Electronic Health Records: A Case Study of an Implementation

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Abstract. Since healthcare institutions have to manage efficiently many terabytes of data on their patients, they need tools that allow them to have an easy access to their data and that enable them to share their data with every specialist involved in the treatment of a patient. That's why they increasingly adopt EMR and EHR systems. As they are quite recent systems, healthcare institutions usually lack of experience to implement these systems. The purpose of this paper is to do a case study on the implementation of an EHR system in a local healthcare institution, and then to analyze this case study to give directions so as to avoid some arising issues.

Keywords: EHR, EMR, Implementation, Case Study.

1 Introduction

Health services play a crucial role in society. By curing people adequately, they participate to the increase in their lifetime. According to the *Bureau of Labor Statistics* [1], there were about 661,400 physicians and surgeons in the US in 2008, which means that for a population of about 310 million, each one has about 470 patients. When we consider this number, we think that the doctors should be very well organized to collect and analyze information on their patients, in order to deliver an adapted treatment. That's why information systems are very useful to help healthcare institutions to manage large quantities of data on their patients. There are mainly two types of information systems dedicated to the healthcare industry: the Electronic Medical Record (EMR) and the Electronic Health Record (EHR).

"An Electronic Medical Record (EMR) is a computerized medical record created in an organization that delivers care, such as a hospital or physician's office." (Wikipedia). EMR is the legal record created by healthcare providers. Essentially, it is just an electronic version of the same paper form doctors have used for decades. EMR allows physicians to get rid of large quantities of stored paper files on their patients, and enables them to have easily access to structured information. In the electronic form, the information is allowed to be shared and viewed much more quickly by those who need the information. The main limitation to this technology is that it is cannot easily be sent out from the original location to other doctors or caregivers. In this way, they are similar to paper records in that many times they must be printed out and sent physically to other locations for processing.

M. Kurosu (Ed.): Human-Computer Interaction, Part II, HCII 2013, LNCS 8005, pp. 46–55, 2013.

The term EHR can briefly be defined as the concept of a longitudinal and cross-institutional record of a patient's health and healthcare. [2]

Tatum states, "Electronic health records are copies of an individual's medical history that is stored as electronic data" [3]. According to Walker, Bieber, and Richards [4], EHR improves communication of clinical data that facilitates doctors and concerned health professionals carry out their duties effectively and efficiently. EHR is one of the most important aspects of any healthcare company or organization because it helps doctors and employees manage all administrative and professional activities using the information stored in the EHR system by the authorized employees.

Carter states, "EHR systems designed for physicians' offices represent the simplest architecture consisting of three basic components: the database management system, user interface, and external interfaces" [5]. An EHR system is not only used for collection of patient related data but also it is used to process, analyze, and disseminate the collected information or data in order to carry out different activities related to provision of healthcare to the patients. "The medical records can cover a wide range of aspects of the patient's health while stored in a format that is easily transferable between health providers" [3].

It is necessary to understand the difference between Electronic Medical Record (EMR) and Electronic Health Record (EHR). Often these terms are used interchangeably however these terms are certainly different.

The main difference between EHR and EMR is the ease of transmission. EHR is designed to allow the patient records to be sent and received by those who need the information. The information moves with the patient wherever they go. Whether it is a specialist or simply a laboratory which is conducting blood analysis, the information can be shared quickly with EHR. Additional EHR functionality is that it may allow the patient to review and look at their own medical records. By being able to look at a timeline of blood tests the patient may be able to ask his or her doctor more informed questions. Patients may also be more motivated to make lifestyle improvements if they are able to view their progressively worsening health. This is done much more quickly via electronic means. EHR possesses this capacity and are thus the direction the health industry is moving towards.

As EHR is better adapted to the current needs of healthcare institutions, and as EHR is a quite recent trend in the industry, we focus our study on the implementation of EHR in a local healthcare institution.

