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Research Proposal: EMRs Changing Patient Medication Errors

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Abstract

In 2009 the federal government initiated the American Recovery and Reinvestment Act (ARRA) in efforts to improve timely and quality health care. This new initiative promised to provide great incentives to health care providers who took advantage of the program by implementing electronic medical records (EMRs) within their facilities, clinics, and practices. Coupled with tight deadlines and the incentive of reimbursement, the health care world has been witness to an influx of EMRs being developed by vendors and implemented at health care facilities. The rate at which these EMRs have been implemented has been astounding. So fast, the health care world has had little time to truly grasp the full potential of the EMR and see the full benefits. Additionally, clinicians have had little time to sit back and evaluate the effectiveness of the EMR. Many have questioned if the EMR has been a benefit or a hindrance to the health care world. Finally clinicians, researchers and administrative staff are questioning if the EMRs have in fact increased patient medication errors. This question has prompted this research proposal to discover from literature review and studies how EMRs have positively or negatively affected patient medication errors.

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Chapter 1

Introduction

The federal government has developed mandated guidelines for healthcare professionals and facilities to meet a set of standards with the focus on improving quality patient care and to also reduce patient safety errors. These guidelines come with monetary reimbursement as a way to get professionals more eager to get involved. However, the stringent deadlines that must be met has caused rapid installations of EMR systems leaving the healthcare facilities left to deal with the mess and trying to figure out how these systems work and can benefit the facility. It seems the dust has settled a bit from all these installs and meeting deadlines so now is the time to sit back and evaluate these systems and determine if they are beneficial and what issues they are causing.

Background of the Problem

Prior to implementing new systems, majority healthcare facilities had processes in place that tracked patient safety errors and they were able to report this data to governing bodies. This tracking and reporting has fallen by the wayside due to staff not totally understanding the depths of these systems as well as errors not being tracked or reported.

Purpose of the Study

This study is to determine if the implementation of the EMR has increased or decreased patient safety errors in the area of medication administration. Medication errors can occur by dosage, route or administration.

Significance of Study

The implementation of EMRs and looking at the data will help healthcare professionals identify if the investment was worthy and will continue to benefit their facility and patients or it will show areas of concerns.

Research Questions

In order to obtain data to support this research project, an online survey will be developed and sent out to random facilities. The questions on the survey will be directed towards medication errors identified post implementation of an EMR. The survey will be completely anonymous.

Definition of Terms

Electronic Medical Record (EMR) – a digital version of a paper chart which contains all of the patient's medical history from one clinical setting. Mainly used by clinicians to diagnose and treat the patient.

Medication Error – any preventable event that may cause or lead to inappropriate medication use or cause harm while being administered by a healthcare professional.

Limitations

The topic of reviewing medication errors in combination with an implemented EMR is not new. From the early discussions of EMRs, there have been discussions on the pros and cons of an EMR. The list of pros during these discussions has included

decreased patient safety errors in almost all areas including errors with medication dosages. Those selling EMRs promise profound reduction in error rates. Healthcare facilities are now stepping back from the whirlwind of implementations and asking to see the data to prove their investment was a wise one. Unfortunately, up to this point, the data has not been readily available for review. There have been numerous studies and majority of the studies have found that either facilities are not reporting patient safety errors consistently or at all. The limitations set by the lack of data and studies continues to prove to be an obstacle for any person or organization wanting to prove if ERMs have or have not effected patient safety errors with medication dosages.

Chapter 2

Review of Literature

Some of the buzzwords among health care professionals for this decade include electronic medical record (EMR), patient portal, and meaningful use just to name a few. In 2009 the United States government initiated the American Recovery and Reinvestment Act in an effort to improve quality and safe patient care. This initiative carries with it significant reimbursement to those who take advantage of the program and meet the stringent deadlines. These rigorous deadlines have the health care industry scrambling to find software applications that will meet the guidelines while at the same time benefit the patient by trying to reduce patient safety errors. Vendors in the health care world are jumping on the bandwagon and developing applications with a promise to meet the government's guidelines while also meeting the needs of their clinicians.

