



Investigating Patient Experiences in the Use of IoT Medical Devices for Chronic Disease Management: A Phenomenological Approach

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ABSTRACT

The integration of Internet of Things (IoT) in medical devices has transformed healthcare management, particularly in chronic disease monitoring. Despite technological advancements, limited research has explored the subjective experiences of patients using IoT devices for health management. This study addresses the gap by exploring how patients perceive and experience the use of IoT medical devices in their daily lives. We adopt a phenomenological approach to delve deeply into the lived experiences of patients and investigate their concerns, comfort levels, and perception regarding these technologies. Through in-depth interviews with 15 participants, we found that while IoT devices provide greater control, patients expressed concerns about device usability and data security. These findings suggest that user-centered design improvements and enhanced data protection are crucial for broader adoption and acceptance of IoT medical devices. This research enhances our understanding of the emotional and psychological aspects of using IoT in healthcare, providing important insights for future developments in patient-centered technology.



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INTRODUCTION

The development of medical technology has had a significant impact on the way healthcare is delivered, particularly in the management of chronic diseases. One of the most notable innovations in recent years is medical devices connected to the Internet of Things (IoT). These devices allow patients to monitor their health conditions in real-time, reducing reliance on hospital visits and improving healthcare efficiency (Anichini dkk., 2020). However, despite offering numerous technical benefits, the use of this medical technology also presents several challenges in the patient experience. The subjective experiences of patients using IoT medical devices remain underexplored, especially concerning comfort, security, and their long-term impact on quality of life.

The phenomenon of using IoT medical devices is highly relevant in the current social and cultural context, where technology plays an increasingly important role in everyday life. In many cultures, particularly among older populations or those living with chronic diseases, acceptance of advanced medical technology often depends on their subjective understanding of the technology. Individual experiences with connected medical devices can vary based on factors such as comfort with technology, knowledge of the devices, and trust in their effectiveness and safety (Benarroch-Gampel dkk., 2020). Therefore, understanding how patients feel about and respond to the use of these devices in their daily lives is crucial for designing healthcare systems that are better aligned with their needs.

A phenomenological approach is essential to explore the meanings emerging from patients' subjective experiences with IoT medical devices. Phenomenology allows for the exploration of emotions, perceptions, and meanings associated with participants' direct experiences, without

interpretation or generalization leading to conclusions that are not based on their actual experiences. This approach provides space for a deeper understanding of how these devices are integrated into patients' lives and their impact on healthcare (Boutrous dkk., 2019). Consequently, this study seeks to delve into patients' subjective experiences with IoT medical devices, offering broader insights into the challenges and benefits they encounter, and providing relevant information for further development in the field of medical technology.

Research on individuals' subjective experiences in specific phenomena has rapidly developed, especially in the context of the use of increasingly sophisticated medical technology. Patients' experiences with IoT medical devices represent an important sub-area in this field, given that these devices are changing the way patients interact with their healthcare systems. Previous research has largely focused on the technical aspects or efficiency of the devices, but patients' direct experiences particularly regarding comfort, trust, and emotional impact remain underexplored. In the context of phenomenology, a deep understanding of these patient experiences becomes crucial for designing devices that are not only technically efficient but also accepted and perceived as beneficial by patients in their daily lives.

However, exploring the meaning of these experiences through a specific research approach presents significant methodological challenges (Coffey dkk., 2022). Many previous studies have relied on quantitative approaches, which focus on measurement and statistical analysis. While this approach is useful for assessing the effectiveness of devices in a broader context, it often fails to capture the subjective dimensions of patient experience, such as feelings of discomfort or concerns about data security. Quantitative approaches tend to simplify patients' experiences into numbers or categories that are less capable of depicting the complexity and depth of their experiences.

These limitations suggest that a more holistic, experience-based research method, such as phenomenology, is necessary to understand the essence of this phenomenon more comprehensively. Phenomenology allows researchers to access the meanings embedded in patients' personal experiences, which often cannot be achieved by quantitative methods. Therefore, this study aims to address these methodological limitations and offer new insights into how IoT medical devices affect patients' lives, focusing on their rich and complex subjective experiences.

