The Implementation of Electronic Health Records

# ABSTRACT

A 2000 Institute of Medicine Report estimated that as many as 98,000 U.S. patients die from preventable medical errors as a result of lack of access to complete medical information (Institute of Medicine, 2003). The development of an electronic health record system has been supported by the federal government as an opportunity to reduce medical errors by providing complete, accurate and timely information to health care providers. This paper will discuss the advantages and disadvantages of an electronic health record system and the barriers to implementing a system. Three case studies will be discussed to support salient points.

INTRODUCTION

Despite the fact that the United States' health care expenditures comprise 16% of the gross domestic product and expected to reach nearly 20% of the gross domestic product, U. S. citizens fail to consistently receive high quality health care (National Health, 2006). A 2000 Institute of Medicine Report estimated that as many as 98,000 U. S. patients die annually from preventable medical errors—many due to lack of access to complete medical information (Institute of Medicine, 2003). Medical informatics science, developed in the 1950s, is concerned with developing and evaluating information technology to advance health care focuses on the storage, retrieval, and use of biomedical information for problem resolutions (Vreeman, Taggard, Rhine, & Worrell, 2006; Austin& Boxerman, 2007). The use of electronic health records (EHR) or electronic medical records (EMR) may be considered a fundamental application of medical informatics, although there appears to be varying definitions of these systems (Jha, Ferris, Donelan, DesRoches, Shields, Rosenbaum&Blumenthal, 2006).

EMRs are electronic documentation of providers' notes, electronic viewing of test results and electronic prescribing. They are not a single computer application; rather a set of systems that are integrated that require investments in money, training, change and time. EHRs are more complex because it points to where other patient information can be found. An EMR provides information to the physicians regarding care recommendations and can also receive data from remote sites (Thielst, 2007). Because both systems have similar challenges during their implementation in an organization, the acronym EMR will be used interchangeably for both systems. Research indicates that the use of information technology and particularly the use of EHRs and EMRs may provide a platform to improve the quality of health care while controlling health care costs (Caldwell, Beattie, Cox, Denby,Ede-Golightly, & Linton, 2007). This type of management system focuses on both the efficiency and effectiveness needed to control health care costs.

In 2004, President Bush indicated that there should be widespread national adoption of EMR by 2014...that every U.S. resident should have an EHR/EMR (GAO Report, 2007). Bush established the National Health Information Technology Coordinator with a 10 year goal of creating an interoperable health information infrastructure that would ensure that most Americans would have electronic health records that are accessible by the health care delivery system (Valerius, 2007). The Health Resources and Services Administration (HSRA) have a \$27 million grants budget that will be allocated to community health centers nationally to implement HER systems (Shields, 2007). The Certification Commission for Healthcare Technology was formed in 2004 by three leading healthcare industry associations to develop a certification program and establish criteria for EMR systems (Reber&Ladd, 2007). Funds have been awarded to them by the federal government to achieve these goals and is anticipated that a certification program for EMR will be established this year. Also, the Health Information Technology Initiative, which began in 2005, is a partnership between the federal government, several academic institutions and a non for profit organization. Their goal is to collect baseline data on the use of EMR systems in physician practices and hospitals (Physician Quality, 2005). This paper will discuss the evolvement of the use of EMRs/EHRS in the U.S. health care system, its impact on the different health care

delivery systems, the cost of using an EMR system, the advantages and disadvantages of implementing an EMR system, and the legal and ethical issues of an EMR system.

### HISTORY OF THE ELECTRONIC MEDICAL RECORD

In 1991 and 1997, the Institute of Medicine issued reports that focused on the impact of computer-based patients' records as important technology for improving health care (Vreeman et al, 2006). The IOM has been urging the health care industry to adopt the EMR but initially costs were too expensive and the health community did not embrace the recommendation. As software costs have declined, more health care providers have adopted the use of the EMR system. In 2003, the Department of Health and Human Services began to promote the use of health information technology including the use of the EMR. The IOM was asked to identify essential elements for the establishment of an electronic health record. The IOM broadly defined the definition of an EMR to include:

- 1) the collection of longitudinal data on a persons health;
- 2) immediate electronic access to this information;
- 3) establishment of a system that provides decision support to ensure the the quality, safety and efficiency of patient care (IOM, 2003).

