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HEALTH CARE QUALITY ENHANCEMENT: ESTABLISHING ELECTRONIC HEALTH RECORDS SYSTEM IN BANGLADESH

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ABSTRACT

This research paper explores the role of Electronic Health Records (EHRs) in enhancing healthcare quality in Bangladesh. The paper investigates the potential benefits, challenges, and implementation strategies associated with adopting DHR systems. It also discusses the implications of DHRs for healthcare professionals, patients, and the overall healthcare system. The findings suggest that leveraging DHRs can lead to improved patient care, streamlined communication, enhanced data management, and increased efficiency in healthcare delivery. However, certain barriers such as infrastructure limitations, data security concerns, and the need for workforce training must be addressed for successful DHR implementation. This research contributes to the understanding of the impact of digital health technologies in low-resource settings and provides insights for policymakers, healthcare administrators, and researchers in Bangladesh and other similar contexts.

1 Introduction

1.1 Background:

Healthcare information is vital for clinical decision-making at present and in the future for every individual. Simultaneously, a person may be sick one or more times in his or her life, which makes the task of maintaining paper-based healthcare records difficult. According to Bangladesh's population and household census 2022, the total population in Bangladesh is near about 169 million; this is a big number and not an easy issue to keep their health records on paper, which may result in the avoidance of health records preservation and management. To resolve this problem, the developed nations depend on electronic health records (EHRs), a reliable, easy, and permanent health records management system that benefits patients as well as health care providers. EHRs are digital patient medical records, containing data from various encounters in healthcare settings. They streamline data management, improve patient care quality, and reduce costs. EHRs are

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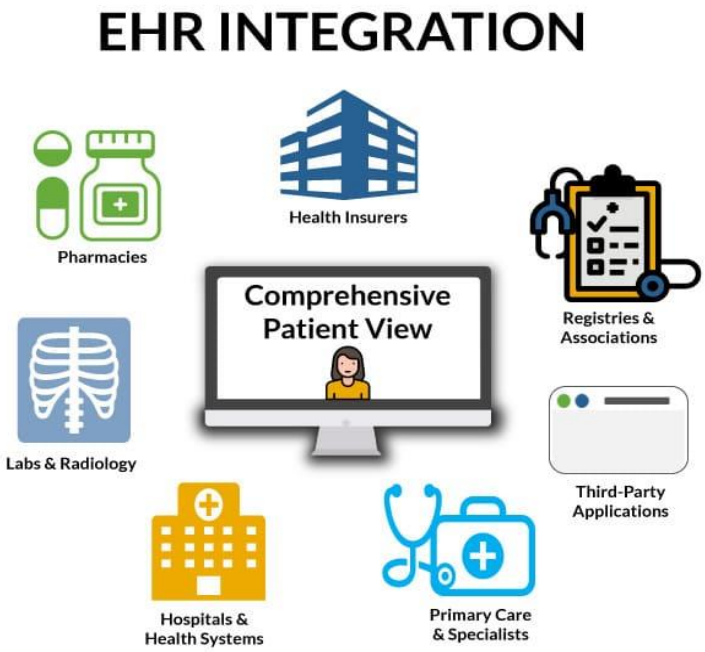
typically maintained within institutions, with different data formats and presentation levels depending on the user's role (Rahman & Reddy, 2015).

Health is one of the fundamental human needs and it involves the doctor's abilities in determining diagnosis, carrying out pathological tests and health interventions medical or otherwise, which comprise knowledge in the forms of prescriptions, imaging and reports. Therefore, health record management aims to guarantee data confidentiality, reliability, authenticity, and quality in paper-based and electronic systems (Obotu, 2018). Although Bangladesh is a densely populated country, its healthcare system has yet to be improved to a standard level. The EHRs system can help improve healthcare quality for patients by creating opportunities to make accurate clinical decisions. Hossain et al. opine that Bangladesh, with a population of 165.83 million in 2017, has a low adoption of electronic health records (EHRs) in healthcare institutions (Hossain et al., 2018). In most cases, hospitals or other healthcare service providers neither preserve out-patient nor in-patient health records after providing healthcare services; they hand over all documents when discharging the patients. However, some hospitals and clinics keep paper-based records for a while, and they destroy them to clean their space in the hospital building. Administrative staff focused on avoiding financial loss when using EHRs systems, while hospitals destroyed patient records after 5 years, including Holy Family Hospital's record room (Khan et al., 2017).

Conversely, physicians and the pharmaceutical sector, and other private healthcare providers have an excellent working relationship in healthcare for their mutual advantage; physicians prescribe drugs, while pharmaceutical companies and other private healthcare providers offer benefits to physicians. Despite the fact that the regulatory body Bangladesh Medical and Dental Council (BM & DC) prohibits physicians from accepting unethical relationships with pharmaceutical companies, doctors receive cash, hospitality, pleasure trips, medical equipment, books, sponsorship for conferences, workshops, chamber decoration, and professional and nonprofessional gifts (Alam, et al., 2015). Only legitimate papers and records are available and may be used as proof for exercising an individual's rights, making a chronological recording of health data exemplary and guaranteeing the operator's and the patient's legal security. Health records' legal relevance and the effects of injuries serve as a crucial legal foundation for liability claims. Accurate records of observed changes in the patient's health state and planned and carried out treatments attest to the medical professionals' adequate reaction. Identifying even the most minor change in a patient's health state is necessary for comprehensive hospital care, as is taking the proper response (Marinič, 2015). Therefore, the

Figure 1 : Electronic Health Record integration in healthcare procedure



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documents produced during the treatment process are requirements for the preservation of future clinical decision-making, auditing, judicial evidence, protecting patients' rights and research purposes. It is the most significant database of health treatment of the patient. Consistent recording by doctors, nurses and other staff is proof of proper monitoring of the health, planning and treatment (Marinič, 2015).

