Chapter 16
Unlocking Potential:
Proving the Value of Digital Twins to Healthcare Executives

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ABSTRACT

This chapter explores the effective communication of digital twin technology's value to healthcare executives. It identifies the critical role that healthcare managers play in integrating digital twins into healthcare systems, emphasizing the need for clear communication of the technological benefits and business impacts. Through comprehensive literature review and case studies, the chapter delves into strategies for presenting digital twin capabilities in a manner that aligns with healthcare executives' strategic priorities. Key methods include data-driven evidence, stakeholder engagement, and aligning digital initiatives with healthcare goals to enhance patient care, operational efficiency, and strategic decision-making. The discussion includes overcoming communication barriers and the importance of executive buy-in for successful technology adoption. This chapter serves as a guide for professionals seeking to leverage digital twin technology in healthcare, highlighting its potential to transform healthcare delivery through improved patient outcomes and operational excellence.

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1. INTRODUCTION

Digital twins represent a revolutionary approach in the healthcare field that allows the replication of real and physical entities, systems, or processes in the digital environment (Zhong et al., 2022; Walter et al., 2021). The introduction of digital twins in healthcare represents a transformative approach, integrating Internet of Things (IoT), Artificial Intelligence (AI), cloud computing, and advanced data analytics to replicate real and physical entities in a digital environment. This convergence of technologies is illustrated in Figure 1, which provides an overview of the technologies and applications of patient digital twins, showing their pivotal role in healthcare monitoring, emergency warnings, and strategic decision-making. The emergence of digital twinning within the healthcare sector stems from the need for immediate data insights, thorough examination of predictive models, and tailored interventions.

The healthcare industry is undergoing a constantly evolving character laced with breakthroughs driven by enhanced technology and data analytics (Zhong et al., 2022). One of its key applications is the use of digital twins' technology, which in turn generates a leap in the ability to take care of patients, optimize operational processes, and optimize strategic decision-making (Erol et al., 2020). Organizations' investing in digital twins in healthcare is predicted to increase at an average return on investment (ROI) of 25% for the next five years (Royan, 2021). However, the successful implementation of digital twins in healthcare necessitates not only the enhancement of technical skills but also a strategic approach that concentrates on conveying the value proposition to crucial stakeholders, such as health executives.

In healthcare, digital twins have a wide scope of applications that include patient care, process optimization, and strategic decision-making (Erol et al., 2020; Royan, 2021). Patient monitoring and personalized care are one of the most important applications (Sharma et al., 2023). Digital twins made it possible to perform routine control of patients' vital signs, medical conditions, and health metrics. With the help of data from wearable devices, Electronic Health Records (EHRs), and IoT sensors. Figure 1 demonstrates how these technologies come together to create a comprehensive digital replica that enables clinicians to detect health anomalies early and provide proactive interventions, ensuring high-quality patient care and improved health outcomes. Research indicates that 85% of health organizations are inclined to invest in smart IoT digital twin solutions to enhance service and operations. These investments have led to tangible benefits, including a reported 30% improvement in disease outcomes when using digital twins for individual care management (Royan, 2021).

Another case application of digital twins is in surgical planning and training (Sharma et al., 2023; Voigt et al., 2021). With the help of a digital twin, surgeons can simulate surgical operations that are quite complicated, thereby improving their workflow and utilizing techniques free from dangers in a virtual environment (Voigt et al., 2021). This leads to better operation progress, decreased risk of incidents during operations, and safer patients. Besides, digital twins are highly effective in healthcare facility optimization by developing hospital planning, checking patient flows, and improving resource utilization (Attaran & Celik, 2023). Digital twins are expected to cut healthcare costs by $15 billion globally by 2025 through improved operational efficiency and preventive maintenance strategies (Attaran & Celik, 2023; Ginter et al., 2018). Also, AI-based analytics in digital twins have demonstrated a 40% rise in diagnostic accuracy for complex medical conditions (Kumar et al., 2023).

Effective implementation of digital twins requires an alignment with the organization's objectives as well as stakeholders' buy-in (Elton & O'Riordan, 2016). PwC reported that 70% of healthcare executives believe that digital twins will not only drive innovation but also be the major factor that will improve patient outcomes in the coming years (Elton & O'Riordan, 2016). Nevertheless, some of the issues like

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