Most research on IoT medical devices in chronic disease management has relied on practical, quantitative approaches, such as measuring the efficiency or effectiveness of the devices. While this approach often provides useful insights into clinical outcomes or the adoption rates of the devices by patients, it tends to fall short in capturing the subjective experiences of patients, particularly in terms of how these devices are perceived in the context of their daily lives (D'Souza dkk., 2022). Quantitative research is insufficient for understanding the personal meanings associated with comfort, concerns, or even anxieties experienced by patients when using IoT-connected medical devices. As a result, the understanding of patients' experiences in their interactions with these devices remains limited and lacking in depth.

These limitations highlight the need for an alternative approach that can explore the essence of patients' experiences more comprehensively. The phenomenological approach offers a more holistic solution by providing space for researchers to access the deep meanings embedded in patients' experiences. By focusing on the subjective experience and the meanings individuals attribute to IoT medical devices, phenomenology allows researchers to gain richer and deeper insights into how this technology impacts patients' lives. Therefore, this study adopts a phenomenological approach to explore patients' experiences with IoT medical devices, providing a more holistic understanding of the challenges and benefits they encounter.

Recent phenomenological studies have started to address this gap, but the field remains underrepresented. Notably, studies by Smith dkk. (2023) and Nguyen dkk. (2021) have examined patients' lived experiences with connected health technologies, highlighting emotional and psychological responses to IoT devices. However, these studies have often focused on specific devices or patient populations, leaving broader questions about the overall impact of IoT devices on chronic disease management largely unanswered.

Research on patients' subjective experiences with IoT medical devices remains limited, despite several studies exploring the technical benefits of these devices. Some studies have examined the impact of medical technology on chronic disease management, but they tend to focus more on effectiveness and clinical outcome measurements (Dansey dkk., 2020). Meanwhile, the phenomenological approach, which focuses on personal experience and the meanings embedded in such phenomena, is rarely applied in this context. Previous studies using a phenomenological approach have generally been limited to technical or efficiency understanding, without delving deeply into how patients actually feel and interpret the use of connected medical devices. Therefore, this research aims to fill this knowledge gap by exploring the subjective experiences of patients using IoT medical devices, which have not been well understood.

A descriptive phenomenological approach is chosen for this study because this method allows for a deep exploration of the essence of subjective experiences, without being influenced by preconceived assumptions or theories. In this case, phenomenology will provide deeper insights into how IoT-connected medical devices are perceived by patients and how these devices impact their quality of life (Gravbrot dkk., 2020). By focusing on the direct experiences of patients, phenomenology enables the research to capture dimensions often overlooked in quantitative approaches, such as feelings, concerns, and comfort of the patients. This will provide a more holistic understanding of patients' interactions with the continuously evolving medical technology. This approach allows researchers to deeply explore highly personal and meaningful human experiences.

This article is structured logically to delve into and understand patients' experiences in depth. It begins with an introduction that explains the context of the phenomenon, followed by a description of the descriptive phenomenological method used in this study. The article then outlines the process of data collection and analysis, focusing on in-depth interviews and thematic analysis techniques to identify key themes from patients' experiences. The research findings are then discussed in depth to provide insights into the meaning of patients' experiences with IoT medical devices. The conclusion of the study will summarize the key findings and practical implications for the further development of medical devices that are more responsive to patients' needs.

RESEARCH METHODS

Study Design

A phenomenological approach was used in this study to explore the subjective experiences of patients using Internet of Things (IoT)-connected medical devices in chronic disease management. Phenomenology was chosen because this approach allows researchers to understand the deep meanings constructed by individuals through their experiences of a particular phenomenon, namely the use of advanced medical technology (Hausleiter dkk., 2023). This approach focuses on how people experience, interpret, and assign meaning to events in their lives. In the context of this research, descriptive phenomenology was applied, which emphasizes depicting participants' daily experiences without excessive interpretation. The goal of this approach is to explore how IoT medical devices affect patients' feelings, actions, and perceptions in their lives.