Now that some dust has settled from the overzealous implementations, health care facilities are finding the programs are not delivering as promised, but instead are causing more heartache and increased processes for staff. Those who elected to implement these applications are now asking where the benefits are and wanting to know where is the pay off. Those in administration or in the corporate offices are asking to see data that will back up their decisions to spend millions of dollars implementing these programs. Unfortunately, this simple request of data is not so simple after all. Many facilities are so consumed with the implementation and getting adjusted to new and different processes, there has been little time to collect data to determine if patients are experiencing a decrease or increase in safety errors. The review of research and literature has found that

many are asking the question but few have had the time or resources to answer the question.

Majority of the literature that is available on the subject has shown there are a few groups concerned with the same demand. Their way of addressing the question is to develop a set of standards that facilities can use to address the frustrations and concerns being experienced from the use of these EMRs. As Sittig described for the *New England Journal of Medicine*, their group's initiative is developing an approach in three phases. Phase one will focus on risks associated with this particular technology. Phase two will center on the risks associated to errors as a result of users misusing the technology; and finally phase three will focus on processes and outcomes to identify potential errors before they happen (Sittig 2012). Sittig, along with other authors, developed a paper that specifically addressed patient safety errors in the terms of data. This group developed a web-based survey and received 369 responses. Those who were surveyed were from the American Health Lawyers Association and the American Society for Healthcare Risk Management. From their survey they were able to establish that 53% of those surveyed experienced at least one serious safety event due to the EMR in the last five years. Additionally, 10% reported to have experienced more than 20 events.

The table below (Table 1) demonstrates that many have posed the same queries. As the table displays, those involved in the studies and papers have authored and co-authored more than one paper. Those involved in these studies and in the papers have demonstrated that reporting of patient safety errors is seriously underreported. It is because of this lack of reporting and missing data, the health care industry has come to term that the EMR and the processes associated with it need to be reworked and

streamlined to fix the many issues discovered since the implementation. Sittig and group reported in another paper in the *Journal of Healthcare Risk Management* "The 2012 Institute of Medicine report on HIT and patient safety identified the lack of risk reporting and hazard data on HIT as a major barrier in building safer systems," (Sittig 2014). While the question may have been posed years ago, there is no data to support the concern that patient safety errors have increased or decreased.

One explanation to why these errors are underreported may be due to not being aware of the potential error. This cannot be linked back to any human error but in fact may be linked back to the system that was implemented in an attempt to prevent such errors. An error may be experienced behind the scenes of the EMR with the user not being aware of the error at all. Sittig gives the example of this miscommunication in the article. He stated "an example of such an error is an order for 30mg of oxycodone, sustained release, that is correctly entered in the computer-based provider order entry (CPOE) system but erroneously mapped to 30mg of oxycodone, immediate release, in the pharmacy management system and incorrectly dispensed," (Sittig 2014). While reviewing this error one may say it's not a human error because the person entering the order for the medication did it appropriately. However, the error can be traced back to who mapped the tables incorrectly in the first place which is a human error. Even though the person entering the order did not make the error, a human still did cause the error but behind the scenes. Sittig and his fellow colleagues are suggesting a development of standards that will prevent such errors as this example.

The Office of the National Coordinator for Health IT (ONC) has taken the information that was published in 2012 from the Institute of Medicine and agreed that

patient safety errors continues to be an issue even with the use of EMRs. The ONC has since contracted out the development of a research team called SAFER that addresses patient safety errors and the need to address the issue before, during and after implementation, (Sittig 2014). The SAFER team was developed with the sole goal of producing national safety guidelines or measures that can be put in place to help prevent patient safety errors with the use of EMRs. The team agrees that errors go unreported. Knowing this, it is the group's hope that by developing guidelines, facilities will see a decrease in potential and actual safety errors even if they are not being reported. The SAFER team also anticipates these guides will evolve over time and grow with the systems to address the processes at that time.

In addition to the SAFER team, Sittig and a group are developing guidelines that address errors as well. This group reviewed over 100 closed patient safety error cases from the Veterans of Affairs (VA) facilities to find out exactly where the error originated. This review of cases was key to developing their guidelines. Their findings from the review are what guided them to the development of these safety guidelines. They were able to place patient safety errors into categories based on how the error occurred. Examples of the categories include hardware and software, clinical content, and internal organizational features such as policies and procedures. These categories are the focus of the team's guidelines that will assist facilities to use EMRs and reduce patient safety errors.

