



Exploring Healthcare Professionals' and Patients' Subjective Experiences with Data Analytics in Medical Decision-Making in Hospitals

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ABSTRACT

Data analytics in healthcare has emerged as a crucial tool for improving diagnostic accuracy and treatment efficiency. However, while the technical advantages are well documented, there is limited understanding of the subjective experiences of healthcare professionals and patients who engage with this technology. This research seeks to address this gap by exploring the perceptions and experiences of medical staff and patients regarding the use of data analytics in healthcare decision-making. Employing a phenomenological approach, we examine the lived experiences of these individuals to gain a deeper understanding of their feelings of empowerment, trust, and concerns about the technology. Through in-depth interviews with 8 healthcare professionals and 7 patients, we identified key themes of uncertainty, empowerment, and privacy concerns that influence the acceptance and integration of technology in medical practice. Our findings show that while technology improves clinical outcomes, its adoption is shaped by personal and social factors, such as trust in the system and fears of data misuse. These insights contribute to a more comprehensive understanding of the challenges and opportunities that data analytics presents in healthcare, offering valuable implications for training, policy development, and future research. The limitations of this study include a small sample size and the potential for bias in participant selection. Future research could expand on this study by including a larger and more diverse sample to further explore these findings.



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INTRODUCTION

The phenomenon of using data analytics technology in the healthcare sector has rapidly developed over the past few decades. The advancements in this technology enable the analysis of big data, which can assist in making more accurate and evidence-based medical decisions. In this context, hospitals and healthcare facilities worldwide have started implementing analytics systems to analyze disease patterns, predict health trends, and improve efficiency in medical services. Although this technology holds great potential to revolutionize healthcare delivery, challenges in its implementation still exist, both technically, socially, and culturally (Amoon dkk., 2020). One of the key challenges is how healthcare professionals and patients respond to and adapt to this relatively new technology, and how their subjective experiences shape their understanding and use of data analytics in the medical context.

The relevance of this phenomenon is significant because data analytics technology not only changes how healthcare professionals make diagnoses and plan treatments but also influences how patients interact with the healthcare system. In modern society, where technology is increasingly becoming an integral part of everyday life, understanding how individuals feel about and interpret this technology is crucial (Baldassano dkk., 2020). The subjective experiences of healthcare professionals, who are accustomed to traditional procedures, and patients, who may feel anxious or disconnected from data-driven decisions, can provide valuable insights into the acceptance and effectiveness of this

technology in healthcare settings. This underscores the importance of understanding the meaning of these experiences from the participants' perspectives, paying attention to their feelings, trust, and the challenges they face in adopting and interacting with this technology.

As part of understanding this phenomenon, there is a need to explore the meaning of the subjective experiences of healthcare professionals and patients. The phenomenological approach allows researchers to delve deeper into how individuals understand and experience this technology within their social and cultural contexts. This study aims to provide richer insights into the perceptions and experiences that shape their attitudes toward the implementation of data analytics technology in hospitals, and how this impacts medical decision-making and the quality of care provided. Therefore, the phenomenological approach will enable a deeper and more contextual understanding of this phenomenon, which cannot be fully explained by quantitative data or technical analysis alone.

Research on subjective experiences in specific phenomena, particularly in the context of technology use in healthcare systems, has become an increasingly important area in health and technology literature. Phenomenological studies provide valuable insights into how individuals both healthcare professionals and patients experience, interpret, and respond to technologies such as data analytics applied in medical contexts (Blonigen dkk., 2023). Although many studies have examined the effectiveness of technology through objective metrics, few have specifically addressed the emotional and experiential responses of those interacting with the technology. Many previous studies have focused on technical and quantitative outcomes, often overlooking the profound subjective experiences that shape individual acceptance and understanding of this technology. For example, while many studies assess the effectiveness of technology based on clinical outcomes or results, understanding how healthcare professionals and patients feel the impact in everyday practice remains limited.