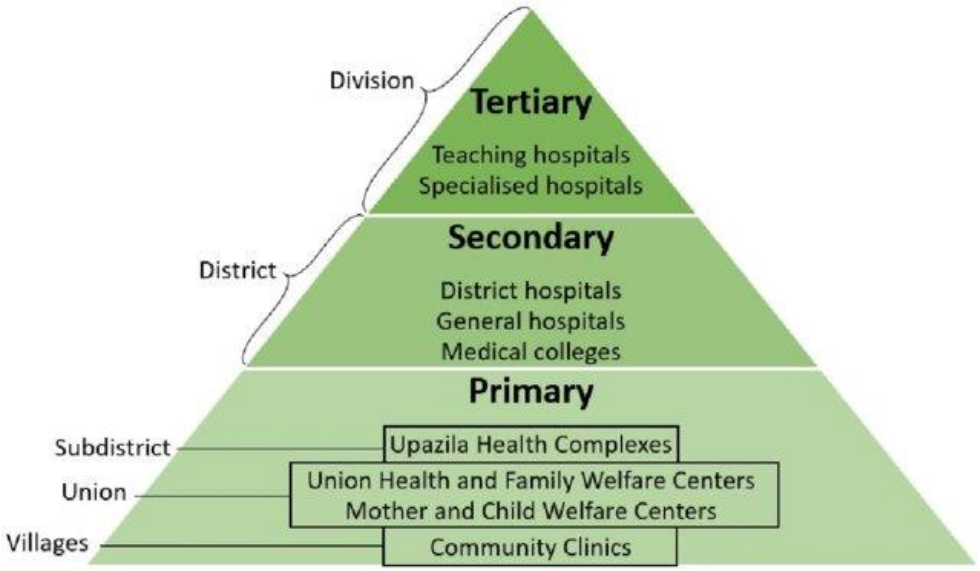
Electronic health records (EHRs) have emerged as a game-changing tool in the healthcare industry worldwide. In Bangladesh, the adoption of EHRs has been increasing rapidly over the past few years, providing the potential to enhance the quality of healthcare services offered to the population. The use of the EHRs in Bangladesh can enable healthcare providers to store and manage patient data electronically, streamline clinical workflows, enhance data sharing, and improve the accuracy and speed of diagnoses, among other benefits. With a population of over 170 million people and limited resources in the healthcare sector, the EHRs system offer a way to deliver more efficient and effective care to the people of Bangladesh. Bangladesh has made remarkable progress in healthcare over the past few decades. However, significant challenges remain in providing equitable and quality healthcare services to its population, especially in rural areas. In this research, how electronic health records (EHRs) can be identified as a promising approach to enhancing healthcare quality and efficiency in Bangladesh will be explored based on the primary and secondary research approach.

1.2 Objective:

Healthcare services' quality has a profound impact on enhancing the patients' health and the overall health of the population. Bangladesh, a developing country with a growing population and diverse healthcare needs, ensuring high-quality care is a significant challenge. Moreover, people from poor or rural areas do not have access to quality health care in Bangladesh except by going to the Upazila Health Complex, where there are some qualified doctors who provide services. However, treatment facilities are limited, and they refer the patients to the district hospital, or the hospitals attached to the medical colleges. Even the low-income and low-middle-income people in the urban areas are also unable to access quality health care. The world's developed countries managing health records for quality care and patient safety is very much correct. Patient safety and quality of care remain top priorities in countries aiming to prevent harm and adverse outcomes. Accreditation processes and quality indicators are encouraged to assess hospital quality, improving patient safety and care. The Joint Commission integrates accountability measures into accreditation processes (Plantier et al., 2017). For this purpose, preservation of health records is essential for auditing and verification.

As a developing country, Bangladesh is giving more importance to healthcare, taking it as a constitutional mandate like some other countries in the world. Developing countries' governments focus on health information and information and communication

Figure 2: Healthcare procedure in Bangladesh (Ray-Bennett, 2019)



technology (ICT)-based health information systems (HIS) to increase access to healthcare services, cooperation, and care quality (Khan et al., 2012). In this regard, the study can examine the role of digital health records in ensuring quality care and how an electronic health records system can be established in Bangladesh. A typical nature of people is to resist a new system and establish it all over the country; acceptance from the physicians and how to build the system throughout the country are the challenges. This study investigates the potential challenges and how to mitigate them for the betterment of people. So, this qualitative study aims:

1. To explore the role of digital health records in enhancing healthcare quality in Bangladesh.
2. To evaluate the benefits, challenges, and potential strategies for implementing digital health records in the Bangladeshi healthcare context.

