

Virtual and Retail Healthcare

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Innovation Round-up: How Virtual and Remote Care Transform Patient Outcomes Across Medical Fields
Thierry Godelle

Strategic Activation Planning for Outpatient Clinics
Bishan Nandy

Virtual Care Readiness: Exploring Adoption Perspectives
Sofia Zanrosso | Shane Fitch | Mustafa Abusalah

Hybrid Health Approach: Integrating Traditional Treatments and Wearable Technologies
Alan Zettelmann | José A Cano

Evolution and Impact of Telenursing and Telemedicine
Samar Abdelsalam

Impact of AI Multimodality in Retail Healthcare
Bragadeesh Sundararajan

Virtual Reality In Nursing: A New Frontier in Healthcare
Precious Chisom Uzoeghelu



Virtual Reality in Nursing: A New Frontier in Healthcare

Virtual Reality has become a transformative tool in healthcare, enhancing patient care through advancements in pain management, rehabilitation, and mental health treatment.

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key points

- VR's Healthcare Integration: Virtual Reality has moved beyond entertainment, significantly enhancing patient care, pain management and medical training.
- VR has shown effectiveness in reducing pain and anxiety in various medical procedures, offering a non-drug alternative for pain relief.
- VR provides immersive and personalised rehabilitation experiences, particularly benefiting stroke and Parkinson's disease patients.
- VR is increasingly used to diagnose and treat mental health conditions, including PTSD, depression, and stress reduction.

The works of the Greek physician Galen of Pergamon were a foundation of medicine up to the Middle Ages. The Renaissance and scientific revolution prompted questioning of traditional authorities. The 18th century incorporated a more scientific approach to medicine, with further advances in the 19th century. The 20th century saw significant developments in medicine and the solidification of an evidence-based approach. In the 21st century, cutting-edge technology like Virtual Reality (VR) has become instrumental in improving patient treatment and outcomes.

Enhancing Patient Care with Virtual Reality

This cutting-edge technology has evolved beyond gaming and entertainment and found a prominent place in the healthcare sector. The inclusion of VR in patient care not only shows advancements made in medical technology but also highlights the recognition of a more holistic approach to patient care. This technology

promises to improve pain management, mental health, rehabilitation, medical training and other aspects of health care. This article explores the multiple aspects of using VR in patient treatment and care, shedding light on its potential to change the healthcare experience for both patients and healthcare providers.

The growing body of research and real-world implantations of VR show a wide range of exciting possibilities, from using its immersive environment during therapy sessions to leveraging it as a distraction technique during medical procedures. As the world struggles to deal with the challenges of an ageing population, chronic diseases, and the demand for more efficient healthcare delivery, VR emerges as a promising tool for addressing these problems.

Virtual reality (VR) technology has made significant inroads in healthcare, proving an excellent means of improving patient care experience in diverse clinical contexts. VR can effectively impact patients and

caregivers. The current areas of application of VR in patient care can yield many benefits and open various avenues for further research and development. By elucidating the impact of VR in patient care and treatment, this article aims to provide insight into the journey towards a more immersive, personalised, and effective healthcare experience.

Transforming Pain Management with VR

One of the critical places virtual reality has been researched and implemented is its use in pain management and relieving pain-associated anxiety. VR does not inhibit any pain pathway, but rather, it alters the pain perception of the individual. From paediatrics to women in labour, VR has proved to be an effective tool in pain reduction, offering more comfort to patients. In an open-label RCT (Wong 2020), nulliparous women with a pain score of 4-7 who were having adequate contractions for at least every 5 minutes didn't receive any other form of analgesia. The study involved a VR intervention for up to 30 minutes for one group and no intervention for the control. Researchers reported a significant difference in pain levels between the two groups in pre-post-interview pain scores. While patients

