

Secured Electronic Hospital Database Management System

K.K. Bharath, Ankit Kumar, Adithya Varma, R. Rajyashree

Abstract--- *The major reason for naming this project as "Secured Electronic Hospital Database Management System" is to secure the database holding the personal medical record or data of the patient. Various issues are there in maintaining the records in the current used system which makes it difficult most of the records are currently held manually using paper and record books which are very time consuming and not cost friendly. It takes time for doctors to access the data, this also affects the quality of the health care provided by the hospitals and also are highly cost demanding and also consume a lot of time. It is easy for a people to either access the data illegally by using several manual methods or to hack and to access all the important information and exploit the information to wrong hands. It is very important to have a highly secured database especially when containing highly confidential information such as a hospitals database. Patients generally wouldn't want to disclose their actual health issues for several reasons such as fear of losing their privacy and security of their health-related information. This project's sole purpose is to solve all of the above problems in a more efficient and cost-effective manner with an aim of reducing the time and resources currently required for such tasks so that the institution's resources may be efficiently utilized. This project attempts to protect the privacy of hospitals records from hackers and also viruses, Trojan horses etc.*

Keywords--- *Hospital Record, Secure, SHA3, Database.*

I. INTRODUCTION

Electronic health record otherwise known as EHR is an electronic database system designed especially for holding all the data of the hospital on their patients. The current system is all manual where the data is held manually in paper. This system has a lot backlogs and disadvantages because it is tough to organise a huge number of manual data written on a paper and this could reduce the quality of the health care and is also time consuming. All these factors reduce the efficiency of the health care. In a few places there are electronic databases, but they aren't encrypted all these would lead to data being hacked by unauthorised people. In general all the patients would want their data to be private and wouldn't want to share it and if the data is being hacked or being leaked by unauthorised access is a big issue. This is where our project would provide a solution. Here the EHR would provide a more organised and a secure data base where the data is completely secured. The electronic health

record also has a feature where the data can be sent or transferred securely. These features give more advantage than the previous systems. These databases hold the previous health record of the patient, medical history, vaccination history and previous details of his/her's visit to the hospitals all these are held in the database in an organised and more secured form. The speciality of family medicine has also stated that the EHR is a core technology for the future of family medicine in the Future of Family Medicine Project. This design showcased here outlines a "New Model" of care for family medicine with the EHR as "the central nervous system" of that model. The EHR turns into a tool through which the family medicine office can transform practices to meet its needs and the needs of its patients. Enhanced work algorithms and access to information make the practice of medicine more efficient for physicians and their staff. Decision support is provided, and automated reminders help the practice deliver safer and higher quality care to patients and the community. The EHR is about quality, safety, and efficiency. It is a great tool for physicians and patients. While achieving the required benefits of EHR systems requires the transformation of practices, based on quality improvement methodologies, system and team-based care, and evidence-based medicine.

Electronic Health Record – This is a software used by all doctors around the world which is used to keep a track of all the aspects of the patient provided by the hospital. They also provide functions such as management over billing and scheduling. The data entry is made very easy where the data can be fed straight through the software and also voice activated feed input is also possible.

Potential Productivity and Financial Improvement

- Fewer chart pulls
- Improved efficiency of handling telephone messages and medication refills
- Improved billing
- Reduced transcription costs
- Increased formulary compliance and clearer prescriptions leading to fewer pharmacy call backs
- Improved coding of visits

Quality of Care Improvement

- Easier preventive care leading to increased preventive care services

Manuscript received June 10, 2019.

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- Point-of-care decision support
- Rapid and remote access to patient information
- Easier chronic disease management
- Integration of evidence-based clinical guidelines
- Job Satisfaction Improvement
- Fewer repetitive, tedious tasks
- Less "chart chasing"
- Improved intra-office communication
- Access to patient information while on-call or at the hospital
- Easier compliance with regulations
- Demonstrable high-quality care

Customer Satisfaction Improvement

- Quick access to their records
- Reduced turn-around time for telephone messages and medication refills
- A more efficient office leads to improved care access for patients
- Improved continuity of care (fewer visits without the chart)
- Improved delivery of patient education materials
- Secured health records

II. PROSED SYSTEM

The electronic health record management system is generally proposed to improve the current methods of storing data in hospitals and also to provide more efficient and quick service. Current systems use a wide range of methods to store data where they use both physical and electronic methods but they all create a lot of conundrum and ruckus.

