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IMMERSIVE TECHNOLOGY ADOPTION IN HEALTHCARE: READINESS, BARRIERS, AND PATIENT OUTCOMES

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ABSTRACT

Purpose: The incorporation of Immersive Technologies, namely, AR (Augmented Reality), VR (Virtual Reality) and MR (Mixed Reality) is increasing rapidly across all the business sectors. Healthcare institutions are also integrating these technologies to strengthen clinical treatment, patient care, medical training and patient interaction. This study makes an effort to assess how healthcare institutions understand, adopt, and experience the integration of Immersive Technologies, more especially emphasizing on perceived value, implementation challenges and institutional readiness.

Methodology: A quantitative as well as qualitative analysis of questionnaires, discussions and interrogations with doctors, hospital administrators, and technology staff employed at healthcare institutions that are using or exploring immersive technologies like VR, AR, and MR. The interviews and responses provided a report on the different methods by which these institutions implement technology, as well as the upsides and downsides they have witnessed. The responses were thoroughly reviewed to find prevalent themes and patterns.

Findings: Immersive technology is an effective tool to enhance overall patient satisfaction and outcomes. The technology improves the treatment through personalized care and interactive visuals. Despite its numerous benefits, concerns about implementation costs, ethicality, time constraints, and the requirement for specialized training for the healthcare providers involved in the treatment procedure remains a significant challenge. Among 60 participants in this study, 41.7% identified that their institutions were sufficiently equipped to handle these technologies, while 33.3% disagreed and 25% were uncertain. 90% of the doctors had some awareness about immersive technologies in healthcare, with 41.7% confident and 48.3% having merely basic knowledge, and only 10% were entirely unaware. A significant number of doctors indicated time constraints (75% agreed, 11.7% strongly agreed) and cost (76.7% agreed, 16.7% strongly agreed) as significant barriers, while over 80% acknowledged ethical challenges. Furthermore, 80% of doctors believed immersive technologies could make healthcare more patient-centered and engaging, enhancing interactions between patients and providers, though 16.7% were uncertain and only a small fraction (3.3%) disagreed.

Research Limitations: This study includes views from a few healthcare institutions, so the results may not be representative of all types of hospitals or clinics. Longitudinal studies on the changes in the patterns of adoption and challenges to implementation of immersive technology can be studied in future research.

Practical Implications: The findings are relevant to healthcare service providers in terms of effective implementation of immersive technology. By addressing concerns related to cost, training, and ethical issues, healthcare institutions can improve their effectiveness of implementation and integrate immersive technologies to enhance patient care and treatment procedures.

Originality: With emphasis on real word implications and institutional readiness, this study provides a distinctive institution-centered viewpoint on immersive technology in

healthcare. It provides basis for further research and practical frameworks to harness immersive innovations in healthcare institutions.

Keywords: Immersive Technology, Healthcare Institutions, Digital Health Transformation, Clinical Innovation, Patient Engagement

1. INTRODUCTION

1.1. IMMERSIVE TECHNOLOGIES IN HEALTHCARE

Immersive technology effortlessly merge the physical and virtual worlds, allowing users with a deeply engaging and interactive experience. Augmented Reality/Virtual Reality/ Mixed Reality/Extended Reality (AR/VR/MR/XR) are being diligently used in the healthcare sector owing to their numerous advantages. Medical Extended Reality (MXR) precisely signifies XR in healthcare (Yang, 2023). These technologies are being used in a vast number of healthcare services, including AR assisted surgeries, VR simulations for medical education, MR for therapy and rehabilitation, and even immersive patient care tools that supports in pain management and anxiety reduction. These technologies helps to improve patient experiences, operational effectiveness, and enhance the outcome of the treatment.

1.2. THE GROWING ADOPTION AND POTENTIAL BENEFITS

The Sustainable Development Goal (SDG) 3 of good health and well-being, framed by the United Nations' focuses on promoting healthy lives and well-being for people of all ages (Liu et al., 2022). With the aim to achieve this goal, strong healthcare systems that provide access to necessary medical resources, thorough health education, and equitable healthcare services are crucial. To ensure that people and communities live healthier lives, these elements are essential for fostering overall well-being. As stated in Market Research Future Report, the Global Immersive Technology in Healthcare Market Size was valued at 5.2 USD Billion in the year 2024. The Immersive Technology in Healthcare Market industry is projected to grow from 6.1 USD Billion in 2025 to 17.5 USD Billion by 2034 exhibiting a compound annual growth rate (CAGR) of 12.9% during the forecast period (2019 - 2034) (Analysis, 2019). The report also added that the Global Immersive Technology in Healthcare Market is undergoing remarkable evolution, strengthened by rapid advancements in immersive technologies. Expanding adoption across surgical training, patient rehabilitation, and telehealth solutions is accelerating this transformation. Market growth is further encouraged by improved user experiences and favorable regulations, while the rising need for remote healthcare services amid economic changes underscores the critical role of adaptability and innovation (Analysis, 2019). The global demand for AR and VR in medicine, driven by advancements in patient care, medical simulations, and training is anticipated to expand at an annual growth rate of over 30%, according to the Healthcare Information and Management Systems Society (Analysis, 2019). Overall, the trend highlights a strong upward trajectory, with the market expected to more than triple over the decade, underscoring the increasing importance of immersive technologies in transforming healthcare delivery, training, and patient care.

