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E-Health Record Using Block Chain and Data Mining

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Abstract

E-Health record is an electronic record of patient record information, pharmacy, clinical findings, diagnostic test results, patient's history, patients progress and medication. It provides the details of treatment, performed date, time. During these three years, we can see a huge increase in the number of patients. Sometimes there is a chance of losing the doctor's prescription. And also, patient don't know how much money they are spending on hospital. So, this application provides a solution to those problems. In olden days, we consult doctors for very small disease. Now the condition is not like that, patients do not consult doctor for a small disease and they are taking self-medication. So, this medical record helps you to consult doctors online. Assume If a person is having corona, for getting his current medication and also about the health condition, we can use this medical record. The existing health records are kept and maintained by hospital. In addition to this, the patients can also easily access their medical health record a and review their treatment plans. Moreover, the pharmacy services and laboratories are also made available where, they can book appointments and make online payments and transactions. The medicines will be delivered to the patient's location. Through these kinds of online deliveries, it assures job opportunities for individuals. If a person gets sick, he can search using symptoms and this application helps to identify the disease. This application provides all the hospital information and make them aware about the expenses incurred due to a specific treatment. Through this project we aim to provide medical assistances and health records under one application.

I. Introduction

The healthcare sector has undergone significant advancements in recent years, with technology playing a crucial role in transforming how medical services are provided and managed. One of the key innovations in healthcare is the implementation of **Electronic Health Records (EHRs)**, which are

digital versions of a patient's medical history. These records contain important information such as clinical findings, diagnostic test results, treatment plans, medications, and progress, making it easier for healthcare providers to access and update patient data.However, with the increasing number of patients seeking healthcare services, the complexity of managing medical records, prescriptions, and treatments has also risen. Patients often struggle to keep track of their medical histories, lose prescriptions, or face challenges understanding their treatment costs. Additionally, many people avoid visiting healthcare professionals for minor ailments, relying on self-medication, which can sometimes lead to complications.This application aims to address these challenges by providing a comprehensive solution for managing **e- health records**, **remote consultations**, **pharmacy services**, and **medical expenses** all in one platform. By allowing patients to easily access their medical history, book appointments, order medications, and track their healthcare spending, this application not only empowers patients but also enhances the efficiency of the healthcare delivery process.

Furthermore, the app introduces a symptom-based search feature that helps patients identify possible diseases, guiding them on whether a doctor's consultation is needed. This is particularly useful during times of health crises, such as the COVID-19 pandemic, where remote consultations and online services have become essential.In addition, the app supports the delivery of medications and diagnostic test bookings, contributing to job creation and economic growth in the healthcare and delivery sectors. By offering these integrated services, the application is designed to simplify the healthcare experience and provide patients with better control over their health and well-being.

In summary, this e-health record system aims to revolutionize healthcare management by combining medical records, online consultations, pharmacy services, and financial transparency under a single user-friendly platform. Through this, we seek to improve healthcare access, reduce costs, and enhance the overall patient experience.

RESEARCH OBJECTIVE

The primary objective of this research is to develop and assess an **e-health record system** that integrates various healthcare services, including medical records management, online consultations, pharmacy services, and expense tracking. This system aims to improve the overall healthcare experience for both patients and healthcare providers. The specific research objectives of this project are as follows:

1. **To Develop an Efficient Electronic Health Record System:**

- Design and implement a user-friendly digital platform that stores and manages patient health data, including medical history, clinical findings, diagnostic results, treatment plans, and prescriptions.
- Ensure that the system allows easy access to and retrieval of patient records for both healthcare providers and patients, reducing the chances of lost or forgotten information.

2. **To Facilitate Remote Healthcare Consultations:**
   - Create a platform that enables patients to consult with doctors remotely, ensuring timely access to healthcare for individuals who may not be able to visit healthcare facilities in person.
   - Provide tools that allow healthcare providers to monitor patient progress, update treatment plans, and issue prescriptions digitally.
3. **To Integrate Pharmacy and Laboratory Services:**
   - Integrate features for patients to book laboratory tests and order medications directly through the platform.
   - Develop a secure payment system to allow for easy and transparent online transactions for medical services and prescriptions.
   - Enable medication delivery to patients' locations, improving convenience and accessibility.
4. **To Provide Cost Transparency and Expense Management:**
   - Implement a feature that helps patients track their medical expenses related to consultations, treatments, medications, and lab tests.
   - Offer insights into how much money patients are spending on healthcare, making it easier to manage costs and avoid unexpected financial burdens.
5. **To Support Symptom-Based Disease Identification:**
   - Develop a symptom-checking feature that allows patients to input their symptoms and receive potential diagnoses or recommendations on whether they should seek medical consultation.
   - Assist patients in making informed decisions about their healthcare based on their symptoms and the advice provided.
6. **To Improve Healthcare Accessibility and Patient Engagement:**
   - Enhance patient engagement by offering easy access to health information, ongoing treatments, and medication updates, empowering patients to take a more active role in their health management.
   - Ensure that patients, particularly those in remote areas or facing mobility issues, can access healthcare services conveniently from their devices.