1.3 Significance of the Study:

In Bangladesh, most healthcare services are provided by private facilities, which incur significant costs for patients, including the cost of gifts for physicians and other indirect charges. Out-of-pocket payments account for 64.3 percent of total health spending in Bangladesh, amounting to Taka 103.46 billion (US$1.4 billion) per year. Bangladesh's most defining feature, though, is its significant out-of-pocket spending on drugs. Nearly 62 percent of healthcare spending is spent on drugs and medical consultations (Haque et al., 2015). Because of costs and consciousness, the illiterate rural poor believe in traditional medicine, which is not actually a scientific treatment method except for providing some sort of mental trust and hope to be cured. On average, only 20–25% of Bangladesh's population has access to modern healthcare facilities, while 75–80% of the rural population still receives healthcare services from indigenous traditional medical practitioners, who have a long tradition, effective outcomes, and local belief in their effectiveness (Haque et al., 2018). The people who do not have access to allopathic treatment believe in this traditional medicine, although this kind of treatment system goes without any scientific research except people's beliefs. Sometimes the human body heals some sought of disease without taking any medicine which pretend to be the power of the traditional medicine.

Private enterprises that deal with healthcare items, such as pharmaceutical corporations, pathology laboratories, and private clinics and hospitals, rely on physicians' prescriptions, which contain their treatment decisions. As a result, these industries aim to persuade physicians to write prescriptions for their products to increase their revenue. Pharmaceutical corporations, pathology labs, and private hospitals all target physicians for marketing objectives, even though the patient is the ultimate consumer of the medicinal drug. As a result, a physician's prescription habit has an impact on patients' prescription medicine and other health-related product habits. Other well-known criteria also impact a doctor's decision to prescribe a certain drug (Smith, 2009). Drug companies pay well-known doctors to promote a certain brand of medicine, either publicly during a lecture or subtly by linking oneself with a particular brand name. These marketing techniques are based on the notion that the doctor is objective (Haque et al., 2013). Pathology tests are an important aspect of evidence-based practice, yet they come at a high cost and cause harm. Physicians, on the other hand, benefit financially by referring a patient for a specific test or procedure. They are also not giving out enough or accurate information regarding the process. Others attend pharmaceutical industry-sponsored symposia or accept a small gift from pharmaceutical company officials (Gabel, 2011).

Bangladesh has yet to do a lot in this area, as various studies have evidently shown. "We found very little use of EHR systems at the hospitals (Khan et al., 2012, p. 1)." Only some private hospitals have a system where investigation reports can be transferred from one desk to another, which is not for preserving the reports or any records; the objectives are to avoid more paperwork and make the service faster. There are several necessities satisfied by the digital health record system in ensuring quality care, which has been established in the Organization of Economic Cooperation and Development (OECD) countries and some other countries. The system enhances healthcare quality and reduces costs through clinical decision support, computerized physician order entry, and health information exchange, reducing medication errors and enhancing efficiency (Menachemi & Collum, 2011).

1.4 Research Questions:

Establishing an electronic health record management system in Bangladesh is the objective and focus of the research, which is essential to healthcare quality enhancement and mitigates the challenges of implementation and potential strategies for successful adoption. Keeping the objectives in mind, the research questions have been formulated to find out the role of electronic health records in quality health care and how

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an electronic health records management system can benefit the people. Therefore, the research questions are:

1. What are the roles of electronic health records in quality health care in Bangladesh?
2. How electronic health records management system can be established in Bangladesh?

2 Literature Review:

2.1 Healthcare Quality Enhancement:

In healthcare quality improvement, it is crucial to review the definitions and conceptualizations of quality in health care in the existing literature across countries. As a sociological study, humane health care is composed of many elements which help the managers and health care policymakers to comprehend and effectively restrain them. These elements include patient outcomes, care setting, time taken for consultations, costs, attitudes of care givers and various other concerns that are related. A systematic assessment of these components offers a clearer perspective on the quality of health services and therefore the interventions best suited for change. The US National Academy of Medicine has formulated a definition of quality healthcare that is widely accepted and is based on six pillars, but practice often under-specifies these domains. Quality assessment programs focus on effectiveness, safety, timeliness, patient-centeredness, equitable and efficiency, making it difficult to draw inferences about a hospital's quality of care (Hannawa et al., 2022). Quality healthcare not only depends on the outcome of the treatment but also on some other aspects such as time, cost, providers' attitude and behavior, and the treatment ecosystem. Healthcare quality improvement is vital for any nation specially the low-and middle-income countries (LMICs) like Bangladesh where it has various areas in healthcare to improve. In Bangladesh, resources are limited, but a huge population makes the situation worse in terms of the natural environment, quality food intake, housing, safe drinking water, and sanitation, which are plausible to keep healthy and fit. High-quality care requires appropriate resource stewardship, minimizing waste, and maximizing equitable outcomes, and quality improvement promotes confidence, government investment, and consistency in care. However, recognizing and addressing quality improvement is crucial, with reliable methods and data gathering being essential (Bhat & McCammon, 2021). Healthcare quality improvement requires identifying the areas of improvement, including the fields discussed above, and keeping data, as improvement is a continuous and never-ending process. The policymakers and healthcare providers have the scope to review their policies and service-providing processes and make comparisons with other countries to gather experience for quality improvement.

Better patient outcomes are the main objectives of healthcare that require to be ensured and that should be the motto of providers and policymakers. The whole arrangement and resources allocated to ensure health outcomes where physicians should spend more time with patients to improve healthcare goals. Encouraging, motivating, and responsive interactions, self-efficacy plays a significant role in individuals' approach to health goals. Conversely, patient education and self-management programs offer immense potential for improved health outcomes in escalating healthcare costs (Paterick et al., 2017). It requires an emphasis on the patient's outcome, including the other indicators of quality healthcare, and a continuous improvement process must be practiced. Analyzing the performance of healthcare systems is an indispensable aspect of the management of health and health care today, which requires a thorough collection of data on patient outcomes, clinical decisions, and their impact. The information created during the treatment of patients can also be useful in enhancing planning and quality in the years to come. Health System Performance Assessment (HSPA) is essential also in modern health systems that help decision-makers and aid in gauging advancement to the national health aim (Kumah et al., 2020).

