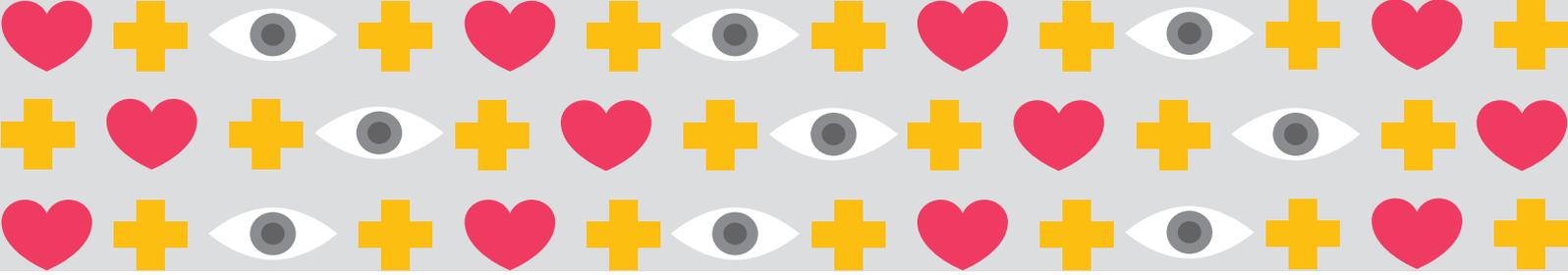




# Healthcare in the metaverse

The COVID-19 pandemic proved that physically visiting an overburdened healthcare facility for a simple consultation is no longer necessary as one can easily avail remote care via telemedicine services. Such services would be able to provide an overall experience similar to that of in-person consultations. By merging augmented, virtual, (AR/VR) and physical reality, the metaverse would revolutionise healthcare by facilitating access to consultations with physicians, medical advice and surgical procedures with the help of 5G technology. The use of 5G and AR/VR technologies is projected to significantly improve interactions between patients and doctors. Also, as the consultation will not be restricted to a physical location, overall costs of healthcare would reduce.

Further, because the healthcare sector is highly regulated and involves sensitive data related to patients, it becomes important to consider ethical, privacy and safety concerns. The metaverse can also help in addressing the same by setting regulations in place that will ensure patient data confidentiality.



# Use cases of the metaverse in healthcare

With the increasing adoption of digital means of communication and the rapid development of virtual environments, more people are becoming comfortable with the idea of the metaverse as it will provide an experience similar to that of physical interactions. The metaverse can have applications in various fields such as entertainment, business operations, education and training, and customer experience; one such application is in healthcare. Some use cases of the metaverse in healthcare have been broadly classified below:

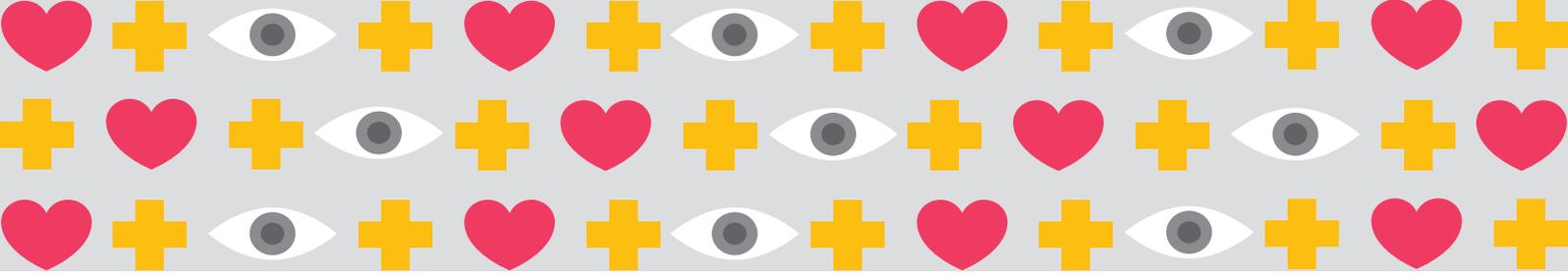
## a. Academics and research

- A cloud-based collaboration and communication platform developed by an American technology company allows specialists from various geographies to join the metaverse. A group of medical students and professionals can connect using the platform to study the human body in depth using VR modules, and discuss challenges and new ideas that can be implemented in their respective healthcare domains.
- The neurosurgery department in a private research university used AR technology along with mixed-reality gear for patient care and academic programmes.
- A medical technology manufacturer is studying the complications of a human body. The VR headset's eye display would project images of the patient's internal anatomy while the practitioner operates on the patient. This technology was a breakthrough in healthcare where the first AR surgery was performed.
- Computed tomography (CT) and magnetic resonance imaging (MRI) scans were used to build 3D models of the brain and spine, which will pave the way for incorporating healthcare in the metaverse in future.

Before any surgery is performed, the practitioner would navigate through various complications they might have to tackle during the procedure and plan the appropriate method. One such instance is the successful removal of a cancerous tumour from the spine using AR at a public research university.

## b. Medical efficiency and training

- Before the pandemic, the interaction between a doctor and a patient would generally happen in person. In the post-pandemic world, patients are open to switching to teleconsultations with the doctor using the high-speed network, to mitigate the risk of contracting infectious diseases at healthcare facilities. Patients can create their avatars in the metaverse and have their concerns addressed by physicians.
- An American multinational technology conglomerate which uses mixed-reality gear has diversified into the healthcare industry along with the World Health Organisation Academy. This company has developed a mobile application to help healthcare workers acquire the required skills for effectively managing the pandemic by enabling simulations for the following scenarios:
  - using and discarding PPE kits – gives an orientation on the application and removal of safety gear to frontline healthcare workers, thus helping them to protect themselves while working with affected patients
  - revolutionising the way surgeons operate in each phase of a surgical workflow by enhancing their efficiency through use of mixed-reality gear and ensuring patient care through adoption of relevant safety measures. This scenario extends beyond the pandemic, having the potential to be used by surgeons at any point in time.



