ABSTRACT

AREAS OF ELECTRONIC MEDICAL RECORDS IMPACTS IN NURSING PRACTICES: A CONTENT ANALYSIS

by

Phylicia Lee

Objective: The aim of this review is to examine areas of electronic medical records (EMRs) impacts in nursing practice. Healthcare organization leaders are introducing EMRs as part of their electronic documentation systems. Therefore, the impact of such systems need to be examined to ensure they are helping organizations to achieve the expected benefits. In addition, nurses are some of the primary users of those new systems, but there are no recent review studies that provide evidence on whether EMRs impact positively or negatively in areas, such as communication with other providers, accessibility of records and information, costs or savings, security and privacy, and quality of patient care.

The EMR is a tenant of Electronic Health Recording (EHR) system. Only ten of the fourteen articles that were reviewed provided a definition for EMR (*N*=9, 64%). From these 9 articles, a general definition for EMR is a legal record documenting in a specific health care institution or care delivery organization, and is used in such a way that it links care delivery systems. The content analysis revealed six categories of areas/outcomes being impacted as a result of the use of EMR systems. These included: (1) accessibility of records and information, (2) cost, (3) practice efficiency, (4) security, (5) patient- nurse relationship and communication, and (6) quality of patient care. All 14 articles that were reviewed used three methods to carry out their research: qualitative, quantitative or a mixture of both.

It is essential that future research replicates those studies, using valid measuring instruments on EMR factors impacting nursing practices. The validity of future studies could increase if they use more concrete, unambiguous, universally acceptable and applicable operational definitions of EMR as a concept. In addition, it is essential that future researchers expand theories of EMRs on cost and security. The studies that were reviewed did not have a lot of information on these two areas. Equally important future researchers should do an extensive study on the theories and definitions on EMRs in countries in Europe, as well as do a comparative analysis on the extent of EMRs adoption in Europe and the United States and their impacts on nursing practice. This would provide an in-depth knowledge of the use of EMRs in different cultures.

AREAS OF ELECTRONIC MEDICAL RECORDS IMPACTS IN NURSING PRACTICES: A CONTENT ANALYSIS

by
Phylicia S M Lee

A Field Project Submitted
In Partial Fulfillment of the Requirements
For the Degree of

Master of Public Administration

at

The University of Wisconsin Oshkosh
Oshkosh WI 54901-8621

December 2014

COMMITTEE APPROVAL

Anna Filipova Advisor
12/10/2014 Date Approved
Member
12/10/2014 Date Approved

DEAN OF GRADUATE STUDIES

Susan Cramer
12/11/2014 Date Approved

FORMAT APPROVAL

Marci Hoffman
11/24/14
Date Approved

TABLE OF CONTENTS

Page

LIST OF TABLES

LIST OF FIGURES

Chapter I: Introduction

Electronic Medical Records Background

In 2004 President George W Bush revealed that “his vision for the future of health care in the United States involved the development of an interconnected electronic health record” (Pomerleau, 2008, p.152). The President noted that innovations in electronic medical records and the secure exchange of medical information will help transform health care in America. Health information technology could help improve health care quality, reducing health care costs, preventing medical errors, improving administrative efficiencies, reducing paperwork, and increasing access to affordable healthcare (Transforming Health Care, 2004). In order to put the plan for health information technology into existence, the President issued an Executive Order titled, “Incentives for the Use of Health Information Technology and Establishing the Position of the National Health Information Technology Coordinator” (Transforming Health Care, 2004). The goal of the Executive Order was to implement electronic health records that could ensure that complete health care information was available for Americans at the time and place of care, regardless of where it originated.

The Electronic medical record (EMR) is a digital version of a paper chart that contains all of a patient’s medical history from one practice (HealthIT.gov, 2014).EMRs are transitioning into the future of primary care. In fact, the move to

EMRs began more than 25 years ago, but progress has been very slow (Robles, 2009, p.31). A statistical report illustrated that the United States was slowly adopting EMRs in comparison to other developed nations, with 98% of practices in the Netherlands using EMRs, while New Zealand had an EMR adoption rate 92% (Zieger, 2008).

Nurses are on the frontlines of health care and their participation in the adoption and implementation of an EMR is crucial. Standardizing nursing documentation into an electronic record, and the value of charting for this discipline will be more identifiable. Data can be read by computer through filtering and sorting features. Since health care is data-dependent, this capacity will pave the way for measuring outcomes of nursing interventions, providing evidence of quality of care, as well as identifying opportunities for improvement (Kunz, 2010, p. 294). But according to Kunz (2010), clinical nurses in Labor and Delivery at El Camo Hospital in California have identified barriers hindering the ease of the adaptation and implementation in nursing practices in the United States:

"….Resistance to change, losing the unfamiliar, varying degrees of computer efficiency, nurse isolation, depersonalize care, reduction to data entry role, techno-source the nursing role, fear of auditing and tracking late entries. On the other hand however, adopting EMR creates advantages such as: reducing duplication, improve legibility, reduction in transcription errors, standardization of terms, continuity of care, accessibility of data, improved medication administration, reduction in charting time, immediacy in documenting, reduction

in cost, statistical sorting and data retrieval to measure nursing impact" (p. 293-295).

