Chapter 19
IoMT Future Trends and Challenges: Emerging Technologies, Policy Implications, and Research Questions

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ABSTRACT

The healthcare industry is transforming significantly due to the rapid emergence of the internet of medical things (IoMT). The integration of cutting-edge technologies facilitates this paradigm shift. A new age of healthcare system optimization and patient care is being ushered in. This study provides a comprehensive overview of the future trends and open issues in adopting the IoMTs. It explores the current status of IoMT and forecasts its evolution. The study examines the policy and regulatory ramifications and the essential ethical and data privacy aspects. More still elucidates the urgent security, interoperability, and scalability difficulties while underscoring the imperative for collaborative efforts and standards within the industry. This study affords insights for future research by presenting a set of unanswered inquiries and corresponding possible implications, accompanied by relevant cases. Finally, it emphasizes the significant impact the IoMT can have on the healthcare industry by availing lightweight medical digital trust architectures.

INTRODUCTION

The emergence of the "Internet of Medical Things (IoMT)" signifies a paradigm shift in the healthcare field, wherein the amalgamation of cutting-edge technology and interconnected equipment fundamentally alters how patients are cared for and healthcare services are provided (Lee et al., 2023). The concept of the IoMT encompasses integrating many components, for example, medical equipment, sensors, software, and the internet. This integration facilitates the efficient and uninterrupted flow of health-related infor-

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mation and enables continuous real-time patient well-being monitoring (Z. Ali et al., 2023). Integrating this interdependent ecosystem provides healthcare providers with vast data, from ongoing patient vital signs monitoring to tracking medication adherence.

This enables healthcare professionals to make more accurate diagnoses, develop individualized treatment plans, and intervene promptly. Integrating the physical and digital domains in healthcare, known as the IoMT, can optimize patient outcomes, mitigate healthcare expenses, and elevate the overall standard of medical treatment (Sadhu et al., 2023). The origins of the IoMT can be attributed to the advent of the initial medical equipment that incorporated internet connectivity, including early telehealth solutions and remote monitoring devices. Nevertheless, the rise of IoMT in healthcare innovation can be attributed to the combination of various technological developments (Jamshidi et al., 2023). These include the widespread adoption of wearable devices, the growth of high-speed internet connectivity, and the creation of advanced healthcare applications.

The field of IoMT is now seeing significant growth and development. Various technologies, such as smartwatches, wearable fitness trackers, smart inhalers, and implanted medical devices, are being utilized to efficiently gather and communicate patient data to healthcare professionals and electronic health records (EHR) systems (Abbas et al., 2023). The IoMT possesses significant potential to improve patient care and healthcare outcomes. The IoMT enables healthcare providers to gain real-time insights into a patient's status by constantly monitoring the patient's vital signs and health-related data. Providing this information facilitates the attainment of more precise diagnoses, individualized treatment strategies, and prompt actions (Xu et al., 2023). Furthermore, the IoMT promotes a proactive stance towards healthcare by enabling the timely identification of health concerns and facilitating the implementation of preventive interventions. Patients also derive advantages from the IoMT, acquiring enhanced agency over their well-being by accessing real-time data and fostering increased connection with healthcare practitioners (Alabdan et al., 2023).

Furthermore, the IoMT can substantially decrease healthcare expenditures while enhancing patient treatment quality. Implementing IoMT technology has the potential to decrease the frequency of in-person medical appointments, specifically in the context of chronic disease management, through the facilitation of remote patient monitoring and telemedicine (Liu et al., 2023). This not only mitigates the economic hardship experienced by patients but also relieves the pressure on healthcare infrastructure (Bera et al., 2023). In addition, the IoMT has the potential to enhance the efficient distribution of healthcare resources. By leveraging real-time data and urgency, healthcare practitioners can effectively prioritize patients, as shown in Figure 1. The evolution of the IoMT gives rise to a diverse range of research challenges and opportunities (Samuel et al., 2023). The factors encompass the need to guarantee the security and privacy of data, establish compatible standards for seamless data exchange, leverage the potential of artificial intelligence and machine learning for data analysis, and tackle ethical concerns about patient permission and data utilization, (Datta Gupta et al., 2023).

The primary relevance of the IoMT is its capacity to revolutionize the healthcare sector by fostering a proactive, personalized, and efficient system. The IoMT facilitates real-time data collecting, monitoring, and analysis by interconnecting numerous medical equipment and sensors with the internet (Karagiannis et al., 2023). The continuous flow of patient data provides healthcare providers with unparalleled insights into an individual's health condition, enabling early identification of diseases, accurate diagnoses, and tailored treatment strategies (Karar et al., 2023). Consequently, this phenomenon results in enhanced patient outcomes and decreased healthcare expenditures. This article aims to examine several topics related to the IoMT comprehensively (Riya et al., 2023). Specifically, it will delve into the current status