

A Novel Dr.KSM Approach for Information Security and Risk Management in Health Care Systems

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Abstract

At Present times, A common person focus on their health issues not only for themselves but also for their family because health is a wealth. In the modern days most of the people are working and they spending 40% to 50% of the income on their health issues not only for themselves but also for their family. By this the rate of population arrival to the Hospitals are increasing day-by-day. So the hospitals have to be reliable towards the patients. The records of the patients and the medication details are to be maintained correctly. There may be many risks in the software that they use. So any health organizations are struggles to display the patient electronically measured health records and what they use medication outside. So every time common people are lose their health information. If the common people know the about their previous health records they reduce their money and take the first aid immediately. In this paper we suggest a new approach to risk assessment for health care systems. As risk assessment is a Qualitative approach, there are no exact techniques to solve such risks. Lack of risk assessment techniques leads to failure in the system and organization as the people don't find interest to come if once the organization fails in any of the issues. Our new method mainly focuses on the risk management for health care organizations. Today's health care industry faces a number of emerging risk issues related to health care reform, the shift from fee-for-services to outcomes-based compensation, the use of electronic medical records and the management of human capital. Therefore our method has put forth a Risk management technique for the Risk assessment.

Keywords: *Risk assessment, security, Health-Care system, Information security, Qualitative approach, risk management, Electronic Health Records, dependencies.*

1. Introduction

The information security and risk management are commonly associated with IT projects and both must be there in a successful project. As no IT project can ever be risk free, many methodologies have been applied to quantify the likelihood and estimate the impact of risks that a project may encounter. Risk is inherent in the delivery of healthcare. The security risks associated with healthcare systems have increased as direct (network) and indirect (media) connectivity has increased. With sophisticated equipment, there are always more risks than any organization can afford to fully eliminate. Therefore, the need arises for a systematic, documented method to assign risks so that they can be listed in

priority order, mitigated accordingly, have residual risks documented and accepted. The process for managing healthcare systems IT security-related risks is very similar to long-standing device safety processes. The medical device industry has been engaged in safety risk analysis for over 30 years. This paper recommends that Dr.KSM method applied to security risks to healthcare systems. These methods support a manufacturer in assisting the healthcare provider and directly support a healthcare provider in maintaining confidentiality, integrity, availability and risk free of protected health care information system.

2. Information Electronically Measured Health Record System

At Present in Health care organization Electronically Measured Health Records place a major role to identify the diseases and to start the treatment.

Medical information has been defined as “the theoretical and practical aspects of information processing and communication, based on knowledge and experience derived from processes in medicine and health care” (van Bommel and Musen 1997).

An alternative definition is “the field that concerns itself with the cognitive, information processing, and communication tasks of medical practice, education and research, including the information science and technology to support these tasks”

Now a day we are using different types of health record systems are used in health care system. Actually automated medical record system was first developed in the 1960s (Shortliffe and Perreault 1990). Last 30 years there are different types of health care systems are available but any health care system cannot display the patient records outside world because there are so many problems. Hospitals/Health organizations treatment was going on based on the electronic health records but any organization cannot display the patient health records outside they only provide scanning reports, normal reports even though they cannot mention prescription also clearly.

There are so many problems are there to show the patient records outside for example consider the personal bank account money information if any mistake is there display the amount money there is no problem we can meet bank officials and rectify our problems but if any mistakes are there in display patient records health organizations are facing so many problems. Whenever we develop the 100 % risk free health care system then only health organizations are display the patient records outside.

3. Identify the Risks in Health Record System

The oxford advanced Learner’s dictionary defines risk as the possibility of something bad happening at some time in the future, or a situation that could be dangerous or lead to a bad result (Hornby and Wehmeier 1989). Therefore, potential risks needed to identified and reduced. Sommerville defines risk as the product of the consequence of a hazardous event and the frequency, or probability of its occurrence (Sommerville 2001) :

$$\text{Risk} = \text{Probability} \times \text{Consequence}$$

Now we focus on where risks are available in health care system.

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|---|------------------------------|
| 1. Data content | 2. Information capture |
| 3. Information representation | 4. Clinical practice |
| 5. Operational dimension and data model | 6. Decision support |
| 7. Security | 8. Quality assurance |
| 9. Applications | 10. Performance |
| 11. Health information and data | 12. Result management |
| 13. Decision support | 14. Order entry/management |
| 15. Administrative process | 16. Patient support |
| 17. Electronic communication and connective health management | 18. Reporting and population |

Risk assessment is the important and main work in Risk management process normally there are two types of approaches for risk assessment

1. Qualitative approach and
2. Quantitative approach.

Risk assessment consists of risk analysis and risk evaluation. Risk analysis is the systematic approach of estimating the magnitude of risks. Risk evaluation is and the process of comparing the estimated risks against risk criteria to determine the significance of the risks identifying all assets.