The advantages of the EMRs noted above are crucial in adopting and implementing the system. Without focus on the advantages, America will continue to fall behind other developing nations who have adopted those technology systems.

Statement of the Problem

It is important to note that many nurses perceive the change from paper charting to the EMR as requiring more complex documentation (Robles, 2009). Registered nurse Jane Robles at North Memorial Health Care in Minnesota stated that the EMR "…shines a revealing light on all the hidden deficiencies that were falling through the cracks with paper documentation. The formats used in electronic documentation are often based on those used in manual or paper process. In addition, when EMRs were first implemented, they were often viewed as an obstacle to patient care. Patients and their families complained that caregivers spent more time on the computer than in giving care. Nurses are some of the primary users of those new technology systems. They are able to recognize the value of the EMRs contributions to patient safety, such as improved legibility, interfaced data validation with monitoring equipment, automatic alerts for allergies, drug interactions, and others (Robles, 2009).

Nurses are either for or against the implementation of EMR. The success of the implementation of the EMR relies on the technical characteristics and flexibility of the selected product, the interoperability and availability of technical assistance, as well as the systems impact on the work organization and the involvement of nurses (Ventura et al., 2011). Regardless of this assertion, many nurses feel conflicted when they are spending time typing on a keyboard instead of providing direct patient care. As more regulatory requirements are mandated, nurses feel anxiety and frustration that one shift is too short a time to accomplish all that is expected of them (Kunz, 2010).

There are varying perspectives on the pros and cons surrounding the implementation of EMRs, but there are no recent review studies on empirical research that provides evidence on whether EMRs impact positively or negatively nursing practices in areas, such as communication with other providers, accessibility of records and information, costs or savings, security and privacy, and quality of patient care.

Purpose of the Study

The purpose of this systematic literature review is to examine empirical studies on areas of EMRs impacts in nursing practice. Three key research questions guided this study:

1. How have the concept of electronic medical records, as well as related technology concepts and theories have been defined and/or used in the studies researching nurses' use of EMRs?
2. What outcome areas (e.g., quality of care, safety, privacy) of EMRs impact have been addressed most in empirical studies, and which areas have received little attention?
3. How have studies been designed and used so far, and what are some common methodology issues that could be considered in further research?

Significance of the Study

There are mixed reviews on adopting EMRs. It is also true that the adopting of the new system is very low in the United States, but there are prospects for improvement. Healthcare organization leaders are introducing EMRs as part of their electronic documentation systems. Therefore, the impact of such systems needs to be examined to ensure they are helping organizations to achieve the expected benefits. According to Pomerleau (2008), Clinical Professor at Lawrence Memorial Regis College and staff nurse at Massachusetts General Hospital:

> "…To begin to meet the challenges of an interconnected electronic health record, all stakeholders, including nurses, need to be involved in the development process. As health systems make commitment to meet this

goal, it's important to look at the transition to electronic documentation as a process. There are no perfect systems available yet. This is an evolving technology and a climate in which waiting for the development of a "perfect" system prevents opportunities for improvement" (pp. 152-153).

This review will offer three contributions to researchers and nursing practices.

First, given the increasing trend of EMR adoption, the findings from the content analysis would inform organizational leaders of the potential value of EMR adoption. Second, it will inform nurses on how they could utilize EMRs to achieve expected benefits. Third, the study would extend knowledge that relates to the topic of EMR impacts, and also help inform the research design of future studies.

Chapter II: Methodology

Criteria for Inclusion

A thorough search was conducted, selecting articles for inclusion on the basis of the following criteria (1) are written in English, (2) deal with EMR system use, (3) have nurse providers as the primary end users, (4) are written between 2008 and 2014, (5) involve empirical research, and (6) clearly and explicitly report outcome measures that relate to the impact of EMR system. In this review, I followed the definition provided by Pomerleau (2008, that EMR generally refers to “a legal record documenting what happened in a specific healthcare institution or care delivery, and is used in such a way that it links care delivery systems” (p.152). Please note that I use the term *electronic medical record* in this review for consistency when discussing papers regardless of the term used in the original paper.

Search Methods

The literature search was performed using four databases: CINAHL, Medline, ABI/INFORM Complete, and IEE Digital Library. The search was conducted in October 2014 in all the aforementioned databases simultaneously, using the combined keywords *electronic medical record impact* AND *nurse practice*.

Retrieval of the Studies for Analysis

The search gave 2000 results. 1200 from CINAHL, 600 Medline, 150 ABI/INFORM Complete, and 50 IEE Digital Library. After excluding duplicates, a total of 1500 citations were identified and retrieved for a more detailed evaluation. Following a thorough selection process, altogether 14 publications of the studies were accepted. These 14 studies are summarized in Figure 1.

