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Electronic Health Records, Using ClinixSoft Approach

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Abstract

It's seductive how the EMR changed rapidly into HER with such great effort from physicians into making healthier environment. As the evolution of computer continues to impress us and develop the how we live in the world. the business perspective is worse looking after in developing countries as it's rare in countries like Egypt to find a good us of it in hospital rather than finding it in the first place, the beauty of HER systems In an era defined by technological innovation and digital transformation, Electronic Health Records (EHRs) stand as a testament to the convergence of healthcare and information technology. And we must have the courage as officials to take further steps in this manner supporting the vision of 2030.

Keywords: *EHR, Electronic Health Records, EMR, Diagnosis*

1. Introduction

As we know at the recent days technology played a major role in health care, and made it easier to take care of patients and communicate with them one of these tech is electronic medical records (EMRs) and electronic health record (EHRs) that we adopted at our project to bring out a work we hope it meets your expectation so, The EMR, or electronic medical record, refers to everything you'd find in a paper chart, such as medical history, diagnoses, medications, immunization dates, allergies and personal information as shown at figure (a) . While EMRs work well within a practice, they're limited because they don't easily travel outside the practice. In fact, the patient's medical record might even have to be printed out and mailed for another provider to see it, and there is development at it includes advancements like interoperability, allowing different systems to share and exchange data seamlessly, improving patient care coordination. Additionally, AI and machine learning integration in EMRs offer capabilities such as predictive analytics for better patient outcomes and population health management. Furthermore, patient portals enable individuals to access their medical records, schedule appointments, and communicate with healthcare providers conveniently.

Fig (1) Sample view of electronic medical record.

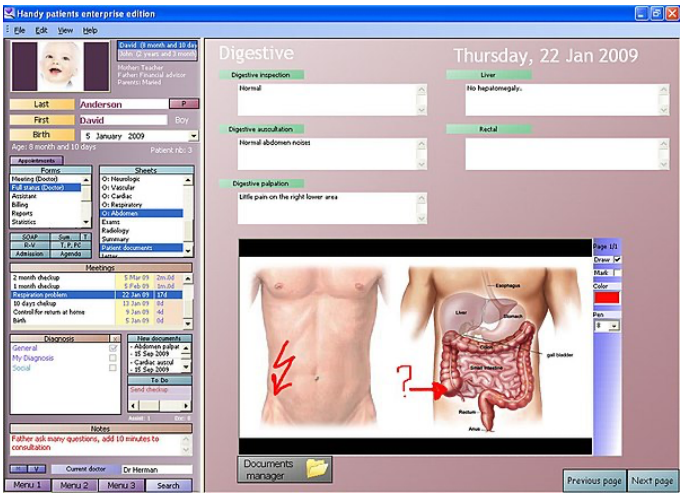

Fig (2) Sample view of electronic health record.

(EHR) is the systematized collection of patient and population electronically stored health information in a digital format as shown in figure (b) .

These records can be shared across different health care settings. Records are shared through network-connected, enterprise-wide information systems or other information networks and exchanges. EHRs may include a range of data, including demographics, medical history, medication and allergies, immunization status, laboratory test results, radiology images, vital signs, personal statistics like age and weight, and billing information.

For several decades, electronic health records (EHRs) have been touted as key to increasing quality care. Electronic health records are used for other reasons than charting for patients; today, providers are using data from patient records to improve quality outcomes through their care management programs. EHR combines all patients' demographics into a large pool and uses this information to assist with the creation of "new treatments or innovation in healthcare delivery" which overall improves the goals in healthcare. Combining multiple types of clinical data from the system's health records has helped clinicians identify and stratify chronically ill patients. EHR can improve quality care by using the data and analytics to prevent hospitalizations among high-risk patients.

EHR systems are designed to store data accurately and to capture the state of a patient across time. It eliminates the need to track down a patient's previous paper medical records and assists in ensuring data is up-to-date, accurate and legible. It also allows open communication between the patient and the provider, while providing "privacy and security." It can reduce the risk of data replication as there is only one modifiable file, which means the file is more likely up to date and decreases the risk of lost paperwork and is cost efficient. Due to the digital information being searchable and in a single file, EMRs (electronic medical records) are more effective when extracting medical data for the examination of possible trends and long-term changes in a patient. Population-based studies of medical records may also be facilitated by the widespread adoption of EHRs and EMRs.