Many vendors now offer EHR systems. But as this type of systems is quite recent, their functions may not be well adapted to physicians' needs yet. Moreover, the experience in the implementation of EHR is not very extensive. However, any error in the information on the patient may make the doctor interpret wrongly symptoms and deliver an inadequate treatment, which may lead to devastating consequences for the patient.

This study investigates the problems that a typical physician may encounter while implementing and then using EHR systems. Through an investigation in a local healthcare institution, which has recently adopted EHR, we look for the common problems that any physician can encounter while implementing EHR systems, and

then we analyze them to give directions on how to solve them. This study is aimed at helping healthcare institutions to manage the implementation of their EHR.

2 Literature Review of Success Factors in Implementing EHR

The success of a healthcare company without implementation of an EHR system is impossible in the today's world. It is because there is a lot of competition between companies these days and only those companies can get competitive advantage which keep up to date information about different issues related to diagnostic methods and treatments. An EHR system provides companies with various benefits related to the information management. A health company can make use of an EHR system to ensure quick processing of data needed to provide quick treatment to the patients.

The benefits and efficiency of using EHR system can be evaluated by comparing the past and present organizational performances. EHR systems definitely improve the performance of any healthcare organization by providing them with many considerable benefits, such as, documentation of patient-doctor interactions, retrieving medical histories quickly, making referrals, increased storage capacity, and customized view of relevant information. "An EHR also represents a huge potential for cost savings and decreasing workplace inefficiencies" [12]. Considering these advantages, a well-structured EHR system is definitely productive for any healthcare organization.

The implementation of electronic medical records (EMR) decreases patient sufferance, which often occur because of medical errors [13]. Quick collection of information and provision of accurate information to the healthcare providers are two of the most significant aspects related to the EMR systems. As we know that doctors often write in illegible style, which leads to inaccurate data entry into files by a second or third party. "With EMR this problem will mostly become a thing of the past" [14].

"Electronic health records reduce the chances for medical errors because they contain all information necessary, which in turn creates more accurate and clearer reports" [15]. Data security is another key aspect of EHR because the computerized data prevents unauthorized people from accessing the data. An efficient EHR system not only improves data security but also provides benefits to the health consumers. Moreover, the data is not lost in case of any hazard because it can be saved at more than one place. EHR also helps health professionals in the analysis of information by providing them with accurate and up to date information about the patients. Complete medical histories of the patients can be stored in their respective folders, which can help health professionals retrieve that data easily and quickly when needed. Quick retrieval of accurate information also helps doctors provide instant medical care to the patients, which is a considerable benefit for the health consumers.

ERP systems also facilitate healthcare companies in managing their business processes through providing them with efficient mechanism in the form of electronic health record system to manage information. Oz states, "Information is the lifeblood of any organization" [16]. An Electronic Health Record system means management of all medical information, which is required to administer different business activities.

An EHR system is a part of internal business control system that manages company's documents, people, procedures, and information technology. Stahl found that information systems promote efficiency and optimal control of business processes [17]. Today, a health services providing company can never be successful without implementation of an EHR system because such systems keep proper record of all information that is needed to run the business activities effectively.

There are a number of factors, which make a healthcare company implement an electronic health record system. Let us discuss some of those factors in some detail in order to get a better understanding of how those factors influence the working of the healthcare companies.

One of the main challenges in the implementation of this system in a healthcare setting is the ability of the employees to use such system. Management of the healthcare organization where such system is to be used, should first provide proper training to all concerned employees regarding use of this system and then they should go to implement it. The management should consider all technical and social issues while training the employees. The employees should be made aware of the importance of information security or privacy of the patients' information so that they should not disclose any patient's information to any unconcerned person. Young found that some other problems in the implementation of electronic health record system are organizational and human issues, such as, untrained medical professionals and rise in unemployment due to automated systems that need to be resolved in order to implement for an electronic documentation record system in the healthcare companies [19]. Although money is saved by using electronic medical records, such as, reduced cost of papers and labor, but the concerns arising due to these factors should not be ignored.