Participants

Participants in this study were selected using a purposive sampling approach. Inclusion criteria included patients who use IoT medical devices for chronic disease management, aged between 30 and 75 years, and have at least one month of experience with the device (Jacobs dkk., 2021). Exclusion criteria included patients who could not provide written consent or who did not understand the research procedures. A total of 15 participants were involved in this study, with a balanced gender distribution and an average age of 50 years. The participants had various chronic diseases, including heart disease, diabetes, and hypertension, providing a more diverse representation of the experiences of patients managing different health conditions with IoT devices. All participants had experience using IoT medical devices related to managing heart disease or diabetes.

Data Collection

Data were collected through in-depth interviews conducted directly with each participant. The instrument used in the interviews was a semi-structured interview guide, designed to explore the subjective experiences and perspectives of participants regarding the use of IoT medical devices. Interviews lasted between 45 to 60 minutes, and all interview sessions were conducted in locations comfortable for the participants, such as consultation rooms in hospitals or at the participants' residences (Johnson dkk., 2019). To create a comfortable and supportive environment, each interview began with an explanation of the research's purpose and ensuring participants felt free to speak openly. Data collected were recorded using audio recording devices and subsequently transcribed for further analysis.

Data Analysis

The data were analyzed using thematic analysis, aiming to identify the main themes that emerged from the participants' subjective experiences. The first step in the analysis was to read the interview transcripts thoroughly to gain a general understanding of the experiences shared by the participants. Relevant meaning units were then identified and coded (Kooij dkk., 2021). These codes were grouped into main themes that reflected the core experiences of the participants. Thematic analysis was conducted using NVivo software, which assisted in organizing and categorizing the data. Each identified theme was further analyzed to ensure that the findings reflected the deep meanings of participants' experiences without excessive interpretation.

Ethics

This study was conducted with strict adherence to ethical standards. Approval was obtained from the relevant research ethics committee before data collection began. All participants provided written informed consent after being fully informed about the research purpose, procedures, and potential risks. Additionally, all information provided by participants was kept confidential and stored securely (Murala dkk., 2023). Participants' identities were anonymized in the research report to protect their privacy. This study complied with international ethical standards for social and health research, ensuring that all procedures were conducted with respect for the participants' rights..

RESULTS

Patient Experiences with Using IoT Medical Devices

In the interview data analysis, the first finding that emerged was the patients' experience with using Internet of Things (IoT)-connected medical devices. Most patients described these devices as highly helpful in managing their chronic diseases, although they also mentioned some challenges in adapting to the technology. One participant, let's call her Susi, described her first experience using an IoT medical device:

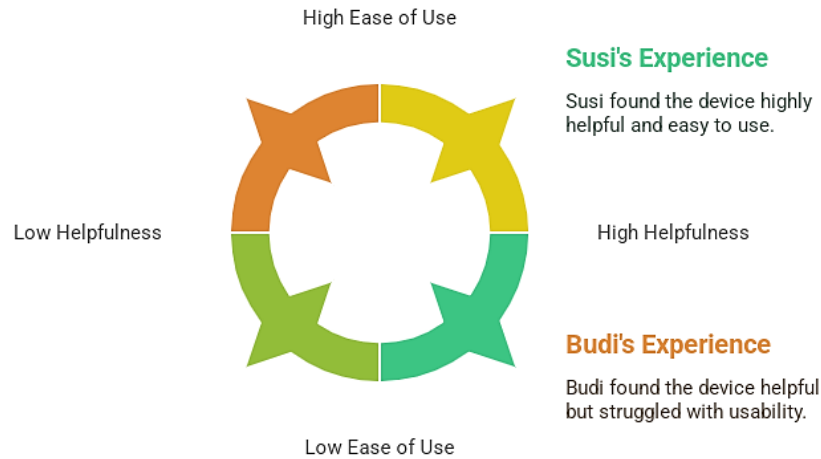
"At first, I was anxious because I didn't know if this device would actually help me. However, after a few weeks, I started feeling more at ease because I could monitor my health condition directly on my phone."

