CHAPTER: 19

INTERNET OF MEDICAL THINGS (IoMT) IMPLEMENTATION, APPLICATIONS, DATA MANAGEMENT AND CHALLENGES

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INTRODUCTION

The global progress in digitizing information, especially health data, and its utilization in healthcare has been remarkable. The COVID-19 pandemic has notably accelerated the integration of the Internet of Things (IoT) in the healthcare sector. Various rapidly evolving technologies are converging and influencing the direction of IoT in healthcare. Challenges in this domain include innovation development, healthcare delivery obstacles, concerns about data security, the digital divide, the involvement of government and other stakeholders, and the behavior and adoption by medical professionals and hospitals [2]. This study aims to give an outline of the enhancement, implementation, and challenges of IoT in the healthcare sector universally, the complexities of various variables impinging its present status and provides recommendations for proper enablement of this technology while managing the real- time health data that is being accumulated to gain data-driven insights.

The technological advancements include a massive technological upgrade for flexible processing power and mobile computing power for handheld devices, enhancements in near field communications (NFCs, for example, Bluetooth low energy innovation, development of Rapid Frequency Identification (RFID) innovation, and lastly the expansion away from the limitations of an integrated circuit (chip) and big data clouds, such as those offered by Amazon and Google [1]. IoMT utilizes internet-connected devices for remote patient monitoring, including wearables and stand-alone devices, and integrates these with patient data. Deloitte notes that IoMT is gaining momentum as medical devices increasingly connect to the Internet of Things, performing tasks such as generating, collecting, analyzing, or transmitting health data, linking to provider networks, and uploading data to the cloud or internal servers. A study by researchers at Cedars-Sinai Medical Center and UCLA found that Fitbit activity trackers can simultaneously measure heart rate and accelerometer data in patients with ischemic heart disease. This may explain the reported 88 percent investment by healthcare providers in remote patient monitoring, as highlighted by mHealth Intelligence [3, 4].

RESEARCH QUESTION

1. How could we integrate IoMT for chronic disease management to improve quality of care and overall population health?
2. How could we manage the big data that was collected from real-time monitoring using IoMT and gain data-driven insights using Machine Learning?
3. What were the challenges related to implementation of IoMT and how can we overcome them?

RESEARCH OBJECTIVES

1. To provide comprehensive literature review and scientific evidence for Implementation of IoMT and its technological architecture
2. To discuss applications and use cases of IoMT.
3. To use Predictive Analytics for IoMT Data Management and Analysis using Machine Learning
4. To determine the challenges associated with IoMT and provide recommendations to overcome them.

RESEARCH METHODOLOGY

After a thorough exploration of significant scientific databases, including PubMed, IEEE Xplore, Cochrane, Google Scholar, and ResearchGate, publications underwent scrutiny. The selected papers for review, published between 2016 and 2021 and in English, met inclusion criteria related to the Internet of Things (IoT) in predictive analytics, IoMT data management, chronic illness management, and healthcare. Secondary data extraction covered IoMT deployment in healthcare IT architecture, IoMT applications and use cases, IoMT data management, predictive analysis, and related consequences and solutions.

RESULTS AND DISCUSSION

The review encompassed a total of 50 articles based on the inclusion criteria. These selected articles underwent a thorough

examination, leading to an in-depth analysis of diverse architectures for the Internet of Medical Things (IoMT). The study delves into architectural details, accompanied by pertinent scientific evidence. Additionally, The Internet of Things' primary uses in healthcare were investigated. The management of IoMT data through predictive analysis is one of the main foci of this research, which aims to extract data-driven insights for improving population health in general.

CONCLUSION

By facilitating early intervention, this systematic review study reveals how IoMT is used in the real-time management of chronic illnesses. It covers the IoMT's architecture, technology, applications, and difficulties in the healthcare industry.

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