The conventional approach shouldn't be followed for the development of EHR model. The development and flexibility of technologies makes the development of EHR to produce required benefits while still keeping it to the fundamentals such as secure, dependable and easy to use which supports the client's needs and requirements while also meeting professional and ethical needs to.

The EHR system has a huge potential and would easily become one of the major components in health care services. Thus it cannot be treated simply as another exercise in systems procurement.

The proposal brings together the expertise required to deliver the following elements:

- Continues and repetitive investigation of EHR resulting in a systems and operational architecture which has been successfully tested and validated against the policies and interests of all user communities and stakeholders i.e. a secured EHR.
- A simulator was run in an environment with realistic circumstances but anonymised data (some sensitive information being overruled for a few safety reasons), which provides the basis for explaining and exploring proposed solutions, introduction strategies and evolution paths for an EHR service.
- A 24 hour access is being provided to key patients and their data of medical history.

- Reduce the risk of poor treatment and outcomes arising from poor communication of information.
- Provide more accurate, comprehensive and relevant extracts, to support healthcare providers and the further development of health improvement programmes.
- Provide appropriate data sets to the patient.

III. RELATED WORKS

The current system which is being used is capable of only providing basic functionalities. The software is not completely secure when it comes to access of patient's records. With this current system a constant check must be maintained to keep data safe and secured. Another huge problem is data breaches and missing records. The current system is not completely secured. Unauthorized users would seek a way to create a data breach and also, they would try to exploit using these circumstances. A few technological changes can reduce all these problems and could reduce the risk factors. These advancements are highly necessary because data security is one of the most important factors when it comes to sensitive data handling.

[1] Doctors and physicians have come to realize the importance and necessity of medical records for both patients care and also for medical education, and people have come to realize that the current system is inefficient. This mentioned paper attempted to document the type and extent of deficiencies in our current system of handling medical data. The extent of drawbacks which are specified there needs to be an updating in the system. Audit of the record to determine clerical deficiencies is relatively simple and as discussed in this paper can be useful. The audit may also be useful in discovering gross and easily discernible medical errors where the standards are relatively simple and well defined. However there are a lot of deficiencies which are directly associated with lack of standards for either organization of the medical record or the logic and criteria that should govern the collection and use of medical data seriously impair the effectiveness of the audit as a tool for assessing the quality of care. There needs to be a development in a standardized and systematic approach to management of records.

[2] Health record management is an important and challenging task. Utilization of technologies in health care, particularly the use of Electronic Health Records (EHR) offers a wide variety of benefits. Better healthcare has been provided by EHR by improving all the aspects of health care. This paper aimed to conduct an extensive review of existing literature on the issues and expectations concerning consumers and physicians in the development of EHR. In this mentioned paper, based on the given issues, recommendations are made, and future directions explored. High-quality research - studies regarding attitudes towards e-Health are severely lacking. Throughout the health development sector conflict between utilization of technology in EHR and preserving patient's privacy regarding their medical history remains as a major issue.

Physicians are faced with many various issues while using the EHR, which leads to troubled outcomes.

This paper mentioned here aims to investigate expectations, issues, and challenges in the area of EHR. The main objective of this given study has identified the EHR issues, challenges related to physicians and consumers that are significant in the development of EHR. Overview of laws, standards and developments of HER systems along with recommendations and future directions are explored.

[3] The increasing presence of electronic health records (EHRs) in health care has caused interesting and unique challenges in the Emergency Department (ED) setting. Unfortunately, the scant literature exists addressing the implementation of EHRs in this setting.

The authors in both involved in the implementation of such systems at their respective institutions, review the challenges and benefits that exist with such implementation, and the steps that EDs can take to facilitate this process.

Unlike ambulatory and inpatient setting, where patient volume can be adjusted to help with this transition, EDs are unable to alter their usual volume and must maximize their efficiency during this process.