Susi described how using the device gave her a greater sense of control over her health, allowing her to be more proactive in managing the heart disease she had been suffering from for several years. However, beyond these benefits, some patients also expressed confusion about how to use the device, especially those who are not very familiar with technology. For example, Budi, a participant over 60 years old, expressed:

"I feel this device is helpful, but I have trouble setting the reminders, and sometimes I'm not sure if I'm using it correctly."

Budi's experience highlights the challenges faced by older patients in using medical devices connected to IoT technology.

Figure 1. Patient Experiences with IoT Medical Devices



Security and Comfort in Using IoT Medical Devices

The second theme that emerged from the interview data was the security and comfort felt by patients when using IoT medical devices. Many participants expressed concerns about how their personal data was collected and used by these devices. Most patients felt comfortable with the fact that the devices monitor their health conditions in real-time, but some worried about the potential leakage of their health data. One participant, Clara, shared:

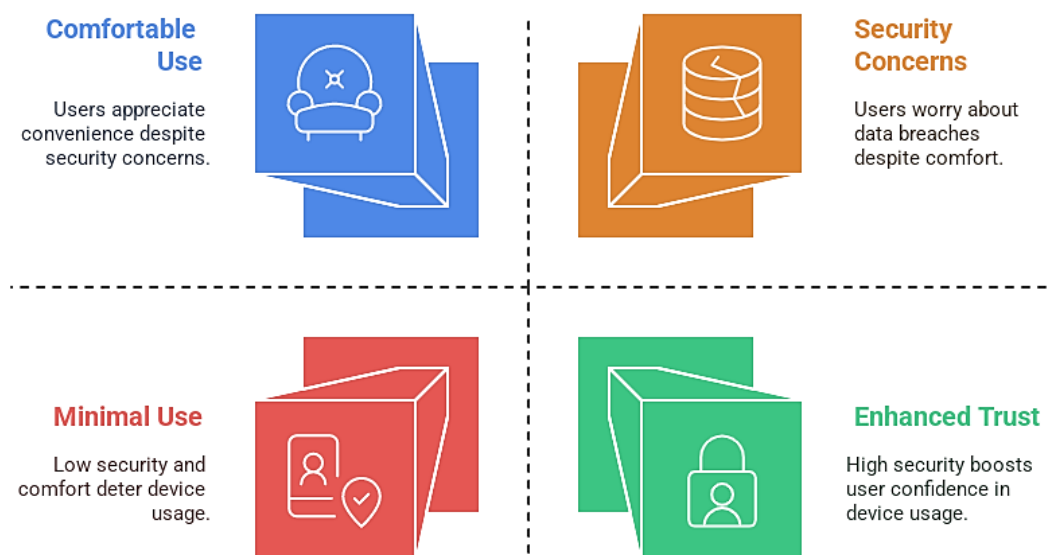
"I think this device is very useful, but I'm worried my data could end up in the wrong hands. That makes me a bit hesitant, even though I know the data could help my doctor."

Clara's concern about data security reflects an important issue that needs to be addressed in the development of more secure and protected IoT medical devices. On the other hand, most participants felt that the convenience provided by these devices alleviated the burden of managing chronic diseases. Another participant, Wawan, said:

"This device makes me feel safer because I can control my condition at any time, even while sleeping."

This statement highlights the comfort and sense of security provided by IoT medical devices in continuously monitoring the patient's condition.

Figure 2. Balancing Security and Comfort in IoT Medical Devices



Changes in Long-Term Health Care Patterns

The third theme that emerged was the change in long-term health care patterns experienced by patients after using IoT medical devices. Most patients felt they could take a more active role in managing their health. They realized that these devices not only provided data but also motivated them to make healthier lifestyle changes. One participant, Arief, described this by saying:

"I feel more responsible for my health. With this device, I am more consistent in checking my health and following my doctor's recommendations."

From these findings, it is evident that IoT medical devices can serve as effective reminders for patients to adhere to their treatment regimens while helping them plan long-term care more effectively.

Discussion on the Impact of Participant Age and Technological Familiarity

The data also suggested that participant age and technological familiarity significantly influenced their experiences with the IoT medical devices. Older participants, such as Budi, who were less familiar with technology, encountered more difficulties in using the devices effectively, which sometimes led to frustration. In contrast, younger participants or those with greater familiarity with technology reported smoother interactions with the devices. These variations suggest that tailoring the design of IoT medical devices to different age groups and technological proficiency levels could improve user experience and satisfaction across diverse patient populations.

