Mobile-Web based Electronic health records system for ICU patient management in heart hospital

1st Hasan Sarwar
Department of Computer Science and Engineering
United International University
Satarkul, Badda, Dhaka, Bangladesh
hsarwar@cse.uiu.ac.bd

2nd Mizanur Rahman
Faculty of Computing
Universiti Malaysia Pahang Al-Sultan Abdullah
Pekan, Pahang, Malaysia
mizancse7462@gmail.com

3rd Mohammad Nurul Akhtar Hasan
Department of Pediatric cardiac ICU
National heart foundation hospital
Dhaka, Bangladesh
drhasan.pediicu@gmail.com

Abstract—**Heart disease is a major public health issue that requires timely and accurate diagnosis, treatment, and follow-up of patients. However, many healthcare providers and patients face challenges in accessing and updating health information, especially in resource-limited settings. This paper presents the design, development, and evaluation of a novel Mobile-Web-based electronic health records system (MWEHRS) that leverages the advantages of both mobile and web technologies to provide a user-friendly, secure, and scalable system for patient management in heart diseases. Through this research a real system has been implemented in National Heart Foundation Hospital, Bangladesh. MWEHRS allows healthcare providers and patients to access and update health information using any device with an internet connection, such as smartphones, tablets, or computers. The developed system also integrates various features and functionalities to support the diagnosis, treatment, and follow-up of heart disease patients. The system provides automation to calculate some parameters and thus relieves the attending nurses from doing so. The developed system enables doctors to watch patient status in real time and take decisions with ease both during and after the course of therapy.**

Keywords—Electronic Health Record, Heart Failure, Mobile Health, Web system, Patient Care, Digital health

I. INTRODUCTION

Heart disease is a major public health issue that affects millions of people worldwide. According to the World Health Organization, cardiovascular diseases (CVDs) are the leading cause of death globally, accounting for 32% of all deaths in 2019 [1]. In the United States, 6.2 million adults have heart failure, and roughly $31 billion is spent annually on heart failure-related costs [2]. Approximately 50 400,000 death certificates in 2018 cited HF and it is predicted that by 2030, cases will surge by 25% [3]. In the United States, heart disease is also the leading cause of death, causing about 1 in every 5 deaths in 2021 [4]. Managing heart disease requires timely and accurate diagnosis, treatment, and follow-up of patients, which can be challenging in resource-limited settings or remote areas. Heart failure (HF) is a chronic disease associated with the presence of comorbidities - more than 85% of HF patients have 2 or more comorbidities [5], and with a high mortality rate [6], which has a great impact on the patient's quality of life [7] and, if not properly prevented and treated, HF can lead to significant losses in the autonomy of sufferers and their primary carers [8].

Electronic health records (EHRs) are digital systems that store and share health information of patients across different health care providers and settings [9]. EHRs can improve the quality and efficiency of healthcare delivery, as well as reduce medical errors and costs. EHRs can also support clinical decision-making, patient education, and self-management [10]. However, EHRs are often not accessible or affordable for many healthcare providers and patients, especially in low- and middle-income countries or rural areas. Mobile-Web based electronic health records system (MWEHRS) is a novel approach that leverages the advantages of both mobile and web technologies to provide a user friendly, secure, and scalable EHR system for patient management in heart diseases [11]. MWEHRS allows healthcare providers and patients to access and update health information using any device with an internet connection, such as smartphones, tablets, or computers. MWEHRS also integrates various features and functionalities to support the diagnosis, treatment, and follow up of heart disease patients, such as risk assessment tools, medication reminders, appointment scheduling, teleconsultation, and data analysis. The primary objective of this study was to transform a labor-intensive data capture system into an intelligent and efficient data collecting system. This system aims to assist doctors in the continuous real-time monitoring of patients and facilitate decision-making throughout and following the care process.

The paper is organized as follows: Section 2 reviews the related literature on EHR systems and mobile-web technologies; Section 3 describes the system architecture and components of MWEHRS; Section 4 reports the results of user testing and feedback; and Section 5 concludes the paper.

II. RELATED WORKS

Mudaliar et al. [12] proposes a blockchain-based system that improves healthcare management and includes machine learning features to monitor and predict heart diseases. They used Blockchain, IoT, and AI technologies and also used Machine learning for arrhythmia and heart disease prediction. The result improved healthcare management through a patient-centric model allowing better privacy and interoperability of medical data. The limitation is lack of control over personal data and scattered medical records among numerous institutions. In another work, the health record management system [13] is a web-based application designed for hospitals to manage and use patient data effectively. In their system, doctors can upload and retrieve patient data. Their main focus is on data storage, retrieval, and patient appointment booking. It Improved the accessibility and user friendliness of the system.

Kao et al. [14] discusses the benefits of using electronic health records (EHRs) in the management of heart failure but does not specifically mention a mobile-web based system. They used EHR tools for individualized risk stratification and decision support and leveraging EHR functionality to improve outcomes. They improved guideline-based therapies and reduced adverse clinical outcomes. The use of mobile-web based systems has been discussed and has been shown how existing electronic health record tools can support patient