So overall at this paper we used the data above to provide an EHR system that we can use at Egypt then all over the world by using a new approach, a new method that we hope it will have a huge impact on the world and how it will achieve the vision of 2030, and Improving the healthcare methodology and this will have a great impact on patients healthcare and will make it easy for the doctors to cure them .

The work on this paper will be divided into few sections as shown below :

- Background
- Related work
- Proposal
- Results
- Conclusion
- Future work
- Refrences

work on this paper will be divided into background where we discuss the history Of EHR system through ages, followed by related work where we discuss the evolution of HER when it was called EMR from 60s of the previous century and we follow it's evolution till the current day then we discuss in the project details our clinixsoft approach and how we are planning to create something different in the market then we discuss in the results the impact of HER system on the market we are targeting which is the health-tech market followed by conclusion where we talk about the final vision of HER system market in Egypt and how HER is a misused concept where we discuss the need yet the drawbacks and danger on humanity by ignoring EHR evolution yet not developing a comprehensive and integrable solution that fits globally the final section we talk about our future work where we discuss our next step and it's importance in the health-tech industry

refrences ; [1], [2], [3], [4],[5],[10].

2. Background

Electronic information can improve the quality and efficiency of healthcare. National and international organizations spread this belief all over the world. However, the evidence base regarding the effectiveness and quality of electronic information is controversial. Healthcare outcomes are influenced by many factors, making it difficult to approve specific interventions. Moreover, electronic records themselves are a complex, multifunctional intervention that can have both positive and negative effects on clinical outcomes.

Today, it's easy to think of electronic health records (EHRs), also known as electronic medical records (or EMR software) as just a substitute for paper record-keeping. As a prominent EHR software company, we know otherwise. EHR systems represent an area of healthcare technology that has seen an overhaul since its inception.

2.1 (EHRs): The Early Days

The history of EHRs and EMR companies began in the 1960s – the Mayo Clinic in Rochester, Minnesota was one of the first major health systems (among a select few other healthcare providers) to adopt an EHR1 and move away from the massive swath of healthcare organizations keeping paper medical records. to adopt an EHR.1 In the 1960s, EMR programs and EHRs were so expensive that they were only used by the government in partnership with health organizations.

Throughout the 1970s, only the biggest hospitals could use them, and they were used for billing and scheduling and keeping basic personal health records for patients.

At the same time, during the 1960s, a new approach to patient records (still on paper) began to emerge. Referred to as the "problem-oriented" patient record, this approach added more robust information about the patients and over time evolved to become the version of electronic medical record we see today.

This approach was a breakthrough in medical recording. Previously, doctors had typically only recorded a patient's diagnosis and the treatment they provided, but it ended there.

As part of the "problem-oriented" medical record, clinicians began collecting and storing data about a patient's history. When properly implemented, this model provided health care providers with a more effective means of communication among members of healthcare teams, while also facilitating the coordination of preventive care and maintenance.

As EHRs and EMR software programs became more affordable and available in the 1980s, they were developed with fields that could be filled in with clinical information and stored as an electronic health record.

2.2 How Portable Medical Records Became Electronic Health Records

The truth is, great advances have been made in the healthcare information field, combined with a rich history, and electronic medical record companies have evolved, changing electronic medical record management. Let's take a look at EHR systems by looking at the start of EHR software, its mainstream adoption and digitization.

With portability came the dawn of the computer era hospital management systems began to change. Many of the earliest computer applications in the 1970s were in use at hospitals and government institutions, but scarcely elsewhere. At first, these applications were used predominantly for billing and scheduling purposes, and not EHRs specifically. 2

Then, thanks to the portable records model, large hospitals started to provide the same level of service for each patient without worrying that only specific providers had knowledge of that patient.

Computers, of course, really didn't gain traction in smaller clinics and private practices until they became popular with the general public. Therefore, medical charting systems were recorded manually until then. At this time, we began seeing more on digital medical records and the idea of EHR systems.