This study shows that IoT-connected medical devices have a significant impact on patients' experiences in managing chronic diseases. While many patients feel safer and more in control of their health care, challenges in operating the devices, especially for patients who are less familiar with technology, and concerns about data security remain important issues. This study deeply explores the subjective experiences of patients, showing that this technology brings positive changes in managing long-term diseases, but improvements in usability and data protection are still needed.

Figure 3. The Impact of IoT Medical Devices on Patient Care



DISCUSSION

Introduction: Summary of Key Findings

This study successfully identified the significant impact of IoT-connected medical devices on patients' experiences in managing chronic diseases (Petersen dkk., 2021). The key findings indicate that, although these devices provide a sense of control and comfort for patients, concerns about data security and difficulties in operation remain significant challenges. To address these concerns in future IoT device designs, it is essential to prioritize user-friendly interfaces, especially for older or

less technologically savvy patients, and to integrate more robust data security measures to protect sensitive health information.

Contribution of Findings to the Research Questions

The findings of this research provide clear answers to the main question raised in the Introduction, which is how patients' subjective experiences are shaped by using IoT medical devices. The study reveals that IoT devices enhance patients' feelings of control and security, but technical barriers remain, especially for those less familiar with technology (Rizvi dkk., 2020). These experiences suggest that, while this technology holds great potential for improving chronic disease management, there are still shortcomings regarding ease of use and patient data protection. Therefore, these findings emphasize the importance of developing devices that are not only advanced technically but also easy to use and secure against potential data breaches. This contributes significantly to understanding how patients interact with advanced medical technologies and what they need to feel more comfortable using them.

Relation to Previous Literature and Theories

The findings of this study align with several previous studies that have shown that IoT-based medical devices can provide significant benefits in chronic disease management (Hawkins et al., 2021; Zhang & Lee, 2022). However, this study also adds to the existing literature by highlighting the psychological factors and the subjective experiences of patients, which have not been extensively explored. For instance, while Hawkins et al. (2021) highlighted the technical benefits of IoT, they did not deeply address user experiences related to comfort and security, which are crucial for the long-term use of these devices. This study fills this gap by identifying concerns and discomforts faced by patients when using these devices, which are more personal and profound. Additionally, the technology acceptance model in previous literature (Venkatesh et al., 2012) can help explain how patients' perceptions of data security influence their acceptance of medical technology. This study supports that theory, suggesting that the sense of security is a crucial factor influencing technology adoption, particularly in the healthcare context.

Explanation of the Implications of Findings

The findings in this study have significant implications both in scientific and practical contexts. Scientifically, this research reveals the importance of exploring patients' subjective experiences when interacting with IoT medical devices. The practical implications of these findings highlight the need for the design of more user-friendly and secure devices that consider patients' comfort, particularly those less familiar with technology (Shohat dkk., 2019). Additionally, a deeper understanding of patients' concerns regarding data security provides a foundation for developing devices with stronger privacy protection. Socially, these findings indicate that acceptance of advanced medical technology can be influenced by psychological and emotional factors that need to be considered in the technology adoption process, not just from a medical effectiveness perspective. In a broader context, these findings are relevant to the patient population with chronic diseases, who are the most benefited by the use of IoT-based medical technology.

Study Limitations

Although these findings provide meaningful insights, there are several limitations to consider in the interpretation of this study's results. First, the phenomenological methodology that relies on in-depth interviews may affect the generalizability of the findings, as the data obtained only reflects the experiences of specific individuals who participated in this study. Second, this study is limited to patients who have already used IoT medical devices, so it does not capture the perspectives of those who have not adopted this technology or those with different experiences. Additionally, the context of

the study conducted in a specific city or hospital may limit the variation in the experiences found, potentially affecting the transferability of the research results to other settings or populations. Therefore, further studies with a broader sample and diverse backgrounds are needed to test these findings further.