2.2 Definition and Features of EHRs:

Electronic Health Records are a patient's electronically preserved health-related data for updating and future use in clinical decision-making, research, and audit purposes. According to Yoshiji Yamada, "**The** electronic health record (EHR) is a longitudinal electronic record of a patient's health information generated by one or more encounters in any care delivery setting, which includes patient demographics, progress notes, problems, medications, vital signs, past medical history, immunizations, laboratory data, and radiology reports, and automates and streamlines the clinician's workflow (Yamada, 2008)." Yamada also indicates benefits of EHRs as: "(1) Information can be continuously updated. (2) Data from the EHR system can be used anonymously in statistical evaluation for purposes of quality improvement, outcome reporting, resource management, and public health surveillance of communicable diseases. (3) Information can be

exchanged between different EHR systems, facilitating the coordination of health care delivery in nonaffiliated facilities (Yamada, 2008)." When information is in an electronic system, it can offer easy updating and provide benefits for future use with interoperability. As safe and high-quality healthcare services can be offered through performing many functions such as documenting, medication and practice management as well as communication. Electronic Health Record (EHR) is arguably the most common E-health applications around the globe. EHRs contain a variety of patient information that is kept in electronic form, for example, demographic information, medical history and results from radiology and laboratory tests.

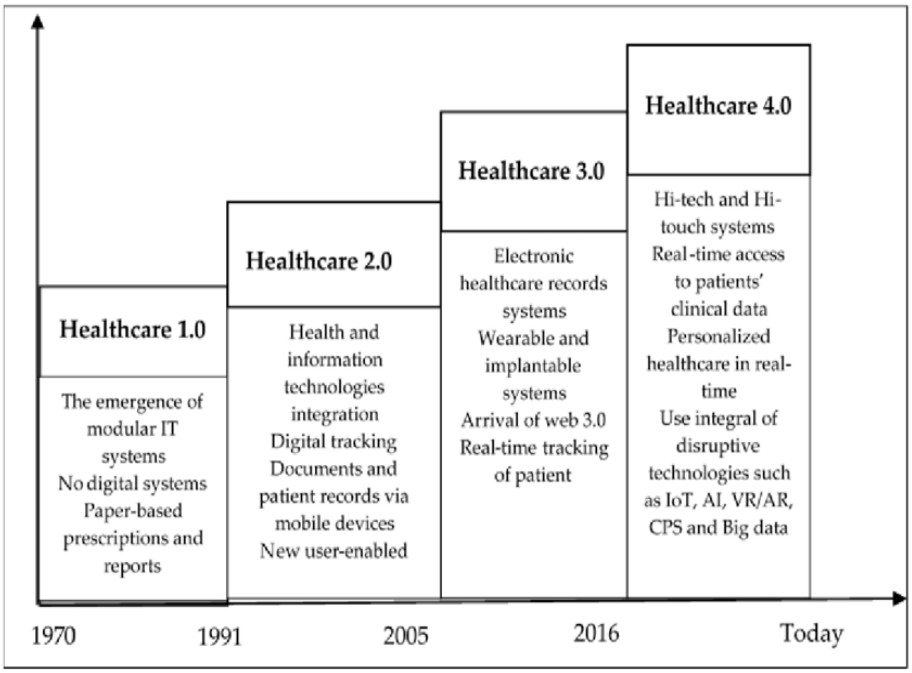
As data is preserved using information technology, the reliability and accuracy of the data are beyond question, and the decisions made based on EHRs data will be accurate and help improve outcomes. EHRs systems are essential for consistent health information collection, organization, and access. However, they can be prone to variable quality issues like missing time stamps, implausible entries, values outside normal ranges, and duplicates (Ozonze et al., 2023). The system works to methodically pile up health information or data for future use, which contributes to improving health outcomes.

2.3 Evolution of EHR systems in Health Care:

Traditionally, healthcare providers used paper to write down the medical information of patients, which was not preserved for a long time for future references. However, the tradition has changed, and developed countries now preserve health-related information and data for patient benefits, research, and audit purposes. Healthcare information and data are more than medical records. The electronic health record (EHR) is not a medical record or legal medical record, but rather a datastore for each patient, consisting of patient-specific data elements collected during care and software system data (Floyd et al., 2021). The electronic health record system stores health-related data, which will help make data-driven decisions in healthcare service provision. The history of the electronic health record is not too old; initially it was Early EHRs emerged in the 1960s to address physician concerns about medical data complexity. Key software innovations included Health Evaluation through Logical Programming (HELP), Computer Stored Ambulatory Record (COASTER), and The Medical Record (TMR) (Rahman & Reddy, 2015). After that, the electronic health records system is going forward with continuous innovation and development to make the system effective and reliable, enhancing patient care quality.

