



Security And Privacy Analysis Of Patient Data To Support The Electronic Health Information System at Hospital X Bandung

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Abstract : This research evaluates the implementation of information security aspects in electronic medical records at Hospital X, Bandung City. The research result show that the hospital has succeeded in maintaining the confidentiality of integrity, authentication, availability, access control and non-repudiation of patient data. Existing policies and procedures support the security of patient information through setting access rights, data change features, and transaction tracking. Security and privacy analysis of patient data is an improving electronic health information systems in these hospitals, involving measures such as data encryption, restricted access, activity monitoring, and staff training. The implementation of electronic medical records uses usernames and passwords to access the system, while aspects of integrity and authentication are also well maintained. Qualitative methods were used in this research through direct observation and interviews. With the conclusion that the implementation of information security is in accordance with applicable regulations.

IndexTerms - Security, Data Privacy, Patient Data, Confidentiality, Access Rights

I. INTRODUCTION

The definition of health based on law No. 36 of 2009 is a condition of physical, mental, spiritual and social prosperity which has the possibility that everyone can live economically and socially productively. This definition of health is in line with another meaning that health is a basic thing that can become a right for every citizen. This has been regulated in the 1945 Constitution in Article 28 H paragraph (1) which states that every person has the right to live in prosperity both physically and mentally, to have a place to live, to have a health and good environment for living and the right to obtain health services (Kalingga et al., 2021).

The quality of health among people in Indonesia is still in the low category. This can happen due to various factors. These factors include unaffordability of health services due to high costs, unequal distribution of health workers, as well as the community's low ability to access health services, inadequate services, and low awareness of the community regarding healthy living behavior (Kusumastuti, 2020).

The hospital is one of the institutions operating in the field of health services which has undergone changes with its development. At the beginning of its development, hospitals were bodies or institutions that had a social function, but now with the existence of private hospitals, this will make hospitals now more referred to as industries that operate in the field of health services by carrying out management based on management as is the case business entity. Along with the development of the hospital, until now there is competition between fellow hospitals, both government-owned hospitals, all competing to attract consumers or patients so that prospective patients use the services provided by the hospital (Fitriani, 2014).

Currently, the health service sector is showing very significant developments in the use of Health Information Technology in providing health services. In Indonesia, the use of information technology has been implemented is the Health Information System (SIK), which is now starting to develop towards creating Electronic Medical Records (RME) (J. Walker, et al, 2015).

The implementation of SIK the development of RME has provided extraordinary changes for patients, doctors and other health services and health institutions both in Indonesia and abroad. The implementation of Electronic Medical Records is intended and is expected to have a positive effect on the care and actions provided to patients (D. Sitting, et al, 2014).

Electronic Medical Records are defined by the Centers of Medicare and Medicaid Services (CMS) as a patient's electronic medical record, maintained by a health care provider over time, and includes clinical data relevant to the care of an individual patient under a particular health care agency, including demographics, notes on progress, problems, treatment, vital signs, history of previous treatment, immunizations, laboratory results and radiology reports (C. S. Kruse, et al, 2017).

Patient data security is an effort to unauthorized access, hacking or leaks. The goal of patient data security is to ensure that patient data remains safe and cannot be accessed by unauthorized parties. Patient data security includes measures such as data encryption, restricted access, activity monitoring, and training of hospital staff on the importance of data security (Kurniawan, A. L., 2012).

Patient data privacy is the basic right of patients to have control over their health information. Patient data privacy includes highly personal information, such as medical history, laboratory test results, and financial information. Patient data privacy is an aspect that influences patient trust in the healthcare system. Data must be carefully guarded to ensure that patient data does not fall into the wrong hands (Rumulus, M H, 2020).

Based of research at Hospital Apart from that, there is no 2-step verification in the information system. This is not in accordance with the principle of availability, where this principle emphasizes ensuring that existing data and information can be accessed and used by parties who have access. This of course has fatal consequences if data is accessed by irresponsible parties, which will likely result in patient data being leaked.