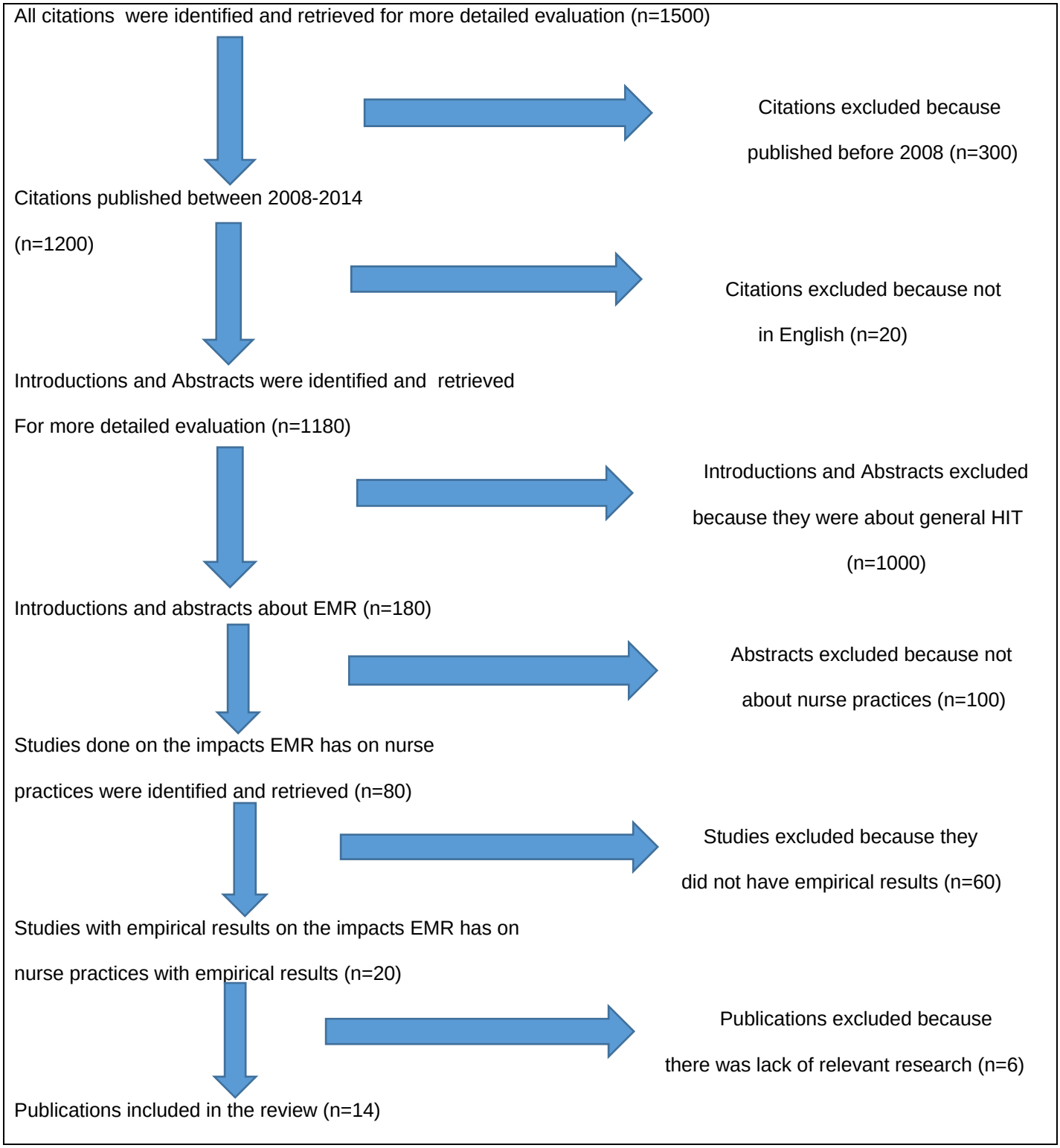

Figure 1. An illustration of the selection of publications

Analysis of the Studies Retrieved

Content analysis was used to analyze the data. This methodology is very popular among Library and Information Science research studies. It is defined by Krippendorff (2004), as “a research technique for making replicable and valid inferences from texts to the contexts of their use” (p.8). Content analysis is chosen as the primary research method because it is applied in qualitative, quantitative, and sometimes mixed modes of research frameworks and employs a wide range of analytical techniques to generate findings and put them into context. In addition, the method allows the researcher to use analytical constructs to move from the text to the answers of the research questions (White-Domas & Marsh, 2006).

In the current review, the full texts of the final eligible studies were first read to identify the data in line with the objectives of the review. Secondly, the identified data were listed in a working sheet. Third, a list of EMR factors impacting nurse practices were coded and categorized. The categories were formed by grouping together similar topics and content areas. The categories were formed and named on the basis of the content of listed factors, as well as the researchers’ explanation or definitions of the variables used in the studies reviewed. As a result, six categories of EMR factors impacting nurse practices were identified: (1) accessibility of records and information, (2) cost, (3) practice efficiency, (4) security, (5) patient-nurse relationship and communication, and (6) quality of patient care.

Chapter III: Results

EMRs Definitions and Theories

The EMR is a tenant of Electronic Health Recording (EHR) system. Only ten of the fourteen articles that were reviewed provided a definition for EMR (*N*=9, 64%). From these 9 articles, a general definition for EMR was a legal record documenting in a specific health care institution or care delivery organization, and was used in such a way that it linked care delivery systems. Figure 2 shows the words that were most frequently used with the definition of EMR. The words were found in at least two of the nine articles that provided a definition of the EMR. Accessibility, efficiency, and improve outcomes were noted three times. While cost was found only twice.