Next important element of an EHR system is its consistency and reliability. Only authorized employees are allowed to collect the data. The EHR system processes the data in a consistent manner. It is because if the data will be processed consistently, the users of the EHR system will not have any difficulty in using the information generated by the system. The management of any healthcare company needs to apply such mechanisms that should be able to bring necessary changes to the system when required. Data consistency acts as the foundation for an efficient EHR system. If the data will not be processed and compiled in a consistent manner, it will be very difficult for the users of the EHR system to run the business operations of any organization efficiently.

Accuracy is another key element of an EHR system. It means that information provided to the users of the system should be precise and accurate in all aspects. All departments of an organization make use of reports generated by the system, so it is essential for an EHR system to generate accurate and properly checked information in the reports. Accuracy of internal controls is of extreme importance for the proper functioning of the system.

Another important element of an EHR system is relevance, which means providing relevant information to the concerned departments. The EHR system provides relevant information to the concerned professionals. Irrelevant or unrelated information is of no use and it leads to time wastage and ineffective decision-making. An efficient EHR system is one that provides relevant and desired information to the users.

Completeness is also one of the key elements of an EHR system, which means to provide users with complete information regarding any matter. However, completeness does not mean that the report should have a huge detail about any specific matter as it creates information overload, rather only relevant and pertinent information should be provided to the concerned departments.

3 Research Method

Data was primarily collected for the case study using semi-structured interviews with doctors, transcriptionists and the resident EMR specialist at the Cape Coral office location. Qualitative and quantitative data was collected including certain e-mails regarding the implementation of the system.

4 Analysis and Discussion

Southwest Florida Neurosurgical Associates (SWFNA) is a full service medical practice which treats patients showing symptoms of back, spine or brain injury. The company employs six different doctors which are spread throughout the three locations. SWFNA offices are located in Fort Myers, Cape Coral and Punta Gorda. The practice was begun with only three neurosurgeons in 1990. At this time they only provided surgical care. The organization now includes six neurosurgeons, two physical therapy divisions, an onsite spinal decompression unit, five physiatrists and a therapy suite which includes onsite MRI capabilities.

The practice is board certified to treat such symptoms as neck/lower back pain, herniated disks, arthritis of the spine and degenerative disc disease. SWFNA regularly prescribes over 100 prescriptions per month to their patients. Due to the nature of their field, many times these prescriptions are for pain medication to be taken after surgery. The abuse of pain medication by certain individuals has made it necessary for any EMR platform to track and monitor all prescriptions for such drugs.

After gaining an understanding of why EHR is superior to EMR it is easy to see why healthcare providers may wish to make the switch. This was the case with Southwest Florida Neurosurgical Associates. SWFNA had employed EMR in the form of Misys, a popular platform used by many healthcare providers. This system had been in place for some time and the employees were able to become adjusted to the system. The system was well liked by the staff and performed all functions which were deemed necessary.

Although the system was functioning properly and there were few complains, the management team was compelled to change to EMR. Management feared that soon EHR would be mandated. In addition to this the government was offering subsidies to medical practices which would make an early switch to EMR. Motivated by this favorable environment, management decided to make the financial decision to adopt the new EHR system at this opportune time. The decisions about switching to a new system fell into the hands of the chief financial officer. This individual acts as the CEO of the organization. Research was done primarily online and through speaking to salespeople. Finally the CFO decided on Allscripts EHR solution.

The timeline for implementation was somewhat rushed due to time constraints involving the government subsidy to migrate to EMR. As a result, employees were only alerted to the fact that the switch would be taking place approximately one month before the go live date. Due to the small size of the organization, SWFNA did not employ a CIO or even any in house technical staff. The practice outsources all of its IT needs. Many of the decisions that were made prior to the implementation were made solely on the information provided by the proposed EHR provider.