on generalising these findings to a larger population. A single-blind RCT (Orhan and Bülez 2023) involving 50 participants also noted remarkable pain reduction during episiotomy and increased patient satisfaction. To improve the generalisability of these findings, a critical analysis of the sample size, diverse population and confounding variables needs to be considered. A double-blind RCT (Gür and Apay 2021) showed the effects of VR in reducing birth pain in 273 pregnant women from July 2015 to June 2019. After dividing the participants into five groups, they received different VR intervention techniques (patients were shown different pictures). All participants homogeneously reported a general result of decreased birth pain. The VR experience of newborn photos, with or without classical music playing in the background, was identified to be more effective. In a pre and post-test study on 54 women with uterine tumours treated with high-intensity focused ultrasound who were educated using a VR programme (Park et al. 2024), there was a significant decrease in anxiety and uncertainty and an increase in patient satisfaction with the healthcare provider recorded in the intervention group. There was, however, no remarkable difference in pain levels between the two groups.

“Virtual Reality has evolved beyond gaming and entertainment, finding a prominent place in healthcare by improving pain management, mental health, rehabilitation, and medical training.”

in the control reported increased pain, the intervention group reported a significant decrease in pain. Some limitations of this study include a small sample and an increased possibility of bias. This highlights the need for further studies to corroborate this study in exploring the optimal integration of VR in labour pain management protocols. Further studies should better define VR intervention and its long-term impact on obstetric patients. A study on VR effectiveness in pain reduction for first-time mothers during episiotomy repair (Zagami 2016) also showed a notable decrease in pain levels between the experimental and control groups. However, this study is limited by its small sample size (30) and specific population. Thus, further studies should focus

Many other studies and experiments have been done on VR as an effective non-pharmacological analgesic, a distraction technique, during different medical procedures such as wound care and burn wound dressing (Taşçı et al. 2023; Czech et al. 2022). VR also reduces pain and anxiety in patients undergoing bone marrow aspiration and biopsy (Korkmaz and Guler 2023) and appears as a vital adjuvant in treating preoperative pain and anxiety (Haisley et al. 2020; Yesilot et al. 2022; Martinez-Bernal et al. 2023). Similarly, VR interventions are linked to less preoperative anxiety and reduced postoperative pain in patients who underwent laparoscopic cholecystectomy (Abbasnia et al. 2023), as well as less pain, anxiety and improved outcomes



in patients who underwent coronary angiography and trans-catheter aortic valve replacement (Turan et al. 2023; Lind et al. 2023). A particular VR device, Fitjaw, was able to reduce the chronic pain and functional ability limitation associated with Temporomandibular joint disorder (Arroyo-Cruz et al. 2023). A review (Shrestha et al. 2024) on the impact of VR in cardiology patients demonstrated improvement in patient outcome and satisfaction particularly in developing countries. Patients were shown the organ using VR glasses before the surgical intervention. There is also evidence, albeit limited, that VR reduces pain during hysteroscopy (Vitagliano et al. 2023).

Virtual Reality can Advance Rehabilitation

VR's impact on rehabilitation is also noteworthy. In stroke and Parkinson's disease rehabilitation, VR provides an engaging and patient-centred approach, allowing patients to perform exercises that may be difficult or impossible in a traditional clinical setting. Its immersive nature enables patients to engage in tasks that promote recovery while enjoying a more interactive and personalised experience. This innovative approach to rehabilitation has shown promising results, making VR a valuable tool in helping patients regain function and improve their quality of life.

VR has proven more effective in the rehabilitation of patients with Parkinson's disease than traditional rehabilitation programs (Chuang et al. 2022). Using VR in stroke patients' rehabilitation has proved effective due to its immersive nature, allowing patients to do things otherwise impossible in clinics. VR is also more patient-centred than traditional or modern technology-based methods (Amin et al. 2024; Hao et al. 2023). VR was used to address the social, psychological, and neurological issues seen in patients with prolonged hospitalisation from the COVID-19 pandemic (Kolbe et al. 2021). VR has also proved to be effective in educating patients who have tested positive; they showed better understanding and satisfaction (van der Linde-van den Bor 2022; Grilo et al. 2023).

