saptadji Fisqua Chae
Universitas Kristen Indonesia, Indonesia
mohamadsaptadji@gmail.com

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ABSTRACT

The growing use of wearable technology in healthcare has revolutionized the management of chronic diseases by enabling continuous monitoring of patients' health However, there is limited understanding regarding how healthcare professionals experience and perceive the integration of these technologies in clinical settings. This study specifically seeks to answer the research question: How do healthcare providers perceive and experience the integration of wearable technology for chronic disease monitoring in their clinical practice? A phenomenological approach was employed to explore these healthcare professionals' perspectives, uncovering the challenges and benefits they perceive in incorporating wearable technology into their practices. Through in-depth interviews with 12 healthcare providers, the study found that while wearable devices offer substantial benefits in continuous health monitoring, issues such as data reliability and integration with existing medical systems remain significant barriers. The findings highlight the need for improved training, better device integration, and more robust data management systems to enhance the effectiveness of wearable technologies These insights contribute to a deeper understanding of the complex dynamics between technology and healthcare professionals, paving the way for future research into more effective implementation strategies and the role of healthcare providers in technology adoption.

INTRODUCTION

Wearable technology is rapidly advancing in the healthcare sector, particularly in monitoring patients with chronic diseases (Albahri dkk., 2019). These devices, which can be worn by patients in their daily lives, collect real-time health data such as heart rate, blood pressure, and activity levels, helping healthcare professionals in managing treatment. On a global scale, the use of wearable technology is considered one of the greatest innovations in the digitalization of healthcare services, with the potential to improve patient care quality through more intensive and personalized monitoring. This phenomenon has developed in response to the need for more efficient healthcare systems, given the increasing number of patients with chronic diseases who require continuous monitoring.

However, despite the growing recognition of wearable technology's potential, there remains a gap in understanding how healthcare professionals experience and perceive the integration of these technologies in clinical practice. The relevance of this phenomenon lies in its ability to transform how healthcare professionals interact with patients and manage treatments. Healthcare professionals' subjective experiences with wearable technology are crucial in understanding how they make sense of these devices in everyday practice. Often, technology is introduced without considering the perspectives and challenges faced by medical professionals who must integrate these devices into their clinical routines (Azbeg dkk., 2022). Although these technologies offer significant benefits in

chronic disease management, challenges such as data integration limitations, trust in device accuracy, and the need for further training are key issues that need to be explored further.

The importance of exploring the meaning of healthcare professionals' experiences in using wearable technology lies in the deep understanding required to address these challenges. The phenomenological approach allows researchers to delve into the meanings embedded in healthcare professionals' personal experiences, offering deeper insights into how they interpret this technology in the context of their daily work (Bent dkk., 2021). Therefore, this research aims not only to assess the technical effectiveness of the devices but also to understand how healthcare professionals' perspectives shape the acceptance and use of this technology in managing patient health.

Research on the experiences of individuals using wearable technology for health monitoring has become an important field within medical and health technology literature. Several studies have identified the positive impacts of these devices on the management of chronic diseases such as diabetes and hypertension. However, despite numerous quantitative studies demonstrating the effectiveness of wearable devices in health monitoring, there is still limited understanding of how healthcare professionals make sense of this technology in their everyday contexts. Healthcare professionals' subjective experiences, as the primary users of this technology in clinical settings, play a crucial role in determining the success of its implementation in patient management.

One of the main methodological challenges in this research is the ability to capture the deep meaning embedded in healthcare professionals' experiences. Quantitative approaches, often used to assess the success of wearable technology, are unable to explore the complexity of subjective experiences related to healthcare professionals' direct interactions with patients and devices (Binyamin & Hoque, 2020). The limitations of quantitative approaches create a gap in the literature, where understanding of the challenges and acceptance of wearable technology in clinical practice remains insufficiently explored. For example, existing studies tend to focus more on technical aspects or measurable outcomes, without giving adequate attention to how healthcare professionals feel and evaluate the benefits and constraints of using this technology.

These methodological limitations highlight the importance of a phenomenological approach, which focuses on exploring subjective experiences, in understanding the essence of this phenomenon. By exploring healthcare professionals' direct experiences, this study can fill the gap in the existing literature, providing a more holistic insight into how wearable technology is accepted and used in chronic disease management.