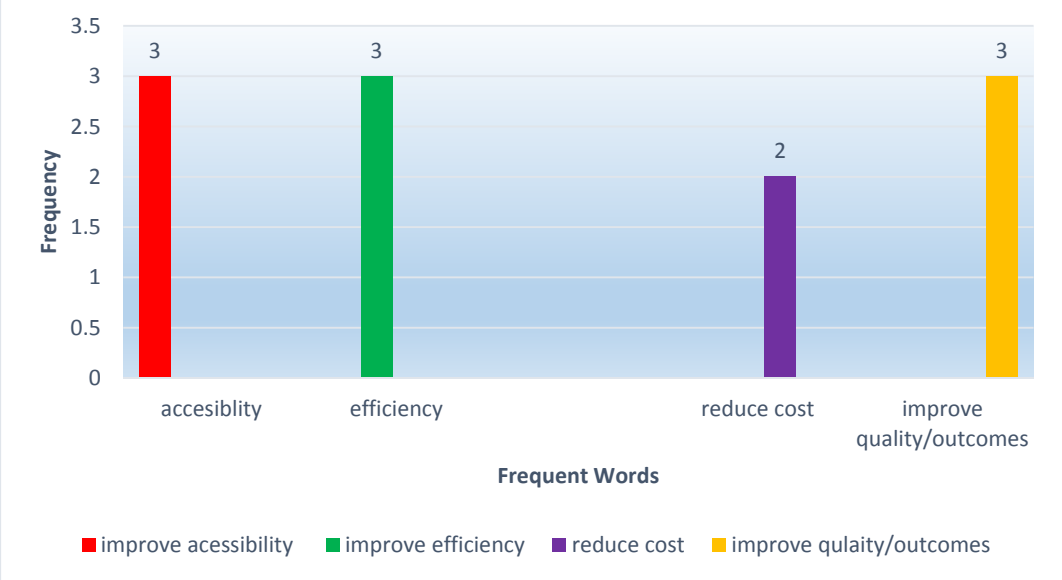

Figure 2. Words frequently used with the EMR definition

The following are the various definitions that were retrieved from the literature that was reviewed. Watkinson-Powell and Lee (2012) defined EMR as a "…technological method that provides health workers with a complete and rapidly accessible record of patient data and can help improve the efficiency of care delivery and lead to potential cost savings" (p. 196). McGuire et al. (2012) defined EMR as a "strategy to improve patient safety" (p. 184). Savinon, Smith Taylor, Canty-Mitchell and Blood-Siegfried (2012) defined EMR as a "…method used to reduce healthcare expenses and improve patient outcomes" (p. 464). According to Beiter, Sorscher, Henderson and Talen (2008), "…EMR is technology used to improve patient care quality in primary care" (p. 222). Chung et al. (2008) stated that EMR was "…the computerization of patient–data in order to improve healthcare service and increase the efficiency of hospital administration (p. 499). Another definition of EMR was "…information technology used to enhanced accessibility, diverse formatting, and electronic imaging, increase the accuracy and precision of important patient data" (Green & Thomas, 2008, p. 225). The EMR was also defined as the electronic record of health-related information on an individual "…that is created, gathered, managed, and consulted by licensed clinicians and staff from a single organization who are involved in the individual's health and care" (Edwards, 2012, p. 111). It was further considered as "…one way to reduce practice variation and improve quality by improving access to patient data, efficiency of documentation, prompting of clinicians, decision support, presentation of data, and access to educational materials for patients" (Adams, 2008, p. 626). One study also referred to it as "a

computerized record of clinical, demographic and management information" (Top & Gider, 2012, p. 1979).

EMR Impacts

The content analysis revealed six categories of areas/outcomes being impacted as a result of the use of EMR systems. These included: (1) accessibility of records and information, (2) cost, (3) practice efficiency, (4) security, (5) patient- nurse relationship and communication, and (6) quality of patient care (see Table 1).

Table 1.*A Summary of Studies on EMR Use Impacting Nursing Practices*

Author and Year	Sample	Study Design, Methods, Analytical Method	Definition/ Theories/ Legislation	Scale Range	Factors Impacting Nursing Practice
Van der Vaart, Drossaert, Taal and Van de Laar (2013)	*N*= 9 nurses and N=13 rheumatologists	Qualitative and Qualitative; Thematic Interview; Content Analysis	No	N/A	Security, patient-nurse relationship and communication, and quality of patient care
Don O'Mahony, Graham Wright, Parimalarani Yogeswaran and Frederick Govere (2014)	N=33 nurses from community health centers	Qualitative; Semi-structured Interviews	No	N/A	Accessibility of records and information, cost, practice efficiency, security, patient-nurse relationship and communication, and quality of patient care
Matt Mouley Bouamrane and	*N=25* healthcare	Qualitative; Semi-	Yes	N/A	Practice efficiency and