Until EMRs can be stabilized and fully understood, reporting of patient safety errors is going to be hit and miss. Trying to identify if EMRs have or have not had an impact on patient safety errors may be like trying to play darts in the dark. Sittig and his

colleagues are working to stress the importance of proper reporting but also to prevent errors from happening in the first place. These new guidelines are their way of helping healthcare facilities maintaining the use of EMRs and prevent patient safety errors at the same time. It is also the hope that the use of these guidelines will allow for better reporting down the road. In conclusion, it has been found the lack of reported data on patient safety errors cannot prove whether EMRs have reduced or increased patient safety errors due to an EMR. More studies need to be completed and EMRs need to be worked more in depth in order to reach a conclusion.

Table 1: Comparison of Reviewed Studies

Author(s), Year	**Participants, Survey Method**	**Goal**	**Results**
Shojania, Duncan, McDonald, Wachter, & Markowitz (2001)	79 practices/facilities completed survey in with a rating scale.	Provide critical appraisal of evidence on patient safety errors since implementing an EMR.	Not enough data has been collected to be substantial. Research continues.
Charles, Hall & Coustasse (2014)	Study conducted in 3 phases: • Literature Identification and Collection • Literature Analysis • Literature Categorization	Identify the benefits and problems of implementing a CPOE and/or EMR.	Preventable medical errors and adverse drug events have increased from 98,000 cases in 2000 to 210,000 in 2013.
Middleton, Bloomrosen, Dente, Hashmat,	Task force was developed and given responsibility of reviewing error data,	To establish a set of guidelines approved by the American Medical Informatics	Developed a set of recommendations to increase the awareness of

Koppel, Overhage, Payne, Rosenbloom, Weaver & Zhang (2013)	literature review and current activities already in place.	Association to monitor and improve patient safety errors.	increased patient errors and implementation of monitoring guidelines.
Singh, Ash & Sittig (2013)	• Interviews • Naturalist observations • Document analysis	Develop self-assessment guides based on 8 dimensions to evaluate current processes and increase awareness and put processes in place to decrease errors.	Developed self-assessment guidelines to implement in a beta testing facility.
Meeks, Smith, Taylor, Sittig, Scott & Singh (2014)	Group analyzed 100 extracted cases of patient errors.	Confirm patient safety errors have increased since the implementation of a EMR or electronic components.	Established the need to continue the research/observation activities and provide recommendations to procedures to monitor and prevent patient safety errors.
Menon, Singh, Meyer, Belmont, & Sittig (2014)	Web-based survey. Received 369 Responses	Identify new risks associated to using an EMR.	Patient safety errors are under reported and under studies. Facilities should implement robust measures to identify, prevent and reduce errors.

Chapter 3

Methodology

Research Question

As discussed in chapter one; the method of obtaining the needed data and feedback for this research project has been through an online survey focusing on patient safety errors with medication dosages. The specific focus will be errors that pertain to medication errors by dosage, route or administration.

Population

No specific population was targeted. Rather, the survey was sent to a variety of healthcare professionals to be completed by only those currently working in an acute care setting where an EMR has been implemented.

Data Collection Procedures

After receiving IRB approval, the survey was sent out via email to current and post graduates of University of Tennessee Health Care Science Center. Each participant was provided with an informational letter explaining the study and their participation. All participants were assured their participation and the results of their survey were completely anonymous and no identifying information would be collected.

Data Collection Instrument

In order to establish some base line data for the study, a basic online survey was developed with a serious of multiple choice and fill in the blank questions. The survey was developed using surveymonkey.com which would then provide the ability to analyze the responses to the survey for inclusion in the study.

Data Analysis

There were only four participants to the web based survey. Of those who did respond, a decrease in patient safety errors with medication dosages was seen. However, due to the small response rate, this study cannot conclude that health care organizations nation-wide have experienced a decrease in their patient safety rates.