Most existing research on wearable technology in chronic disease management employs a practical approach that focuses on quantitative outcomes and device effectiveness. This approach tends to measure variables that can be quantified, such as changes in health parameters or patient adherence to device use, without delving deeper into the subjective experiences of healthcare professionals who interact directly with the technology (Chong dkk., 2019). While this approach provides insights into the effectiveness of wearable technology in improving health monitoring, it has significant limitations in capturing the deeper dimensions of experience, which are crucial for fully understanding how this technology is integrated into clinical practice.

The dominant quantitative approach does not allow researchers to understand how healthcare professionals interpret the use of wearable technology in their professional lives, including the challenges they face, how they evaluate the device, and how they adapt to it in patient management. This limitation creates an impoverished understanding of the dynamics of wearable technology use in clinical settings (Chung & Park, 2019). Additionally, the lack of research exploring the perspectives of healthcare professionals creates a significant gap in the literature regarding the acceptance and implementation of digital health technology.

As an alternative solution, the phenomenological approach offers the potential to explore healthcare professionals' subjective experiences in a more in-depth and holistic manner. By focusing on the meaning embedded in healthcare professionals' real-world experiences, phenomenological research can reveal challenges, perceptions, and adaptations that have previously been undetected in studies that focus more on quantitative outcomes. This approach is critical for understanding how

healthcare professionals interpret wearable technology in their social and professional contexts, which in turn can guide the development and implementation of technology that is more effective and aligned with clinical needs.

Previous research on the use of wearable technology in chronic disease management has largely focused on the technical and quantitative aspects of these devices, such as the effectiveness of health monitoring and patient adherence levels (Ed-daoudy & Maalmi, 2019). Some studies have also evaluated the benefits of wearable devices in improving the management of certain health conditions but have not deeply explored the subjective experiences of healthcare professionals involved in using this technology. Most of the existing literature uses survey or experimental approaches to assess outcomes, while the experiences or meanings perceived by healthcare professionals in clinical practice have not received sufficient attention. These studies highlight a clear need for a more holistic approach to understanding how wearable technology is accepted and used by healthcare professionals in managing chronic diseases.

To fill this gap, the phenomenological approach was chosen as a more appropriate method for exploring healthcare professionals' subjective experiences. This approach allows researchers to gain a deep understanding of how healthcare professionals interpret the use of wearable technology in their clinical practice. By adopting descriptive phenomenology, this study focuses on exploring the experiences and perceptions of healthcare professionals, as well as the challenges they face when interacting with these devices. The phenomenological approach will provide richer and more in-depth insights than quantitative approaches, uncovering meanings that have not been revealed in previous research.

This article is organized with a clear and structured format. The introduction will discuss the background of the phenomenon under study and explain why it is important to explore healthcare professionals' subjective experiences. Next, the phenomenological methodology used will be explained, including the rationale for selecting this approach to address the identified gap. The data collection and analysis process, using thematic analysis, will be described in detail, followed by a discussion of the results that highlight key findings from this research. The article concludes with a summary of the research contributions to understanding healthcare professionals' experiences with wearable technology.

RESEARCH METHODS

Study Design

This research employs a phenomenological approach to explore the subjective experiences of healthcare professionals regarding the use of wearable technology in managing chronic diseases. The phenomenological approach was chosen because it focuses on gaining an in-depth understanding of individuals' experiences within their life context, allowing the researcher to uncover the meanings derived from interactions with the phenomenon being studied (Hasan dkk., 2019). Descriptive phenomenology was used in this study to describe and understand how healthcare professionals make sense of their experiences in using wearable technology as a tool for monitoring patient conditions. This approach enables the researcher to gain insights into perceptions, challenges, and adaptations occurring in daily clinical practice without altering or interpreting those experiences.

Participants

The participants in this study consisted of healthcare professionals directly involved in the use of wearable technology in managing patients with chronic diseases. Participants were specifically selected from departments within the hospital that actively use wearable technology for patient monitoring, including the cardiology and endocrinology departments, as these departments frequently manage patients with chronic conditions such as diabetes and hypertension. Inclusion criteria included healthcare professionals with at least one year of experience in using wearable technology for patient health monitoring, as well as those working in hospitals that have implemented this technology for managing both outpatient and inpatient care (K. He dkk., 2020). Exclusion criteria were healthcare

professionals not directly involved in monitoring patients with wearable devices, and those unable to provide consent to participate in the study. A total of 12 healthcare professionals participated in the study, comprising 6 doctors and 6 nurses. The average age of participants was 38 years, with work experience in healthcare ranging from 5 to 15 years.

