



## SHORT COMMUNICATION

# The future of health in the metaverse

## El futuro de la salud en el metaverso

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### ABSTRACT

Metaverse references an immersive three-dimensional digital space, conceptions about its specific nature and organization have changed over time, and more strongly emphasize the evolution from considering the metaverse as an extended version of a single virtual world to a wide network of an infinite number of interconnected worlds. The aim of this article is to describe the potential of the metaverse in health care. One potential feature of a doctor's office in the metaverse could be the use of virtual reality technology to create immersive, personalized treatment environments for patients. The doctor may also be able to use virtual reality tools to demonstrate treatment options or procedures, or to provide educational materials to the patient. There are several potential applications of the metaverse in medicine, including the use of virtual reality and other immersive technologies for patient care. Some examples of these applications include: Virtual reality exposure therapy for anxiety disorders; Virtual reality-based cognitive behavioral therapy for depression; Virtual reality-based rehabilitation and physical therapy; Virtual reality pain management; and Virtual reality education and training. There are several potential benefits to delivering clinical care in the metaverse. Metaverse may allow for more efficient and convenient access to care, particularly for patients who live in remote or underserved areas. These platforms will contribute for more personalized and immersive treatment experiences, as virtual reality technology can be used to create tailored environments and experiences for patients. There may also be concerns around patient privacy and security, as well as the potential for cyber-attacks.

**Keywords:** Metaverse; Medicine; Healthcare; Health; Patient; Immersive Technologies.

### RESUMEN

El metaverso es un espacio digital tridimensional inmersivo; las concepciones sobre su naturaleza y organización evolucionado, y cada vez se hace más hincapié en la evolución desde considerar el metaverso como una versión ampliada de un único mundo virtual hasta una amplia red de un número infinito de mundos interconectados. El objetivo de este artículo es describir el potencial del metaverso en la atención médica. Una posible característica de la consulta de un médico en el metaverso podría ser el uso de tecnología de realidad virtual para crear entornos de tratamiento inmersivos y personalizados para los pacientes. El médico también podría utilizar herramientas de realidad virtual para mostrar opciones de tratamiento o procedimientos, o para proporcionar material educativo. Existen varias aplicaciones potenciales del metaverso en medicina, incluido el uso de la realidad virtual y otras tecnologías inmersivas. Algunos ejemplos son: Terapia de exposición en realidad virtual para trastornos de ansiedad; terapia cognitivo-conductual basada en realidad virtual para la depresión; rehabilitación y fisioterapia basadas en realidad virtual; tratamiento del dolor en realidad virtual; y educación y formación en realidad virtual. El metaverso puede permitir un

acceso más eficiente y cómodo a la atención, sobre todo para los pacientes que viven en zonas remotas o desatendidas. Estas plataformas contribuirán a experiencias de tratamiento más personalizadas e inmersivas, ya que la tecnología de realidad virtual puede utilizarse para crear entornos y experiencias a medida para los pacientes. De igual forma existe preocupación la privacidad y la seguridad de los pacientes, y los ciberataques.

**Palabras clave:** Metaverso; Medicina; Sanidad; Salud; Paciente; Tecnologías Inmersivas.

## INTRODUCTION

Metaverse references an immersive three-dimensional digital space, conceptions about its specific nature and organization have changed over time, and more strongly emphasize the evolution from considering the metaverse as an extended version of a single virtual world to a wide network of an infinite number of interconnected worlds.<sup>(1)</sup>

The metaverse is a collective virtual shared space, created by the convergence of virtually enhanced physical reality and physically persistent virtual space, including the sum of all virtual worlds, augmented reality, and the internet.<sup>(2)</sup> In the future, it is possible that clinical care may be delivered in the metaverse, potentially allowing for remote consultations and treatment of patients.

The aim of this article is to describe the potential of the metaverse in health care.

## DEVELOPMENT

However, the use of virtual reality and other immersive technologies for patient care is becoming increasingly common, and these technologies may be integrated into the metaverse in the future.

The use of virtual reality and other immersive technologies for patient care can be systematized as follows:<sup>(3,4,5,6,7,8,9)</sup>

- The use of virtual reality to provide pain management and distraction during medical procedures, such as chemotherapy or wound care.
- The use of virtual reality to provide rehabilitation and physical therapy for patients with injuries or disabilities.
- The use of virtual reality to provide mental health treatment, such as exposure therapy for anxiety disorders or virtual reality-based cognitive behavioral therapy for depression.

### *Doctor's office in the metaverse*

It is possible that a doctor's office in the metaverse may be designed to be similar to a traditional in-person office in some ways, but with the addition of virtual reality technology and other elements that are specific to the metaverse.