Understanding and anticipating the various EHR's impact on workflow has been critical to successful implementation.

[4] This research addresses the urgent need to create a comprehensive guide for healthcare providers to follow to exchange electronic health records securely and meet the associated the Department of Health and Human Services' Meaningful Use objectives.

Healthcare providers have had numerous legal, financial, and ethical motivations to exchange the patient data securely. Unfortunately, in the mentioned paper healthcare providers are provided with various minimal guidance for actually achieving this goal. To this effect the proposed research has layed out a comprehensive and homogeneous approach for implementing secure electronic health record transmission. Additionally, they had presented a standard process of testing and validated a healthcare organization's security and privacy practices. To solidify the effectiveness of our proposed research, the implementation plan and testing tools have been evaluated in a real-world HIMSS Stage 6 healthcare organization.

[5] With widespread adoption of electronic health records (EHRs) and electronic clinical documentation, health care organizations now have greater faculty to review clinical data and evaluate the efficacy of quality improvement efforts. Unfortunately, I believe there is a fundamental gap between actual health care delivery and what we document in the current EHR systems. This process of capturing the patient encounter, which I'll refer to as transcription, is prone to significant data loss due to inadequate methods of data capture, multiple points of view, and bias and subjectivity in the transcriptional process. Our current EHR, text-based clinical documentation systems are lossy abstractions - one sided accounts of what take place between patients and providers. Our clinical notes contain the breadcrumbs of relationships, conversations, physical exams, and procedures but often lack the ability to capture the form, the emotions, the images, the nonverbal communication, and the actual narrative of interactions between human beings. I believe that a video record, in conjunction with objective transcriptional services and other forms of data capture, may

provide a closer approximation to the truth of health care delivery and may be a valuable tool for healthcare improvement.

IV. METHOD OF IMPLEMENTATION

The methodology of this study is through review of past literature in journals, conference proceedings and articles of expert authors. For data collection, health websites and public repositories are examined. All the databases including IEEE, ScienceDirect etc., are explored and research papers within past five to seven years are studied. The results of the studies are then analysed and solutions recommended.