Data Collection

Data was collected through in-depth interviews conducted directly with participants. The interviews followed a semi-structured interview guide designed to explore healthcare professionals' subjective experiences regarding the use of wearable technology in managing chronic diseases. Each interview lasted between 45 and 60 minutes and was conducted in a private space within the hospital to ensure a comfortable environment for the participants (T. He & Lee, 2021). The interview process was facilitated with permission from the hospital authorities, and the interview space was chosen to ensure privacy and comfort for the participants. The interview guide was developed based on phenomenological theory and the literature related to the use of wearable technology in medical practice, with several modifications to adapt to the local context and the participants' characteristics.

Data Analysis

Data was analyzed using a thematic analysis approach, which aimed to identify the main themes emerging from the participants' experiences. The analysis process began with verbatim transcription of the interviews, followed by coding relevant meaning units from the data. The emerging themes were then grouped and analyzed further to uncover the essential meanings of the experiences expressed by the participants (Kalasin dkk., 2022). The analysis steps were conducted systematically using NVivo software to aid in organizing and coding the data. Each identified theme was examined to ensure its relevance to the research objectives and to ensure that the findings authentically represented the participants' experiences.

Ethics

This research adheres to both international and local ethical standards. Written informed consent was obtained from all participants prior to conducting the interviews. Participants were provided with a comprehensive explanation of the research objectives, the procedures involved, and their right to withdraw at any time without consequence (Li dkk., 2021). All data collected was kept confidential, and participants' identities were anonymized using codes that did not directly identify them. The study also obtained approval from the relevant hospital's research ethics committee before data collection began.

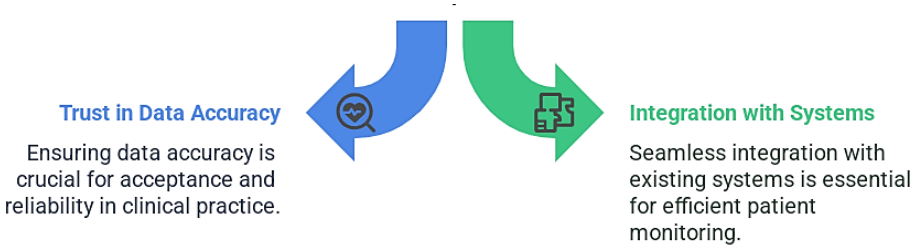
RESULTS

Challenges in the Implementation of Wearable Technology in Hospitals

During interviews with healthcare professionals, many expressed significant challenges in implementing wearable technology in hospitals, particularly related to trust in the accuracy of the data produced. A specialist in internal medicine explained, "Although this technology seems promising, I still have doubts about its accuracy. Often, these devices provide inconsistent results, especially when monitoring patients with complex chronic conditions." This reflects uncertainty regarding the acceptance of wearable technology, which is directly linked to the quality of the data generated and the reliability of the devices in clinical practice.

Additionally, another challenge concerns the difficulty of integrating wearable technology into the existing systems in hospitals. A nurse working in the emergency unit stated, "Wearable technology is very useful, but we struggle to integrate the data from these devices with our electronic medical record system. This makes patient monitoring less efficient." This highlights the technical barriers that hinder the optimal use of this technology in clinical settings.

Figure 1. How to address challenges in implementing wearable technology in hospitals?

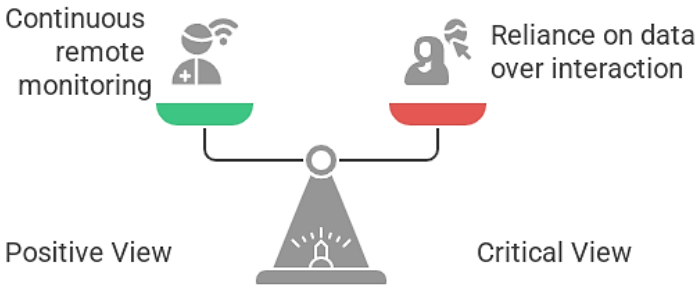


Perception of the Benefits of Wearables in Chronic Disease Management

On the other hand, despite the challenges, some healthcare professionals also expressed a positive view of the benefits of wearable technology, especially in monitoring patients with chronic diseases. A cardiologist remarked, "Wearable technology allows us to continuously and remotely monitor patient conditions, reducing the need for in-person visits, which is particularly advantageous for patients with mobility limitations." This perspective indicates that wearable technology is seen as having great potential in managing chronic diseases by providing healthcare professionals with better tools to monitor patient conditions without requiring patients to come to the hospital.