The methodological challenge in exploring these in-depth experiences lies in the limitations of quantitative approaches, which more frequently measure phenomena through numerical data and objective metrics. This approach is less capable of capturing the subjective dimensions of individual experiences such as anxiety, uncertainty, or even confidence that emerge when interacting with new technologies in healthcare settings. Although quantitative data can provide valuable information about the efficiency or outcomes of technology usage, it cannot explain how individuals' experiences and perceptions are shaped throughout the process. For this reason, a phenomenological approach was chosen for this study, as it allows for a detailed exploration and description of the meanings participants assign to data analytics technology, and how it influences their experiences in delivering and receiving medical care.

The limitations of quantitative approaches and more traditional methodologies have made many previous studies less effective in providing a comprehensive understanding of this phenomenon. By relying solely on numerical data, these approaches often overlook the deeper aspects that can only be understood through direct experience (Fahlevi dkk., 2022). Therefore, it is crucial to use methods that prioritize subjective experience to gain a richer, more contextual understanding of how data analytics technology is perceived and accepted in the medical world.

In the context of the implementation of data analytics technology in the healthcare sector, the commonly used solutions to date have relied on quantitative data-based approaches and algorithms to analyze clinical outcomes or operational efficiency. These approaches are very useful for generating objective data that can be measured and compared; however, they often fail to capture the subjective experiences of healthcare professionals and patients (Fleming dkk., 2024). For instance, while technology may show improvements in terms of the speed of diagnosis or the accuracy of treatment, it does not provide enough insight into how this technology is experienced by users whether they are healthcare professionals directly involved in the diagnostic process or patients who perceive its impact on the quality of their care. Therefore, this approach only offers a partial view of the broader phenomenon.

The limitations in this deeper understanding highlight the need for an alternative, more holistic and exploratory approach. Phenomenology offers a solution by allowing for an in-depth

exploration of the experiences of individuals interacting with this technology, uncovering the meanings they assign to the use of data analytics in medical decision-making. Through the phenomenological approach, this research aims to understand how this technology is encountered and accepted by healthcare professionals and patients, and how these experiences shape their perceptions of the quality of healthcare received or provided (Gous dkk., 2020). By focusing on the subjective meanings embodied in real-world experiences, phenomenology enables the revelation of the essence of this phenomenon, which cannot be fully explained through quantitative or practical approaches alone.

Research on the subjective experiences of using data analytics technology in the healthcare sector is still limited, although several studies have attempted to explore healthcare professionals' and patients' perceptions of this technology. Previous studies have focused on the application of data analytics in improving the efficiency and effectiveness of treatment, but few have explored how individuals feel about and interpret the use of this technology in their daily lives. The theories underpinning this research often lean toward technical and quantitative understanding, thus leaving little room for a deeper understanding of the meaning of the experiences and challenges faced by the subjects. Therefore, the phenomenological approach offers a significant contribution to understanding this subjective dimension, given its focus on the individual's experience and their social context.

The phenomenological method used in this study is designed to explore the subjective experiences of healthcare professionals and patients regarding the use of data analytics in medical decision-making. This approach was chosen for its ability to understand the meaning embedded in personal experiences, which cannot be adequately explained by quantitative data or technical analysis (Gramaje dkk., 2021). By using a phenomenological approach, this research aims to provide deeper insights into how this technology is accepted and understood by the individuals involved, and how it affects their perceptions of the quality of healthcare received or provided. Through this approach, we aim to fill the knowledge gap by uncovering the experiential dimensions that have been overlooked in previous literature.

The structure of this article begins with an introduction that describes the context of the phenomenon under investigation, followed by an explanation of the phenomenological methodological approach used in the study. Next, the methodology section will detail the data collection process, which involves in-depth interviews with participants, and data analysis using thematic techniques to identify key themes from the experiences explored (Harb dkk., 2021). The article will then discuss the analysis results, highlighting the subjective experiences of participants, followed by a discussion on the implications of the findings for theory and practice in the field of data analytics usage in healthcare. The article will conclude with a summary of the key findings and recommendations for further research and practical applications.