3.1. Risk Assessment Should Fulfill all Criteria Listed Below

1. Identifying threats and vulnerabilities, and any other applicable security requirements
2. Identifying the impacts that losses of confidentiality, integrity and availability might have on the assets.
3. Based on this information, assessing the harm and likelihood of risks occurring, and estimating the levels of risk.
4. Identifying the most appropriate risk treatment option
5. Select control objectives to reduce the risks to an acceptable level

Now a day's maximum researchers are doing Qualitative approach because Quantitative approach is very difficult we can measuring a numerical value for each and every phase. Qualitative approach is not suitable for health care system. The result of the qualitative approach is depend up on the researchers taken value one researchers to another researchers assumptions are different so this is not suggestible for health care system. So In this paper we proposed a new quantitative approach. A new methodology for providing security to the information and globalization of patient records in the following way:

1. Assigning an unique token to patient which is used as reference for the patient's records.
 - a. A unique token id is identified through biometrics like thumb prints, retina scans etc.,
 - b. Whenever the patient went to hospital his previous medical records are retrieved by using the token number so that the doctor easily knows the patients health condition, blood group, and about the diseases he/she has like blood pressure, diabetes etc.,
 - c. The information associated with the token number about the patient helps the doctors to know easily about patient and what type of medicine is suitable for him.
 - d. When a patient enters into hospital a token is assigned to him for the first time and after every time token assigned is used.
 - e. These token numbers are maintained globally so that all the hospitals will have that data.
2. The data is maintained in one domain and the trusted doctors can access the patient information through some login credentials.
3. The data is continuously monitored and updated in the server which gives many advantages.
 4. A list contains the hospitals data is maintained which contains the hospitals name, address and for which treatment they are serving better etc.,
 5. This data helps the patients, easy to approach a better hospital quickly.
 6. A server is maintained globally by having a proper network connection which must be available 24*7.
 7. This data can be accessed by every doctor who has been recognized from a standard institution, so that there is no chance of misleading the patient through charging extra money for unnecessary tests, scanning, etc.,.

8. By maintaining patient records globally every doctor can view the patient's condition, so that he can suggest the better treatment for that patient through emails, messages, phone calls to respective hospitals.

9. The patient's health records are continuously monitored and that data is updated time to time.

10. The advantage by doing this is, all the doctors available are given information about the condition of patient so that immediate treatment should be made possible.

11. The patient can get the medicines for some mild illness by not going to hospital through some emails or messages.

12. The security to the data can be maintained by keeping all the data in the encrypted form and the doctors are given the key to decrypt so that only certified doctors can access data.

13. The continuous data connection is maintained through Wi-Fi and if any data connection is lost a local server is maintained to serve at those times.

4. Dr.KSM Quantitative Approach

Quantitative risk assessment describes risks from a purely mathematical viewpoint, fixing a numerical value to every risk and using that as a guideline for further risk management decisions. Risk is often described by a mathematical formula:

$$\text{Risk} = \text{Vulnerability} * \text{Threat} * \text{Asset Value}$$

The vulnerability is the weakness indication.

4.1. Existing System

There are so many systems prevailing which provide security to electronic health records, but so many of them are lagging significant features like display patient records outside, Maintain the patient records long period, etc..

4.2. Proposed Method (Dr.KSM Approach)

- Step 1. In Health care system find the individual module Reliability.
- Step 2. Based on the Reliability find the risk in that module.
- Step 3. In health care system identify how many modules are there
- Step 4. Each and every module we identify 18 types of risks factors
- Step 5. Each and every risk value finds and counts those values module wise
- Step 6. Based on the modules and their dependency summarized modules risk
- Step 7. Assume integrated all modules summarized entire system risks.
- Step 8. Based on the risk factors and module risks Give suggestions how to rectify the risks.

5. Results and Comparison

Based on the Dr.KSM Qualitative Approach the results of the sample system.

Table 1. Risk Assessment Results based on the Dr.KSM Approach

Sl. No	Module Name	Risk value	Risk Effect (%)	Dependency Effect (%)	Remedies
1	Login	20	40	80	Checking
2	Patient Display	30	45	30	Understand
3	Patient Records upload	2	0.5	1	Confirmation

4	Patent Records update	3	2	2	Confirmation
5	Doctors module	4	2	2	Good Interface
6	Data entry module	5	2	2	Checking and Confirmation
7	Guest user	6	10	4	Understand

Present Existing systems cannot display risk factors clearly. The displayed output health care system users are not understood so the health organizations cannot display the patient records outside. Using proposed Dr.KSM approach is very helpful for health care organizations to use health care systems and easily rectify any risk occurs in middle using remedies information in the result.

6. Conclusion

As Risks are inevitable in any IT project and Information security is an ongoing process to manage risks. One could say that risk management is essentially a decision making process. The risk assessment stage is the collection of information that is input into the decision. The risk mitigation stage is the actual decision making and implementation of the resulting strategy. The effectiveness evaluation is the continual feedback into the decision making. This approach can be further extended to eliminate corruption for various government schemes in health sector. The fully automated and wifi connected system can be implemented as real time project which will be very useful. The advantage of using these fuzzy cognitive approach and risk evaluation techniques together is that it takes into account intuitive human observation, which forms the basis of any risk assessment, and also accounts for the vagueness regarding patient information and risks when calculating a phase's risk level in a typical patient route. By identifying a phase's IT risk value, this approach helps health care staff manage risks by facilitating the decision-making process. Since the information should be accessible for the clients throughout the day and the records are disclosed to the required one's wherever needed, requires the server to stay active 24*7. Also multiple numbers of clients will be connected to a single server at a time; this can be a little bit bottle neck. Hierarchical diseases can be efficiently treated by studying his/her ancestors' record. If managed in an efficient way, this system will have a great scope in the future.

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