Frances Mair (2013)	workers	structured and open-ended interview questions			quality of patient care
Courtney Edwards (2012)	Unreported number of Trauma Center Nursing staff	Quantitative; Post-implementation survey was conducted 2 weeks after the implementation of EMR	Yes	Not reported	Practice efficiency, patient- nurse relationship and communication, and quality of patient care
Carla Savino, Julie Smith Taylor, Janie Canty-Mitchell and Jane Blood Siegfried (2012)	*N*=74 records, 40 were written records, while 34 were electronic	Quantitative; Longitudinal design; Questionnaire; Independent *t* –test used to compare the mean	No	Not provided	Patient- nurse relationship and communication and quality of patient care
Mehmet Top and Omer Gider (2012)	N=325 nurses working at inpatient care units	Quantitative; Self-administered questionnaire; Comparisons were made with the use of ANOVA.	Yes	1-5 Likert Scale	Accessibility of records, practice efficiency, and quality of patient care
McQuire et al. (2012)	*N*=17-18 primary care practices	Quantitative; Survey; Longitudinal study; Chi square	Yes	1-5 point Likert Scale	Security and quality of patient care
Chung et al. (2008)	*N*=101 nurses working in different medical units	Quantitative; Survey; Cross-sectional design; Chi-squared test, t-test, ANOVA	Yes	Not reported	Accessibility of records and information and practice efficiency
Patrick Beiter, Jonathan Sorscher, Carol Henderson and Mary Talen (2008)	*N*= 39 participants. 19 physicians and 20 staff	Quantitative; Longitudinal design; Survey; *T*-test	Yes	Not reported	Accessibility of records and information, practice efficiency, and quality of patient care
A Watkinson-Powell and A Lee (2012)	*N*=11 rural village districts	Qualitative and Quantitative; Interviews; Observation;	Yes	Not reported	Accessibility of records and information and practice efficiency

		Longitudinal design			
Shayla D. Green and Joan D Thomas (2008)	*N*= 37 healthcare workers	Qualitative and Quantitative; Survey; Content Analysis	Yes	Not reported	Patient-nurse relationship and communication, and quality of patient care
John Kochevar, Matthew Gitlin, Richard Mutell, Jeff Sarnowski and Tracy Mayne (2011)	*N= 280* including nursing administration and upper nurse managers	Qualitative and Quantitative; Survey; Iinterviews; Chi-square	No	Not reported	Accessibility of records and information and practice efficiency
William G. Adams, Adriana M Mann and Howard Baucher (2008)	*N= 12* nurse practitioners in urban pediatric care	Quantitative; Pre-and-post-intervention; *T*-test	Yes	1-5 point Likert Scale	Practice efficiency and quality of patient care
Rhodes et al (2008)	*N=13* healthcare workers *N=26* patients	Qualitative; Conversation Analysis	No	No reported	Patient-nurse relationship and communication, and quality of patient care

Accessibility of Records and Information

Table 1 shows that seven of the studies that were reviewed highlighted accessibility of records and information (*N=7*, 50%) and alluded to the fact that the implementation of EMR helps to improve work production. In one study, nurses stated that "…the main benefit of the EMR was that there was faster completion of monthly reports, taking only a few minutes compared to 5-6 days. The staff also pointed out that stock keeping were less time consuming using the computer system, compared to the paper system that took 2-3 hours after every clinic session" (Watkinson-Powell & Lee, 2012, p. 197). Accessibility of records and information also provided an advantage for patients. Nurses in

another study pointed out that with the introduction of EMR, patients could look through their data before a consultation, and therefore, they could be prepared and have questions (Van der Vaart, Drossaert, Taal & Van de Laar, 2013, p. 2406). EMRs thus had a positive impact on nursing practice by making the access to information easier for nurses and patients.

Practice Efficiency and Communication with Other Providers

Nine of the reviewed studies (*N*= 9, 64%) showed that the use EMR systems impacted nursing practices by promoting practice efficiency (see Table 1). For example, Chung et al. (2008) stated that "…environmental change related to nursing records decreased the time for indirect nursing activity by entering nursing data right after providing nursing activities" (p. 501). EMR also improved practice efficiency because it helped with statistics. After nurses entered data, the EMR provided an option to automatically obtain statistical results. In addition, the EMR helped solve the problem of missing patient cards and ensured a permanent record (O'Mahony, Wright, Yogeswaran & Govere, 2014). Another study pointed out that "…with the implementation of the EMR less time was spend filing paper work during consultations" (Watkinson-Powell & Lee, 2012, p.198). Practice efficiency helped, in general, because information was easy to read and understand and thus made work flow and communication between nurses and patients smoother.

In addition to impacting practice efficiency, EMRs helped foster communication and teamwork with other providers. In an observation, Courtney Edwards (2012) found that: "…With the support of the director of trauma and disaster services, Trauma Center, clinical nurses joined the emergency services EMR project development team. This was to ensure that the EMR would meet the needs of the clinical nurses at the bedside. The clinical nurses worked together with information systems technologists, each observing the other in their natural environment" (p.113).

Patient –Nurse Relationship and Communication

Table 1 that six studies (43%) reported patient-nurse relationship and communication as a positive outcomes of EMR system use. Care providers mentioned that the service enhanced patients' knowledge and made them better informed about their diseases and treatments. This lead to treatment adherence, since patients had a better understanding of how and why their treatment worked (Van der Vaart et al. 2013). Another interesting result was that nurses asserted that with EMR they were able to get quicker access to continuing professional development through the Internet, as well as able to access circulars from the Department of Health and Information on disease management (O'Mahony et al. 2014). The results also showed that EMR had a positive impact on nurse and physician communication. It fostered better collaboration, which in turn, positively influenced quality of care for patients (Green &Thomas, 2008; Rhodes et al., 2008; Van der Vaart et al., 2013).