1.3. THE INSTITUTIONAL PERSPECTIVE: A CRITICAL GAP IN RESEARCH

Several major healthcare domains are making use of immersive technologies, but despite the growing scholarly attention around the application of immersive technology in healthcare, there remains a significant gap in achieving a comprehensive understanding of the role of these technologies and their potential impact. Furthermore, institutional readiness, including infrastructure, leadership commitment, and staff acceptance plays a critical role in determining whether these technologies are successfully adopted in healthcare contexts or they are still underutilized. The existing literature in Immersive Technologies and Healthcare predominantly focuses on the perspective of doctors and patient-centered benefits, however, there is a noticeable gap in understanding how healthcare institutions perceive, implement, and adapt to immersive technologies. The present study intends to fill this gap by analyzing the institutional perspective on immersive technology's adoption, seeking to understand how healthcare institutions perceive immersive technologies, address the challenges in its implementation, and prepare themselves for the digital transformation.

1.4. PURPOSE AND SIGNIFICANCE OF THE STUDY

This study aims to bridge the gap in the literature by emphasizing on the institutional adoption of immersive technologies in healthcare institutions. It aims to examine the perceived benefits, challenges, and organizational readiness to implement immersive technologies in healthcare facilities. By doing so, it provides a practical understanding of how healthcare institutions can prepare for and manage the integration of immersive technologies.

The study also considers key factors such as technological infrastructure, staff preparedness, administrative support, and financial feasibility, which play an important role in influencing the adoption process. It further highlights the need for proper training and awareness among healthcare professionals to ensure the effective use of these technologies in routine clinical practices.

Understanding these aspects is important to support effective policy formulation and informed decision-making at both institutional as well as regulatory levels. The study seeks to offer practical insights that can help healthcare institutions adopt immersive technologies in a structured and efficient manner. By encouraging a gradual and well-planned integration, the study intends to ensure that institutions are adequately prepared for implementation, while minimizing disruptions in existing procedures.

Overall, this study contributes to a better understanding of how immersive technologies can be realistically implemented in healthcare settings, ultimately supporting improved patient experiences, enhanced clinical outcomes, and prominent operational efficiency.

2. LITERATURE REVIEW

2.1. UNDERSTANDING IMMERSIVE TECHNOLOGY IN HEALTHCARE

As compared to the traditional healthcare practices, immersive healthcare practices have numerous advantages. The integration of immersive technologies transformed aspects of healthcare sector. These innovations strengthened the healthcare system's capacity to adjust and accommodate to the epidemic by enabling remote consultations, improving training for doctors, and enhancing patient engagement. A study revealed that AR and VR are beneficial for patient education and surgical simulations. AR improves surgical precision, while VR is mostly used for training and preliminary work (Bui et al., 2024). These immersive solutions have a tremendous impact on different elements of healthcare, including behavioral therapy, stress reduction, and remote communication amongst healthcare experts.

VR keeps patients distracted by immersing them in engaging VR scenarios, such as exploring virtual worlds or taking part in interactive games. This helps reduce pain levels and enhance patient comfort during medical procedures or treatments. By engaging patients in an interactive environment, VR deludes patients from the acute and chronic pain that results from burns or surgical procedures (Mallari et al., 2019). VR produces mental stimulation that diverts the brain's attention from pain signals. VR also creates an environment of learning for the patient, where the patients can involve themselves in understanding about their medical condition so that they can focus on taking care of themselves. Relevant studies reveal that the application of VR has been growing at a rate of 30% annually in educational institutions, and medical fellowship programmes are also adopting it with increasing frequency (Jain et al., 2020). This technology offers real-time, 3D anatomical visuals, which simplifies surgical procedures. This improves planning and results by increasing precision and enabling medical professionals to interact with both virtual and real surgical fields (Coelho et al., 2020).

Amrita Hospital in Kochi has developed South Asia's first XR ecosystem combining AR, VR, and MR to support complex clinical care, medical training, and research. The hospital's XR system converts patient imaging data (like CT scans) into interactive 3D holograms that clinicians can explore before planning surgical interventions. More than 150 patients have benefitted from this technology across different specialties, including pediatric cardiac care, where complex congenital defects were better understood and planned. This system has also enabled collaboration with specialists remotely. In one notable case, a young child with a rare condition rejected by other centers received successful surgery after XR-guided planning. The initiative also integrates 3D printing and immersive teaching tools for students, reinforcing clinical learning and decision readiness (https://www.amritahospitals.org/kochi/news/south-asias-first-extended-realityecosystem-healthcare). Figure 1 below is a live demonstration at Amrita Hospital, Kochi, showcasing the use of XR technology for immersive clinical visualization and medical training.

Figure 1

Figure 1 A Live Demonstration at Amrita Hospital, Kochi, Showcasing the use of Xr Technology for Immersive Clinical Visualization and Medical Training

Source: https://www.amritahospitals.org/kochi/news/south-asias-first-extended-realityecosystem-healthcare

2.2. THE INSTITUTIONAL PERSPECTIVE ON PERCEIVED VALUE

The integration of immersive technologies in healthcare procedures can undoubtedly improve patient experience. These technologies assist in improved diagnostic accuracy, patient compliance, and enhanced clinical outcomes which can result in favorable patient experience (Glegg & Levac, 2018). The early adopters of immersive healthcare technologies have an advantage to Establish themselves as leaders in innovation, which can alleviate them attract top talent, funding for research, collaborations, and patient trust.

