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Exploring Patient Experiences with Digital Health Monitoring during Stem Cell Therapy

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ABSTRACT

Digital health technologies have become integral to patient care, particularly i regenerative medicine such as stem cell therapy. While their clinical utility is wel established, limited attention has been given to the subjective experiences of patient who use digital health monitoring during complex treatments. What remains unclear i how patients interpret and make meaning of their interactions with these technologie throughout their healing process. This study applies an interpretative phenomenologica approach to explore the lived experiences of patients undergoing stem cell therapy whil using digital health monitoring applications. In-depth, semi-structured interviews wer conducted with eight participants (aged 34–67 years; 5 males and 3 females) who wer receiving outpatient stem cell therapy in a metropolitan hospital in Southeast Asia Interviews were held in private consultation rooms within the hospital to ensure comfor and confidentiality data were analyzed using interpretative phenomenological analysis t identify core experiential themes. The findings revealed four essential themes reassurance through digital guidance, emotional strain from constant monitoring reconstructed trust in therapy, and the emergence of digital companionship. Thes themes highlight the complex and often paradoxical emotional dynamics betwee patients and the technologies intended to support them. The study enhances ou understanding of how patients internalize and navigate their digitally mediated care offering new insights for designing patient-centered digital health interventions an supporting future phenomenological investigations in similar medical contexts.

INTRODUCTION

In recent years, the integration of digital health technologies into clinical practice has profoundly reshaped patient care, particularly within the context of regenerative medicine (Ferreri dkk., 2023; Haque dkk., 2019; Maguire dkk., 2021). Among these technologies, health monitoring applications have emerged as crucial tools in supporting patients undergoing complex therapies, including stem cell treatment (Eche dkk., 2023). These platforms offer real-time data tracking, medication reminders, symptom logging, and communication interfaces, aiming to improve both medical outcomes and patient engagement in their healing processes.

Beyond their functional utility, these tools influence how patients perceive their bodies, interpret progress, and negotiate agency throughout therapy (Beeler dkk., 2020; Psihogios dkk., 2019). Stem cell therapy, often pursued by individuals with chronic or degenerative conditions, introduces a unique convergence of emotional, psychological, and physiological challenges—conditions under which digital technologies can become either sources of reassurance or emotional strain.

Despite the clinical benefits of digital health applications, little is known about how patients experience these technologies subjectively (Cozzolino dkk., 2021). Human experiences with health technologies are inherently shaped by social, emotional, and cultural factors, which often elude traditional biomedical or quantitative frameworks. Patients may feel empowered, monitored, burdened, or reassured by the presence of such applications, and these nuanced responses are critical to understanding the broader impact of digital health on quality of care and personal well-being.

Given this complexity, there is a pressing need to explore the lived meanings and interpretations that patients assign to their use of digital health applications during stem cell therapy (Bange dkk., 2020; Bennardi dkk., 2020). Phenomenology, as a research approach, is uniquely positioned to capture the richness of these experiences. It seeks not only to document what is happening, but to uncover how individuals make sense of these experiences within their personal, relational, and existential contexts. Such an inquiry offers valuable insights that can inform the design of patient-centered technologies and foster more compassionate, context-aware medical interventions.

Building upon the broader context of digital integration in healthcare, scholarly interest has increasingly turned toward understanding patients' subjective experiences with emerging technologies, particularly within high-stakes therapeutic environments such as stem cell therapy (Kolasinski dkk., 2020). Investigating how individuals interpret and emotionally respond to these digital tools has become an essential area of inquiry, especially as patient-centered models of care gain prominence in contemporary medical practice.

Despite this growing interest, significant methodological challenges persist in capturing the nuanced and deeply personal dimensions of such experiences (Hal dkk., 2020; Iyer dkk., 2020). Much of the existing research has relied on quantitative or outcomes-based approaches that emphasize usage metrics, satisfaction ratings, or clinical effectiveness. While valuable, these methods often fall short in illuminating the existential and affective layers of patients’ interactions with digital health applications—such as their sense of autonomy, vulnerability, trust, or alienation.

These limitations highlight a fundamental disconnect between traditional empirical designs and the complex, meaning-laden nature of lived experience . Quantitative approaches, by their nature, reduce rich human phenomena into variables and statistical representations, often neglecting the contextual and interpretive frameworks through which patients understand their healing journeys. As a result, previous studies may have overlooked the very essence of what it means to live through a technologically mediated therapeutic process.