SWFNA elected to use Allscripts EHR solution. Again, due to the size of the organization SWFNA would rely on Allscripts to implement the EHR themselves and provide any technical support needed. Allscripts informed the practice that their employees would need twenty hours of training each prior to the implementation. This training was scheduled to take place online at the leisure of the employees. Allscripts has a website called AllscriptsAcademy. At this website trainees are allowed to log in through a portal and access a sample of Allscripts EHR. The employees however had their own ideas. They were paid for an eight hour work day. These eight hours were filled with medical related tasks that fit their job description. The employees would be required to use their own free time if they were to receive training on the system.

Obviously this did not create great motivation on the employees end to go out of their way to receive the needed training. The staff communicated to management that if they were not being compensated, they would not be willing to receive this extra treatment. Management was then faced with a decision to either stop their business processes for a period of time to allow training or alter their plans. Understandably, the revenue generating business processes were given priority and the training was reduced to a single training session on 9/12/2011 which did not include hands on experience for the trainees. One employee however in each office received extensive training with the system. In interviews, the employees admitted that they viewed the training session as unneeded and did a very poor job of paying attention.

For the implementation Allscripts sent down three EHR specialists from North Carolina to oversee the process and troubleshoot any issues for the first three days of implementation. One specialist was stationed at each office. A big bang approach was used as all offices went live on the same day. The system first went live on 4/18/2011. Employees of the company described this day as a day of chaos.

On the day the system went live, employees hated the new system. They had not received training and were not able to use the Allscripts platform. Employees hated the new platform and expressed that they liked the old system. The new Allscripts system was not used on this day by the employees. Employees would instead hand write prescriptions for patients. They also had no access to patient information. In a very embarrassing situation, each patient had to be asked about their medical history as it could not be retrieved from the system by the untrained staff. The staff hated the new platform. The first day of implementation was extremely embarrassing and unproductive for the employees.

In each office there was one employee (usually a transcriptionist) that received extensive training with the system. On the second day of implementation this employee took the time to show the rest of the staff how to use the basic functions that

were needed to treat patients. If an employee had a problem they would call the extensively trained individual over for help. Over time, the employees learned the new system and can now appreciate its benefits. Although the lack of training disallowed the system to support the staff initially, the system in itself performed exactly as it should and no major technical glitches were observed during the implementation.

There was little to no modification of the Allscripts EHR. SWFNA employed a small R implementation strategy. Minor changes in business processes however did occur. These small changes mostly included learning the new steps to complete the same task as well as adjusting to the process of sending and receiving EHR information. The system does not match the business process requirements of SWFNA exactly. In some instances which are detailed later employees are forced to perform certain tasks manually or without the help of the Allscripts EHR. The practice however lacks the ability and motivation to change the Allscripts EHR to better fit the needs of the employees and patients and simply makes do with what they were given.

In interviews with employees it was learned that overall the Allscripts EHR works very well. The main resistance with the program stems from the initial learning process employees had to undergo to learn the program. The biggest complaint about the system is the amount of information the employees are required to enter into the system. Every small piece of information must be entered in the system whether it may be a new allergy or test results. This however is more a matter of medical bureaucracy and thoroughness of care and has little to do with the Allscripts platform. Employees are required to keep extremely detailed records regardless of EMR or EHR platforms.

The Misys EMR which was used prior to Allscripts is still used in one regard. SWFNA employees were not impressed with the Allscripts appointment system so they retained the Misys version. There is no single individual responsible for the EHR system. At each of the three offices there is one person assigned to look over the system. These individuals receive very little training and typically get in touch with Allscripts support to fix any problems. In addition to this minimal training these individuals are also in charge of medical coding at the office. Their time is divided and mostly spent on the medical coding portion of their job.