Additionally, such acceptance and integration can be associated with more general institutional goals regarding digital transformation and future readiness (Kouijzer et al., 2023). However, the perceived value often relies on the institution's commitment, strategic alignment, and willingness to completely embrace the changes. In the absence of these facilitators, even the most promising immersive techniques can come across challenges or remain inadequately utilized. Thus, the successful integration of immersive technologies requires not only technological investment but also a strong institutional foundation. When supported by appropriate planning, together with institutional readiness, these technologies can play a transformative role in enhancing both patient experience and overall healthcare efficiency.

2.3. CHALLENGES IN IMPLEMENTATION

Immersive technology has unquestionably become an important instrument in healthcare. Integration of immersive technologies into medical procedures have significant challenges due to limited infrastructure and a lack of readiness among healthcare professionals, caregivers and patients to use them for clinical care (Yap, 2024). As healthcare technology continues to develop, VR is becoming more prevalent in medical settings for both therapeutic and diagnostic purposes. Although implementation interventions could help with the systematic adoption of VR, they are rarely used in execution. Formidable issues include integration problems with pre-existing electronic health record systems, the need for suitable implementation scenarios, and a scarcity of convincing evidence confirming the clinical capability of AR-assisted procedures (Iqbal et al., 2024).

Healthcare organizations that provide training to the healthcare providers should be well equipped with a fitting number of VR headsets, reliable Wi-Fi connection, and adequate learning materials. However, a significant barrier to implementation is the insufficient availability of these essential resources, which hinders the scalability as well as effectiveness of XR-based training programs for healthcare providers (Khlaif et al., 2025). According to (Chung et al., 2022), the most significant barrier in implementation of immersive technologies in healthcare is the cost associated with

purchasing and maintaining these technologies, and providing training sessions to the healthcare professionals. Even when hardware is available and accessible, it is frequently inaccurate or unable to support AR/VR applications of the highest quality.

Furthermore, the lack of developed logistics and production for AR/VR equipment increases reliance on pricey imports, which further restricts adoption (Mondal & Mondal, 2025). It was further added that adoption of AR and VR is hindered by power supply instability since frequent outages shorten hardware lifespan and interfere with device usage. It is challenging for many medical institutions to entirely rely upon technology-dependent learning resources since they lack backup power sources. Moreover, VR simulations require spacious environments to permit unrestricted movement, medical institutions frequently lack dedicated spaces for VR-based training. Figure 2 below compiles the major challenges identified from the literature review in implementing immersive technologies in healthcare settings.

Figure 2

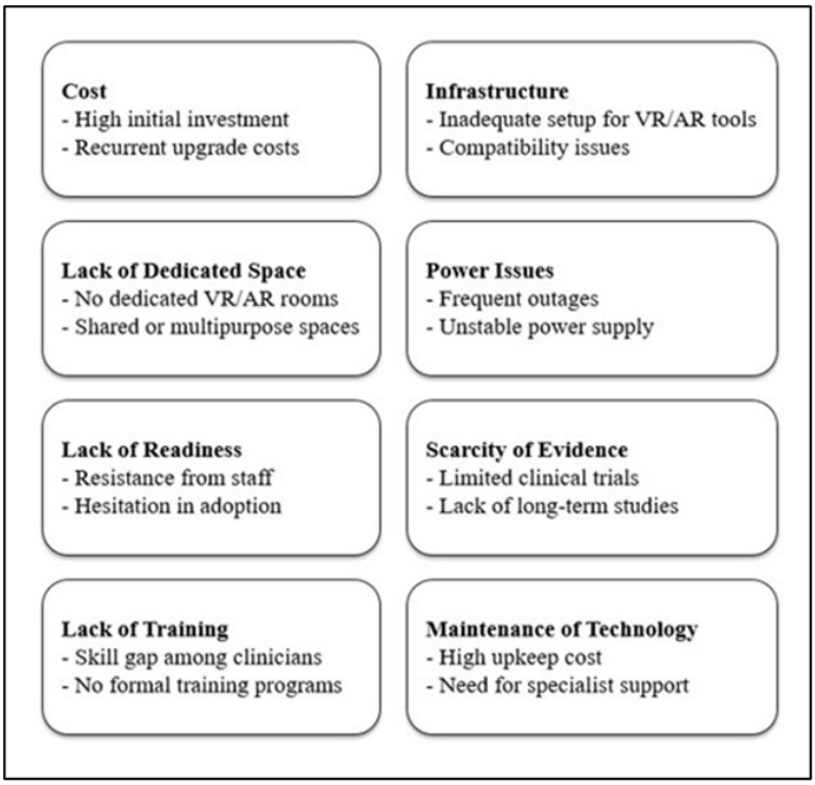

Figure 2 Challenges in Implementation of Immersive Technologies in Healthcare

Source: Author's compilation based on various literature sources

2.4. ROLE OF INSTITUTIONAL READINESS

A genuinely meaningful execution of immersive technologies in healthcare settings requires a comprehensive and technologically proficient healthcare environment, where immersive technologies can contribute to improving medical efficiency. Institutional readiness plays a crucial role in determining whether these technologies can be successfully adopted, integrated, and sustained within healthcare systems. The system requires infrastructure that can integrate doctors, healthcare providers, patients, researchers, devices, and data on a large scale (Yap, 2024). This includes high-speed internet connectivity, advanced hardware (such as VR/AR devices), interoperable software systems, and secure data management platforms. Without such foundational support, the implementation of immersive technologies may remain fragmented or ineffective.