Electronic health records are the simplest way to preserve, manage, retrieve, diagnose, and guarantee that patients receive high-quality care. They have several

Figure 3: Evolution of HER System (Bongomin, 2020)



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advantages and are very usable. According to Rahman and Reddy, an electronic health records (EHRs) is an electronic patient medical history containing information from various encounters in healthcare settings that streamlines data management and supports care-related activities like evidence-based decision support, quality management, and outcomes reporting. EHRs have several advantages over paper-based systems, including improved patient care quality, increased participation, accurate diagnosing, and efficient storage and retrieval. Depending on the objectives and role of the user, it has various data formats, presentations, and levels of detail that can be maintained within institutions (Rahman & Reddy, 2015). Although electronic health records are to be used within institutions, this system is interoperable in the various countries that have already implemented electronic health records.

Electronic health records require a permanent information technology-based infrastructure, and health-related data is preserved by connecting all the service delivery points, such as doctors' offices, hospitals, clinics, investigation centers, and medical stores. All these are interconnected, and the concerned person can access the system using the ID and password. McDonald et al.(2014) opine that an electronic health record (EHR) aims to provide integrated access to patient data, but gathering and organizing this data is difficult due to its complexity and diversity. Different patient data source systems use various identifiers, terminologies, and formats, necessitating message modification and code mapping. Although interface engines can manage messages and automatically translate codes between systems, humans must define mappings (McDonald et al., 2014). Alharbi explains, "An EHR comprises four components: patient management, clinical, laboratory, and radiology. Patient management includes administrative, demographic, and billing data, while clinical includes medical history, vital signs, medications, consults, immunization, progress, and nurses' notes. Laboratory includes lab and test results, and radiology includes images (Alharbi, 2023)" which is very close to the above diagram. With the four components, another component requires adaptation, which is the clinical trial, which can ensure the accuracy of the clinical trial and patients' safety, adverse effects, and medicine costs.

2.4 Role of Electronic Health Records in Health Care Quality Enhancement:

The use of electronic health records (EHRs) has been gaining attention worldwide due to their potential to enhance the quality of healthcare services. It plays a vital role in clinical care improvement, administrative functions, and other areas also. EHRs are essential to the healthcare system because they increase productivity, patient safety, access, and affordability. It is helpful for

Figure 4 : Stored Data in Electronic Health Record System

reporting, research, financial applications, administrative tasks, and clinical care (Odekunle, 2016). As it is a permanent record, repeated use is possible, and interconnectivity with several devices can help patients' outcomes by reducing costs, enhancing effective management, and facilitating future research and audit.

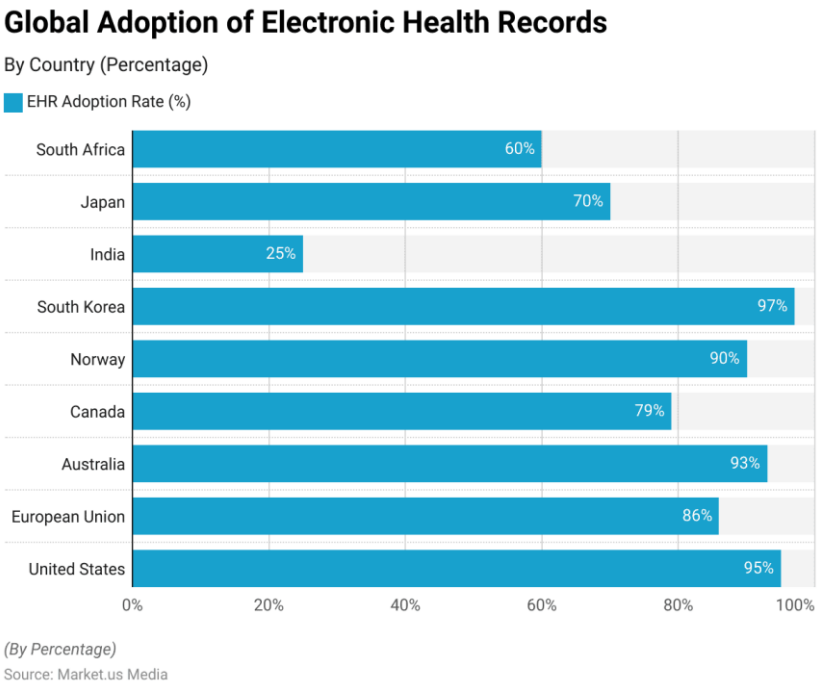
The major issue is health information, which supports clinical decision-making, improves patient care, and reduces costs. EHRs are continuous electronic records of patient health data, including medical history, progress notes, medications, vital signs, and demographic information. Benefits include more access to electronic records and better handwriting. For enhancing care quality and lowering costs, three functionalities—clinical decision support tools, computerized physician order entry systems, and health information exchange—show promise (Menachemi & Collum, 2011). Electronic health records can provide a better outcome in terms of enhancing care quality, safety, and accessibility.

Electronic health records are associated with patients' safety. According to experts, a key component of providing high-quality care is ensuring patient safety, access to healthcare, effective treatment, effective resource management, equity of care across populations, and patient-centred care. These areas match the definitions of high-quality care the World Health Organization provides. Considering individual preferences, aspirations, and community cultures, electronic health is multifaceted in enhancing healthcare quality (Ibrahim et al., 2022). Therefore, electronic health records can improve patient safety, support evidence-based practice, enhance coordination among healthcare providers, and streamline healthcare processes.