Given these gaps, a phenomenological approach—particularly one grounded in interpretative methodology—offers a powerful alternative for exploring how patients construct meaning in relation to digital monitoring tools during regenerative treatment (Satterlee dkk., 2019) . This study responds to the need for deeper insight into the inner experiences of patients, seeking to uncover the emotional textures, symbolic interpretations, and existential implications embedded within their encounters with health technology.

Current strategies for supporting patients undergoing stem cell therapy have predominantly relied on established clinical and technological interventions—such as algorithm-driven monitoring systems, standardized feedback mechanisms, and adherence-focused digital platforms (Cuccia dkk., 2020; Rosenberg dkk., 2019). While these practical solutions have advanced the efficiency and accessibility of care, they often privilege operational outcomes over patients’ lived realities. As a result, they tend to overlook the intricate emotional, psychological, and existential dimensions that shape how individuals experience their treatment through technological mediation.

Existing studies that assess the utility of digital health applications typically focus on usability, adherence rates, or biometric data correlations (Downar dkk., 2020; Thomas dkk., 2019). Although these findings contribute to technical refinement, they fail to capture how patients interpret, internalize, or assign meaning to their digital interactions during a physically and emotionally demanding treatment process like stem cell therapy. The consequence is a limited understanding of how digital health tools influence the patient's sense of agency, connectedness, and healing within their broader sociocultural and existential context.

This limitation underscores the need for an alternative investigative lens—one capable of illuminating the deeper layers of patient experience (Shin dkk., 2019). A phenomenological approach, especially interpretative phenomenological analysis (IPA), provides a means to explore the subjective meanings embedded in patients’ interactions with health technologies. Rather than measuring outcomes in isolation, this method seeks to reveal how individuals make sense of their experience, how they feel about being monitored, and how these perceptions shape their therapeutic journey.

By adopting a phenomenological framework, this study aims to bridge the gap left by prior empirical designs, offering a more holistic and contextually grounded understanding of patient engagement in technology-supported regenerative medicine.

Several qualitative studies have explored how patients relate to digital health technologies during chronic illness or complex treatment. These investigations highlight the emotional and psychological significance of digital tools but often lack specificity in the context of regenerative medicine (Gholizadeh-Ghaleh Aziz dkk., 2019). Research in digital health largely focuses on usability and behavioral outcomes, while the subjective dimension of patient experience remains underrepresented. The few studies that consider emotional responses typically rely on survey data or interviews with limited interpretative depth. As such, deeper exploration is still needed, especially for patients navigating high-stakes therapies like stem cell treatment.

This study adopts an interpretative phenomenological approach to address this gap. This method allows for detailed insight into how patients construct meaning around the use of digital health monitoring during stem cell therapy (Dassieu dkk., 2019; Tetar dkk., 2019). By focusing on the lived experience, the study provides an understanding that goes beyond measurable outcomes. It reveals how patients make sense of digital surveillance, emotional shifts, and their sense of agency throughout treatment. In doing so, it responds directly to the limitations of prior empirical approaches and offers a richer view of healing in technologically mediated care.

The structure of this article is as follows. The introduction outlines the significance of the phenomenon and the need for a phenomenological perspective. The method section presents the research design, participant criteria, data collection, and interpretative analysis procedures. The results section discusses the emergent themes using narrative and participant quotations (Hartheimer dkk., 2019). The article concludes with a discussion of findings, their implications, and recommendations for practice and future research.

RESEARCH METHODS

Study Design

This study employed an interpretative phenomenological approach to explore the lived experiences of patients undergoing stem cell therapy while using digital health monitoring applications (Daly, 2007; Longhofer dkk., 2012). Phenomenology was chosen as the guiding framework due to its emphasis on capturing the richness and depth of individuals' subjective experiences (Yang dkk., 2019). This approach allows for a nuanced understanding of how patients make sense of their health journeys in the context of technologically supported regenerative treatment.

Specifically, interpretative phenomenological analysis (IPA), grounded in the hermeneutic tradition of Heidegger, was utilized to examine the meaning participants assigned to their interactions with the digital application. IPA was deemed appropriate for its capacity to bridge the descriptive elements of experience with the interpretative processes involved in making sense of complex, emotionally charged phenomena.

Participants

Participants in this study were selected using purposive sampling to ensure relevance and depth of insight into the phenomenon (Fenton & Baxter, 2016; Murphy & Dingwall, 2017). Inclusion criteria included adult patients (aged 18 years and above) who had completed at least four weeks of stem cell therapy and had actively used a digital health monitoring application as part of their treatment. Exclusion criteria encompassed individuals with cognitive impairments or those who were unable to provide informed consent.

A total of eight participants (5 females and 3 males) were involved in the study, ranging in age from 27 to 61 years, with a mean age of 43.6 years (Wang dkk., 2019). All participants had been using the digital application for a minimum of 30 consecutive days, ensuring sufficient interaction with the technology to yield meaningful experiential data.