RESEARCH METHODS

Study Design

This study employs a descriptive phenomenological approach to explore the subjective experiences of healthcare professionals and patients regarding the use of data analytics technology in enhancing healthcare services (Harb dkk., 2020). Phenomenology was chosen because it allows for an in-depth exploration of individuals' experiences and perceptions of a phenomenon, without relying on pre-existing theories. The focus of phenomenology is on understanding the essential aspects of participants' experiences within their context, which in this study centers on how data analytics technology is accepted and used in a medical setting. A descriptive phenomenological approach was selected because this research aims to describe in detail and accurately the meaning given by participants to the phenomena they experience, without attempting to interpret or analyze these experiences further. The sample size of 15 participants was determined based on the need for rich, detailed insights into the phenomenon under study, allowing for a manageable yet diverse range of experiences. While the sample size is relatively small, it is consistent with the requirements of phenomenological research, which focuses on depth over breadth.

Participants

Participants in this study include healthcare professionals (doctors, nurses, and other medical professionals) and patients who are directly involved in the implementation of data analytics in hospitals (Hodgson, 2019). Participants were selected using a purposive sampling approach, with the following inclusion criteria:

Healthcare professionals with experience using data analytics technology in the process of diagnosis or medical decision-making.

Patients who have received healthcare services at hospitals that use data analytics systems to enhance their treatment or diagnosis.

Exclusion criteria include healthcare professionals or patients who have never been directly involved with the use of data analytics in healthcare or who are unable to provide relevant information about their experiences. This study involves a total of 15 participants, consisting of 8 healthcare professionals and 7 patients, with ages ranging from 30 to 60 years. The gender composition includes 9 men and 6 women. These demographic characteristics were chosen to reflect diverse perspectives on the use of technology in a medical context.

Data Collection

Data were collected through in-depth interviews conducted directly with each participant. These interviews were guided by a semi-structured interview protocol designed to explore participants' experiences, perceptions, and challenges related to using or accepting data analytics in healthcare services. Each interview lasted between 45 and 60 minutes and took place in a comfortable and private setting, such as an interview room at the hospital or a quiet office, to ensure participant comfort (Maddeh et al., 2023). All interviews were recorded with the participants' consent, and the transcripts were then analyzed. The interview protocol used was developed based on existing literature, with adjustments made to fit the local context and the specific characteristics of the data analytics technology used in this study.

Data Analysis

The data collected from the interviews were analyzed using thematic analysis, a method that is appropriate for a descriptive phenomenological approach. In this analysis, the data were examined by identifying the main themes that emerged through systematic steps, starting with a thorough reading of the interview transcripts, coding meaningful units, and grouping relevant themes. This process involves identifying the essential elements of the experiences expressed by participants. Additional steps were taken to ensure that the analysis was relevant and thorough, such as using NVivo software to help organize the data and mark relevant quotes (Mahajan et al., 2019). The results of the thematic analysis allow for the identification of key themes that reflect participants' experiences and perceptions of the phenomenon under study.

Ethics

This study adheres to the applicable international ethical standards, and participant consent was obtained in a lawful and transparent manner. All participants were given a full explanation of the study's purpose and the process they would undergo before being asked to sign informed consent forms. Anonymity and confidentiality of the data were carefully maintained, and all collected data were securely stored. The names and identities of participants will not be used in the publication of the research findings. Ethical approval was obtained from the relevant research ethics committee, ensuring that the study met all ethical criteria for research involving human participants.