Quality of Patient Care

In comparison to all the other outcome areas impacted by nurses' use of EMR systems quality of patient of care was the most studied in the literature. It was discussed in 11 of the 14 articles that were reviewed (*N*=11, 80%) (see Table 1). There were mixed perceptions about both positive and negative impacts of EMR on quality of care and user satisfaction (Top & Gider, 2012). However, more studies had results that alluded to the fact that EMR improved quality of patient of care. When it comes to pediatrics, one study stated that: "…Documentation of more specific, evidence-based recommendations for interventions occurred in the EMR for both overweight and obese children in the EMR for both overweight and obese children when compared to written records: counseling to reduce screen (TV and computer) time, monitor portion control, increase fruits and vegetables, and reduce sugar-sweetened drinks. Obese children were more likely to be referred for return visits for counseling and interventions with the use of customized EMR (43%) compared to written records (0%)" (Savinon et al. 2012, p. 467).

In some cases, the implementation of the EMR created a mixed reaction. Beiter et al. (2008) stated that, "…positive responses focused on efficiency, accuracy, reminders, access, legibility and health maintenance/preventative care. The negative responses addressed problems related to getting old records into the new system, time required to become experienced/efficient with EMR, computer difficulties and confidentiality issues" (p. 225). Nurses in another study

stated that the EMR had improved their ability to provide a safer patient care (McGuire et al. 2012). It was obvious that when it came to quality of care for patients, the pros that EMR provides outweighed the cons.

Security

When it comes to the Internet and people personal information there are always questions and fear of how secure the information is. With that said, security is one of the main questions that arise from the implementation of EMR in nurse practices. Only three of the articles (21%) discussed security (see Table 1). One study pointed out that patients were worried about EMR because there was a concern that the service might affect the patient-provider interaction due to the shared information and the openness of the record (Van der Vaart et al. 2013). In such situations, the healthcare organization needed to ensure that EMRs were secure in order to prevent liability from unsecure data.

In another study, nurses concluded that EMR helped to lessen the risk of stigma of diseases. It also assisted in the tracking of sexually-transmitted diseases, as well as in the following up of patients on chronic medication who have defaulted, at the same time making patients data more private and secure (O'Mahony et al. 2014).

Cost

Healthcare cost is always a debate especially among patients. Having good health is very essential, but as quality of care, value, efficiency, and access moves in the right direction, health care cost continues to move in the direction of always increasing. With great concern about the increasing health care cost, studies' results (*N*=1, 7%) illustrated that reduction of health care cost was one of the impacts that the EMR use/implementation had on nursing practices. O'Mahony et al. (2014) stated that, "…nurses identified that there was cost saving with regard to the purchasing of stationery and a reduction in paper-storage facilities. Advance technology was sometimes blamed for the increasing prices in healthcare cost, if technological cost was to be reduced that would mean a reduction in healthcare cost for patients" (p. 4).

Characteristics of the Studies Reviewed

All 14 articles that were reviewed used three methods to carry out their research: qualitative, quantitative or a mixture of both.

Qualitative studies.

Table 1 shows that there were three qualitative studies (Bouamrane & Mair, 2013; O'Mahony et al., 2014; Rhodes et al., 2008). The three articles used interviews as a data collection method. Bouamrane and Mair (2013) studied

perspectives on EMR in Scotland. The researchers conducted 19 interviews via a telephone and 6 face- to-face. O'Mahony et al. (2014) explored knowledge and attitudes about information technology and EMR. Thirty three nurses were interviewed. Rhodes et al. (2008) used conversation analysis that includes nine practices and thirteen healthcare workers. In total twenty six patients were eligible for the study.

Quantitative studies.

Six quantitative studies used surveys as a data collection method (*N*=*6*, 43%). Chung et al. (2008) surveyed 101 nurses in a hospital to evaluate if implementing EMR would change the way nurses recorded their data. Mean, standard deviation, percentage were used for analyzing the results of the data. McGuire et al. (2012) surveyed medical workers. The longitudinal study was done in 2007, 2009, and 2010; 123, 143 and 181 respondents were surveyed, and 101, 119 and 133 answered respectively. The survey was carried out to measure patient safety perceptions after the implementation of the EMR. Top and Gider (2012) surveyed 325 nurses in a non-experimental study conducted in three hospitals in Turkey. Edwards (2012) surveyed to nurses in a Trauma Center Clinical nurses in order to identify the advantages and the disadvantages of the EMR. The study had a cross-sectional design and the data were collected after the implementation of the EMR. Beiter et al. (2008) used a longitudinal survey to assess the attitudes, knowledge, skills or needs related to EMR. A total of 39 participants were involved in the study. Savinon et al. (2012) used a risk questionnaire to compare the attitudes to EMR before and after its

implementation. The longitudinal study included the same children over the same three months in two different years. The study had a quasi-experimental design. Adams, Mann, and Bauchner (2008), evaluated the possibility of EMR improving quality of urban pediatric care. The first analysis included 235 paper-based records, and the second study included 986 computer-based records on interim health history. Twelve nurse practitioners were included in a post- intervention and pre-intervention analysis. The study evaluated EMR in diabetes consultations.