II . LITERATURE REVIEW

The integration of technology into healthcare has been an area of significant growth over the past few decades, with Electronic Health Records (EHRs) playing a pivotal role in transforming the way patient data is managed and accessed. This section will explore the current body of literature on the adoption and impact of e-health records, online healthcare consultations, pharmacy and laboratory services, symptom-checking technologies, and healthcare cost transparency.

1. Electronic Health Records (EHRs)

EHRs have revolutionized the management of patient data by digitizing traditional paper-based medical records, allowing for easier access, storage, and sharing of patient information among healthcare providers. According to *Wager et al. (2017)*, the implementation of EHRs has led to improvements in the quality of care, enhanced patient safety, and a reduction in medical errors. However, challenges such as data security, patient privacy, and system interoperability remain. *Dufresne et al. (2019)* note that while EHRs improve efficiency and reduce the risk of errors, the lack of standardized systems across healthcare providers can hinder the smooth exchange of information. The development of interoperable EHR systems is essential for facilitating communication between different healthcare organizations.

2. Online Healthcare Consultations

The rise of telemedicine and online healthcare consultations has been one of the most notable developments in recent years, especially highlighted by the COVID-19 pandemic. Research by *Bashshur et al. (2020)* indicates that telemedicine offers significant benefits in improving access to healthcare services, particularly for those living in rural areas or individuals with mobility challenges. It can also reduce the pressure on healthcare facilities by providing an alternative means of diagnosis and consultation.

In terms of quality, *Levine et al. (2020)* found that telemedicine consultations are generally well-received by patients, with many reporting that the quality of care was comparable to in-person visits. However, they also highlighted that the lack of physical examinations and the need for reliable internet connectivity can present challenges. Despite these issues, the use of online consultations is projected to continue growing due to its convenience and flexibility.

3. Pharmacy and Laboratory Services Integration

Integrating pharmacy and laboratory services into digital health platforms has been an emerging trend aimed at improving patient convenience and streamlining healthcare processes. According to *Zhang et al. (2021)*, the ability to book appointments for laboratory tests and order medications online offers numerous benefits. It simplifies access to services, reduces wait times, and provides a more personalized experience for patients.

A study by *Albrecht et al. (2018)* found that online medication ordering systems, when paired with reliable delivery services, can improve patient adherence to prescribed treatments by providing timely and convenient access to medications. The integration of these services also offers patients transparency in terms of cost and service availability.

4. Symptom-Based Disease Identification

Symptom-based disease identification through artificial intelligence (AI) and machine learning has gained attention as a means to empower patients to make informed decisions about their health. Platforms such as *WebMD* and *Babylon Health* provide symptom checkers that analyze patient inputs and offer potential diagnoses,

helping patients determine whether they need to seek medical attention.*Wallace et al. (2019)* suggest that AI-driven diagnostic tools have shown promise in improving the accuracy of diagnoses. In some cases, these tools can help identify conditions earlier than traditional methods. However, challenges remain in ensuring the accuracy and reliability of these systems. Misdiagnosis or the overreliance on these tools could lead to unnecessary treatments or delays in seeking professional care.

5. **Healthcare Cost** TransparencyOne of the significant barriers for patients in managing their health is the lack of transparency regarding healthcare costs. *Berwick et al. (2018)* argue that healthcare costs are often hidden or unclear, leading to financial strain and unexpected medical bills. The rise of digital health platforms that provide cost transparency can help patients make informed decisions about their care options. Platforms that offer clear breakdowns of medical services, prescriptions, and treatments allow patients to better understand their expenses and manage their budgets. A study by *Goldman et al. (2019)* revealed that providing patients with access to real-time pricing information resulted in more cost-conscious decision-making and a reduction in unnecessary healthcare services.

6. **Impact on Healthcare Accessibility and Job** CreationThe integration of e-health solutions contributes not only to improving healthcare accessibility but also to economic growth through job creation. The expansion of digital health services like telemedicine, online pharmacies, and home delivery services is expected to create new employment opportunities. *Martin et al. (2020)* found that the rise of telemedicine services has generated jobs in IT, customer support, logistics, and delivery sectors, with many positions being remote or flexible.

Moreover, e-health systems help bridge the healthcare accessibility gap by allowing patients to consult healthcare providers remotely, book appointments, and access medications without having to visit physical healthcare facilities. This is particularly beneficial for underserved populations and rural communities, where healthcare facilities are often scarce.

III. PROPOSED SYSTEM

The proposed system is a comprehensive **e-health record management platform** that integrates various healthcare services, providing a seamless experience for both patients and healthcare providers. The system will serve as an all-in-one digital health solution that manages patient health records, facilitates online consultations, supports pharmacy and laboratory services, tracks healthcare costs, and allows for symptom-based disease identification.

Key Features and Modules of the Proposed System:

1. **Electronic Health Record (EHR) Management:**
   - **Patient Profiles:** The system will maintain digital health records for each patient, including medical history, clinical findings, diagnostic

results, treatment plans, prescriptions, and progress updates.