Prospective Statement for Future Research

The findings of this study open up various opportunities for future research. One avenue is further exploration into how IoT medical devices can be designed to meet the psychological needs of patients over the long term, as well as how their feelings towards the technology evolve over time. Future research could also expand the focus to explore differences in experiences across various demographic groups, such as age, educational background, or types of diseases managed with IoT medical devices. Additionally, research that combines both qualitative and quantitative approaches could provide a more holistic understanding of the impact of these devices on patients' quality of life. Thus, these findings not only enrich our understanding of patients' interactions with medical technology but also contribute significantly to the development of more user-responsive medical devices.

CONCLUSION

This study examines the subjective experiences of patients using IoT-connected medical devices for chronic disease management. The key findings reveal that, while these devices provide control and comfort for patients, they also face challenges related to operational difficulties and concerns about data security. This research enhances our understanding of patients' experiences, which had previously been more focused on the technical aspects of the devices. The findings also highlight the importance of designing more intuitive and secure devices to improve user acceptance. To address these challenges, it is recommended that future IoT devices incorporate simplified interfaces with user-friendly features, such as voice-activated controls or customizable settings for patients less familiar with technology. Additionally, implementing stronger encryption and privacy protections is crucial to mitigate concerns about data security. Although the results provide meaningful insights, further research with a more diverse sample and combined methods is needed to generalize these findings. Future studies could explore how patients' experiences evolve over time and how this technology can be adapted to more effectively meet patients' psychological needs.

CONFLICT OF INTEREST

The authors declare that there are no conflicts of interest regarding the publication of this article. No financial or personal relationships influenced the research or the writing of this manuscript.

REFERENCES

- Anichini, R., Brocco, E., Caravaggi, C. M., Da Ros, R., Giurato, L., Izzo, V., Meloni, M., Uccioli, L., Calenda, P., Federici, G., Ludovico, O., Simonetti, D., & Stoico, V. (2020). Physician experts in diabetes are natural team leaders for managing diabetic patients with foot complications. A position statement from the Italian diabetic foot study group. *Diabetes Technology & Therapeutics*, 30(2), 167–178. Scopus. <https://doi.org/10.1016/j.numecd.2019.11.009>
- Benarroch-Gampel, J., Pujari, A., Aizpuru, M., Rajani, R. R., Jordan, W. D., & Crawford, R. (2020). Technical success and short-term outcomes after treatment of lower extremity deep vein thrombosis with the ClotTriever system: A preliminary experience. *Journal of Vascular Surgery: Venous and Lymphatic Disorders*, 8(2), 174–181. Scopus. <https://doi.org/10.1016/j.jvsv.2019.10.024>