2.5 Global Implementation of Electronic Health Records:

OECD countries, including some African and Asian countries, are using electronic health records in health service providers, including hospitals, clinics, doctors' offices, investigation centers, and radiology centers, and producing highly satisfactory results in patients' care and privacy, research, and administrative and financial management. Alharbi depicts, in the US, 84% of doctors in offices and 96% of non-government hospitals adopted electronic health records in 2017. These systems provide more advanced technological features, including tracking patient demographics, drug information, clinical notes, and related data. In England, patient records had to be computerized by 2015, and patients had to be given access to their records by healthcare professionals. The Australian Electronic Health Agency was founded in 2016 to promote electronic health initiatives in Australia. By 2018, there were 732 hospitals and 1,882,503 patients in France with EHRs, which gave patients and healthcare workers individual

Figure 5: Implementing EHR around the Globe (Yardi, 2024)



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electronic identifiers (Alharbi, 2023). The countries' adapted electronic health record systems are gaining expected benefits; however, they face some initial challenges that they overcome and establish the system with continuous improvement.

The countries customized some sort of strategy to implement the electronic health records system, successfully. Adler-Milstein et al. explain, in the US, 84% of doctors in offices and 96% of non-government hospitals adopted electronic health records in 2017. These systems provide more advanced technological features, including tracking patient demographics, drug information, clinical notes, and related data. In England, patient records had to be computerized by 2015, and patients had to be given access to their records by healthcare professionals. The Australian Electronic Health Agency was founded in 2016 to promote electronic health initiatives in Australia. By 2018, there were 732 hospitals and 1,882,503 patients in France with EHRs, which gave patients and healthcare workers individual electronic identifiers (Adler-Milstein et al., 2014) Countries like Bangladesh can learn from and gather experiences from countries that have successfully implemented electronic health records to achieve the best healthcare outcomes in terms of healthcare quality enhancement.

2.6 Electronic Health Record Adoption in Low-Resource Settings:

Countries with low resources use electronic health records for healthcare quality improvement. Despite their financial constraints, they adapt the electronic system as the sustainable development goals relating to healthcare are a significant target for the member countries, and they should achieve the targets set by the UN. Particularly in low-income nations, more than 50% of global EHR installations fell short of their intended goals. Only 15% of these nations have implemented computerized record-keeping systems. Due to the electronic gap and socioeconomic difficulties, sub-Saharan nations are more likely to adopt these technologies. However, developments in some areas indicate that EHR is practical and affordable in settings with low resources (Ngusie et al., 2022). The low-income countries established EHRs systems are employed in nations like Uganda, Rwanda, Sierra Leone, and Angola despite obstacles like limited economic preparedness and experimental adoption. Before implementing EHRs systems, LICs should assess their organizational, technological, social, and economic preparedness. Open-source EMR systems are improving clinical care and decision-making (Woldemariam & Jimma, 2023). Their inclination toward this system has incited them to adapt it, which is nothing but the motivation of a country's policymakers.

3 Methodology:

In this research, data is required to be collected from the people, the doctors, who are the main driving force of healthcare in Bangladesh and whose opinions and suggestions are valuable in implementing an electronic health records system for quality enhancement in this arena. For this reason, the qualitative method has been used in this research; it examines the nature of occurrences, including their quality, manifestations, context, and viewpoints, without looking at their scope, frequency, or position along an impartial cause-and-effect chain. (Busetto et al., 2020).

3.1 Study Method:

Practical healthcare services today involve a lot of paperwork, ranging from prescriptions and investigation reports to financial and administrative documents, all of which tend to be of single use and are not kept for future reference, review, or auditing. More often than not, even the prescriptions and investigation reports issued to the patients are not kept, leading to absence of any medical records that could have been used at a later date. This problem, however, is as a result of absence of systematic methods of preservation and the use of paper records which can easily be misplaced or destroyed in one way or another. However, this challenge can be taken care of electronic health records (EHR) solutions that will guarantee the safety and convenience of keeping any medical documents. Key stakeholder such as providers of healthcare services and policymakers regard the implementation of electronic health records (EHR) systems as a viable and feasible solution. The qualitative research orientation is suitable for those attempting to grasp the views and the experiences of people, especially in the area of pharmacy practice, patient attitudes, and non-compliance with medication. This process comes as an aid in mixed-methods research, the type of research whereby qualitative data is used to enhance or deepen quantitative results. (Sutton & Austin, 2015).

Study Area

Data were gathered from physicians practicing within the boundaries of the Khulna City Corporation which is composed of three private medical colleges and a government medical college as well as over three

hundred specialist practitioners most of who work in the public and the private health systems. The researchers opted for Khulna, as they were able to easily access local doctors and relevant data, and consider available resources and time. Field study, quantitative and qualitative research and document review including books and journals and government publications provided primary and secondary data respectively. To enrich data qualitative and purposive sampling technique helped to get a few respondents. In Khulna BMA (Bangladesh Medical Association) sets the sample size to 30 doctors which is 10% of the community. The specific foundation for the study considered attention on professionals from the medical field who would provide the most extensive responses in regards to the objectives of the study. As such, because of the comprehensive subject matter that pre-empted this study, purposive sampling was the most appropriate method.

3.2 Study Design:

In-depth interviews with open-ended questions were used to gather information, allowing researchers to explore participants' experiences, opinions, and attitudes. These one-on-one meetings were particularly effective for discussing sensitive subjects and providing a secure environment for participants to share their experiences. All respondents were doctors, and demographic information such as age, gender, profession, and religious identity was not collected. The collected data were categorized by breaking it into smaller portions and assigning codes to each segment. Patterns and themes were identified through this coding process, which grouped similar data into broader categories to reveal more general concepts. Interpretation involved examining these patterns and themes to draw conclusions and provide meaningful insights.

