Healthcare and Medical Apps : A Review

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Abstract

Evolving technologies and mobile apps are revolutionizing the healthcare industry. These technologies overcome the traditional limitations of healthcare systems such as instant and secure access, accuracy, and mobility. Mobile devices and apps are proving beneficial for healthcare professionals, as they provide easy access to point-of-care tools, which enable better clinical decision-making and improved patient outcomes. The present paper reviews different types of technologies and mobile apps being used in the healthcare industry and their future potential.

Keywords : **Artificial Intelligence, healthcare, mobile app**

I. INTRODUCTION

Mobile devices offer advanced features, such as internet access, global positioning systems (GPS), high-quality cameras, and sound recorders on the go. With powerful processers and operating systems, large memories, and high-resolution screens, mobile devices, and reduction of cost, the ownership of mobile devices has increased by leaps and bounds. The iPad provides intuitivesness, portability, and a comparatively large screen. Google Android Operating System tablets are also available [1].

Mobile devices and apps are proving beneficial for healthcare professionals (HCPs), as they provide easy access to tools at the point-of-care. This enables better clinical decision-making and patient outcomes. There is some reluctance in using them as better standards of mobile medical apps need to be established to ensure that they are properly used and integrated into medical practice. These measures will raise the barrier for entry into the medical app market, eventually increasing the quality and safety of the apps [1].

II. NEED FOR MOBILE DEVICES AT THE POINT OF CARE

Healthcare practitioners need to access many types of resources. Some of these are:

- Communication capabilities that include voice calling, video conferencing, text
- Information systems that store electronic health records (EHRs), decision support systems
- Informational resources like textbooks, guidelines, medical literature, drug references
- Software applications for diagnosis

There are many medical apps for electronic prescriptions, diagnosis and treatment, billing, and e-learning. A number of apps help with answering clinical practice and other questions. Some of these are drug reference guides, clinical guidelines, and other decision support aids, textbooks, and portals for searching literature. There are mobile apps to conduct medical tests, such as hearing or vision tests [1]. Apps for appointment and reminders, diet plan, medical records,

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mental health exercises, medical training, pharmacy delivery etc. are available in the market.

Some of the best healthcare and medical apps that are used by patients and doctors use Artificial Intelligence (AI). Machine Learning algorithms generate deep insights from a patient's health data. Thus, they help in diagnosing terminal diseases such as cancer at an early age. Also, AI powered chatbots help in answering queries of patients.

III. HOW MEDICAL PROFESSIONALS USE MOBILE DEVICES AND APPS

Healthcare professionals use medical devices and apps for the following broad categories:

A. Administration - Information and Time Management

With popular information management apps, users can write notes, record audio, store pictures, and organize material into categories. These can be stored and categorized in an electronic database and can be searched. E-books reader apps such as GoodReader and iAnnotate allow users to view, underline, highlight, and annotate text in PDF files.

Files stored on a Cloud service can be accessed using a mobile device instantly from multiple devices. People can also share materials quickly [1].

B. Health Record Maintenance and Access

Apps for data collection and retrieval are also available. Hospital information systems allow management of records, permit secure access to patient information onsite or remotely. Such information includes medical history, vitals, prescriptions, lab results, x-rays, scans, consultations, and discharge notes.

C. Communication and Consulting

Healthcare systems are often highly distributed over multiple locations such as clinics, inpatient wards, outpatient services, emergency departments, operating theaters, and labs. Therefore, healthcare professionals need to communicate on the go and collaborate with people in different locations. Mobile devices offer multiple means of communication, such as voice and video calling; text, e-mail, and multimedia messaging; and video conferencing for this purpose.

Social networking apps enable discussion, consultations, and collaboration among healthcare professionals. Doximity is one such app. Such forums make it easy and efficient for medical specialists to share opinions. A number of chatting apps are now available, through which text and images can be shared during consultations [1].

D. Reference and Information Gathering

Mobile devices are invaluable tools for healthcare professionals to search or access medical literature as well as other information sources.