#### Benefits to the Implementation of the EMR

Several studies have been performed to assess the impact of the EMR on health care delivery. Administrators of several health care delivery systems reported many benefits to the implementation of an EMR. Many administrators cited the capability of more comprehensive reporting that integrated both clinical and administrative data. It also provided an opportunity to analyze and review patient outcomes because of the standardization of the clinical assessments. Also noted was the development of electronic automated reports that improved the discharge of a patient. The reports also provided an opportunity for the administrator to assess the workload of a department. The EMR also improved operational efficiency. The EMR had excellent capabilities to process and store data. Administrators also reported that the computerized documentation took 30% les time than the previous handwritten notes (Shields, 2007).

Several studies indicated there was an improvement in interdepartmental communication. The EMR provided aggregate data in the patient records to other departments and the information about the patient was legible. The EMR allowed accessibility by many departments regarding integrated care. The actual design and implementation of an EMR system developed a more interdisciplinary approach to patient care (Ventures&Shah, 2007; Whitman&David, 2007). The implementation of an EMR system led to improved data accuracy because it reduced the need to replicate data. The EMR system also provided a platform for routine data quality assessments which was important to maintain the accuracy of the EMR data. The EMR system provides an opportunity for future research. The data captured in the database could be used to analyze outcomes and develop baseline data for future research.

#### Barriers to Implementation

The major issue with EMR implementation was the cost of the implementation of the system. Software purchases, hardware, network upgrades, training and computer personnel must be considered in the purchase of the system. Estimates vary from \$15,000-\$30,000 per physician which can be amortized over a period of 5 years (Adler, 2004). Estimates should also include annual costs of \$5,000-\$15,000 over the first 5 years. According to Lowes (2007), Barbara Drury, President of Pricare, a healthcare IT consulting firm, recently compared several bids of five EHR vendors to upgrade physician practices computer system to include the HER/EMR components. The vendor quotes varied from \$58,000 to \$13,000 for similar practices. These quotes also do not include any hardware upgrades for their systems. Therefore, it is very important for a provider to understand what they are receiving from a vendor and comparison shop for the most appropriate system for the best price.

According to Valerius (2007), migrating from a hard copy system to an electronic system, requires several components including: a physician order communication/results retrieval, electronic document/control management, point of care charting, electronic physician order entry and prescribing, clinical decision support system, provider patient portals, personal health records, and population health. When an organization implements an electronic system, there are changes in the workflow because much of the process was manual. Training was required for both health care professionals and staff to fully utilize the system.

When purchasing an EMR system, it was found that there were equipment or software inadequacies which created a processing of the data much slower. If the system failed, it created frustration from health care professionals and administrators. Both of these problems emphasized the need for adequate training for both the providers and staff. Much of the initial training required overtime for the staff. Most of the training lasted approximately 4 months. Continued training was also required for maintenance of the system (Valerius, 2007).

#### CASE STUDIES

### Financial Analysis of EMR - A Case Study

The EMRs have long been promoted as a means to reduce costs, improve patient customer service, and improve outcomes (Schmidt&Wofford, 2002). However, many organizations are reluctant to invest millions of dollars in a system if the returns on the investment are not realized within a certain timeframe. Virginia Mason Medical Center, an acute care hospital, with 400 employed physicians, initiated a cost benefit study in 2000 to assess the effectiveness of an EMR implementation. They organized an advisory team, consisting of physicians and staff, to perform a cost benefit analysis. The team found that a major cost of the EMR implementation is the reduction in physician productivity during the new system transition. They also reported that the anticipated benefits would far outweigh the cost of implementing and maintaining the EMR. The following cost analysis of the EMR benefits are as follows:

- there would be approximately \$9 million in labor costs reduction: by reducing the laboratory and radiology paper entry system, there would be an elimination of clinic, hospital and ancillary staff to transcribe and manually enter orders. By physicians entering their prescriptions into the system, would provide guidelines for the most cost effective medications for the patient, and reduce the opportunity for prescription errors.
- 2) there would be approximately \$8 million in enhanced charge capture due to an increase in collections because of efficiency of the EMR system.
- 3) Overall, there was an annual benefit of nearly \$18 million dollars as a result of the EMR system (Schmitt&Wofford, 2002).

Health Care Professionals and Staffs' Attitude toward EMR Adoption: A Case Study

Many health care professionals and staff were hesitant to utilize the EMR system because they would need to require new skills and had limited time for training which would result in some inefficiency in their practices as they adopt the EMR system (Millstein, 2007). Health care professionals and staff were also concerned with the financial investment into this system. There were also issues regarding the confidentiality protection of the patients' information that is stored electronically. Which individuals have access to the information and what type of information should be maintained in an EMR system.

Silver Cross hospital, a 306 bed hospital, located in Illinois that had 450 doctors with privileges at their hospital, understood these issues and developed a strategy to successfully implement an EMR system (EHR:Myth, 2007). The main reason they were successful because they provided opportunities for providers to actively participate in the implementation plan. They selected the system that would be used; they formed task forces to discuss the implementation and shared the cost of the system purchase with the providers. They treated the providers as business partners. The entire process was transparent which enabled the providers and their staff to voice their concerns. They also designed trainings for both the providers and the staff to ensure they would be comfortable with the EMR system. As a result of this approach, the hospital reached an 80% penetration usage rate with the providers that worked with the hospitals.

## Cost Benefit Analysis of EMR System

Savings from using an EMR can include: reduced medical transcription costs, paper chart related costs and improved staff efficiency. Annual estimates of transcription costs of \$3600-12,000 per year will be reduced by 50-100%. Printing, storage and paper supplied will also be dramatically reduced by using an EMR system. Improvements in diagnostic coding as a result in the EMR system increased physician revenue by \$26 per patient visit (Adler, 2007). (Wang et al, 2007) performed a cost benefit analysis from using the EMR model as compared to the traditional paper based system. Their results indicated that transcription costs were reduced by 28%, adverse drug events were reduced by 34%, and radiology ordering would be reduced by 14%

Ambulatory EMR Use - A Physician's Adoption of an EMR System – A case study

The physician's priority is for an EMR system to capture a clinical encounter in real-time to increase the quality and accuracy of documentation which reduces malpractice risk. Physicians also would like a database for knowledge management of clinical care (Brown, 2007; Burt, Hing&Woodwell, 2005). A typical physician patient encounter would consist of accessing the electronic system together in an exam room. All demographic, insurance, lab reports, etc would be visible to both the patient and the physician. As a result of this system, a physician would save approximately \$30,000 annually because there would be no need for medical transcriptions. Also, revenues increased because there was a reduction in billing errors and the collection rate increased dramatically. The efficiency that resulted in the implementation of the system resulted in employee satisfaction because they worked effectively. The success of the EMR is based on continued training of all staff. As a result of the success of the EMR program, he has acquired three additional practices over the past 7 years and all of the patient data was transferred from paper charts to EMRs .

#### An Acute Care Hospital System Adoption of an EMR System – Case Study

In 2006, the American Hospital Association surveyed more than 1500 community hospitals which represents 31% of all community hospitals nationally. Results indicated that nearly 70% of hospitals had full or partial HER records. Approximately 50% shared electronic patient data with others in 2005 and 2006 (Shields, 2007)). Large urban hospitals used more health IT. Hospitals' spending on IT is increasing annually and therefore, cost is often cited as a barrier to adoption.