RESULTS

Healthcare Professionals' Perceptions of the Use of Data Analytics in Medical Decision-Making

The experiences of healthcare professionals regarding the use of data analytics technology reveal two main themes: confidence in the benefits of the technology and concerns about its

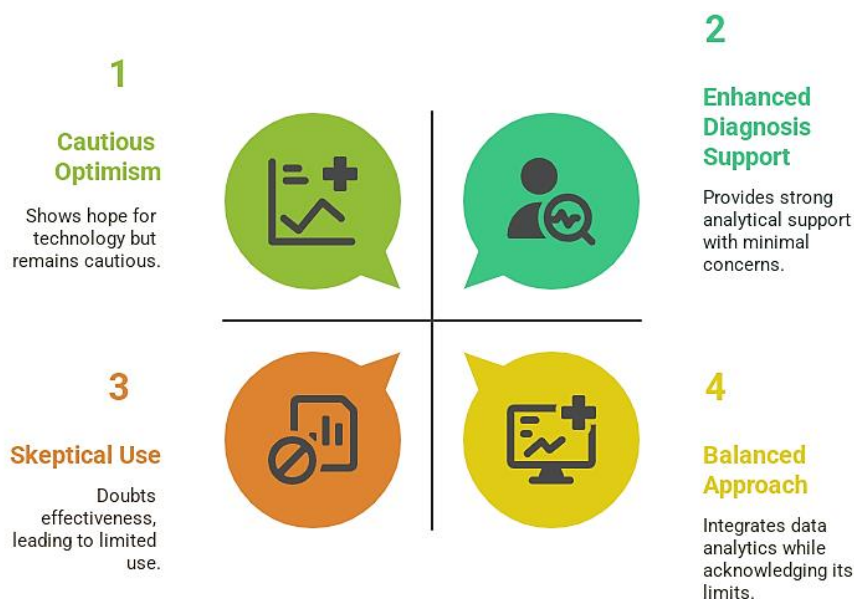
application. Some healthcare professionals shared that they felt more supported in identifying disease patterns more accurately. For example, one doctor explained:

"Data analytics provides me with a deeper understanding of disease patterns that I previously struggled to identify. With data-driven analysis, I feel more confident in formulating an initial diagnosis, even though I also feel there is still uncertainty in its application in some highly complex cases."

On the other hand, there are concerns about accuracy and dependence on technology. Some healthcare professionals feel that data analytics does not fully replace their clinical skills. One doctor stated:

"I sometimes feel anxious about relying on a system governed by data analytics. While the data can help, ultimately my clinical experience is also crucial, especially for unusual cases."

Figure 1. Balancing Confidence and Concerns in Data Analytics



Patients' Experiences with Data Analytics Technology

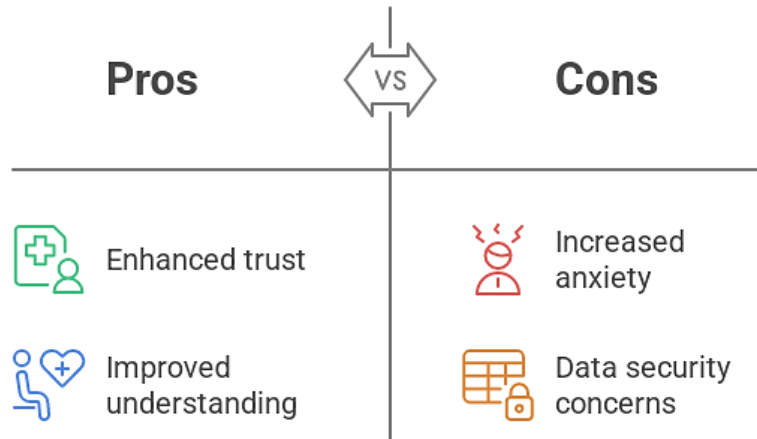
Patients' experiences with the use of data analytics in healthcare services are also varied. For some patients, the use of this technology enhances their trust in the hospital and medical staff. For example, one patient shared their experience:

"I feel more at ease when my doctor shows me the in-depth data analysis to explain my condition. It makes me feel more valued and understood because the data shows that they truly care about my condition."