Research Questions

The questions included on the online survey include:

- How long has your health care organization had an Electronics Health Record (EMR)?
    - 0-2 years
    - 3-5 years
    - 6-8 years
    - 9 years or more
- Prior to the implementation of your EMR, what was your patient error rate for errors with medication dosages?
- Post EMR implementation, what is your current patient error rate for errors with medication dosages?
- Are patient medication dosage errors reported to a governing body or committee? If so, what is the name of this committee?
- Do you currently have a group within your organization monitoring all patient safety errors including medication dosages?
- If patient safety errors including medication dosages are currently being monitored, has your organization identified a trend? If so, what is the trend that has been identified?

- If your facility has found a trend of errors in the area of medication dosages; what is being done to address the errors?

- If your facility is not monitoring patient safety errors including medication dosages please provide a reason why.

____ Lack of System Capabilities

____ Lack of Staffing for Monitoring

____ Not required to monitor this particular error rate by any governing body

____ Other; please explain

Approval

For approval of the survey, a draft of the survey questionnaire was submitted to Dr. Rebecca Reynolds, associate professor and program director for the graduate program in University of Tennessee Health Science Center (UTHSC) Health Informatics and Information Management Department and Sajeesh Kumar KR, PhD, associate professional in Health Informatics and Information Management Department. Approval was received by both professors and the survey was then submitted to the UTHSC IRB for review and approval (IRB 15-03941-XM; 7-1-2015).

Study Method

Once the data has been captured, it will be determined if EMRs have increased or decreased patient safety medication errors. This data will be presented in the final thesis project. In addition to distributing an online survey, literature views will continue to be conducted to evaluate if other groups are involved in a similar project and review those outcomes. This information will also be presented in the final project.

Summary of Chapter

Using the information obtained during literature review, review of other like studies, and data from the developed survey, the study will be able to determine if EMRs have had a negative or positive impact on patient safety errors with medication dosages.

Chapter 4

Results

Table 2 – Survey Results	
Survey Question	**Responses**
1. How long has your health care organization had an Electronic Medical Record (EMR)?	0-2 years - 0 3-5 years – 1 6-8 years – 3 9 years or more - 0
2. Prior to the implementation of your EMR, what was your patient error rate for errors with medication dosages?	7% 10 per month Unknown/Unsure - 2
3. Post EMR implementation, what is your current patient error rate for errors with medication dosages?	4% or less Improved but unsure of rate Unknown 2 or less a month
4. Are patient medication dosage errors reported to a governing body or committee? If so, what is the name of the committee?	Yes – 3 No – 1 Committees: Medical Education Committee Patient Safety Committee Pharmacy Committee
5. Do you currently have a group within your organization monitoring all patient safety errors including medication dosages?	Yes – 4 No – 0
6. If patient safety errors including medication dosages are currently being monitored, has your organization identified a trend? If so, what is the trend that has been identified?	Yes – 75% No – 25% Trends: Process and/or technology gaps/over sites Sound alike drugs CPOE not functioning correctly Not being entered into EMR correctly
7. If your facility has found a trend of errors in the area of medication dosages, what is being done to address the errors?	• Education and/or configuration of system • Continuous improvement and monitoring • Set up templates for medications • Patient Safety Committee/Medical Staff Office/Pharmacy and IT working to improve