JKL Healthcare System is a not for profit organization that operates three acute care hospitals with five satellite ambulatory locations, a research component, a network of 50 local physician offices and a home care services company. In 2001, they decided to implement an EMR and physician order entry system. Their goal was to implement the system quickly to ensure physicians did not redirect prospective patients to competitors.

A challenge was to train over 1500 employees and 450 physicians on this system to avoid any adverse patient outcomes and to improve quality of care. In order for it to be cost effective, the compliance would need to be 100% by all physicians. The anticipated cost of the system was \$35 million. (Obrien, 2007). Nine months after the system's implementation, the physicians surveyed indicated they would not want to return to a paper system. Nearly 90% of the physicians surveyed that the system, made it easier for them to work. Nearly all medication errors caused by illegibility and transcription were eliminated. Patient satisfaction for overall care also increased as a result of the system.

Staff felt their jobs became more efficient because many staff could be reviewing the same information from different systems. Because JKL Healthcare was one of the first to successfully implement an EMR system, it will serve as a consultation site for other healthcare systems (Obrien, 2007).

## CURRENT STATUS OF EMR/HER IMPLEMENTATION

The Centers for Disease Control center for health statistics has issued a new health report regarding the use of EMRs in the medical community. In 2005, nearly 25% of physicians reported using a EHR in their office based practice which is a 31% increase from the 18.2% reported in 2001 (www.cdc.gov/od/oc/mediapressrel/a060721.htm). In 2006, the first national survey of federally funded community health centers (n=725) indicate that 26% reported using some EHR capabilities. CHCs that serve the most indigent and uninsured were least likely to utilize Emirs (Shields, 2007). Approximately 91% of the respondents indicated that the major barrier to EMR adoption was lack of capital to invent in a system. Approximately 81% indicated that the second major barrier to adoption was the inability to integrate an EMR system with their current billing system. Approximately 76% indicated that a third barrier to adoption was the loss of productivity during the transition between the different systems (Shields, 2007). Because community health centers budgets are heavily financed by public funds, EMRs systems are also part of the funding. Unfortunately, many CHCs have budget deficits.

In November 2007, the Certification Commission for Healthcare Information Technology announced that six EMR products designed for use in acute care hospitals which represent 25% of the vendor marketplace have received CCHIT status. The certification indicates that these products have demonstrated compliance with CCHIT published criteria which focus on improving patient care. Additional certification for physician office systems, nursing homes, and specialized health care settings will also be developed which will assist with the President's goal of most Americans having an EMR by 2014 (Reber, &Ladd, 2007). The Doctor's Office Quality Information Technology project, which has enrolled more than 4,000 providers nationally, is designed to promote the adoption of EMRs (Doctor's Quality, 2005).

The federal government announced on October 30<sup>th</sup>, 2007 that they will pay higher Medicare reimbursement rates to those providers who utilize an EHR/EMR system. Providers applauded the effort indicating the increase in financial incentives would help to offset the costs of the new systems (Havenstein, 2007). Although critics indicate that the new reimbursement will only add thousands of dollars annually per practice which is not enough money to offset the expense of the EHR/EMR system adoptions.

## LEGAL AND ETHICAL ISSUES OF AN EMR SYSTEM

Computerized information systems in healthcare that is seen in finance, manufacturing and retail have not achieved the same penetration. EHR/EMRs have captured the attention of politicians, insurance companies and practitioners as a way to improve patient safety because patient information will be more complete and standardized which will enhance the decision making process of a practitioner (Murer, 2007). Major barriers to EHR/EMR implementation have been discussed including training and financial impact of an organization as the system becomes integrated with daily operations. However, legal and ethical issues are also a concern. As with any technological development, regulations often lag behind its' implementation. A major legal barrier is the sharing of the patient information electronically with other providers. Does this violate any HIPAA regulations pertaining to privacy and confidentiality? Does the patient have to consent this sharing of information each time their information is electronically shared with other providers (Christman, 2007). Recent surveys have indicated that nearly 50 percent of U.S. adults polled indicated they had concerns about privacy and security of their information but felt that a computerized system like EHRs would outweigh the risks. The remaining 50 percent of those polled indicated that the HER/EMR systems do not outweigh the risks of privacy and security (Swartz, 2005).