However, some patients also feel anxious about the use of technology, which they perceive as "too complicated" and are concerned about the confidentiality of their data. Another patient commented:

"Sometimes I feel that this technology is too complicated. I feel anxious about how much of my personal information is being used, and whether that data is truly secure."

Figure 2. Data analytics in healthcare



Challenges in Implementing Data Analytics by Healthcare Professionals

The biggest challenge faced by healthcare professionals in implementing data analytics is the lack of adequate training and the suboptimal integration of systems. One nurse explained their challenge:

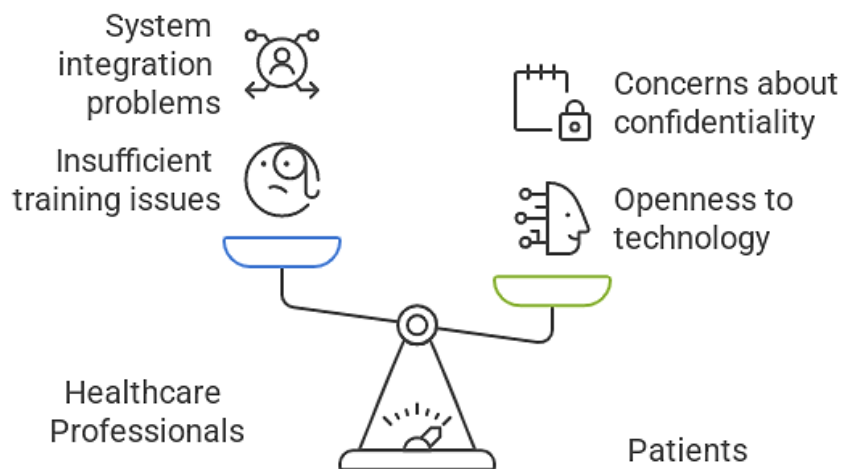
"Many of us haven't received enough training on how to effectively use data analytics tools. We're given a pre-existing system, but there hasn't been sufficient preparation. This leads to confusion in its usage."

Additionally, limitations in access to hardware and software that meet clinical needs are also obstacles. One doctor added:

"Sometimes we have systems that are not synchronized with the tools we use in the care rooms. This slows down workflows and sometimes adds to the confusion."

This research demonstrates that while data analytics technology can offer many advantages in improving diagnosis and treatment, there are differing experiences between healthcare professionals and patients in dealing with this technology. Healthcare professionals focus more on the accuracy and utility of the technology in decision-making, but many also face challenges related to insufficient training and system limitations. Meanwhile, patients show openness to technology as long as they feel informed and secure, although some still have concerns about data confidentiality and the complexity of using the technology.

Figure 3. Balancing Healthcare Technology Challenges and Acceptance



DISCUSSION

Opening: Summary of Key Findings

This study found that both healthcare professionals and patients experience a complex and diverse range of emotions related to the implementation of data analytics technology in healthcare services (Metz dkk., 2021). While this technology offers benefits such as improved diagnostic accuracy, there are also challenges regarding its acceptance and understanding, reflecting the subjective experiences of those involved.

Contribution of Findings to the Research Questions

The findings of this study provide deeper insights into the question of how data analytics technology is accepted and understood in the medical context. While this technology has the potential to enhance the quality of treatment and diagnosis, the subjective experiences of healthcare professionals reveal uncertainty and anxiety in integrating this technology into their medical practice. Furthermore, the findings related to patients indicate that although they feel more empowered by the technology, they also have concerns regarding privacy and the complexity of using the data. These findings emphasize the importance of considering subjective experiences in health technology research and development, as well as how these experiences influence its acceptance and effectiveness in practice.