3.3 Ethical consideration:

The objectives and method used in the study were explained to the respondents, and they were assured before the interview that this study was conducted to understand the status of the electronic health records system and how to implement it for quality healthcare in Bangladesh. Moreover, the commitments and opinions provided would not be disclosed to anyone. They were also free to abstain from the interview at any time if they thought it fit. The respondents were spontaneous as they put their trust in the assurance of the interviewer.

4 Results:

4.1 Opinions on Healthcare quality:

The respondents expressed their dissatisfaction with the quality of healthcare in Bangladesh in terms of indoor or outdoor treatment, where the environment of the hospital and its cleanliness, sufficient facilities, doctors, nurses, behavior of the doctors and nurses towards the patients, technicians, medicine supply, pathology and radiology facilities, and dietary support for the patients are not up to the mark. In most cases, the required facilities are not available in the Union and Upazila health complexes, so they should refer the patients to the district-level hospital or Dhaka for proper treatment. Sometimes, the patients die on the way to the referred hospitals. Respondents say, *"Facilities need to be enhanced, and most importantly, the behavior of doctors and nurses should be kind and friendly to the patients, and all hospitals and clinics with diagnostic centers should maintain the same quality."* In addition, some of the respondents opined that quality could be more satisfactory; however, it depends on the government's financial strength.

4.2 Status of electronic health records and their relationship with healthcare quality:

The respondents opine that Bangladesh has yet to introduce electronic health records in the government hospitals, private clinics, pathological laboratories, consultation centers, and any other health service delivery points; however, some private hospitals with pathology laboratories have built a computerized system to deliver test results and financial services, which rather serves the interest of the hospital by saving costs and manpower. Respondents say, " Neither government nor private healthcare institutions nor pathology laboratories preserve health records on paper or electronically for future use or research for quality enhancement of healthcare, as quality depends on continuous research…. Preserving paper-based reports is not easy as it requires buying papers, ink, and additional manpower to carry them to the front desk from the laboratory; however, it is easier to transfer the report to the front desk, which can print it and deliver it to the patients." Moreover, they can also send it to the doctor using the lane line to the different service delivery points. Proper preservation of health data can help clinical decision-making considering the previous data from the electronic health records; thus, the

electronic health records maintain a relationship with healthcare quality.

4.3 Benefits of Electronic Health Records in Bangladesh:

The respondents opine that electronic health records can produce potential benefits for Bangladesh in healthcare administration, financial management, data storage, clinical decision-making, research, and auditing. Electronic health records can ensure easy healthcare administration and management at the hospital, including financial accounting issues and resource management. Respondents explains, "*As the patient's previous health-related data is stored in the system, clinical decision-making will be more accurate, enhancing quality care and patient outcomes. In the absence of previous data, sometimes adverse events may occur, and the patient may suffer even up to death.*" Without health records, doctors may unethically suggest excessive or unnecessary pathological tests, hospital admission, and surgery, which can enhance treatment costs and patients' suffering even up to death. Therefore, electronic health records can enhance healthcare quality and safety, improve patient outcomes, and increase efficiency in healthcare delivery.

4.4 Establishing collaborative approach and data management:

Most respondents opine that all the health-related service delivery stations can be brought under the same network, such as doctors, hospitals, clinics, pathology laboratories, medical stores, billings and payments, and nurses' orders, which must be connected to a data store. Respondents say, *"The doctors and other relevant healthcare managers shall have access to the system using their user ID and password. Similarly, patients shall be issued health cards, and their biographical information shall be preserved along with their medical history, which will be available for future decision-making if required."*

An electronic health records system helps maintain data for the safety and security of patients, ensuring long-term data storage. In addition, an auditing system can be established to protect against malpractice. Conversely, the researcher can access the data store to improve research work which can foster to improve new medicinal or non-medicinal interventions. The system may have a module for clinical trials that will preserve data for new drug development, success, failure, and adverse effects, and this kind of data will help to approve new drugs and fix prices. So, the collaborative approach will ensure long-term data preservation, interoperability, future use, auditing, new drug approval, protection from malpractice, and overall healthcare improvement.

4.5 Potential limitations or challenges associated with implementing electronic health records system:

The respondents say that infrastructure and the attitude of the healthcare providers are the potential challenges in implementing a electronic health records system in Bangladesh. In addition, healthcare providers habituated to unethical practices and suggest excessive medicinal intervention, having been influenced by the pharmaceutical industry, unnecessary pathological investigation, and hospital admission may oppose the system out of the apprehension of being caught. Respondents are skeptical but optimistic in implementing EHRs system as they say, *"The pressure groups may also influence the policymaker; however, this is resolvable."*

The government has yet to make the necessary policy and legal framework for implementing the system, although the third sustainable development goal is to achieve good health and well-being. Therefore, policy or legal framework is another barrier to implementing Bangladesh's electronic health records system.

4.6 Strategies for Successful Implementation of Electronic Health Records:

Most of the respondents' state that the government has to formulate a compatible health policy and legal framework for implementing the electronic health records system. Supporting the EHRs system respondents says, *"A suitable infrastructure has to be established connecting all the health-related service delivery points, including hospitals, clinics, pathology laboratories, consultation centers, and every individual practicing doctor, whether employed by the government or not."*

After establishing the infrastructure, the government should take the initiatives to provide the necessary technical and motivational training to the doctors and other administrative personnel for capacity building so they can use the system effectively. Meetings, seminars, and workshops can be arranged with the stakeholders to understand the system's necessity and usefulness because every citizen, including doctors, will benefit from the electronic health records system. In addition, some financial benefits, such as a certain percentage of a tax rebate, can be offered to the user, with penalties for non-users.