V. APPLICATION DESIGN AND RESULTS

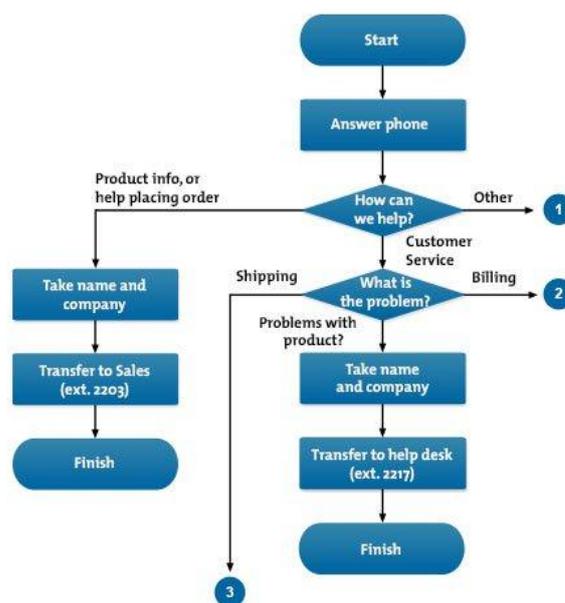


Fig.1: Health Record Process

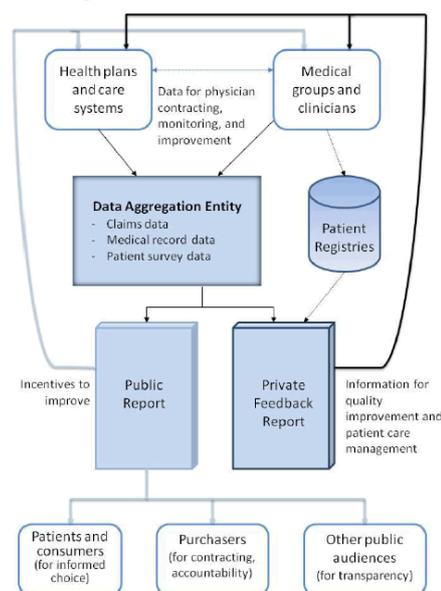


Fig.2: Working of Health Record Design



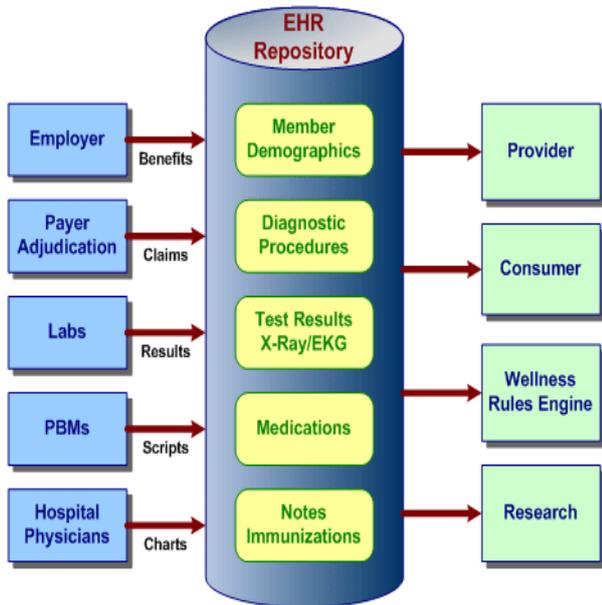


Fig.3: Interfacing Design
Table I: Comparison

categories	Current system	Our Design
Brute force	Easy	Hard
Data Decryption	Easy if key is identified	Requires large amount of decryption time
Coding	Same	Same
Database Loss	Possible	Not possible
Access to database	Hacker can easily identify the data	Without the required salt and key, it is difficult to retrieve data

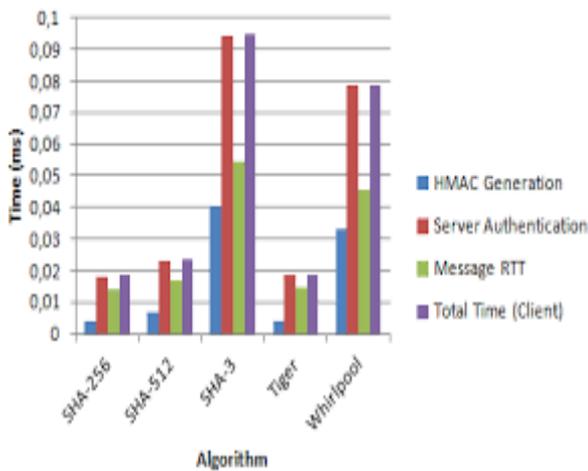


Fig.4: Hacked Reports (Analysis)

The flow of encryption and function usage can be found using Fig. 1. In this we can see that stored data requires special decryption technique such as using SHA3 salt and special encryption for the same using SHA3 algorithm for storing/writing of data into the database.

The algorithm for the system can be found from Fig.2 which shows the working of functions in the design specified here. We can also understand the system architecture of the system using Fig.3 which shows us the networking concept and interlinking of interface using a dedicated system architecture diagram.

After thorough analysis of hacked reports of health record systems from the Fig. 4, we can understand that hospital software's which were not encrypted or secured have been prone to constant attacks in the recent times. SHA3 based encryption has proven to be highly effective and secured since 2015. Other security encryptions are evolving from 2015 but the constant security patches to the SHA3 algorithm has kept it effective till date.

VI. CONCLUSION

In this paper we have proposed the design for "Secured Electronic Hospital Database Management System". We face various security threat in the health record management systems which we have successfully able to minimize the security risks and breaches provided by hackers. We have implemented SHA3 algorithm and were able to encrypt the data stored in the server using provided salt and key. The SHA 3 encryption is provided to the complete server interface in order to prevent any loop holes in the system.

This design is easy to be implemented and requires less number of code updates to the system. The security of the system can be updated by providing a newer version of SHA3 salt.

FUTURE WORKS

There is a huge scope to develop this project and add more features into it for example push notification and etc. we could also biometrics for more security. Biometrics such as facial recognition, retinal scan, voice recognition and many more. All these biometrics will help us restricting unauthorized access and many more.

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