In addition to technological infrastructure, organizational readiness holds equal importance. Healthcare institutions must ensure that their staff members are adequately trained and they feel comfortable in implementing immersive tools. This involves continuous skill development, technical support, and a willingness among healthcare professionals to adapt to new modes of treatment and patient interaction. Resistance to change and lack of digital literacy can significantly impact the successful implementation of immersive technology in healthcare contexts (Javvaji et al., 2024).

2.5. GAPS IN EXISTING RESEARCH

Immersive technology integration with healthcare has an enormous potential to transform the landscape of patient care, medical training, and facility design. All stakeholders must contribute equitably for these technologies to be successfully implemented in healthcare settings (Antoniou et al., 2024). VR has various advantages, its appropriation in clinical practice is still nascent, and implementation procedures are not well understood in practice. This implies that more in-depth research is required for assessing how medical institutions can effectively integrate and use these technologies (Kouijzer et al., 2023).

Existing literature on this topic has extensively examined healthcare provider's and patient's perspective. However, there is limited exploration of institutional adaptability, stakeholder collaboration, and infrastructure readiness. By addressing these gaps, the current study aims to accommodate a more holistic understanding of medical institution perspective on integration of immersive technologies in healthcare, thereby contributing to the theory as well as practice.

3. RESEARCH METHODOLOGY

This study adopts a mixed method approach to explore how healthcare professionals perceive and experience the adoption of immersive technologies in clinical settings. The focus of this research is to understand doctors' viewpoints, practical experiences, and challenges related to the use of immersive technology from a medical institutional perspective.

Using both methods facilitated in having a comprehensive view of the existing situation. While quantitative questions provided numbers and percentages, the qualitative questions contributed to get detailed answers, opinions, and personal experiences.

3.1. PARTICIPANTS

This study involved a total of 60 doctors from several departments such as surgery, general medicine, emergency medicine, dentistry, medical specialties, psychiatry, women and child health took part in this study. All the responses collected, met the inclusion criteria and were considered for the final analysis. The participants included doctors and consultants from government, private, and academic hospitals, together with those engaged in individual practice or handling their own medical facilities.

3.2. DATA COLLECTION TOOL

The questionnaire that was prepared and circulated, had two types of questions:

Closed-ended questions (Quantitative): These included multiple choice questions at a Likertscale to understand the level of awareness, usage, and institutional support towards the immersive technology and healthcare sector integration. The Likert scale was selected because it is simple for respondents to understand, allows clear differentiation in the intensity of attitudes, and is wellsuited for quantitative analysis. (Allen & Seaman, 2007).

Open-ended questions (Qualitative): These questions allowed doctors to freely share their thoughts, experiences, and challenges, in the form of one line sentences or a short paragraph. This method facilitated the collection of rich, detailed insights and helped capture diverse perspectives that may have not emerged only through structured questions.

The questionnaire was shared both in person and online, and responses were collected over a period of four weeks. Some telephonic discussions with the doctors and consultants were also a part of the survey.

3.3. ETHICAL CONSIDERATIONS

Before participating, all the doctors were explicitly informed about the purpose of the study. Their consent was taken, and they were assured that their responses would be kept confidential and used only for academic purposes.

4. DATA ANALYSIS AND RESULTS

4.1. QUANTITATIVE ANALYSIS

Doctors answered several multiple-choice and rating-scale questions. Quantitative data (numbers and ratings) were analyzed using basic statistics including, percentages and frequency counts. This helped to identify the patterns in responses.

Key Findings from the Questionnaire and interactions with the Doctors:

1) **Awareness:** The results indicated that 90% of doctors have at least some level of awareness, with 41.7% being confidently aware of immersive technologies and 48.3% having only heard of them without any detailed knowledge. However, 10% of respondents were completely unaware of such innovations in a clinical context. This implies that while awareness is relatively high, a large number of doctors lack a deep understanding of how these technologies function, where they are applied, or how they can be integrated into daily medical practice.

The disparity between general awareness and practical familiarity highlights the importance of conducting training sessions, exposure visits, or demonstrations within hospital settings. To bridge the gap between awareness and practice, hospitals and institutions must go beyond introducing the concepts and invest in hands-on experiences to help doctors build confidence in adopting immersive technologies. The Figure 3 below presents the level of awareness regarding immersive technology in healthcare among 60 respondents.