The issue of provider and organizational liabilities has also been discussed. As part of an EMR/HER system, a provider may electronically prescribe medication to a patient. Are there any violations under state and federal fraud laws regarding electronic prescriptions of drugs? The Centers for Medicare and Medicaid Services issued regulations in 2005 which established legal exceptions and safe harbors for related to the use of e-prescribing and EHR/EMR technology. If these exceptions are more widely publicized, this may increase the usage of EHR/EMR adoptions (Murer, 2007; Diamond, 2005).

## CONCLUSION

The implementation of an EMR system can greatly improve quality of patient care for several reasons. Access to medical information has improved which impacts turnaround times for follow up appointments, billing information, and conducting quality management reviews. Providers have immediate access to patient information. The system has also increased the efficiency of operations and reduced the costs of medical delivery (Austin &Boxerman, 2007; Millstein, 2007). These benefits can be found in any health care organization. However, in order to ensure the EMR is a success in a health care organization, the participants need to understand these benefits.

Research has indicated that there are several factors involved in the successful implementation of an EMR. The most important factor is involving the users of the EMR in the process. The users understand what their needs are for the EMR and the vendors can develop a system that will accommodate those needs. The users need to understand the increase in the quality of patient care as a result of reduced errors of patient information, increasing integrated patient management by having the EMR system available to different providers, improved patient and physician satisfaction as a result of the EMR (Scmitt&Wofford, 2002). Although the cost of an EMR can be daunting for organizations, the cost benefit analyses indicate that it would be a positive step to improving patient care in a cost effective environment. Considering the increasing percentage of health care expenditures of the U.S. gross domestic product, national adoption of an EMR/EHR system should be embraced by all health care organizations.

## References

More physicians using electronic medical records. *Indian Journal of Medical Science*, (60), 7: 308. Retrieved November 10, 2007 from <u>www.cdc.gov/od/oc/media/</u>.

Abrahamson, C. (2007). From pong to PHRs: Advances in electronic recordkeeping. *Nursing Management*, 38(8), 20-21.

Adler, K. & Edsall, R. (2007). Electronic health records: The 2007 FPM User-satisfaction survey. *Family Practice Management*,11(10), 43-46.

Adler, K. (2004). Why it's time to purchase an electronic health record system. *Family Practice Medicine*,11(10),43-46.

Austin, C.& Boxerman, S. (2007). *Information Systems for Healthcare Management*. Chicago: Health Administration Press.

Brown, V. (2007). Planning makes perfect. *Health Management Technology*, 28(5), 12-17.

Burt, C., Hing, E., & Woodwell, D. (2005). Electronic medical record use: By officebased physicians, United States, 2005. National Center for Health Statistics. Retrieved November 7, 2007 from http//cdc.gov/nchs/pubs/pubd/hestats/electronic/electronic.htm.

Cauldwell, M., Beattie, C., Cox, B., Denby, W., Ede-Golightly, J., & Linton, F. (2007). The impact of electronic patient records on workflow in general practice. *Health Informatics Journal*, 13(6), 155-163.

Certification commission announces first EHR products certified for hospitals. Retrieved November 10, 2007 from http://www.cchit.org.

Christman, K. (2007). Will electronic medical records doom your practice? *Journal of American Physicians and Surgeons*, 11(3), 67-69.

Diamond, M. (2005). Early adopters and lemmings: Look before you leap into electronic records. *Physician Executive*, 31(4), 18-22.