E. Patient Monitoring

Mobile devices can be used to remotely monitor the

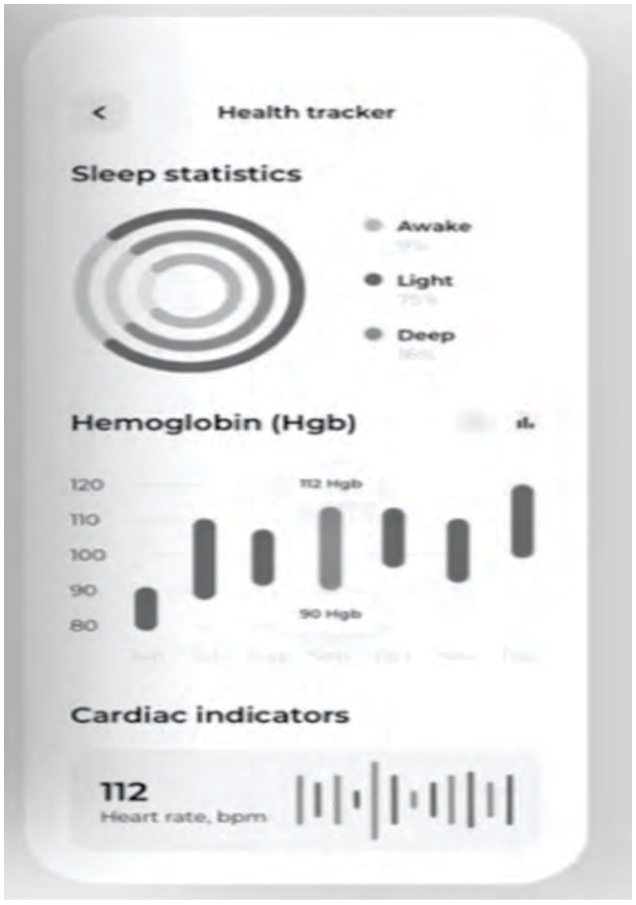

Fig. 1. Healthcare App

health of patients with chronic diseases. Mobile device apps can be used for public health surveillance and can be used for data collection of communities. During the COVID-19 pandemic, the Indian government launched the mobile app Aarogya Setu to collect health data of people, do self-assessment on the basis of responses to some questions, calculate risk status of user, share updates and advisories with people, schedule appointments for vaccine dose etc.

People can use lifestyle apps and health monitoring apps to keep themselves fit [2]. Wearable gadgets are useful for tracking the health of patients. Some healthcare apps for consumers connect with wearable devices to tranmit information such as heart rate, oxygen, blood pressure, and even stress in real-time to the doctors.

F. Medical Education

Mobile devices play an important role in medical education as students use mobile technology during training. They use them to access information about disease, treatment, medicines etc. [1].

IV. HOW MOBILE DEVICES AND APPS HELP MEDICAL PROFESSIONALS

Mobile devices and apps enable healthcare professionals to reduce the errors, increase the quality of diagnosis, manage data, and access it easily. These are also beneficial for patients as it increases their comfort and leads to faster recovery [1].

Mobile app services can notify doctors about an emergency and all the crucial data is sent to the doctor's device. This saves a lot of time as the doctor can prepare for such a situation well in advance, and this can be a life saver. [2].

V. CONSIDERATIONS FOR BUILDING MOBILE HEALTHCARE APP

A. Interoperability and Compatibility

The applications, devices, ERP, and other systems should seamlessly connect with each other to prevent loss of data and system silos. Cloud services should be used to protect data loss by hosting it on different servers. This also boosts performance.

B. Security and Confidentiality

Medical apps have lot of sensitive data and private information that needs to be protected. Confidentiality should be ensured through encryption and through the use of secure communication channels. Appropriate multi-factor authentication method should be used to ensure safe access.

C. Regulatory Compliance Standards

Regulatory compliance standards for medical data should be followed depending on the country and type of data. Some of these standards are as follows:

1) Health Insurance Portability and Accountability Act (HIPAA): HIPAA stipulates that Private Health Information (PHI) should be protected by healthcare and insurance companies to prevent fraud and theft of this data.