However, not all healthcare professionals are entirely positive about the benefits of this technology. A physiotherapist added, "Although the benefits are clear, I feel that this technology sometimes relies too much on statistical data, while direct experience with patients is more important in physical rehabilitation." This suggests concerns that wearable technology may not always capture the complexity of physical care that requires direct patient interaction.

Figure 2. Balancing Wearable Benefits in Healthcare



Healthcare Professionals' Adaptation to Wearable Technology

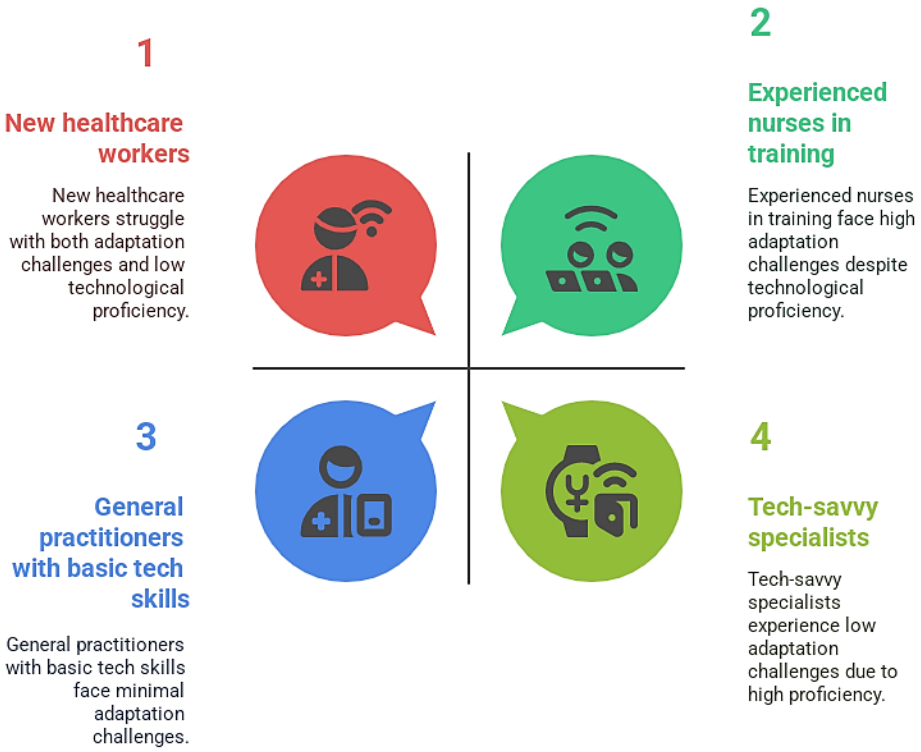
Another important theme that emerged was how healthcare professionals adapt to the use of wearable technology. Several participants revealed that adaptation to this technology takes time and training. A nurse in the intensive care unit explained, "Initially, we had difficulty using this device. However, after several training sessions and practice, we began to feel more confident using it to monitor patients." This indicates that while there are initial barriers, with the right training, healthcare professionals can overcome these challenges and become more comfortable using wearable technology in their work.

Additionally, some participants noted that the experience of using wearable technology can vary depending on the background and expertise of the healthcare professionals. A general practitioner shared, "I think wearable technology is more effective when used by healthcare professionals who have a better understanding of technology. However, for those who are not familiar with technology, this device can feel confusing." This perspective shows that the success of wearable technology usage is highly influenced by the readiness and skills of individual healthcare professionals in adapting to new technology.

The findings of this study suggest that while there are challenges in the implementation of wearable technology in hospitals, particularly related to data accuracy and integration with existing systems, many healthcare professionals see significant benefits in using this technology for patient

monitoring, especially for chronic diseases. Adapting to the use of this technology requires time and sufficient training, as well as the readiness of healthcare professionals to face it. However, the experience of using this technology highly depends on the level of expertise and understanding of technology by each individual healthcare professional.

Figure 3. Adaptation of Healthcare Professionals to Wearable Technology



DISCUSSION

This study found that although wearable technology holds significant potential in the management of chronic diseases, healthcare professionals' perceptions and experiences with the technology are influenced by challenges related to device reliability and difficulties in data integration into existing medical systems (Nasr dkk., 2021). These findings highlight the importance of understanding healthcare professionals' subjective experiences in using these devices, an aspect that has not been fully addressed in previous research. Thus, this study answers the broader question of how wearable technology is accepted and used in clinical settings, and how healthcare professionals' perceptions impact its effectiveness in health management.