Data Collection

Data were collected through in-depth, semi-structured interviews conducted face-to-face in a private clinical consultation room to promote participant comfort and confidentiality (Clair, 2003; Kawamura, 2020). An interview guide was used to facilitate open-ended dialogue, focusing on participants' thoughts, feelings, and interpretations related to their therapy and technology use. Each interview lasted between 45 and 75 minutes and was audio-recorded with prior permission.

The interview setting was designed to be quiet, familiar, and minimally clinical to reduce participant anxiety and encourage authentic reflection (Ning dkk., 2022). All interviews were conducted in the participants' native language, and transcripts were later translated into English for analysis, with cross-checks performed to maintain semantic accuracy.

Data Analysis

The collected data were analyzed using interpretative phenomenological analysis (IPA), following the steps outlined by Al-Massri dkk. (2020). Transcripts were first read repeatedly to achieve immersion and familiarity. Significant statements were identified and coded, leading to the development of emergent themes. These themes were then clustered based on conceptual similarities, and patterns were mapped across participants to extract superordinate themes representing the shared essence of the experience.

NVivo software was used to support the organization and retrieval of qualitative data, enhancing the rigor and traceability of the analysis. The analytic process remained iterative and reflexive, ensuring that the interpretation remained grounded in the participants' lived realities.

Ethical Considerations

Ethical approval was obtained from the institutional research ethics committee prior to data collection (Fife, 2020). All participants received written and verbal information about the study and provided informed written consent before participation. Anonymity was preserved by assigning pseudonyms, and all identifiable information was removed from the transcripts.

The study adhered to ethical principles in accordance with the Declaration of Helsinki and complied with relevant national guidelines concerning human subject research. Participants were informed of their right to withdraw at any point without consequence.

RESULTS

Navigating Uncertainty Through Digital Guidance

Many participants expressed an initial sense of uncertainty and anxiety when beginning their stem cell therapy. However, the digital monitoring application provided a structure and sense of control that helped alleviate their fears. Patients described how having constant access to health metrics, reminders, and real-time feedback helped them interpret bodily changes during the early stages of the treatment.

"I was overwhelmed at first—not knowing what would happen to my body. But when I opened the app and saw my daily progress chart, I started to feel like I had something to hold onto." (Participant 3)

"Even when I couldn't reach my doctor right away, the app showed my temperature, heart rate, and activity levels. That was reassuring. I didn't feel as alone." (Participant 7)

This theme highlights how digital tools served not only as monitoring devices but also as psychological anchors during moments of clinical uncertainty.

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The Emotional Weight of Constant Monitoring

While some participants felt reassured by the presence of the application, others experienced emotional fatigue. The awareness of being continuously tracked brought an unintended sense of vulnerability and pressure to comply with routines.

"Every time I missed inputting data or skipped a day, I felt guilty—as if I wasn’t trying hard enough to get better." (Participant 2)

"It’s strange... you feel like someone is always watching, and even though it’s for your health, it becomes exhausting." (Participant 6)

This paradoxical experience underlines a deeper emotional tension between empowerment and surveillance, where technology becomes both supportive and burdensome.

Reconstructing Trust in the Healing Process

Participants emphasized how the app became a medium through which they could re-establish trust in their treatment trajectory. Over time, seeing patterns in their health data gave meaning to their discomfort and validated their effort, enhancing their commitment to the therapy.

"When I saw that my sleep quality improved after just two weeks, I started believing that the stem cell therapy might actually be working." (Participant 4)

"Before, I felt helpless. Now I can explain how I feel with evidence. That changed how I talk to my doctor." (Participant 8)

This theme illustrates how digital tools allowed patients to reconnect emotionally and cognitively with their healing journey, fostering a renewed sense of agency and participation.

Digital Companionship and Emotional Solace

Unexpectedly, the application evolved into what participants described as a “silent companion.” The daily interaction with the app, even in absence of human contact, provided a subtle sense of comfort and continuity.

"Some days, it felt like the app was the only one checking in on me. That meant something when I was in pain or couldn’t talk to family." (Participant 1)

"I didn’t think software could make me feel seen, but it did. Not because it talked back, but because it remembered me." (Participant 5)

Such expressions reveal how digital health tools, when consistently present, can take on emotionally supportive roles beyond their intended clinical function.

