The Ethics of Digital Twins in Healthcare: Should Virtual Bodies Guide Medical Decisions?

Would you trust a virtual copy of yourself to help make life-altering health decisions? This is the primary concern that arises in people's minds when we propose the idea of a digital twin being utilised in healthcare. In our modern and fast-paced world, technology is ever-improving, and so is healthcare. Among some of the most recent innovations are digital twins. By definition, a digital twin is a virtual replica, or a dynamic representation of something that exists in the physical world, built using real-time data collected from the original source. Essentially, they are used to test, stimulate and experiment with different medical procedures to help gauge how a body might react to them. But who controls this data? And can we really trust the judgment of a virtual copy?

But before we delve into the ethics of digital twins, we must first familiarise ourselves with the concept. The actual term ‘digital twin’ (DT) was coined in 2005 by Michael Grieves during a product lifecycle management course; however, NASA adopted the concept around 2010 as a virtual model of physical systems and machines. So, what once was a concept oriented in the field of engineering, was now applied to the field of healthcare, making interactive virtual models of human organs and bodies. In this case, the physical component is the patient, and the digital twin is a data-driven replica of their body, health status, and even lifestyle. Often appearing as dynamic 3D models, this technology updates in real time, effectively allowing doctors to test and stimulate medical procedures before carrying them out in real life. Furthermore, this model utilises data from AI, wearable devices and sensors to increase the accuracy of its predictions.

Privacy and Data Ownership

Digital twins accumulate a broad range of health data, ranging from genomic sequences to real-time physiological metrics, creating new ethical concerns about surveillance and privacy. Thus, the most prominent question arises - who owns this virtual version of you? Without any strong systems in place, sensitive digital twin data may be accessed, shared, or sold without patient consent, raising serious concerns about data exploitation. Moreover, a digital twin may be built on both types of data: personal patient data and data from hospitals and companies, therefore further raising the question of ownership. As of now, privacy laws in the United States and Europe tend to focus on limiting data collection and giving users control over their data; however, this clashes with the objective of digital twins, which requires a continuous stream of data. Lastly, the idea of anonymity seems impossible, as each digital twin is tied to a real person.

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Inequality & Social Disruption

Another major concern is that digital twins could contribute to widening existing socioeconomic gaps. Due to the sheer complexity and cost of this technology, it is likely to only be offered and limited to wealthy clinics and patients, further aiding the creation of a two-tiered healthcare system. This suggests a vast gap in the type of treatment both tiers receive - where patients in the higher tier can expect personalised AI-guided treatment plans and so much more. Another important factor that we must take into consideration is the type of data these models are trained on; if the data comes from a constant single source, chances are that it might become biased to it and not provide accurate information for marginalised groups. If digital twins perform better for some groups than others, it could further deepen healthcare inequality.

As we advance into the era of digital healthcare, digital twins show a definite promise in their ability to transcend and cross traditional medical boundaries. With their AI-guided planning, early disease detection and predictive and preventive care, digital twins certainly make healthcare more efficient and safe. However, it is important not to forget the vast set of ethical questions that come alongside this, as well as the threat of social disruption. Therefore, before we set out to use this technology, we must first implement strong legal systems and regulations in place that safeguard both the user's data and privacy.

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