- **Access Control:** Healthcare providers and patients will have secure, role- based access to health records, ensuring privacy and confidentiality. Patients can access their records anytime, allowing them to monitor their health status and treatment history.
- **Real-time Updates:** Medical data, such as lab results, prescription changes, and treatment plans, will be updated in real time, ensuring that all information is current and available to both doctors and patients.

2. **Online Healthcare Consultations:**
   - **Telemedicine Interface:** The system will include a secure video conferencing module, enabling patients to consult with doctors remotely. This feature will be particularly useful during pandemics or for patients who cannot visit a hospital due to mobility issues or distance.
   - **Virtual Consultation Scheduling:** Patients will be able to schedule appointments with healthcare professionals based on their availability, receiving notifications and reminders before their consultation.
   - **Digital Prescriptions and Follow- ups:** After consultations, doctors will issue digital prescriptions that patients can access directly through the system. Follow-up appointments can be scheduled based on the doctor's recommendations.
3. **Pharmacy and Laboratory Services:**
   - **Pharmacy Integration:** The system will allow patients to order prescribed medications directly through the platform, with delivery services to their homes or preferred addresses. A comprehensive database of medications will ensure accurate and timely dispensing.
   - **Laboratory Integration:** Patients can book appointments for lab tests via the system. Results will be automatically uploaded to the patient's record, and doctors can access them for diagnosis or treatment adjustments.
   - **Order Tracking:** Patients can track the status of their medication and laboratory test orders in real time, ensuring transparency and convenience.
4. **Symptom-based Disease Identification:**
   - **AI-powered Symptom Checker:** The system will feature a symptom-based diagnostic tool that allows patients to input their symptoms and receive potential disease suggestions based on AI algorithms. This feature will help patients understand whether their symptoms require medical attention or if self-care is sufficient.
   - **Guidance for Next Steps:** Based on the symptom input, the system will recommend whether the patient should

seek medical consultation, potentially connecting them directly with a healthcare professional if needed.

5. **Cost Transparency and Expense Management:**
   - **Real-time Cost Estimates:** The system will provide real-time cost estimates for various medical services, consultations, laboratory tests, and medications. This will allow patients to understand the financial implications of their healthcare decisions.
   - **Expense Tracking:** A comprehensive dashboard will allow patients to track their healthcare expenses, showing a detailed breakdown of each service, including consultations, medications, lab tests, and delivery fees.
   - **Payment Integration:** Patients will have the option to pay for consultations, medications, and lab services directly through the platform using secure payment gateways. The system will also provide receipts and transaction history for transparency.
6. **Patient Engagement and Health Monitoring:**
   - **Health Alerts and Reminders:** The system will send automated reminders for upcoming consultations, medication refills, and health check-ups. Additionally, it can alert patients to abnormal test results, prompting them to take further action.
   - **Progress Tracking:** Patients will be able to track their health progress over time. This feature can include weight tracking, blood pressure monitoring, and medication adherence, allowing patients to view their improvements or regressions.
7. **Job Creation and Employment Support:**
   - **Delivery and Support Roles:** The system will generate job opportunities in areas such as medicine delivery, customer support, IT maintenance, and telemedicine services. This will contribute to job creation and help stimulate the local economy.
   - **Healthcare Professionals:** By connecting patients with healthcare providers remotely, the system facilitates job opportunities for doctors, nurses, and other healthcare professionals who can offer consultations and services through the platform.

V. RESULTS AND CONCLUSION

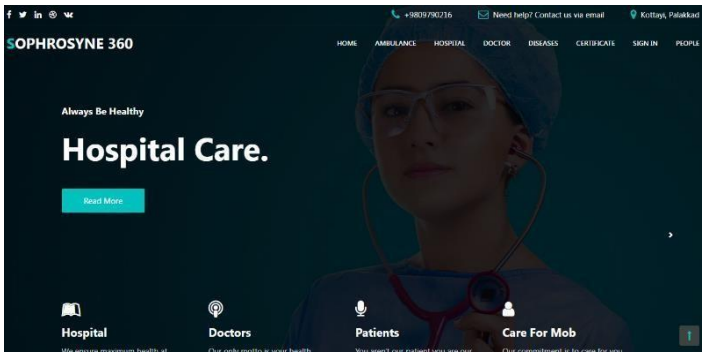

Fig. 1 : Home page

VI. Conclusion

The proposed **e-health record management system** aims to revolutionize healthcare delivery by providing a comprehensive, integrated platform that addresses the growing demands of modern healthcare. Through the development of features such as electronic health records, online consultations, symptom-based disease identification, pharmacy and laboratory services, cost transparency, and secure patient access, this system is designed to improve the overall healthcare experience for both patients and healthcare providers.

By utilizing advanced algorithms to manage patient data securely, facilitate remote consultations, track healthcare expenses, and recommend potential diagnoses based on symptoms, the system ensures efficiency and accessibility while minimizing common issues such as loss of records, missed appointments, and unexpected healthcare costs. Moreover, the system's focus on **symptom checkers** and **cost estimation** empowers patients with better tools to manage their health and finances proactively.

Additionally, the integration of pharmacy and laboratory services, alongside **medication delivery** and **job creation opportunities**, enhances convenience for patients and supports economic growth in the healthcare sector.

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