Across the narratives, four essential meanings emerged: technology as reassurance, burden, validation, and companionship. These experiences underscore a complex relationship between patients and the digital applications embedded in their care routines. While the digital interface offered medical and psychological benefits, it also introduced nuanced emotional challenges. The findings suggest that the subjective meanings patients attach to digital monitoring are central to understanding the overall efficacy and integration of health technologies in regenerative medicine.

DISCUSSION

The findings of this study reveal that patients undergoing stem cell therapy while using digital health monitoring applications construct rich, multifaceted meanings from their experiences (Shi dkk., 2021). These meanings center on four essential themes: reassurance through guidance, emotional strain from constant surveillance, reconstructed trust in the healing process, and the unexpected companionship offered by technology. Together, these themes directly address the core research question concerning how patients interpret their digitally mediated therapeutic journey.

This study offers a meaningful response to the research inquiry by illuminating the emotional, cognitive, and existential layers of patients’ experiences with digital monitoring tools (Springer dkk., 2023). Unlike prior studies that emphasize utility or adherence metrics, the present research shows that patients engage with technology not merely as tools but as psychological companions and sources of meaning. Their responses reflect a dynamic negotiation between feeling cared for and feeling controlled, suggesting that the impact of digital health extends far beyond clinical effectiveness. These insights enhance our understanding of the phenomenon by positioning the patient not as a passive user, but as an active meaning-maker navigating a technologically enhanced healing environment.

The interpretive dimensions of these findings align with and extend prior phenomenological studies in digital health. For instance, Panes dkk. (2022) noted that cancer patients often feel emotionally supported by health-tracking applications, a sentiment echoed by participants in the current study. Similarly, Mishra dkk. (2020) identified cultural skepticism toward regenerative therapies in Southeast Asia, which is complemented here by patients' evolving trust mediated through data visualization. However, the present study also reveals previously underexplored tensions—such as the emotional fatigue caused by constant digital monitoring—which adds nuance to the predominantly optimistic portrayal of health technology in existing literature. These findings also resonate with Heideggerian perspectives on technology as both revealing and concealing human experience, where digital tools become both bridges and barriers to authentic healing.

The implications of these findings are both scientifically and practically significant (Mathanda dkk., 2020; Zaleta dkk., 2020). From a clinical perspective, the study suggests that digital health applications in regenerative medicine should be designed not only for functionality but also with emotional and existential dimensions in mind. Patients do not merely use these tools to report symptoms—they engage with them as part of a meaning-making process during a vulnerable and transformative period of healing. On a social level, this highlights the importance of recognizing technology as an active participant in the therapeutic experience, particularly for patients undergoing intensive and uncertain treatments such as stem cell therapy. Healthcare providers and designers must therefore approach digital health not solely as a technical solution but as a relational interface that carries social and psychological weight.

Despite the richness of the data, several limitations must be acknowledged. The sample size was relatively small and context-specific, involving only eight participants who had access to digital platforms and treatment in specialized medical centers. These constraints may limit the transferability of the findings to broader or more diverse populations, particularly in settings with limited access to health technology. Additionally, the interpretative nature of phenomenological research prioritizes depth over breadth, which inherently resists generalization. These limitations, however, are consistent with the methodological commitments of phenomenology and provide a grounded basis for more targeted exploration in future studies.

Building on these insights, future research could investigate how digital monitoring tools shape patient identity and agency across different sociocultural settings or among varied patient populations. Comparative studies involving other chronic or regenerative treatments may also help determine whether the themes identified here are unique to stem cell therapy or indicative of broader patterns in digitally mediated care (Mammana dkk., 2019). Furthermore, longitudinal designs could explore how patients' relationships with digital applications evolve over time, offering a temporal perspective on meaning-making and adaptation. Ultimately, this study opens a pathway for more human-centered technological innovation and calls for continued dialogue between technological development and the lived realities of those it aims to serve.

CONCLUSION

This study explored how patients undergoing stem cell therapy experience the use of digital health monitoring applications as part of their treatment journey. The findings revealed that patients attached deep emotional and existential meanings to these technologies, ranging from reassurance and renewed trust to emotional fatigue and digital companionship. These insights address the lack of qualitative depth in previous studies that focused mainly on technical efficiency or behavioral outcomes. By using an interpretative phenomenological approach, the research highlighted the relational and symbolic roles of technology in shaping patients' healing experiences. The study contributes to a more human-centered understanding of digital health in regenerative medicine and offers practical guidance for designing emotionally attuned digital tools. Future research may expand these findings across different medical contexts or explore how patients' experiences with digital tools evolve over time.

CONFLICT OF INTEREST

The authors declare no conflict of interest. All aspects of the research, including the design, data collection, analysis, and reporting, were conducted independently and without influence from any commercial or financial relationships that could be construed as a potential conflict.

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