One potential feature of a doctor's office in the metaverse could be the use of virtual reality technology to create immersive, personalized treatment environments for patients. For example, a patient could enter a virtual reality space that is specifically designed to help them relax and feel more at ease during their appointment. The doctor may also be able to use virtual reality tools to demonstrate treatment options or procedures, or to provide educational materials to the patient.<sup>(10)</sup>

Another potential feature of a doctor's office in the metaverse could be the use of telemedicine technologies, such as video conferencing, to allow for remote consultations between doctors and patients. This could be particularly useful for patients who live in remote or underserved areas, or who have mobility issues that make it difficult for them to travel to a traditional in-person office.<sup>(11,12,13,14)</sup>

Based on these elements, we can state that a doctor's office in the metaverse may be designed to be a flexible and adaptable space that can be tailored to the needs of individual patients and providers, and that utilizes the latest technologies to deliver high-quality care.

### *Potential applications*

There are several potential applications of the metaverse in medicine, including the use of virtual reality and other immersive technologies for patient care. Some examples of these applications include:

- Virtual reality exposure therapy for anxiety disorders: Virtual reality exposure therapy involves using virtual reality simulations to help patients confront and overcome their fears. This type of therapy has been found to be effective for treating anxiety disorders, such as phobias and post-traumatic stress disorder (PTSD).<sup>(15,16)</sup>
- Virtual reality-based cognitive behavioral therapy for depression: Cognitive behavioral therapy (CBT) is a type of therapy that focuses on helping patients identify and change negative thought patterns and behaviors. Virtual reality-based CBT involves using virtual reality simulations to help

patients practice and apply the skills they are learning in therapy.<sup>(17)</sup>

- Virtual reality-based rehabilitation and physical therapy: Virtual reality technology can be used to provide rehabilitation and physical therapy to patients with injuries or disabilities. For example, virtual reality simulations can be used to help patients practice movements and build strength, or to provide sensory stimulation to help with recovery.<sup>(18)</sup>
- Virtual reality pain management: Virtual reality can be used to provide distraction and pain management during medical procedures, such as chemotherapy or wound care. Research has shown that virtual reality can be effective at reducing pain and anxiety in these situations.<sup>(19)</sup>
- Virtual reality education and training: Virtual reality can be used to provide education and training to healthcare professionals, such as doctors, nurses, and other healthcare providers. For example, virtual reality simulations can be used to train healthcare professionals on new techniques or technologies, or to provide simulated patient cases for practice and training.<sup>(20,21,22)</sup>

### *Metaverse and mental health*

The metaverse has the potential to affect mental health in a number of ways, both positive and negative.

On the positive side, the metaverse may provide new and innovative ways for people to connect with others and engage in activities that promote mental well-being. For example, virtual reality technology can be used to create immersive social environments where people can interact with others in a safe and controlled way, potentially reducing feelings of loneliness and isolation. The metaverse may also provide new opportunities for people to engage in activities that promote mental well-being, such as mindfulness or meditation practices, or to access mental health resources and support.<sup>(16,23)</sup>

On the negative side, the metaverse may also pose risks to mental health if it is not used in a healthy and balanced way. For example, excessive use of the metaverse or reliance on it for social interactions may lead to social isolation or addiction. There may also be concerns around the impact of virtual reality technology on mental health, such as the potential for inducing anxiety or other negative emotions.<sup>(24)</sup>

We must be cautious as physicians with the long-term effects of "immersion," and it is important for individuals to be aware of the potential impacts of the metaverse on mental health and to use it in a healthy and balanced way. It may also be important for healthcare providers to consider the potential impacts of the metaverse on mental health and to address any concerns that patients may have.

## **CONCLUSIONS**

There are a number of potential benefits to delivering clinical care in the metaverse. Metaverse may allow for more efficient and convenient access to care, particularly for patients who live in remote or underserved areas. These platforms will contribute for more personalized and immersive treatment experiences, as virtual reality technology can be used to create tailored environments and experiences for patients.

There are also potential challenges to delivering clinical care in the metaverse. One concern is the potential for technical issues, such as latency or connectivity issues, which could impact the quality of the care being delivered. There may also be concerns around patient privacy and security, as well as the potential for cyber attacks.

Overall, it is likely that the future of clinical care in the metaverse will involve a combination of traditional in-person care and virtual care, with a focus on providing patients with access to the most appropriate and effective forms of treatment.

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#### **CONFLICT OF INTEREST**

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#### **AUTHORSHIP CONTRIBUTION**

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