2) Fast Healthcare Interoperability Resources (FHIR): This standard describes how data should be exchanged between digital systems irrespective of their format of storage.

3) Health Level 7 (Hl7): It helps to develop a healthcare app that ensures safe data transfer between various medical organizations.

4) Direct: The standard provides for encryption and digital signing of messages that include private health information.

VI. FUTURE TRENDS

Virtual reality (VR) has far reaching implications for diagnosis and treatment of patients. With VR, doctors practice surgical procedures and treatments in a safe, and virtual environment. VR also enables medical professionals to teach medical students about anatomy and biology in an interactive way.

VR-enabled apps can reduce stress levels and reduce anxiety among patients [5]. As AI and Machine Learning become more widespread in the healthcare industry, new trends are emerging that will shape the future of healthcare application development. AI is being used to predict, diagnose, and treat diseases like cancer and diabetes. [5].

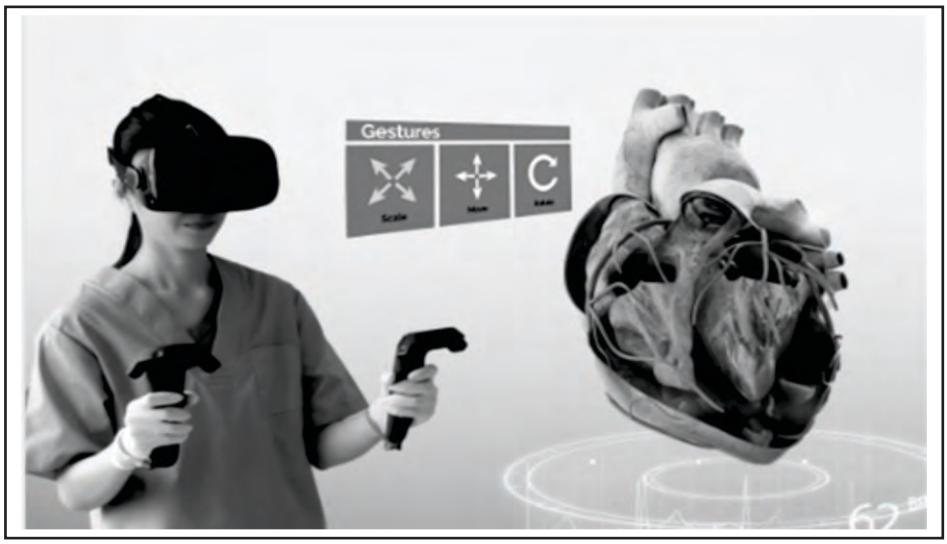

Fig. 2. Learning in a Virtual Reality Environment

Blockchain technology provides better data security, accuracy, patient data privacy, and control. It allows patients to securely store and easily access their medical records. In the future, blockchain technology can be used for various tasks such as electronic medical records management, drug tracking systems etc. This can revolutionize the healthcare industry, making it more efficient and cost-effective while improving the quality of care.

VII. CONCLUSION

Mobile apps make it much easier for HCPs and patients to access data and communicate with each other on the go. using calls, videos, text, images, notifications etc. With emerging technologies such as wearables, Artificial Intelligence, and blockchain, mobile medical, and healthcare apps will become more powerful in monitoring, diagnosing, and treating patients.

AUTHOR'S CONTRIBUTION

Deepak Jain is the sole author of the present paper. He has written the article independently.

CONFLICT OF INTEREST

The author certifies that he has no affiliations with or involvement in any organization or entity with any financial interest or non-financial interest in the subject matter or materials discussed in the manuscript.

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About the Author

Deepak Jain is an experienced engineer and product leader with a demonstrated history of working in the computer software industry solving technically challenging problems at scale. Eager to build products, solving real-time problems, Deepak founded Subtlelabs as a product engineering company that is today serving customers across the globe. He had earlier worked with global companies and created solutions in Healthcare, Security, Fintech, Logistics, and CRM domains.