Before the 1980s, it was rare to see a computer used at all in private practice, let alone for storing EMR or electronic health information and sensitive personal information (SPI).

Even though the portable record-keeping system of keeping patient medical history had become far more commonplace, records were still largely paper, which meant health records had to be physically stored and moved.

Business technology then became advanced enough that even paper records could be sent electronically, via fax, in cases where an office needed to get in touch with a patient's family doctor in case of urgent care.

But time is often of the essence in caregiving scenarios, and because of this, the electronic health record system of storing electronic patient data became the standard. Medical providers realized that in every medical specialty, from urgent care to rehab, from hospital to home, there were always unique cases that had to be resolved electronically.

This is where EHR development accelerated, influencing treatment plans and leveraging healthcare information at healthcare facilities across various care settings, from practice management to larger institutions of public health and preventative services. It was at this point that EHR adoption or the widespread adoption of EMR systems was here to stay.

2.3 The Internet and the Rise of the EHR

By the 1990s, technology had entered most medical offices, and computers were being used to a limited degree for record-keeping purposes. Specifically, EHRs were mostly seen record patient data at academic inpatient and outpatient medical facilities, and they included patient data interchange for claims processing and image scanning for document capture of medical histories.3

It wasn't until the internet-age that large-scale changes became far more visible on the front of electronic health record keeping. Even in its early stages, the internet became a vital tool for recording and transferring prescription histories and other electronic medical records.

Finally, within the last decade or so, most major medical systems in the developed world could easily communicate with each other when needed. Electronic health record software is no longer a luxury, but necessary for optimal patient care and HIPAA compliance.

Refrences;[6],[7],[8]

3. Related Work

History of Health Information The history of health information is thousands of years old, and its roots go back to ancient times. Until the 19th century, medical records were used primarily for educational purposes and were later used elsewhere in insurance or law. Records pertaining to a patient's medical history and care under the authority of a particular physician are called medical records.

Medical record keeping dates to the 1920s, when doctors agreed that access to medical records was necessary to properly treat patients. The idea of collecting and using data to provide better care quickly emerged.

The history of electronic health records (EHR) dates to the 1960s, when electronic records began to take center stage in the healthcare industry. However, it was not until the 1990s that the term "electronic medical record" was coined, and the concept began to take shape.

Companies that Developed Health Record Systems There are several companies that have made significant contributions to the development of health record systems. Here are a few notable ones shown at table (1):

Table (1) list of companies that developed (HRSs)

Dr Chrono	Best for medical billing	
Kareo	Best for small practices	
NextGen	Best for population health management	
Allscripts	Best for large organizations	
eClinicalWorks	Best for telehealth	
Valant	Best for mental health practices	
Therapy Notes	Best for behavioral health practices	
athenahealth	Best for reporting	

These companies have developed systems that not only store patient health information but also provide tools for scheduling, billing, reporting, and more. They have played a crucial role in the transition from paper-based to electronic health records, improving the efficiency and accuracy of health care delivery

and these are some pics showing the difference between old records and the new ones as

shown at figure (3) and (4)

Fig (3) modern medical records

Fig (4) old medical records

4.Proposal for ClinixSoft

4.1 The good

what is anticipated.