Connection to Previous Literature and Theories

These findings align with the literature that identifies challenges in the acceptance of new technologies within healthcare systems, as evidenced by Minopoulos dkk. (2022) in the Technology Acceptance Model (TAM), which states that perceptions of usefulness and ease of use are crucial factors in the level of adoption. This study also reinforces the research of Mulrooney dkk. (2022), who argued that while technology can enhance efficiency, the greatest challenges in its implementation lie in social and cultural aspects, including the anxiety and uncertainty felt by healthcare professionals. On the other hand, the findings differ somewhat from previous studies that focused more on the quantitative aspects of technology implementation, such as Role dkk. (2021), who emphasized the direct impact of technology on medical outcomes and efficiency. This study adds a new layer by exploring the subjective meanings often overlooked in quantitative approaches.

Explanation of the Implications of Findings

The findings of this study provide important implications for understanding how data analytics technology can be accepted and applied in medical practice, both by healthcare professionals and patients. Scientifically, the findings emphasize that the acceptance of technology in the healthcare sector is not solely dependent on technical aspects or efficiency, but also on the social and emotional dimensions associated with individuals' experiences. For healthcare professionals, the anxiety related to data accuracy and uncertainty in its usage highlights the importance of adequate training and a more comprehensive approach to integrating this technology into clinical practice. For patients, the feeling of empowerment through technology, but also concerns about privacy and data security, underscores the need for more transparent policies regarding the use of medical data. These findings are relevant for a broader population, especially in developing countries, where the adoption of healthcare technology is still in its early stages and requires approaches that consider local social and cultural factors.

Study Limitations

While these findings provide valuable insights, this study has several limitations that need to be acknowledged. First, the research was conducted in a single hospital and involved a small number of participants (15), which may limit the ability to generalize the findings to a larger population or different healthcare contexts. Additionally, the use of in-depth interviews as a data collection method may not fully capture all dimensions of the experiences, as it relies on individual narratives that may

be influenced by memory or subjective interpretation of the participants. Therefore, while the results provide a deep understanding of the phenomenon being studied, generalizing these findings should be done with caution. Future research with larger samples and in more diverse contexts could help expand on these findings.

Prospective Statement for Future Research

The findings of this study open up opportunities for further research to deepen the understanding of technology acceptance in the healthcare context. Future research could explore how various demographic factors, such as age or educational background, influence healthcare professionals' and patients' experiences with data analytics technology (Simsekler dkk., 2021). Moreover, further studies could examine the interaction between technology and broader cultural factors, such as how social norms or religious beliefs influence views on the use of technology in medical decision-making. These findings could serve as a foundation for the development of more effective policies or training programs for implementing healthcare technology in a more inclusive and human-centered way, as well as improving the quality of interactions between patients and healthcare professionals.

CONCLUSION

This study examined the subjective experiences of healthcare professionals and patients regarding the implementation of data analytics technology in healthcare services. The key findings indicate that while this technology enhances diagnostic and treatment accuracy, there are challenges in terms of acceptance and understanding, which vary between healthcare professionals and patients. Healthcare professionals experience anxiety related to reliance on technology, while patients feel more empowered but are concerned about data privacy. This research contributes by uncovering the subjective experience dimensions often overlooked in previous literature, highlighting the importance of social and emotional considerations in the application of health technology. The findings also emphasize the need for more comprehensive training for healthcare professionals and clearer policies regarding the use of medical data. In addition, this study calls for the development of practical recommendations for implementing effective training programs for healthcare professionals, ensuring that they are adequately prepared to use data analytics tools confidently and competently. Furthermore, it highlights the need for privacy policies that are transparent, easy to understand, and regularly updated, to address patients' concerns about data security. Future studies could expand on this research by involving larger samples and examining cultural factors that influence the acceptance of this technology in various medical settings.

CONFLICT OF INTEREST

The authors declare that there is no conflict of interest regarding the publication of this article. All financial and personal relationships with other organizations or individuals that could inappropriately influence the work were disclosed and managed in accordance with ethical standards.

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