Figure 3

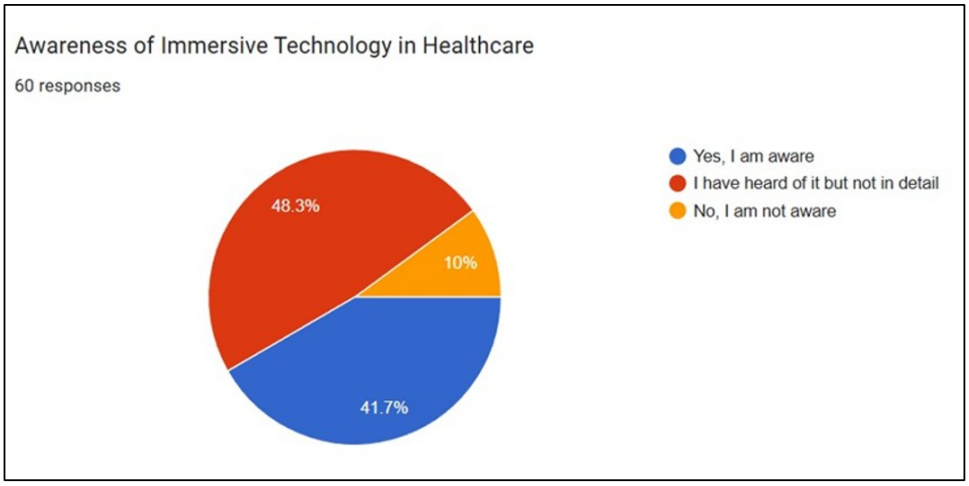

Figure 3 Awareness of Immersive Technology in Healthcare

Source: Primary data (2025)

2) **Institutional Support:** From the sample of 60 respondents, 41.7% (Strongly Agree + Agree) perceive that their institution is well equipped to support immersive technologies, while 33.3% (Disagree + Strongly Disagree) believe their hospitals are not yet ready. The remaining 25% are uncertain, which suggests either a lack of exposure or ambiguity in implementation status.

These outcomes show that despite some healthcare organizations are perceived to be progressing to integrating technology, a significant number of respondents are either unsure or lack confidence in their organization's readiness to integrate the immersive technology. This depicts potential informational, financial, or infrastructure shortcomings that could prevent immersive technology from being used effectively in medical practice and education. Figure 4 below illustrates respondents' perceptions regarding their medical institution's preparedness to incorporate immersive technologies.

Figure 4

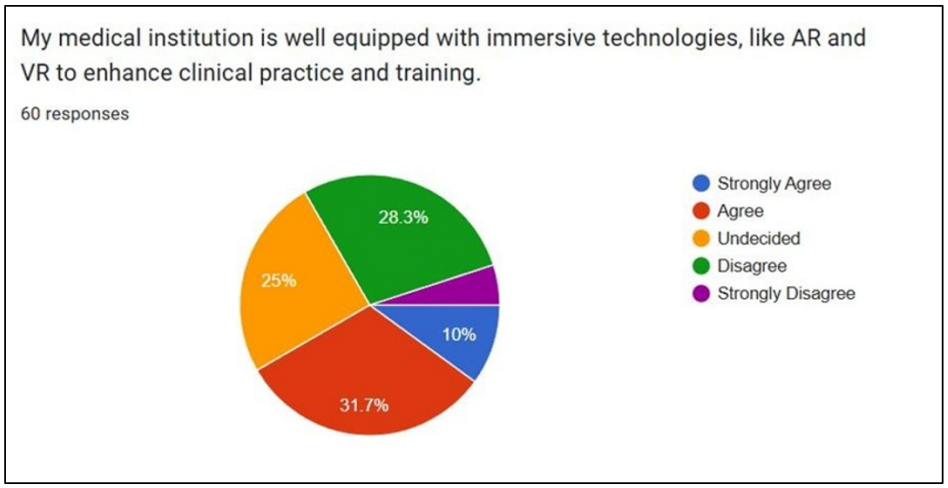

Figure 4 Perception of Institutional Readiness for Immersive Technologies in Clinical Training

Source: Primary data (2025)

3) **Financial Barrier:** Among the 60 respondents, a considerable majority, 76.7% agreed that cost is a considerable limitation. Furthermore, 16.7% strongly agreed with this concern, while only

6.6% were undecided. It's important to note that no participants disagreed or strongly disagreed with the statement.

These results strongly suggest that financial constraints represent one of the most prominent perceived barriers to adopting immersive technology in healthcare settings. Regardless of the potential benefits, high implementation costs impacts the integration of immersive technology in healthcare institutions. Figure 5 underneath represents the participants' perceptions regarding the financial constraints of implementing immersive technologies.