Fig (5) main application view

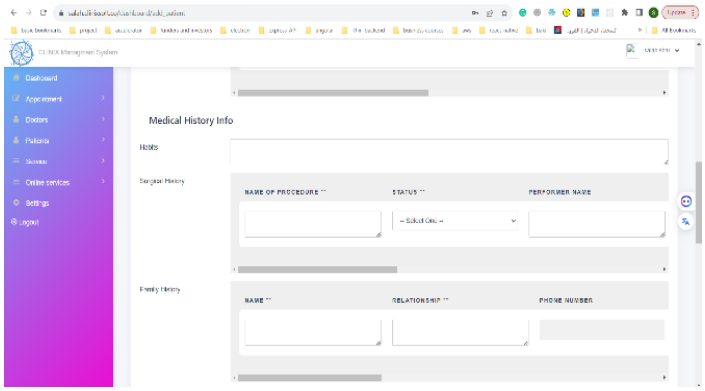

Fig (6) medical history info

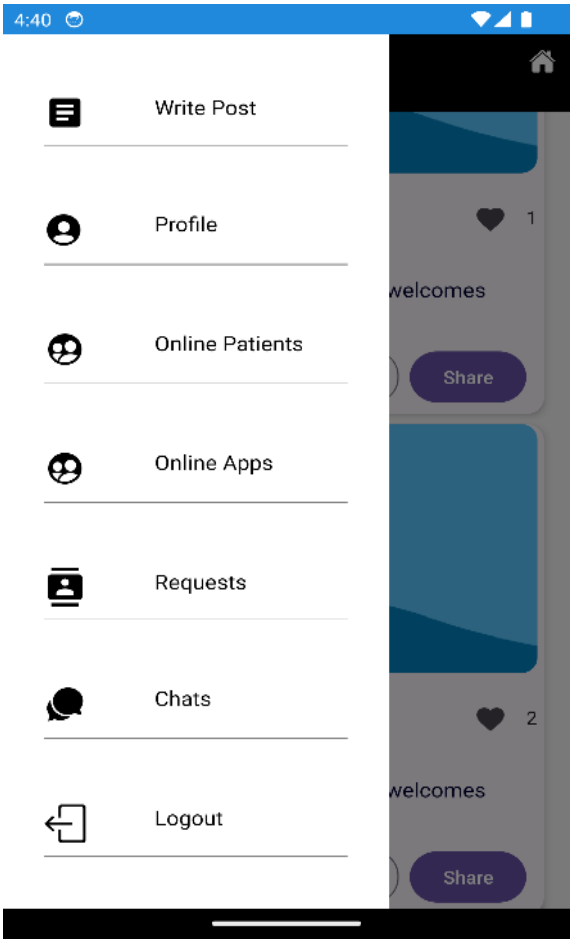

Fig (7) navigation screen

We started clinixsoft as startup in idea phase in 2022 and were market ready solution at 2024 in health-tech industry we started as EHR for clinics but that wasn't enough for us to be incubated or sell a single piece because of many things firstly we needed sales team the second we weren't a mature business model enough to make a great change in the market we developed the idea till we brought it into SaaS model with mobile application support. The mobile application is the key for us we had two users using it making it a challenge to attract both of them the first was the client(patient) the second was the doctor. The doctor will use it to handle many things without the need to open the SaaS app which is great and attractive but when it comes to client why would him use the application if we haven't that great impact on the market why would him download the mobile app in the first place when he doesn't have any clinic to connect to. So that come to us to make an additional trick to attract clients who may not connect to clinic and even if we haven't launched any SaaS for any clinic and that trick was the community where clients can ask, and doctors respond to them as a marketing we are adding and testing this feature right now though it is out of operation and we don't monetize it.

First of all is the clinixsoft EHR system which is the main application see figure [5] and it's adjustable and comprehensive EHR see figure [6] from business

perspective it's adjustable to every clinic and hospital need. But that's not what makes us different. The mobile app does see figure [7] the navigation screen and you can realize that doctors can send prescriptions, invoices and even get paid online for booking appointments through the system. To see the full system, I encourage you to visit CLINIX, now lets have a tour through Client Journey in the mobile application which starts with the login screen Figure(8) which have two permissions and they are the client and doctor, the client signup is free and for all people, but doctor signup is a process where the doctor must have our SaaS contacting CLINIXSOFT team on website CLINIX, now lets jump after the client has made a successful login to the system where the customer journey takes him at first time to the second screen saying please enter the clinic domain you want to connect to see Figure(9) where we offer two connection types the QR scan code and the name of the clinic domain once the system has found it takes him to the doctor's page and makes a request to transfer patient's data to the HER system once the doctor approves the patient and doctors are connected