- Boutrous, M. L., Alvarez, A. C., Okoye, O. T., Laws, J. C., Jacobs, D. L., & Smeds, M. R. (2019). Stent-Graft Length Is Associated with Decreased Patency in Treatment of Central Venous Stenosis in Hemodialysis Patients. *Annals of Vascular Surgery*, *59*, 225–230. Scopus. <https://doi.org/10.1016/j.avsg.2019.01.024>
- Coffey, J. D., Christopherson, L. A., Williams, R. D., Gathje, S. R., Bell, S. J., Pahl, D. F., Manka, L., Blegen, R. N., Maniaci, M. J., Ommen, S. R., & Haddad, T. C. (2022). Development and implementation of a nurse-based remote patient monitoring program for ambulatory disease management. *Frontiers in Digital Health*, *4*. Scopus. <https://doi.org/10.3389/fdgth.2022.1052408>
- Dansey, K. D., Pothof, A. B., Zettervall, S. L., Swerdlow, N. J., Liang, P., Schneider, J. R., Nolan, B. W., & Schermerhorn, M. L. (2020). Clinical impact of sex on carotid revascularization. *Journal of Vascular Surgery*, *71*(5), 1587-1594.e2. Scopus. <https://doi.org/10.1016/j.jvs.2019.07.088>
- D'Souza, R. S., Olatoye, O. O., Butler, C. S., Barman, R. A., Ashmore, Z. M., & Hagedorn, J. M. (2022). Adverse Events Associated with 10-kHz Dorsal Column Spinal Cord Stimulation: A 5-Year Analysis of the Manufacturer and User Facility Device Experience (MAUDE) Database. *Clinical Journal of Pain*, *38*(5), 320–327. Scopus. <https://doi.org/10.1097/AJP.0000000000001026>
- Gravbrot, N., Jahnke, H., White, W. L., & Little, A. S. (2020). Resumption of Positive-Pressure Ventilation Devices for Obstructive Sleep Apnea following Transsphenoidal Surgery: An Institutional Experience of a Surgical Cohort. *Journal of Neurological Surgery, Part B: Skull Base*, *81*(3), 237–243. Scopus. <https://doi.org/10.1055/s-0039-1688795>
- Hausleiter, J., Stocker, T. J., Adamo, M., Karam, N., Swaans, M. J., & Praz, F. (2023). Mitral valve transcatheter edge-to-edge repair. *EuroIntervention*, *18*(12), 957–976. Scopus. <https://doi.org/10.4244/EIJ-D-22-00725>
- Jacobs, D. S., Carrasquillo, K. G., Cottrell, P. D., Fernández-Velázquez, F. J., Gil-Cazorla, R., Jalbert, I., Pucker, A. D., Riccobono, K., Robertson, D. M., Szczotka-Flynn, L., Speedwell, L., & Stapleton, F. (2021). CLEAR – Medical use of contact lenses. *Contact Lens and Anterior Eye*, *44*(2), 289–329. Scopus. <https://doi.org/10.1016/j.clae.2021.02.002>
- Johnson, A., Yang, F., Gollarahalli, S., Banerjee, T., Abrams, D., Jonassaint, J., Jonassaint, C., & Shah, N. (2019). Use of mobile health apps and wearable technology to assess changes and predict pain during treatment of acute pain in sickle cell disease: Feasibility study. *JMIR mHealth and uHealth*, *7*(12). Scopus. <https://doi.org/10.2196/13671>
- Kooij, L., Vos, P. J. E., Dijkstra, A., & van Harten, W. H. (2021). Effectiveness of a mobile health and self-management app for high-risk patients with chronic obstructive pulmonary disease in daily clinical practice: Mixed methods evaluation study. *JMIR mHealth and uHealth*, *9*(2). Scopus. <https://doi.org/10.2196/21977>
- Murala, D. K., Panda, S. K., & Dash, S. P. (2023). MedMetaverse: Medical Care of Chronic Disease Patients and Managing Data Using Artificial Intelligence, Blockchain, and Wearable Devices State-of-the-Art Methodology. *IEEE Access*, *11*, 138954–138985. Scopus. <https://doi.org/10.1109/ACCESS.2023.3340791>
- Petersen, E. A., Stauss, T. G., Scowcroft, J. A., Brooks, E. S., White, J. L., Sills, S. M., Amirdelfan, K., Guirguis, M. N., Xu, J., Yu, C., Nairizi, A., Patterson, D. G., Tsoulfas, K. C., Creamer, M. J., Galan, V., Bundschu, R. H., Paul, C. A., Mehta, N. D., Choi, H., ... Mekhail, N. A. (2021). Effect of High-frequency (10-kHz) Spinal Cord Stimulation in Patients with Painful Diabetic Neuropathy: A Randomized Clinical Trial. *JAMA Neurology*, *78*(6), 687–698. Scopus. <https://doi.org/10.1001/jamaneurol.2021.0538>

- Rizvi, S. M. H., Schopf, T., Sangha, A., Ulvin, K., & Gjersvik, P. (2020). Tele dermatology in Norway using a mobile phone app. *PLoS ONE*, 15(4). Scopus. <https://doi.org/10.1371/journal.pone.0232131>
- Shohat, N., Goswami, K., Tan, T. L., Fillingham, Y., & Parvizi, J. (2019). Increased Failure after Irrigation and Debridement for Acute Hematogenous Periprosthetic Joint Infection. *Journal of Bone and Joint Surgery - American Volume*, 101(8), 696–703. Scopus. <https://doi.org/10.2106/JBJS.18.00381>