Figure 5

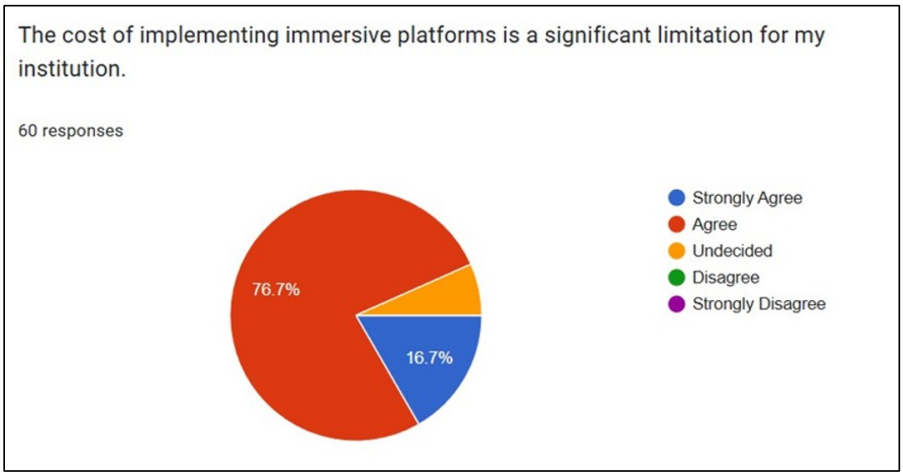

Figure 5 Perceived Financial Barrier in Implementing Immersive Technologies

Source: Primary data (2025)

4) **Time Constraints:** A majority out of 60 respondents, 75% agreed that lack of time hinders their ability to engage with new immersive tools available. Moreover, 11.7% strongly agreed with the statement. Only a small fraction, 6.7% disagreed, and 6.6% remained undecided. Notably, none of the participants strongly disagreed.

These findings indicate that time limitation is a substantial barrier to the integration of immersive technologies in healthcare context. Despite growing awareness and interest, healthcare professionals may struggle to integrate new digital tools due to demanding schedules and competing clinical priorities. This underscores the need for time-efficient training models and institutional support systems to facilitate smooth integration of immersive technologies into routine

practice. Figure 6 below illustrates the extent to which time constraints restricts healthcare professionals from learning new immersive tools or incorporating them into clinical procedures.

Figure 6

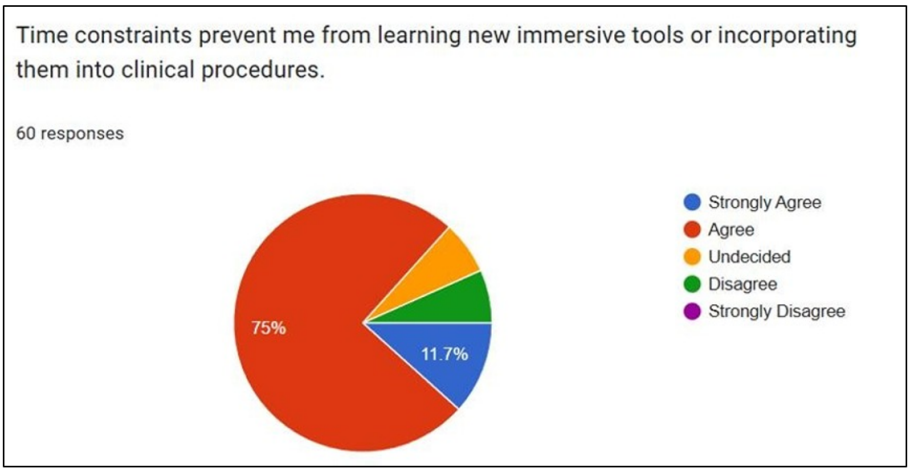

Figure 6 Time Related Barriers to Learning and Integrating Immersive Technologies in Clinical Practice

Source: Primary data (2025)

5) **Ethical Concerns:** Within a group of 60 participants, 46.7% agreed and 35% strongly agreed with the statement, indicating that over 80% of the sample recognized ethical challenges as a critical issue. In contrast, 13.3% were undecided, and only a small fraction of 5% disagreed. This data highlights how critical it is to take ethical considerations like informed permission, confidentiality, and digital safety into account when developing and implementing immersive technologies for medicine. Further, concerns related to data privacy, misuse of sensitive information, and the accuracy of virtual simulations reinforce the need for careful oversight and responsible usage of immersive technology in healthcare contexts.

These results highlight the need for precise institutional policies and legal frameworks to guarantee moral adherence in immersive healthcare settings. Figure 7 below represents the respondents' opinions on whether ethical concerns, particularly related to patient data privacy and virtual simulations, need to be addressed when adopting immersive technologies in healthcare.

Figure 7

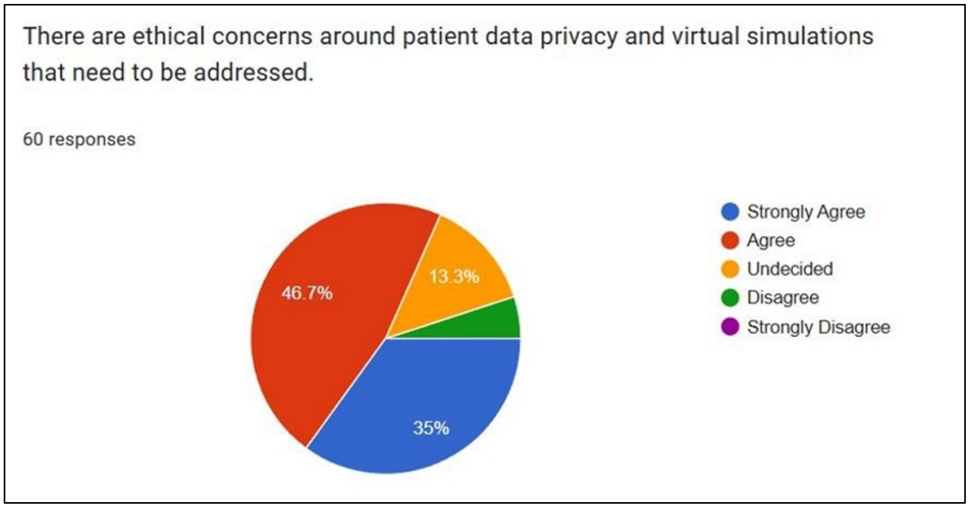

Figure 7 Ethical Concerns Regarding Patient Data Privacy

Source: Primary data (2025)