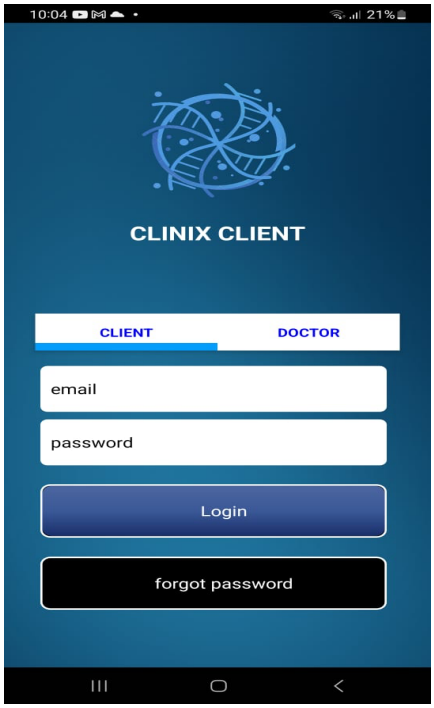

Fig (8) login screen

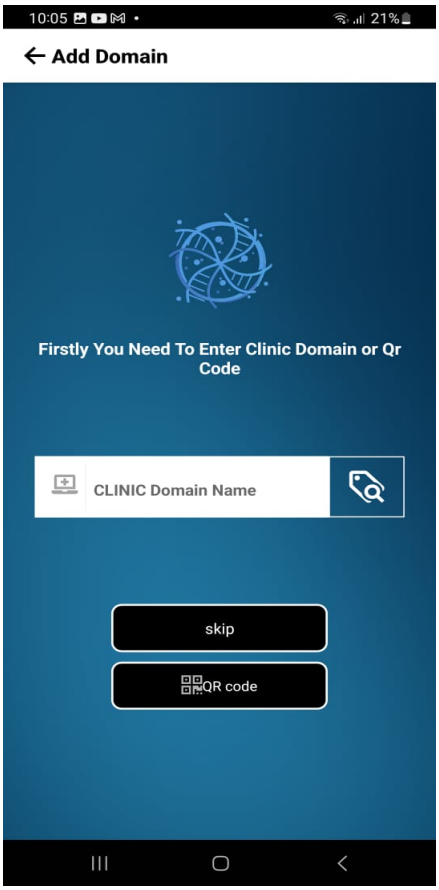

Fig (9) clinic domain name

Now lets move on to the home page where we can see doctor's announcements, and it's where doctor can share medical posts with his patients and even clinic's announcement see Figure(10), now lets move on to fun part which is the community where we can ask questions and doctors answer with filtration and regulation system to neglect and unrelated question see Figure(11)