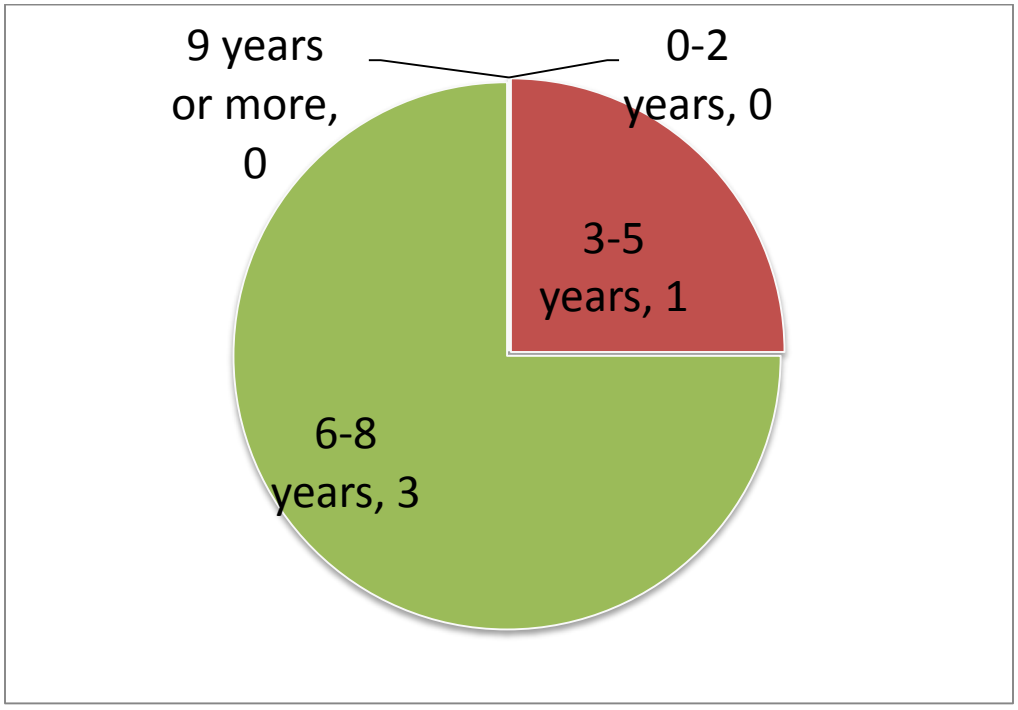
	• In-services
8. If your facility is not monitoring patient safety errors including medication dosages, please provide a reason why.	• Lack of System Capability – 0 • Lack of Staffing for Monitoring – 1 • Not required to monitor this particular error rate by governing body - 0

Results Displayed in Graphs

Survey questions with a numerical value response are displayed with associated graphs.

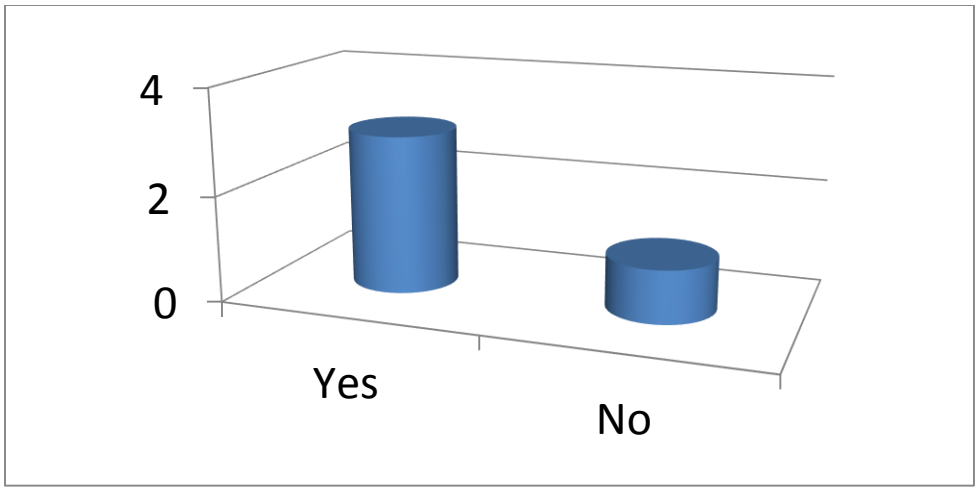
Survey Question 1

How long has your health care organization had an Electronic Medical Record (EMR)?



Survey Question 4

Are patient medication dosage errors reported to a governing body or committee? If so, what is the name of this committee?