5 Discussion

5.1 Impact of Electronic Health Records on Patient Care:

Electronic health records have the potential to impact patient care in Bangladesh. The respondents argue that when the patient's previous history is available, it must help the doctor make an accurate diagnosis and reduce adverse events. The previous records can provide information about the patient's health problem and treatment to support diagnosis, proper treatment, and continuity of care, reducing medical errors and improving patient safety. Moreover, EHRs can reduce unethical clinical practice behavior, health risks, and financial losses for patients and help them take shelter in the legal system of the country because the proper evidence of any adverse events and improper treatment is available.

5.2 Enhanced Communication and Collaboration among Healthcare Providers:

The study explains that all the healthcare delivery points shall be under one network with a sophisticated soft where all physicians' notes, pathological reports, radiological reports, demographical reports, interventions, adverse events, allergic foods, and all other health-related information are preserved that can establish a direct connection and contacts with the doctors working in the specific arena. The network helps the doctors work on a complicated health problem by connecting with multidisciplinary experts to resolve the problem of a particular patient through a collaborative approach. This network ensures the potential benefits of real-time data sharing, remote consultations, and multidisciplinary care coordination.

5.3 Efficient Data Management and Analysis:

Bangladeshi healthcare providers neither preserve paper-based nor electronic health records; however, electronic health records create opportunities to preserve data on servers in organized ways with special software, enabling efficient data management and data availability that can support appropriate analysis in Bangladesh. Conversely, as data becomes accessible, it generates prospects for leveraging data analytics to identify patterns and trends in the diseases of a particular patient or community and offers opportunities for quality improvement in healthcare.

5.4 Potential Limitations and Mitigation Strategies:

Although there are potential benefits to EHRs, they are open to some of the limitations or concerns associated with implementing electronic health records. As health data is sensitive, some hackers can make it a lucrative target for them to gain financially, which seriously threatens data privacy and security. On the other hand, creating interoperability, infrastructure requirements, and user acceptance is a significant challenge for the government. To overcome the challenges, the government must hire a specialized team to build, maintain, secure, and improve the system according to the users' needs.

5.5 Implications for Policy and Practice:

The government should update the health policy to implement the electronic health record system, including enacting the Health Act for its implementation and running. As the law has provisions for punishment, the unwilling people who would try to resist the system would be brought under the penalties. Accordingly, the law can offer financial incentives to the users to motivate them to use the EHR system. The law can make provision for ensuring the availability of the system to doctors, hospitals, clinics, and pathology laboratories, including all health service delivery points, for free of costs, and also train and support the users to establish and use the system in their offices.

6 Conclusion

In Bangladesh, healthcare providers must preserve health records on paper or electronically, creating patient health risks. The electronic health records system can benefit the patient by helping the physicians make proper clinical decisions and select appropriate interventions, including medicinal and nonmedicinal ones which enhance the healthcare quality. Electronic health records can ensure the long-term preservation of the person's health records, offering future use of the documents even after death. The system can generate opportunities for clinical trial data authenticity and research for future development. However, the system can help protect the unethical practice behaviour of physicians influenced by the pharmaceutical industry and other medical product suppliers, which can help reduce healthcare costs and patients' health risks. Although the electronic health records system offers potential benefits, some disadvantages and risks may include data privacy, misuse, cyber threats, and hacking.

However, considering all the benefits and disadvantages, the government should introduce the electronic health records system within a legal framework that updates health policy.

The key findings from the study, including the role of electronic health records in enhancing healthcare quality in Bangladesh, are summarized in this subsection.

a. The health care providers in Bangladesh do not preserve health records either on paper or electronically.
b. Electronic health records enhance healthcare quality in Bangladesh.
c. The electronic health records system ensures long-term health records preservation and supports proper clinical decision-making and research for healthcare quality enhancement.
d. Electronic health records can reduce health risks, unethical clinical practice, and treatment costs.
e. The electronic health records system has the risk of data privacy and breach, cyber threats, hacking, and misuse.
f. The government requires enactment of the Health Act to implement the electronic health system in Bangladesh.

Because of the time and resource constraints, the research was conducted in a limited area with limited sample sizes, which may have drawbacks in producing reliable results. It is a potential area for research, and further investigation is needed to strengthen the evidence base and inform future initiatives in electronic health record implementation in Bangladesh.

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Annex A

Table: Interview Guidelines

Questions to the doctors
1. Would you please let me know your opinion on Bangladesh's healthcare quality?
2. Do you think that electronic health records have a relationship with healthcare quality?
3. What is the status of electronic health record in Bangladesh?
4. What are the potential benefits of implementing electronic health records in Bangladesh?
5. How can electronic health records contribute to enhancing patient care and safety in the Bangladeshi healthcare system?
6. How can a collaborative approach be established through the electronic health records system in Bangladesh?
7. How can electronic health records facilitate efficient data management and analysis to improve healthcare quality in Bangladesh?
8. What are the potential limitations or concerns associated with implementing electronic health records in Bangladesh, and what mitigation strategies can be employed?
9. What are the policy and practice implications of implementing electronic health records for healthcare quality enhancement in Bangladesh?
10. What strategies can be adopted to overcome the challenges and facilitate successful implementation of electronic health records in Bangladesh?