### c. Quality and patient safety training

- Orthopaedic residents of a public research university in the United States were trained on various procedures with the help of VR headsets, which enhanced their skills in a 3D environment. The residents had access to a large number of surgical scenarios at their convenience, which helped them prepare for any orthopaedic emergency. The training was carried out with all safety measures intact.
- A publicly traded medical device company collects and shares patient data with other medical professionals by implementing best practices for protected health information (PHI) security in order to increase patients' safety.
- A public research university has a research centre that specialises in the use of mixed-reality technologies for simulation and innovation in medical studies.
- Research conducted at a university in Ohio revealed that immersing healthcare workers in tranquil scenes using mixed reality could lower stress at work while promoting their wellbeing.

### d. Post-traumatic stress disorder (PTSD)

- An interactive mixed reality-based exposure therapy tool with VR technology is helping ex-military patients with PTSD, allowing them to experience the battlefield in a safe environment. This tool can prove beneficial in veterans medical centres.

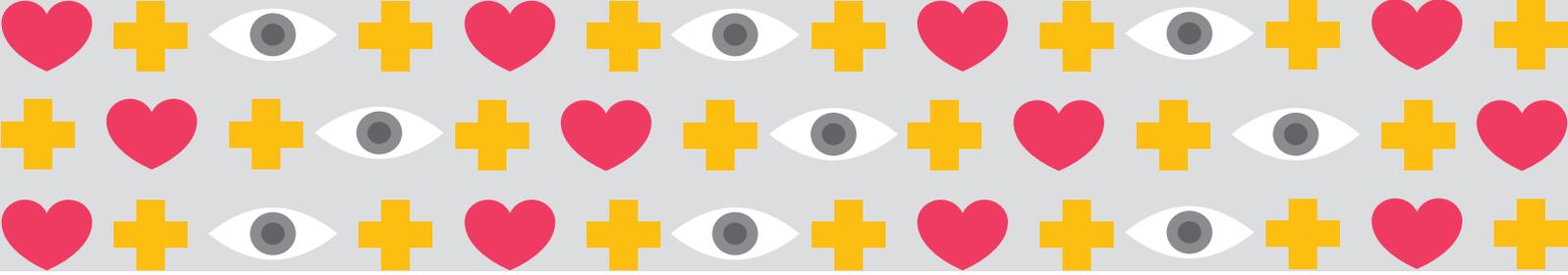
## Advancements in the metaverse in India

A clinic in Hyderabad, India, enables virtual consultations in the metaverse with users' avatars.

A large Indian hospital chain has collaborated with a California-based software firm to adopt the metaverse to provide patient counselling before and after surgical procedures in the mixed-reality space.

A speciality healthcare provider in India – focused on cancer and fertility treatments – employs the use of a mixed reality holographic device wherein experienced physicians in urban regions guide surgeons working in remote/rural areas. This helps combat technology barriers like network speed while improving the quality of care across the country.





# Challenges to adopting the metaverse in healthcare

- A. Patient data is protected under the Health Insurance Portability and Accountability Act of 1996. The provisions of this act will also apply in the metaverse with respect to health insurance, reimbursements and prescriptions.
- B. As healthcare needs to be accessible to the masses, there is a need to focus on the shift in point of care. A major challenge Indian healthcare faces is inadequate digital and technological literacy which impedes the adoption of the metaverse in healthcare.
- C. Physicians can't perform therapy and/or make decisions about the patient based on the conversations they have had with an avatar in the metaverse. In the real world, physicians can perform a thorough physical inspection of the patient, while this cannot be done in the metaverse with an avatar.
- D. Patients may be reluctant to spend long hours to provide input regarding their medical conditions on paper or the metaverse in order to get the consultation to further diagnose the underlying problems.
- E. Linking the virtual world to the real world will involve many trials and technical challenges. Moreover, the virtual healthcare space will have to be continuously evaluated in order to ensure patient safety and compliance with the rules and regulations implemented by healthcare organisations of various countries.

## Conclusion

The metaverse is an emerging technology that will add new dimensions to remote healthcare and introduce immersive experiences. It will help patients and providers to learn, be empowered and have meaningful experiences.

Healthcare is not just limited to treating patients with symptoms. It also encompasses disease prediction and preventive treatment, which can be facilitated with the help of mixed-reality solutions like the metaverse. While the metaverse has a large number of potential use cases, it cannot completely replace real-world relationships between human beings. Mixed reality and physical reality will need to coexist and complement each other. Through innovative cloud and real-time communication technology, the metaverse could lead to significant improvements in the healthcare industry in the future. Further, existing technologies like edge computing and artificial intelligence can enable the metaverse to achieve its full potential, thereby transforming the healthcare industry in many ways.



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## Contact us

### **Ashootosh Chand**

Partner, Digital and Emerging Technologies  
PwC India  
[ashootosh.chand@pwc.com](mailto:ashootosh.chand@pwc.com)

### **Yasha Pandit**

Director, Digital and Emerging Technologies  
PwC India  
[yasha.pandit@pwc.com](mailto:yasha.pandit@pwc.com)

## Contributors

### **Shashank Seetharamu**

### **Ishita Agrawal**

### **Shipra Gupta**

### **Rashi Gupta**

### **Tonella Coutinho**

## **pwc.in**

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