Mixed methods.

Four articles (*N=4,* 28%) used mixed qualitative and quantitative approaches to conduct the research. Green and Thomas (2008), conducted a survey with 37 participants. The survey used both opened and closed ended questions. Content analysis was used to examine the open-ended questions. The study was a quality improvement project and sought to examine interdisciplinary collaboration and EMR. Watkinson-Powell and Lee (2012) used interviews and observations to evaluate the benefits of an EMR in a rural Nepal. Kochevar, et al. (2011) used questionnaires and interviews to examine EMR use and satisfaction. Van der Vaart et al. (2013) used thematic interviews as a research method. The goal of the interviews was to obtain opinions on patient home access to the EMR. The interviewees included thirteen rheumatologists and nine nurses or nurse practitioners. Content analysis was used to review the information gathered during the interviews.

Chapter IV: Discussion and Conclusion

The 14 articles reviewed provided valuable insights into the state of evaluation of perceived EMR impacts on nurse practices through diverse research methods.

Theories and Definitions

Based on the diversity of formulations used in the theoretical frameworks of the studies reviewed, it can be concluded that one true definition of EMR does not exist. The variability in definitions of EMR was due to specific cultures where EMRs were implemented and the specific individuals who used the technology systems.

The above definitions all had one thing in common, and that was, to improve treatment of patients. Indeed, as health care continues to evolve, it is inevitable that nursing staff, administrators, and upper nurse management would implement a system capable of effectively coordinating clinical observation and monitoring, and sustaining the lives of their patients. As health care continues to change, the implementation of EMRs could help nurses to achieve quality outcomes. With that said Ventura et al. (2011), stated that: "….a key element for a successful paperless implementation is the manner in which these vital pieces of information are tangled together and presented. Its format must reflect the increasing complexity of the workflow process of the department; it needs to

facilitate prompt decision-taking and therapeutic actions, while it is also coherent with operative protocols of the department" (p.163).

In addition to improving patient care, the definitions emphasized efficiency of care. The literature reviewed also revealed advantages of using the system. The advantages included: reduction duplication, reduce transcription, improve legibility and accessibility (Kunz, 2010). These advantages all seek to alleviate inefficiency. Equally important: "…..currently, for clinicians (including nurses) to transcribe by hand, human and machine generated data, clinical notes and other demanded documents into flow sheets is the standard neonatal intensive care workflow process with paper systems, even in time-critical situations. This process is very laborious and time consuming. Estimated time and effort to fulfill documentation requirements largely exceed time spent in delivering care. This time gap further increases whenever complex equipment and severely ill patients are involved (Ventura et al. 2011, p. 163).

EMRs Impacts Implications

The content analysis revealed six EMR factors impacting nurse practices. Quality of patient care, practice efficiency and communication with other providers, and accessibility of records and information were ranked first, second and third respectively. Because EMRs are newly implemented systems, nurses and administrators need to be visionaries, and realize that it is only through collaboration that the systems will be properly be utilized and executed. The slow

adaptation of EMRs within nurse practices in the United States may be blamed on the inability to accept change and the inability to dream big. Marguerite Kunz (2010) suggested that: "….. Nurse staff need to have the picture of the future painted for them. They need to realize how much potential there is for the documentation process to improve and how the process can be made easier, more efficient and/or more effective. Some of the components of creating the vision include explaining the advantages of EMRs. This can also be accomplished through creating examples of the work process that can be more productive because of data entry on the computer" (p.298). Jane Robles (2009) further states that: "…While charting, nurses can easily see previously filed values when assessing a change in the patient's condition that may need to be communicated to the physician. When receiving a patient who is admitted or transferred, nurses have found it easier to understand the patient's needs prior to the patient's arrival. Ready access to data helps nurses feel empowered in decision. Interfaced data can be one of the most valuable time-savers in the EMR: Data from cardiac monitors, ventilators, intra-aortic balloon pumps, and IV pumps are automatically entered into the EMR, significantly reducing data entry errors (p. 33).

Two of the barriers listed in the literature review were "losing the unfamiliar" and resisting to change. One of most fundamental philosophy that nurses need to know when adopting EMR is that, "…the larger issue is cultural: getting nurses to see that this comprehensive, interdisciplinary information is

crucial to good patient care, rather than basing their care only on information being passed on from nurses" (Beaty, 2007, p.7).

Fewer articles reported patient-nurse relationship, security, and cost as factors impacting nurse practices; nonetheless, they were equally important. The new storage system called "cloud" was not discussed with the articles, however many individuals are using the new database as a secure way to store information. The new cloud-system to save data offers an insight into the importance of patient-nurse relationship and communication, security and cost. The theory of cloud in EMR is believed to be "….a promising platform for health information systems in order to reduce cost and improve accessibility. Cloud computing represents a shift away from computing being purchased as a product to be a service delivered over the Internet to customers. In addition, the Cloud transform information technology assets from being capital expenditure to be operational expenditure" (Almurity et al. 2013, p. 153).