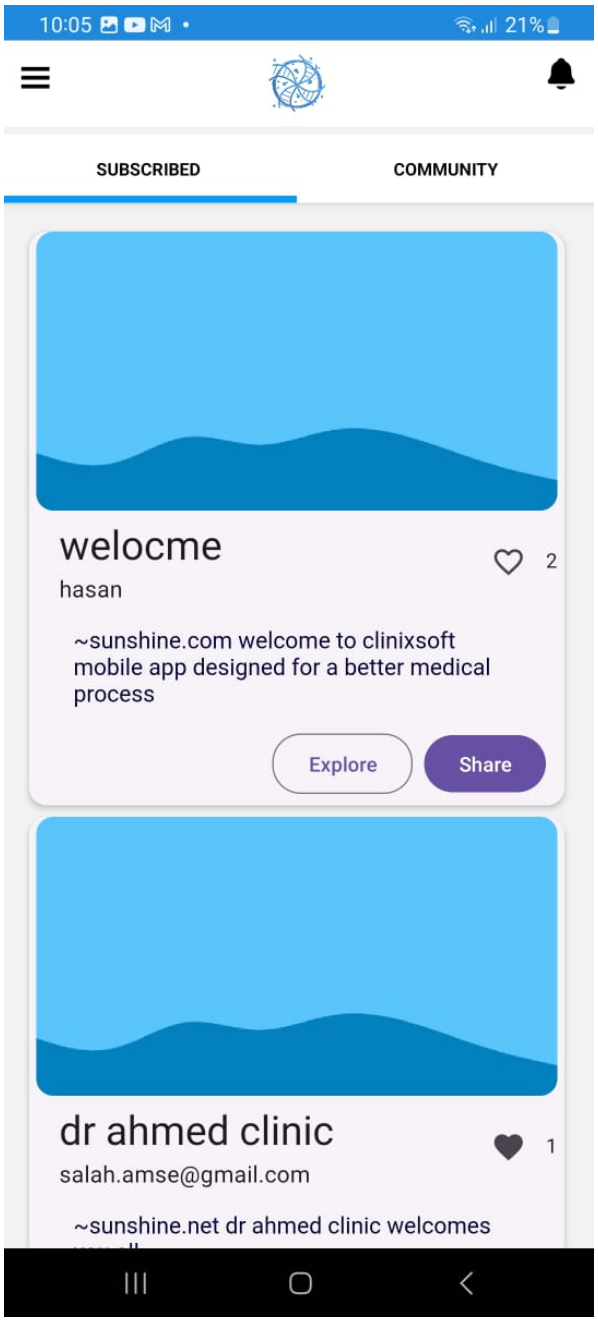

Fig (10) App home page

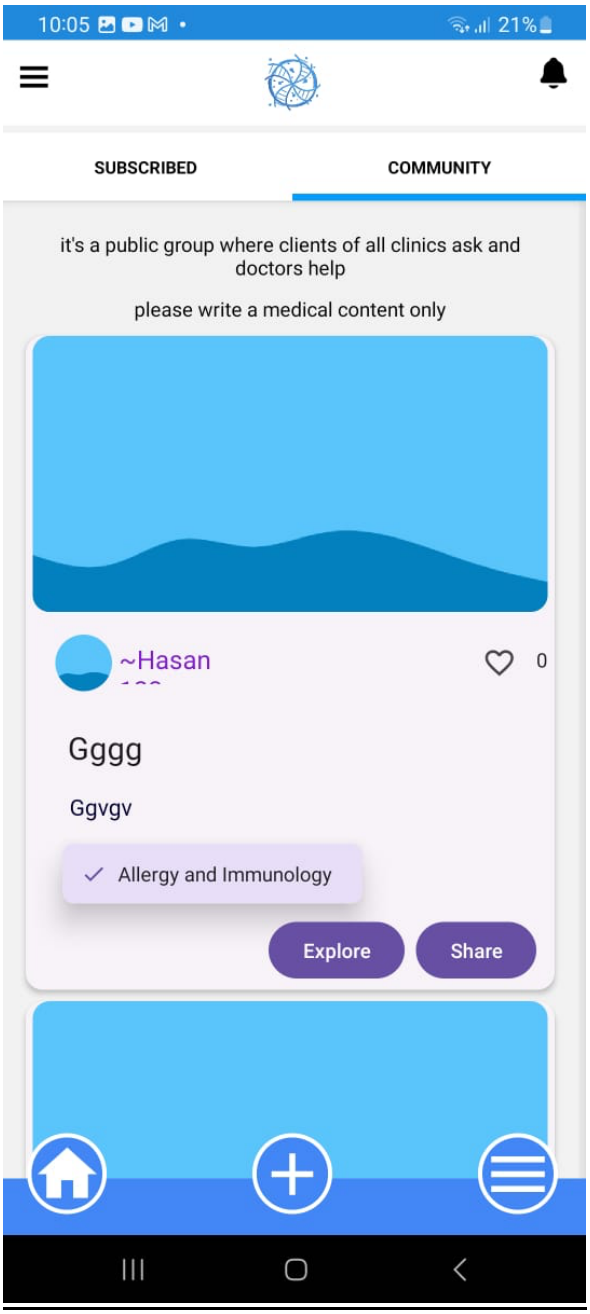

Fig (11) App community page

now lets move to the navigation bar where we can see all the controls patients have starting from all prescriptions, invoices, accepted apps, linked doctors and many more see Figure (12)