The findings contribute significantly to understanding the essence of healthcare professionals' experiences when interacting with wearable technology. Specifically, the study emphasizes that while healthcare professionals see great benefits in wearable technology for more sustainable patient monitoring, challenges such as data uncertainty and integration issues with hospital systems remain significant barriers. These findings underline the need for more attention to training and technical reliability of devices, as well as the development of smoother integration with existing medical systems. However, it is important to note that the small sample size and the focus on a single hospital may limit the generalizability of these findings. The main contribution of this study is providing in-depth insights into the dynamics of wearable technology use, which not only depends on technical aspects but also on subjective factors influencing its acceptance and effectiveness in clinical practice.

In relation to previous literature and theory, these findings align with studies showing that both technical factors and subjective experiences play a major role in the acceptance of digital health technology. For example, a study by Punj & Kumar,(2019)revealed that despite the benefits of

wearable technology in health monitoring, healthcare professionals often have doubts about the accuracy of the devices being used. This study also enriches the literature by emphasizing the importance of considering human factors in the adoption of technology in clinical settings. On the other hand, these findings somewhat contrast with the more optimistic views presented by some studies that assess wearable technology more technically, without exploring the challenges faced by healthcare professionals in its use (Sankhala dkk., 2022). Therefore, this study expands our understanding of the application of wearable technology, emphasizing the importance of not only considering device efficiency but also the readiness of healthcare professionals in adopting it.

Explanation of Findings' Implications

The findings of this study have significant implications both scientifically and practically. From a scientific perspective, this research highlights the importance of considering healthcare professionals' subjective experiences in adopting wearable technology, an aspect that has often been overlooked in previous studies that focused more on technical or quantitative aspects. From a practical standpoint, the findings emphasize the need to improve training and readiness of healthcare professionals in using wearable technology, as well as addressing technical challenges such as better data integration with hospital systems. In the social and cultural context, these healthcare professionals' experiences reflect how technology, while offering great potential to improve healthcare delivery, must still be tailored to fit professional and local cultural contexts. The implementation of wearable technology in hospitals should account for the challenges healthcare professionals face in altering their work patterns and interactions with patients, which requires a deep understanding of human factors in health technology.

Study Limitations

This study has several limitations that should be noted. One limitation is the small number of participants involved, which only includes healthcare professionals from one hospital, so the findings may not be fully generalizable to a larger population. Furthermore, although the phenomenological approach allowed for in-depth exploration of healthcare professionals' experiences, this approach relies on subjective interviews, which can be influenced by participant biases or personal interpretations . Other more quantitative or experimental methods may provide a broader perspective on the success of wearable technology in a more controlled context. Thus, the findings should be used as a foundation for further research that includes more locations and participants, as well as employs a more diverse approach.

Prospective Statement for Future Research

This study opens up opportunities for further exploration into how wearable technology can be more effectively accepted and integrated into healthcare systems. Future research could broaden the focus to include a larger population of healthcare professionals and explore how cultural and professional background differences may influence their experiences with this technology. Additionally, further studies could include a more in-depth evaluation of the integration of wearable technology with existing hospital systems, as well as the development of experience-based training to improve healthcare professionals' readiness. The contribution of this study is expected to enrich the literature on technology adoption in digital health and provide a basis for the development of more effective implementation policies and strategies.

CONCLUSION

This study explores healthcare professionals' subjective experiences in using wearable technology for chronic disease monitoring, focusing on the challenges and benefits they perceive. The key findings indicate that while this technology offers significant benefits in patient health management, substantial challenges such as device reliability issues and data integration into medical systems still hinder its optimal implementation. This research makes a valuable contribution to the

literature by shifting the focus from technical aspects to the human and practical factors that influence the adoption and use of wearable technology in clinical settings. These findings offer practical benefits, particularly in terms of developing better training programs and improving technology integration in hospitals. The study also paves the way for further research that could encompass a broader population and explore differences in experiences based on professional or cultural backgrounds. Going forward, future research could deepen our understanding of how wearable technology can be more effectively integrated into everyday medical practice.

CONFLICT OF INTEREST

The authors declare that there is no conflict of interest regarding the publication of this article.

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