EDITORIAL OPEN ACCESS

Revolutionising Nursing: The Role of Immersive Technology and Artificial Intelligence in Modern Healthcare

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The rapid advancement of digital technologies has significantly impacted healthcare, particularly in nursing. Immersive technology, including virtual reality (VR), augmented reality (AR), and mixed reality (MR), along with artificial intelligence (AI), is revolutionising nursing education, clinical practice, and patient care (1). These innovations enhance the learning experience and improve patient outcomes, efficiency, and decision-making in nursing (2). This editorial explores the contributions of immersive technology and AI in nursing and their future potential to transform the profession.

IMMERSIVE TECHNOLOGY IN NURSING

Education and Training

VR and AR enable simulation-based learning, allowing nursing students to practice complex procedures in a risk-free environment (3). The technology enhances clinical decision-making, improves procedural accuracy, and builds confidence before engaging with actual patients by enabling simulation-based learning. For instance, VR simulations in cardiopulmonary resuscitation (CPR), wound care, and emergency response prepare nurses for high-stress situations, ensuring better patient outcomes (4). An example is the project 'The use of augmented reality in tabletop exercise for disaster preparedness training' (5), which uses an AR approach for tabletop exercises to enhance disaster responders' preparedness.

Clinical Practice

AR and MR assist nurses in clinical settings with real-time guidance for procedures (6), such as vein visualisation for intravenous (IV) insertions and AR-assisted surgical planning. These tools improve precision and reduce procedural errors (7). Moreover, mixed reality technologies enable remote collaboration, allowing nurses to receive expert guidance during critical procedures, even in resource-limited environments (8).

Mental Health and Rehabilitation

Beyond clinical practice, immersive technology is vital in mental health and rehabilitation. VR-based therapies are being used for pain management, anxiety reduction, and post-traumatic stress disorder (PTSD) treatment (9). Additionally, VR applications help elderly patients with cognitive impairments (10), such as dementia, by offering interactive experiences that stimulate memory and cognitive function.

ARTIFICIAL INTELLIGENCE IN NURSING

Clinical Decision Support

AI-powered systems enhance clinical decision-making by providing predictive analytics, early disease detection, and personalised treatment recommendations (11). Machine learning models assist in triage and diagnosis, enabling nurses to make evidence-based decisions quickly and accurately (12). One of the author's final-year research projects on machine learning for predicting triage outcomes in the emergency department provides valuable insights into optimising patient assessment and prioritisation, ensuring that critical cases receive timely intervention.

Nursing Workflows and Efficiency

AI also transforms nursing workflows by reducing administrative burdens (13). AI-powered chatbots and virtual assistants assist in documentation, patient communication, and appointment scheduling (14), allowing nurses to focus more on patient care. Smart hospital management systems utilise AI to optimise patient flow, reduce wait times, and enhance overall efficiency in healthcare settings (15).

Infection Control and Patient Safety

Machine learning is also pivotal in strategies to reduce healthcare-associated infections (HAIs) by identifying risk factors and predicting outbreaks (16). The author and team are currently conducting a study on using machine learning on patient data to detect patterns associated with HAIs, allowing healthcare facilities to implement targeted interventions, improve infection control measures, and enhance patient safety.

Remote Monitoring and Telehealth

With the rise of telehealth, AI-driven remote monitoring systems are proving invaluable in chronic disease management. Wearable health technologies equipped with AI analyse real-time patient data and provide alerts for early intervention (17). Research on AI-driven predictive models for remote patient monitoring in disaster response settings highlights the potential of AI in providing continuity of care in challenging environments (18).

The advancement of AI and immersive technology in nursing reflects the Qur'anic emphasis on knowledge, healing, and the ethical use of human capabilities. As Muslims, researchers, and healthcare professionals, one must ensure that these innovations are used ethically, equitably, and for the greater good of the ummah. By combining technological advancements with Islamic ethical principles, nurses can enhance healthcare, save lives, and serve humanity in a way that aligns with the teachings of the Qur'an and Sunnah.

عَلَّمَ ٱلْإِنسَٰنَ مَا لَمْ يَعْلَمْ

"*He (Allah) taught man that which he knew not.*" (19)

This verse highlights the gift of knowledge given to humankind by Allah. The advancement of AI and immersive technology in nursing is a direct result of human intellect and learning, which are blessings from Allah to be used responsibly for the betterment of society.

وَمَنْ أَحْيَاهَا فَكَأَنَّمَآ أَحْيَا ٱلنَّاسَ جَمِيعًا

"*And whoever saves a life, it will be as if they saved all of humanity.*" (20)

This verse strongly supports the role of AI and immersive technology in nursing, which aims to save lives through early disease detection, better patient management, and enhanced nursing education. AI-powered triage prediction models and infection control strategies are examples of how technology helps protect and preserve human life.

Investment in training programs is essential to prepare nurses for AI-integrated healthcare environments. Furthermore, nurses should actively co-develop these technologies to ensure they align with patient-centred care principles. Ultimately, technology should complement rather than replace human nursing care. By harnessing the power of immersive technology and AI, nursing can become more efficient, precise, and responsive to healthcare's dynamic needs, leading to improved patient outcomes and a more resilient healthcare system.

Article History:
Submitted: 9 January 2025
Revised: 19 March 2025
Accepted: 22 March 2025
Published: 31 March 2025

DOI: 10.31436/ijcs.v8i1.439
ISSN: 2600-898X

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