EHR: Myth or Realty, November 2, 2007. Webinar. Retrieved November 10, 2007 from www.healthdatamanagement.com.

GAO report: Bush administration lacks strategy for EHRs. Retrieved November 10, 2007 from http://www.ihealthbeat.org.

Havenstein, J. (2007). Feds prescribe more money for E-health push. Computerworld,41(46),18.

Institute of Medicine, Committee on Data Standards for Patient Safety, Board on Health Care Services. Key capabilities of an electronic health record System, National Academy Press: Washington, DC: 2003.

Jha, A., Ferris, Donelan, K., DesRoches, C., Shields, A., Rosenbaum, S., & Blumenthal, D.(2006). How common are electronic health records in the United States? A Summary of the evidence. *Health Affairs*, 25(5), 496-507.

Lowes, R. (2007). Avoiding EHR sticker shock. *Medical Economics*, 84(20): 41-45.

Millstein, A. (2007). Health information technology is a vehicle, not a destination: A conversation with David J. Brailer. *Health Affairs*, 25(1), 236-242.

Murer, C. (2007). EHRs: Issues preventing widespread adoption. Retrieved November 10, 2007 from http://www.rehabpub.com/issues/articles/2007-06\_09.asp?mode=print

Murray, P. (2007). One patient, one record unrealistic and unsustainable. Computer Weekly, September 4, 2007,44.

Natiional health expenditure projections 2000-2016. Retrieved November 22, 2007 from http://www.cms.gov/NationalHealthExpendData/downloads/proj2006.pdf.

O'Brien, M. (2007). Implementation of the EPIC electronic medical record physician order-entry system. *Journal of Healthcare Management*, 51(5), 338-343.

Pawlson, G. (2007). Health information technology: Does it facilitate or hinder rapid learning? *Health Affairs*, January 26 2007,178-180.

Physician quality reporting initiative, 2005. Retrieved November 10, 2007, from <u>http://www.cms.hhs.gov/pqri</u>.

Reber, C. & Ladd, S (2007). Certification commission announces first HER Products certified for hospitals. News Release, November 5, 2007. Retrieved November 10, 2007 from http://www.cchit.org/about/faq/general.asp.

Scmitt, K. & Wofford, D. (2002). Financial analysis projects clear returns from electronic medical records. Healthcare Financial Management, 56(1), 52-54.

Shaw, N. (2007). Banking and the electronic health record: what lessons can be learned? Informatics in Primary Care, 14, 81-83.

Shields, A., Shin, P., Leu, M., Levy, D., Betancourt, R., Hawkins, D., & Proser, M. Adoption of health information technology in community health centers: Results of a national survey. *Health Affairs*, 26(3),1373-1383.

Swartz, N. (2005). Electronic medical records' risks feared. Information Management Journal, 39(3), 9.

Thielst, C., (2007). The new frontier of electronic, personal, and virtual health records. *Journal of Healthcare Management*, 52(2), 75-78.

Valerius, J. (2007). The electronic health record: What every information Manager should know. *The Information Management Journal*, 4(1), 56-59.

Ventres, W.& Shah, A. (2007). How do EHRs affect the physician-patient relationship? *American Family Physician*, 75(9), 1385-1390.

Vreeman, D., Taggard, S., Rhine, M., & Worrell, T., (2007). evidence for electronic health record systems in physical therapy. *Physical Therapy*, 86(3), 434:446.

Wang, S., Middleton, B, Prosser, L;, Bardon, C., Spurr, C., Carchidi, P., Kittler, A,Goldszer, R., Fairchild, D., Sussman, A., Kuperman, G., & Bates, D (2003). A cost-benefit analysis of electronic medical records in primary care. *The American Journal of Medicine*, 114, 397-403.

Whitman, J.C.& David, S. (2007). Effectively integrating your EMR initiative.*The Physician Executive*, 33(5), 56-59.