Each employee at the practice has their own computer station. So that they can access the needed information the employees use a remote desktop application. In this way employees can access the EHR when they are on call and at home without ever walking into the office or hospital. The system typically updates every few weeks and users are asked to be logged off at that time to avoid any issues. Allscripts provides any support the SWFNA employees require. There is no on site EHR specialist.

The employees of SWFNA like that Allscripts allows them to easily look up patient history such as allergies. Another major advantage of Allscripts is that employees are able place and view flags on certain patients. These flags are useful for those patients who are often no-shows or have a history of abusing pain medication. Employees also value the ability to see what other doctors have dictated during their visits with a patient. The sharing of this information makes it much easier when

conducting a second opinion or reviewing past visits. Overall the system does exactly what it is meant to.

SWFNA employees however do not like the system Allscripts uses to identify when patients in the waiting room are ready to see a doctor. Often times patients are filling out paperwork and the physician's assistant is not able to discern if they have finished yet to know when to call them back. Also the system does not display what room a patient is in for the appointment. This can lead to the doctor seeing patients out of order and long wait times for some patients. Another con to this system is that it takes so long to chart the patients vitals in the Allscripts system that the employees often do not have time to enter them into the system. These valuable records are often lost due to time constraints.

Another major problem employees had with the system was a malfunction which appeared after an update of the system. Allscripts performed an update which was incompatible with the firm's appointment system. This incompatible update caused roughly half the appointments to not shown in the Misys appointment system. The next Monday patients were coming in without the staff knowing they were going to come in. One of the doctors had even left the office under the false impression he had no patient appointments. Allscripts was contacted and found a solution within three days. For those three days all patient appointments had to be entered and tracked manually to ensure accuracy.

SWFNA employees also complained about the patient message system. When a patient has a question for the doctors the phone number of the patient and the question are entered into the Allscripts EHR so that the employees can call this patient back. The Allscripts solution does not allow employees to identify if the patient has been responded to by another employee. This leads to confusion and often times repeat calls to the patient increasing the work load of the staff. The last complaint of the staff is that the EHR does not differentiate which doctor the patient belongs to. The staff must then sometimes spend time to figure out which doctor the patient is seeing. These redundant tasks take away from the efficiency of the practice.

5 Conclusions

The SWFNA implementation of Allscripts yields some valuable information about small business EHR implementation. In particular one of the main lessons learned was that it is extremely difficult to get employees to actually receive training. Employees have long workdays and must even be called in to perform emergency surgeries. The last thing an employee wants to do when he or she gets home is begin EHR training.

It is suggested that another firm undertaking a similar implementation should pay their employees to learn the system before the go live date. Employee resistance should be expected as any change will require additional work on their part. The employees will lack motivation to learn new systems if they are not forced to do so. One critical factor in the implementation that prevented training to occur was the lack of a project champion. The CFO of the company was the driver for change. This individual knows very little about EMR software implementation. He simply relied

on the information given to him from Allscripts. He did not realize the problems the lack of training would induce.

Management should also make a point of notifying their employees of the EMR change more than a month prior to implementation, as was the case in this example. Employees must be well informed and not surprised by any changes to the system.

The decision to have one Allscripts EHR staff member at each location seemed to work very well. These employees were sorely needed to teach the staff how to use the EHR and deal with any glitches the implementation may have ran into. Staying for three days appears to be a reasonable amount of time to train employees.

The strategy of extensively training one employee at each office location seems to have worked very well. SWFNA made it one specific person's job to learn the EHR program extensively. This person was a transcriptionist meaning they use the program very often and never see patients. This allows them to always be available for any questions other employees may have. This is a very economical solution to not having any in house IT staff. By blending jobs they kill two birds with one stone.

Overall SWFNA performed admirably in implementing Allscripts EHR. Other than some minor glitches the system works very well. None of the employees have any technical experience with any EMR software yet they were still able to identify a suitable EHR solution and implement it on budget and on time. Such an accomplishment is not easy for a small business which does not have a CIO or any IT staff of its own.

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