6) **Perceived Role in Patient-Centered Care:** Out of the 60 respondents, a vast proportion 60% agreed and 20% strongly agreed that immersive technologies will be crucial for making healthcare more patient-centered and engaging. This indicates that, 80% of the participating doctors believe that such tools can significantly improve the interaction between patients and healthcare providers, making treatment experiences more interactive, informative, and distinctive. Whereas, 16.7% remained undecided, and a minority of 3.3% disagreed, indicating slight uncertainty about the actual implementation of these technologies in patient engagement.

The overall favorable outlook reflects a progressing acceptance among medical professionals regarding the future potential of immersive technology in clinical practice. It also stipulates towards the need for further exploration, training, and integration to completely comprehend their impact in making healthcare more participative and patient-focused. Figure 8 below displays the responses related to the perceived importance of immersive technologies in enhancing patient engagement.

Figure 8

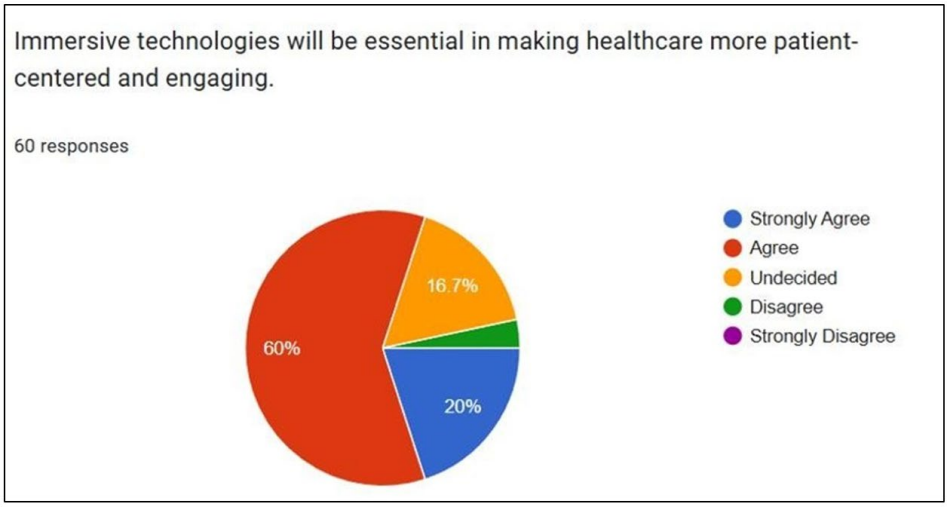

Figure 8 Perceived Role in Patient-Centered Care
Source: Primary data (2025)

The quantitative analysis of 60 doctors' responses highlights that, although there is a fairly substantial level of general awareness regarding immersive technology in healthcare, there is still a lack of extensive expertise. Many respondents expressed concerns regarding institutional readiness, with only a minority believing their medical setups are adequately equipped. Financial barriers emerged as the most significant challenge, followed closely by time constraints that hinder learning and adoption. Furthermore, strong concerns were noted regarding ethical issues, particularly around patient data privacy.

Finally, the perception of immersive technologies playing a transformative role in enhancing patient-centered care was strong, with 80% of respondents agreeing or strongly agreeing that such tools could improve patient engagement and interactivity in clinical settings. These findings underline a promising future for immersive technologies, provided issues of cost, time, training, and ethics are adequately addressed.

4.2. QUALITATIVE ANALYSIS

Apart from the multiple choice questions, doctors were also given space to share their personal thoughts and comments. Qualitative data (descriptive answers) were analyzed using thematic analysis. The answers were read meticulously, common ideas were picked out, and grouped into themes like 'Cost-benefit ratio to be estimated' or 'innovative/futuristic'.

4.2.1. POSITIVITY AND OPTIMISM ABOUT THE FUTURE

Several participants expressed immersive technologies as 'innovative', 'futuristic', or 'will become very effective' in the coming years. These responses show a forward looking attitude and openness to new medical tools. Some doctors even described immersive technology as a 'good initiative' and mentioned that it could help to revolutionize medical science for the overall betterment. This optimism indicates a willingness to explore and experiment with the emerging technologies, particularly when they are perceived to offer improvements in patient care, training, and clinical outcomes. If this willingness supported by the right environment, this can play an important role in facilitating smoother adoption and long-term acceptance of immersive technologies in healthcare contexts.