For metastatic breast cancer patients unable to walk in nature due to their disease, VR was used to immerse patients in a computer-generated natural environment (Chin et al. 2022). Preliminary data suggests that being connected to nature, even if only in VR, is associated with improved physiological and psychological status of the patients, reducing pain, anxiety and depression while improving overall quality of life. Critical analysis for confounding variables is essential for the generalisability

of the study as it serves as a good diagnostic tool and a possible treatment for panic disorders and agoraphobia (Freeman et al. 2022; Jung et al. 2024). VR also reduced anxiety in patients with breast cancer undergoing radiotherapy due to a better understanding of the procedure (Shin et al. 2023; Schulz et al. 2023). VR has also been suggested as a treatment tool for patients with hemispatial neglect (Salatino et al. 2023).

Virtual Reality in Mental Health and Beyond

In the past years, VR applications have expanded their impact beyond just medical training, distraction technique for surgical procedures or pain management (Ma et al. 2023). Mental health care is another area where VR is making significant strides, as this technology can be used to diagnose, understand, and manage many disorders, such as psychosis, depression, substance abuse, and eating disorders. Controlled exposure in a VR environment can trigger symptoms of these conditions (Freeman et al. 2017) or cognitive impairments (Liu et al. 2023), and create a safe space for proper management.

A pilot study (Riches et al. 2023) focused on the use of VR to reduce stress, a common cause of violence in psychiatric patients (Jalil et al. 2017, Kramarz et al. 2022). A total of 42 participants participated in a one-hour-long individual relaxation exercise. Decreased stress and increased patient relaxation levels led to a diminution of violent episodes. VR builds upon available psychiatric treatments to benefit patients and offers other treatment plans that may not be available or feasible within the traditional clinical setting (Ka-Yee Essoe et al. 2022). A meta-analysis of randomised clinical trials (Vasodi et al. 2023) showed how a VR-based exercise led to significantly increased overall well-being and decreased depression levels in older adults, as well as improved cognitive performance for patients whose cognitive function is deficient (Chiu et al. 2023; Yu et al. 2024). Studies have also shown that VR exposure therapy significantly decreases symptoms of posttraumatic stress disorders (Deng et al. 2019; Jonathan et al. 2023).

The psychosocial well-being of patients hospitalised for severe or chronic medical conditions is vital for recovery. VR has been proven effective in improving the psychosocial well-being of individuals in hospitals (du Plessis and Jordaan 2024). The paediatric population also responds positively to VR interventions. VR decreases pain and anxiety during invasive procedures such as venipuncture (Ferraz-Torres et al. 2023; Niaz et

al. 2023) and can be leveraged as a distraction tool to mitigate distress in paediatric cancer patients (Yap et al. 2020). The use of VR during preoperative teaching and in managing postoperative pain to reduce pain exposure in paediatric and adolescent patients undergoing surgery has also been explored (Orgil et al. 2023). VR-induced hypnotherapy has also been used to relieve pain and anxiety in paediatric and adolescent patients during invasive procedures in the emergency department (O'Sullivan et al. 2023).

Conclusion

As VR technology continues to evolve, its applications in healthcare are expected to grow even further. From enhancing patient education and reducing preoperative anxiety to improving healthcare providers' time efficiency and accuracy, VR offers many benefits. Its acceptance among patients and healthcare providers alike (Jawed et al. 2021) suggests that VR will play an increasingly

important role in the future of medicine. As researchers continue to explore and refine VR interventions, this technology promises to create a more immersive, personalised, and effective healthcare experience for all.

Virtual Reality is not just a futuristic concept but a present-day reality with the potential to transform healthcare. By improving patient care, enhancing rehabilitation, and addressing mental health needs, VR is paving the way for a more holistic and patient-centred approach to medicine. The journey toward fully integrating VR into healthcare is ongoing, but the possibilities are exciting and hold great promise for the future.

Conflicts of Interest

None.

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