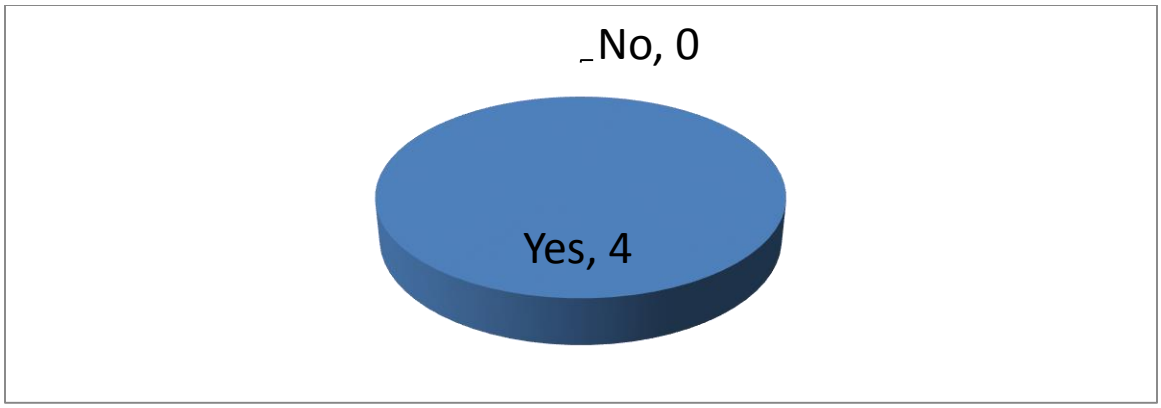


Committees:

- Medical Education Committee
- Patient Safety Committee
- Pharmacy Committee

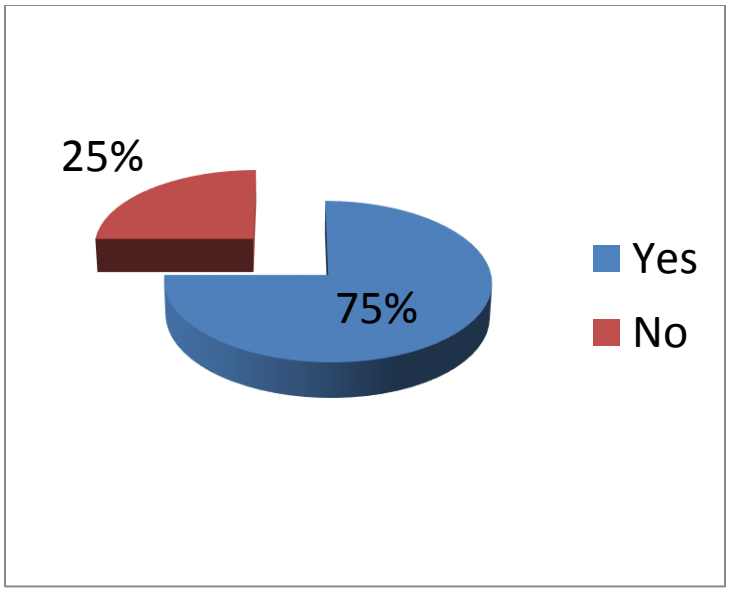
Survey Question 5

Do you currently have a group within your organization monitoring all patient safety errors including medication dosages?



Survey Question 6

If patient safety errors including medication dosages are currently being monitored, has your organization identified a trend? If so, what is the trend that has been identified?



Identified trends:

- Process and/or technology gaps/over sites
- Sound alike drugs
- CPOE not functioning correctly
- Inaccurate EMR entries

Chapter 5

Analysis & Discussion

Limitation & Discussion

The web-based survey produced only four responses. While the responses received did show a decrease in the patient safety rate; the data cannot confirm the nation has seen a trend of decreases with patient safety rates in the area of medication dosages. It cannot be assumed that because four health care organizations have seen a reduction that all health care organizations have been witness to the same reduction. The responses that were received provided data to show reductions in patient safety errors. The respondents also provided these facilities are actively monitoring this particular patient safety error and continue to provide education and system adjustments as needed.

Chapter 6

Conclusions and Recommendations

Summary of Findings

The findings that were obtained in this study did show the possibility that EMRs have positively affected patient safety errors with medication dosages. The healthcare organizations that did respond have been witness to a reduction and continue to monitor patient safety errors.

Conclusions

The small response has proved this study to be inconclusive at this time. While the survey did provide data of a reduction in errors, the data is not enough to support an affirmative conclusion that EMRs have been the cause of reduced patient safety errors with medication dosages.

Implications of Study

The implication could possibly be that EMRs have successfully reduced patient safety errors with medication dosages. However, without more supporting data this cannot be proven.

Recommendations

At the conclusion of this study, it can be confirmed that more time can be spent on researching facilities that have seen a negative or positive impact from the implementation of an EMR towards patient safety errors with medication dosages. In order to obtain solid supporting data, education and awareness on the importance of continued monitoring and data collection in the area of patient safety errors is key not only to aid in the overall reduction in patient safety rates but also to aid in discovering

areas for improvement with systems and processes as well as supporting the proof that implementing an EMR has benefited health care organization.

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