4.2.2. INTEREST BUT LACK OF EXPOSURE

While many respondents hadn't used immersive technology themselves, they mentioned having heard of it and expressed a desire to learn more. Phrases like 'interested to attend workshops', 'want to explore this area', and 'have not seen its use in medical practice yet' were commonly found. These responses indicate the presence of a knowledge gap, but also a positive inclination to engage if the opportunities are provided. This highlights the importance of awareness programs, training sessions, and institutional initiatives to bridge the gap between curiosity and actual adoption. Providing structured learning opportunities could significantly enhance familiarity and confidence among healthcare providers, thereby supporting the gradual integration of immersive technologies into practice.

4.2.3. NEED FOR COST-EFFECTIVENESS EVALUATION

Some doctors expressed concern regarding the financial feasibility of using immersive platforms in healthcare context. Statements such as 'costbenefit ratio should be estimated' or 'not sure if benefits cover the cost' reflect practical thinking. These responses suggest that while the idea is appealing, its actual implementation will depend on affordability and value for money. In addition, concerns were also raised about the high initial investment, which is required for hardware, software, and training, as well as the ongoing costs that is associated with maintenance and system upgrades. For many healthcare institutions, particularly the ones with limited resources, these financial considerations may act as a significant barrier to adoption. Doctors also indicated that without clear evidence of any clinical and operational benefits, it may be difficult to justify such huge investments.

4.2.4. TIME CONSTRAINTS AND ACCESSIBILITY

Several doctors highlighted that due to busy clinical schedules, they don't get time to explore or train in new technologies. Phrases like 'time is a constraint' or 'needs to be made accessible' show that institutional support, dedicated training hours, or simplified tools would help in adoption. The qualitative feedback predominantly indicates that while doctors are genuinely interested and optimistic about immersive technologies, many still need proper exposure, training, and encouragement from the institutions to adopt them. There is a clear demand for awareness sessions, cost evaluations, and realistic use cases. This part of the analysis adds depth to the quantitative findings, showing that adoption isn't just about technology, it's about time, support, and trust too.

5. IMPLICATIONS AND RECOMMENDATIONS

The integration of immersive technologies in healthcare practices presents significant opportunities for transforming clinical practices, medical education, and patient care experiences. However, some predominant factors need to be taken into account in order for it to be successful and sustainable in the long run. Implementation of these technologies can be fruitful only if the investment in compatible hardware, software, and IT infrastructure is dedicatedly executed. It is crucial for the institutions to evaluate their existing capabilities and plan accordingly for upgrades to accommodate these innovative tools.

The readiness of healthcare institutions is critical. This includes administrative support, alignment of immersive technologies with clinical goals, and institutional policies that support innovation, compliance, and ethical standards. Institutional readiness remains a key determinant of successful adoption.

Lack of properly qualified personnel and the high training and implementation costs are the other major obstacles identified. Proactive management of these issues requires continual staff development initiatives, budget planning, and partnerships with technology suppliers. From a financial perspective, the high initial investment and ongoing maintenance costs can be challenging, particularly for resource-constrained settings. Therefore, institutions should adopt strategic budget planning, prospect public-private partnerships, and jointly work with technology providers to ensure cost-effective implementation. Pilot projects and phased adoption strategies can help in minimizing financial risks while evaluating the effectiveness of these technologies.

Healthcare institutions should implement planned frameworks that facilitate the integration of immersive technologies. These frameworks must involve stages such as selection, testing, training, and complete adoption. In order to successfully adapt these technologies to a variety of healthcare demands, interdisciplinary cooperation between clinicians, IT personnel, educators, and policymakers is essential. Regularly establishing mechanisms for evaluation and feedback aids in gauging efficacy and directing advancements. To monitor long-term effects and adoption patterns, future research should incorporate longitudinal studies and a variety of healthcare settings.

Furthermore, establishing continuous monitoring and feedback mechanisms is quite essential.

Regular evaluation helps to assess the effectiveness, usability, and impact of immersive technologies on patient outcomes and operational efficiency. Feedback from users, which includes both, healthcare professionals and patients, can guide in making necessary improvements.

6. CONCLUSION

This study emphasizes the way immersive technologies are becoming increasingly important in changing healthcare provider's involvement, training, and healthcare delivery. These technologies offer innovative solutions that enhance learning experiences for medical professionals, improve patient understanding of treatment processes, and support more precise and efficient clinical interventions. While these technologies offer significant advantages in improving clinical outcomes and medical education, their adoption is frequently hampered by high costs, ethical concerns, and the requirement for specialized training, as demonstrated by a combination of a literature review and interviews with healthcare professionals.

Overcoming these obstacles requires interdisciplinary cooperation, strategic planning, and institutional preparedness. Healthcare organizations can successfully incorporate immersive technology to improve patient care and operational efficiency by comprehending the practical implications and resolving implementation issues. Present study also emphasizes the importance of aligning technological innovation with patient-centric care. Immersive technologies should not only enhance operational efficiency but also contribute to improving patient satisfaction, engagement, and overall healthcare experiences.

Conclusively, immersive technologies represent a promising avenue for improvements in modern healthcare systems. By addressing implementation barriers and leveraging institutional strengths, healthcare organizations can effectively harness these technologies to achieve progressing clinical outcomes as well as elevated service delivery. This research contributes to the existing body of knowledge by providing practical insights into the implications and challenges of adopting immersive technologies, while also laying a strong foundation for future research in this evolving domain.

CONFLICT OF INTERESTS

None.

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