Based on the background that has been explained, considering the importance of Electronic Systems in maintaining the security of personal data in the implementation of electronic medical records, as well as the impact that would arise if information in a patient's medical record is leaked and is at risk of being used by irresponsible parties, researchers are interested in conducting research with the title "Security and Privacy Analysis of Patient Data to Support the Electronic Health Information System at Hospital X Bandung City".

II. RESEARCH METHODOLOGY

The research method used is the Qualitative Research Method. Qualitative Research Method is a scientific research that aims to understand a phenomenon in natural social contact by prioritizing a process of in-depth communication interaction between the researcher and the phenomenon to be discussed. A descriptive approach is a study that finds facts with appropriate interpretations to identify phenomena, groups or individuals that are occurring. The data collection technique used was direct observation and interviews. This research focuses on the security and privacy aspects of patient data.

III. RESULTS AND DISCUSSION

A. Information Security Aspects of Implementing Electronic Medical Records based on Confidentiality Aspects

The privacy aspect protects medical record data through patient data management mechanisms starting from the data collection process, data quality, and access control to the data. Implementation of electronic medical record security at Hospital X Bandung City by applying login user name and password. Username and password are used to prove that the user has the authority to use and enter the system.

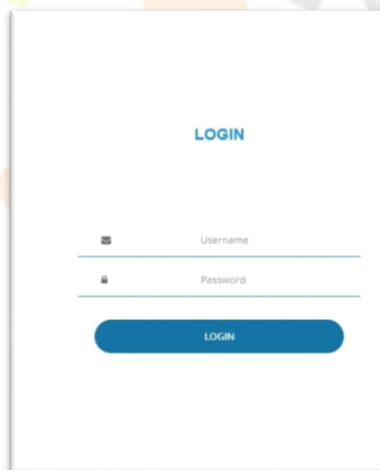


Figure 1. Home Page Aspects of Confidentiality

Based on the result of research that has been conducted at Hospital X Bandung City, it is known that in the application of information confidentiality aspects from parties who do have the right to access, the application of electronic medical record security user login usernames and password in each service unit an each health service officer person. Password and username are a combination of letters and numbers. The user name and password are used to prove that the user has the authority to use and login to the system. Therefore, each user before entering the information system must type and enter their respective passwords.

B. Information Security Aspects in the Application of Electronic Medical Records based on Integrity Aspects

Based on the result of interviews related to integrity aspects that aspects of electronic medical record integrity at Hospital X Bandung City have been available features in MORBIS. However, when experiencing errors or problems automatically the system cannot work or function properly, so service officers will contact the relevant department, namely IT officers to repair the system and change the system to manual temporarily.

Based on the result of research that has been conducted at Hospital X Bandung City, it is known that changes in data or information that function to change or edit when there is an error in filling in patient data. Major changes such as errors occur there are features that function on each item, then the officer will make changes with the knowledge of all parties who have right to access electronic medical records.

C. Know the Aspects of Information Security in the Application of Electronic Medical Records Based on Authentication Aspects

Based on the interview results, the authentication aspect/ aspect of electronic medical record access right is given to all doctors, nurses and medical record officers. Each unit has its own username and password so that officers cannot access units that are not their place of service. For example, nurse cannot open the MORBIS registration section and vice versa.

Table 1. Hospital Staff Access Rights

No.	Hospital Staff	Access Right
1.	Doctor	<ul style="list-style-type: none"> Doctors have the right of access to information and access rights to medical records of patients who have been treated. Doctors can access the medical record files of discharged patients related to the completeness of the files and requests for the patient's medical resume or for the benefit of the patient's health.
2.	Nurse	<ul style="list-style-type: none"> The nurse has access to the medical record file of the patient who is being treated at that time. Nurses can access the medical record files patients who have been discharged for the sake of completeness of the files.
3.	Medical Records Officer	<ul style="list-style-type: none"> Medical record officers have the right to access patient medical record files to input patient files or also repair and complete rice for patients who have been discharged.