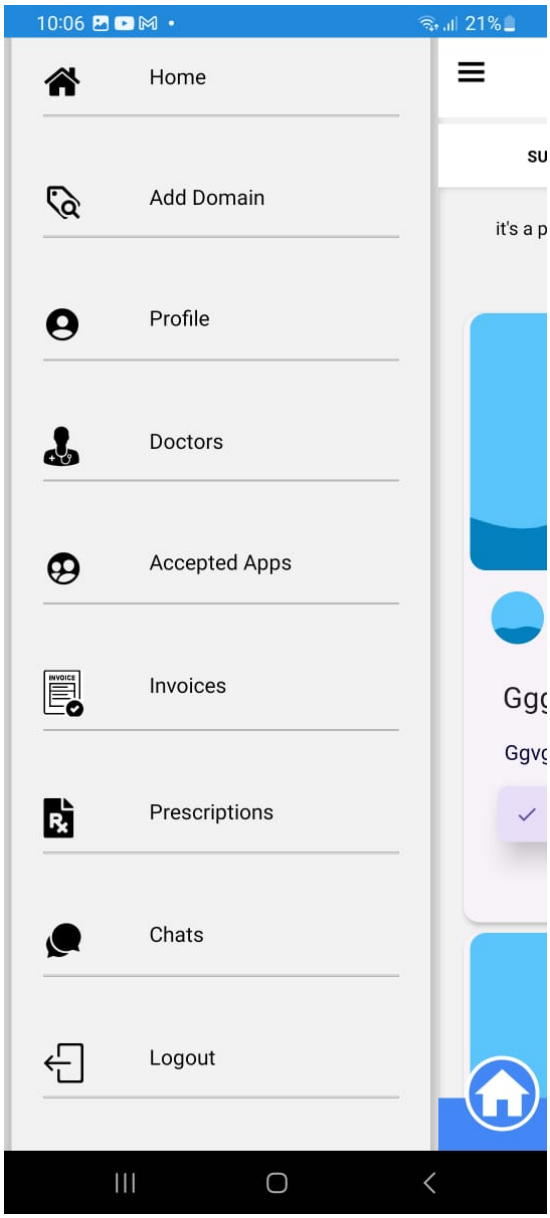

Fig (12) Navigation bar

That's our model and approach in the EHR systems, as we will discuss later the result we will find the drawbacks and failure in our system and even in the idea of EHR system basically and globally.

4.2 The Bad

The Technical Issues

Data Security Vulnerabilities,
one of the most important issues regarding electronic medical records is data security. Despite advances in encryption and data management systems, EHR systems are still vulnerable to cyber threats. Healthcare interope rability increases the risk of data breaches, exposing sensitive patient information to unauthorized access. Additionally, the proliferation of mobile devices and remote access to EHRs have created additional vulnerabilities that increase the potential for security breaches and compromise patient privacy. Information technology is still the most significant technological influence in healthcare.The lack of standardized processes and data feedback hinders the interaction of different systems, leading to information silos and fragmented patient information. Doctors often struggle to access all of their patient information across multiple platforms, leading to inefficiencies, medical errors, and poor patient care. Solving the interoperability challenge requires a coordinated effort to develop common standards and support information exchange processes across the entire healthcare system.Professionals create stress and reduce job performance. Clunky interfaces, nonintuitive designs, and cumbersome navigation make users reluctant and reluctant to adopt EHR. Additionally, the customization options offered by EHR vendors often result in systems being too complex to meet physicians' unique needs. Improving EHR usability requires a user-centered approach that engages end users throughout the design process and demonstrates ease, efficiency, and understanding. Gender presents significant challenges. Data entry errors, duplicate data, and inconsistent practices can compromise the reliability of patient information stored in electronic health records. Additionally, the quality of medical records, including up dates, corrections, and revisions, requires strong management and data validation. Denying data integrity not only undermines the reliability of the EHR, but also compromises decision-
making and patient safety. An incredible challenge. Electronic health records often disrupt operations and require physicians to adapt to new information systems and related software. Conflicts with existing medical devices, diagnostic systems, and ancillary services lead to system integration, resulting in operational inefficiencies and barriers to EHR adoption. Successful EHR integration requires effective collaboration between IT professionals, physicians, and operations specialists to streamline setup and minimize disruption to the nursing process.

