The Benefits of Continuous Health Data Monitoring in Cardiovascular Diseases and Dementia

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INTRODUCTION

Digital health refers to the technological transformation of healthcare that integrates software, hardware and other services, for example, computer modeling, Big Data, machine learning, patient health records and wearable devices. These digital health monitors and interventions assist healthcare systems in providing quality medical care and correct treatment options. The importance of health data depends on the evolving technologies and the large amount of data collected for each patient, especially for patients who suffer from chronic diseases.

The health data may be physiological measurements such as heart rate monitors, body temperature sensors, blood pressure monitors, devices that measure respiration, brain waves, blood volume changes, and devices that scan the body such as computerised tomography (CT) and magnetic resonance imaging (MRI) (Viceconti et al., 2020; Xu et al., 2020). These devices collect a large amount of data that may contribute to continuously monitoring already-known health issues and diagnosing hidden diseases. Digital health datasets from patient records have long been collected in hospitals, emergency rooms and sometimes, when necessary, at home. However, these electronic records may be collected continuously at home using wearable devices, such as smartwatches, for monitoring fitness and heart rate (Casola et al., 2016).

The Chapter mentions the most popular technological advances in digital data collection in healthcare, their uses and their benefits to the patients and healthcare providers, and discusses examples in patients with cardiovascular issues and dementia. It also discusses health economics, the relationship between healthcare systems and health behaviours, aiming to promote healthy lifestyles (Phelps, 2017), and health informatics, the field of science that develops machine learning and data computing systems for patient data information processing (Eysenbach, 2000). The Chapter also mentions the benefits of continuous monitoring, such as the effective and efficient connection and communication and safe interaction between clinicians and patients via digital health tools (Mosadeghrad, 2013). In addition, other benefits are the empowerment of patient-centred treatments and the availability of data to the patients, their families, and their clinicians to read anywhere they are with WiFi connection, mobile data downloads and software applications on digital devices such as smartphones.

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BACKGROUND

Mobile health (mHealth / eHealth), health information technologies (IT), wearables, telehealth and telemedicine, and personalised medicine are all examples of medical and health-related technologies that are internet-focused, and they are commonly called *digital health* (Feldman et al., 2018; Iqbal et al., 2021; Iyengar, 2020; Lupton, 2013; Mathews et al., 2019). Digital technologies have revolutionised how patients are treated and monitored at hospitals, care facilities, and at home (Awad et al., 2021; Lupton, 2013). Traditional methods of patient care, including diagnosis, treatments, and treatment plans, as well as ongoing patient monitoring and rehabilitation, have genuinely lost ground to these digital services and devices (Awad et al., 2021). They have emphasised the value of using them during periods of isolation, such as during the COVID-19 epidemic, and they have empowered tailored patient care, particularly for patients who reside in rural places (Awad et al., 2021). Healthcare systems have already adopted these modern technologies, and the future seems promising in integrating more digital tools into health so that patients can engage in self-monitoring and self-care (Lupton, 2013).

Public and private healthcare, as well as financial and social insurance planning, constitute the *healthcare systems* (Lameire et al., 1999). All health sectors include staff members, products and services provided by health service leaders and managers who are in charge of the availability, effectiveness, and standard of care of health services (Harrison et al., 2019; Lameire et al., 1999). Clinicians, in particular, are responsible for acquiring the knowledge and understanding of the diseases, service delivery, treatment options and care plans for each disease/illness, as well as adhering to the cultural guidelines of healthcare in their country (Harrison et al., 2019). Primary and secondary health facilities, medical doctors, nurses, clinical staff, various types of healthcare organisations, institutions, public and private hospitals are all examples of healthcare systems (Demirkan, 2013).

Chronic diseases such as cancer, stroke, diabetes, pain, respiratory, visual deficits, hearing impairments, and heart diseases directly affect all low- and high-income healthcare systems. Healthcare professionals strive to improve treatment plans' cost-effectiveness while lowering death rates and risk factors associated with chronic diseases. The World Health Organization (WHO) has stressed that modifiable behaviours, such as smoking and physical inactivity, as well as metabolic risks, such as obesity and high blood pressure, might be the primary risk factors for chronic diseases (World Health Organization, 2022b). Furthermore, the WHO reported that chronic diseases could affect people of any age; however, older people and people living in low and middle-income countries suffer at a higher rate (World Health Organization, 2022b). Moreover, poverty-related healthcare systems are vulnerable and significantly disadvantageous in terms of product, medicine, and examination tool usage (World Health Organization, 2022b). Training medical professionals in universities, primary and secondary clinics, workshops, and internships may thus greatly benefit communities and societies by systematically changing how chronic patients are treated. Nonetheless, the patients' medical history and records contain all the information required for the clinicians' decision-making, so they must be correct and complete (Ferreira et al., 2007). Because chronic diseases represent such an important issue in healthcare, this Chapter addresses chronic diseases that appear to impact high percentages of the population.

Electronic health records (EHR) are digital files that contain information about a patient's health, such as demographics, medical history, diagnostics, test results, and treatment records (Atasoy et al., 2019; Kruse et al., 2018). The digitalisation of patient care has improved how healthcare professionals and hospitals process patient data (Atasoy et al., 2019; Bossen et al., 2019). EHR has benefited healthcare by reducing errors in patient diagnosis, treatment, and prognosis, providing empirical knowledge to medical teams, lowering hospitalisation costs, and improving patient quality of life (Atasoy et al., 2019;