Based on the results of research conducted at Hospital X Bandung City regarding authentication aspects related to the right of access to information. The head of Hospital X Bandung City (Director) has made a policy regarding the right to access medical records. Access right are only given to medical records officers, nurses, it officers and Doctors. Access to electronic medical records by unauthorized parties can be controlled by the presence of ID (password and username) for each user. The use of ID is considered not optimal in maintaining data security in electronic medical records because the user ID can be easily known to other parties, or if the user ID has been forgotten the new ID will make it difficult to input data. So the application of user ID and username is always updated, to maintain the security of each ID of health service users.

D. Information Security Aspects in the Application of Electronic Medical Records Based on Availability Aspects

Based on the results of interviews about the availability aspect, it can be concluded that when a patient's medical record is needed immediately from other service officer and at the same time there is a problem or error in the system, the service provider immediately queues long for patients who need service. While other officers will contact the IT department to see the problems with errors that occur in the system.

Based on the result of research conducted at Hospital X Bandung City regarding the availability of information, service officers always pay attention so that patient medical records are available quickly more when needed, besides that this availability aspect is able to display data that has been stored before. Obstacles that sometimes occur for example when doctors need faster patient medical records, suddenly the system error or network is off, the officer uses manual medical records, while waiting for the system to improve again. The officer will contact the relevant doctor and nurse to convey the problem that occurred.

E. Knowing the Aspects of Information Security in the Application of Electronic Medical Records Based on Aspects of Access Control

Based on the result of interviews that have been conducted regarding access control that emphasizes on how to regulate access to information at Hospital X Bandung City, can be concluded that the Hospital already has a policy/ SPO in

implementing access rights. Each service officer has different access rights, for example the head of the unit has wider access than his staff.

Based on the results of research conducted at Hospital X in Bandung, the access control aspect of the medical record system is not all employees have the same access rights, so there are some, for example, the account of the unit accesses more widely than his staff, if anyone needs information or of more complete data later submitted to the head of the IT section. Hospital X Bandung City has also implemented a policy for access rights to each service officer. Electronic medical records can only be accessed by certain users, if there is a patient who needs a medical resume then the patient must fill out an affidavit first, this procedure protects the medical record from unauthorized officers.

F. Information Security Aspects in the Application of Electronic Medical Records based on Non Repudiation Aspects

Hospital X Bandung City in implementing Non-Repudiation aspects that the service team of the section, especially IT officers, is still trying in the future to be able to make special features to track or see traces in the event of data transactions, or changes in data on the electronic medical record system.

Based on research conducted at Hospital X Bandung City regarding the Non-Repudiation aspect can keep someone from denying that they have made transactions or operations on the electronic medical record information system, it is stated that transaction or changes in data can be seen and tracked directly in the hospital's IT department. Anyone who inputs or deletes information data into the electronic medical record will immediately have changes in the log file in the IT department.

IV. CONCLUSION

1. The Implementation of Confidentiality and Security Aspects of Electronic Medical Records at Hospital X Bandung City has been going well. In its application, the Hospital has sought aspects in maintaining confidentiality and security. This is in accordance with the Regulation of the Minister of Health of the Republic of Indonesia No. 24 of 2022 about Medical Records.
2. Privacy or Confidentiality Aspect of Electronic Medical Record at Hospital X Bandung City is the protection of information from parties who do not have access rights through username and password for each user.
3. The Integrity Aspect of Electronic Medical Records at Hospital X Bandung City is that features are available to change or edit when there is a mistake in filling in patient data.
4. The authentication aspect of Electronic Medical Records at Hospital X Bandung City has made a policy regarding the right to access medical records. Access rights are only granted to medical records officers, nurses, IT officer, and Doctors. RME access by unauthorized parties can be controlled by the presence of id (password and username) for each user.
5. The Availability aspect of Electronic Medical Records at Hospital X Bandung City is able to display previously stored data.
6. Access Control aspect of Electronic Medical Records at Hospital X Bandung City not all employees have the same access rights so there are some, for example, the account of the head of the unit accesses more more widely that his staff, if anyone needs information or for more complete data will be submitted to the head of the IT section.
7. Non-Repudiation aspect of Electronic Medical Record at Hospital X Bandung City can keep a person to deny that he has made a transaction or operation on any electronic medical record information mentioned that the transaction or data changes.

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