4.3 The Ugly

From Business and Market perspective

Cost considerations: One of the biggest challenges in implementing electronic health records in Egypt is the cost associated with implementation and maintenance. For many healthcare providers across the country, especially those working for nonprofit organizations, the initial investment required to implement an EHR system can be prohibitive. Additionally,ongoing expenses relatd to software licensing, infrastructure development, and additional staff training put pressure on limited budgets. Therefore, healthcare organizations must carefully weigh the longterm benefits of EHR adoption against up front costs, weighing potential improvements in patient care and working well against financial constraints. . Although the government has taken steps to promote the use of digital health technologies, including electronic health records, by implementing supporting laws and regulations, problems remain in implementing existing standards and procedures. Physicians must comply with data privacy and security laws, interoperability requirements, and electronic health record standards, which increase the complexity of the implementation process. Failure to comply with regulatory requirements can lead to legal and financial consequences, underscoring the importance of compliance during EHR adoption. As the demand for digital health solutions continues to grow, competition is also intensifying. Healthcare organizations have many options when choosing an EHR system, from multiple companies to local vendors to open source. Vendors must differentiate themselves based on features such as physical functionality, flexibility, integration, cost and customer support to achieve good results in the market. Additionally, collaboration and collaboration between EHR vendors, providers, and government agencies play an important role in increasing market penetration and helping promote the use of EHRs nationwide. and staff development: Developing skills and capabilities to implement and manage EHR systems is a challenge for hospitals in Egypt. The lack of IT professionals, data scientists, and data analysts is a barrier to EHR implementation. Investments in staff development programs such as training, certification courses, and knowledge sharing are critical to closing this skills gap and helping editors use EHR technology effectively. Additionally, fostering a culture of innovation and continuous learning in healthcare organizations is crucial to ensuring sustainable EHR adoption and maximizing its benefits.

References: [9]

5.Results

We offered and viewed the system to many doctors who have clinics and they admired the error-free system with the perfect UI-interface but they complained about the complexity of the SaaS application, the system is totally adjustable by doctors even the printer and prescription process was handled by doctor himself to choose the right place for every printed point on the paper due to the extensive work of our team. When it comes to the mobile application they are awaiting for the launch of the system and it's availability of mobile market that with good marketing by us clinixsoft team we can bring

more clients to him, rather than we made the follow up with patient like never before.

With this improvement we added to the idea of EHR systems like the "online medical rep" solution we are striving to add into the market we got accepted and awarded but still needed more effort to sell and improve the market share before we move into the second step mentioned

6.Conclusion

we benefitted from the smart mobile to make an easy way to connect all healthcare stakeholders through the clinixsoft approach but will this do the trick? the future of the small startup holds many for us as well as the whole healthcare industry and the more we succeed the more we develop and improve the quality yet the quantity of the solution like the promised "online medical rep" solution that we currently are opening the gates of by developing the business model, yes it's an only success will make the whole difference

why making a global or country specific EHR is so hard to achieve.

These challenges require multidimensional solutions and cooperation between everyone, healthcare providers, and patients to achieve an effective and comprehensive health system.

why ignoring making a full organized EHR systems has its drawbacks on humanity.

Ignoring the establishment of fully organized electronic health record systems can have major disadvantages to health care and humanity in general, and these disadvantages include:

Delayed diagnosis and treatment: The lack of electronic health records can lead to a delay in obtaining necessary medical information, delaying diagnosis and treatment[1].

Increased medical errors: Relying on paper records can increase the possibility of errors in prescriptions and diagnoses due to misreading or missing information[1].

Difficulty coordinating between providers: In the absence of electronic health records, it is difficult for different health care providers to coordinate and share medical information efficiently[1].

High health care costs: The lack of electronic records can lead to duplicate medical tests and procedures, which increases health care costs[1].

Reduced quality of care: Electronic health records help improve the quality of care by providing accurate, comprehensive, and up-to-date information, so their lack can negatively impact the quality-of-care[1].

Not taking advantage of big data analytics: Electronic records allow health data to be analyzed on a large scale to improve health policies and research and ignoring them means missing this opportunity[1].

Therefore, investing in electronic health record systems is a necessary step to improve healthcare, reduce errors and costs, enhance coordination among health service providers, and improve patient outcomes.

7.Future Work

We are striving to make a distinguished business model and the next step is to build what we are calling "online medical rep solution" which is that we make contracts with drug companies to market their products in mobile app for doctors only and doctors simply make the contract with whatever drug they need then once he have written that drug into digital prescription using our SaaS application he gits his commission immediately this will have a great impact on the industry and a new revenue stream for drug companies as they are confirmed and informed by the transaction in it's time that will save both doctors and companies rights and will bring a fruitful relationship for all stakeholders including us

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