Information security is always an area of questioning when it comes to patient privacy. The main concern was the lack of trust in data security and privacy by users, the loss of governance and uncertain provider's compliance (Almurity et al. 2013). It is important to note that with the EMR there was a lesser risk of stigma of diseases. It also assisted in contact tracking of sexually-transmitted diseases, as well as in following up of patients on chronic medication who had defaulted, at the same time making patients data more private and secure (O'Mahony et al.2014).

Methodological Considerations

All 14 articles that were reviewed used qualitative, quantitative or a mixture of both research methodologies. These methods were deemed accurate and suitable for obtaining specific data. Surveys were the most popular research method. Mixed approaches appeared the most suitable because they also included open-ended questions. The latter gave participants the power to voice their opinions and allowed researchers to formulate themes from open-ended questions that they might never had in mind.

Limitations and Future Research

Despite the fact that EMR has being one of the most frequently discussed topics in Electronic Health Record (EHR), this study was limited to the analysis of only 14 empirical papers that met the established research criteria. Most of the reviewed articles provided a definition of EMR, but the articles included definitions whose formulation and content varied; different authors interpreted the concept of EMR differently. Because of these different interpretations, the validity of describing the actual system could be questionable and easily critiqued. In order to mitigate the risk of confusion, the studies that used other terms instead of EMR, such as HIT and EHR, were excluded from the current review during the literature selection process, if the authors had not defined these concepts as being synonymous with EMR.

It is essential that future research replicates those studies, using valid measuring instruments on EMR factors impacting nursing practices. The validity of future studies could increase if they use more concrete, unambiguous, universally acceptable and applicable operational definitions of EMR as a concept. In addition, it is essential that future researchers expand theories of EMR on cost and security. The studies that were reviewed did not have a lot of information on these two areas. Equally important future researchers should do an extensive study on the theories and definitions on EMRs in countries in Europe, as well as do a comparative analysis on the extent of EMRs adoption in Europe and the United States and their impacts on nursing practice. This would provide an in-depth knowledge of the use of EMRs in different cultures.

Conclusion

Most of the articles reviewed in the current paper defined EMR, therefore, giving an understanding on how the system works. EMR is slowly being introduced into nurse practices in the United States. Regardless the usage, the EMR system is slowly growing because of its positive results in areas that it is used in. Six categories of factors were identified that affected nursing practices: (1) accessibility of records and information, (2) practice efficiency and communication with other providers, (3) patient-nurse relationship, (4) quality of patient care, (5) security, and (6) cost. These categories describe the factors that may be the determinants or benefits for implementing EMRs in nursing practices.

This review presented comprehensive information about current empirical evidence that may be useful for the EMR implementation and for future research investigation of EMRs impacts in nurse practices. The reported findings were based on nurses, patients and heath care workers populations in hospitals, clinics, nursing homes, and health care services settings. This research also identified some methodological weaknesses in the reviewed literature. Future research should develop proper research methodology, including valid and reliable instruments for exploring EMRs factors impacting nursing practices.

References

Adams, W. G., Mann, A. M., & Bauchner, H. (2008). Use of Electronic Medical Record Improves the Quality of Urban Pediatric Primary Care. *Pediatrics, 111*(3), 626-632.

Almutiry, O., Willis, G., Alwabel, A., Crowder, R., & Walters, R. (2013). *Toward A Framework For Data Quality in Cloud-Based Health Information System.* Retrieved October 2, 2014, from http://eprints.soton.ac.uk/359758/1/isociety_paper_OA.pdf

Beaty, B. (2007). The Electronic Medical Record: Shifting the Paradigm. *Creative Nursing, 2,* 7-9.

Beiter, P.A., Sorscher, J., Henderson, C., & Talen, M. (2008). Do Electronic Medical Record (EMR) demonstrations change attitudes, knowledge, skills or needs? *Informatics in Primary Care, 16,* 221-227.

Bouamrane, M., & Mair, F. S. (2013). A Study of General Practitioners'. Perspectives on Electronic Medical Records Systems In NHSScotland. *BMC Medical Informatics& Decision Making, 13*(58), 1-12

Chung, E., Kim, H., Park, K., Song, Y., Lee, B., Lee, M., et al. (2008). An

Evaluation of the time for Nursing Activity in a Hospital using full Electronic Medical Record System (EMR). *Consumer-Centered Computer-Supported Care for Healthy People* 499-502.

Edwards, C. (2012). Nursing LeadersServing as a Foundation for the Electronic Medical Record. *Journal of Trauma Nursing, 19*(2), 111-116.

Green, S. D., & Thomas, J. D. (2008). Interdisciplinary Collaboration and the Electronic Medical Record. *Pediatric Nursing, 34*(30), 225-240.

HealthIT.gov. (2014). *What is an Electronic Medical Record (EMR)?* Retrieved October 15, 2014, from http://www.healthit.gov/providers-professionals/electronic-medical-records-emr

Kochevar, J., Gitlin, M., Mutel, R., Sarnowski, J., & Mayne, T. (2011). Electronic Medical Records: A Survey of Use and Satisfaction in Small Dialysis Organizations. *Nephrology Nursing Journal, 38*(3), 273-280.

Kripendorff,K. (2004). *Conetent analysis: An introduction to its methodology* (2nd ed.) Thousand Oaks, CA: Sage.

Kunz, M. (2010). *Embracing the Electronic Medical Record.* Retrieved October 10,2015 from http://nwh.awhonn.org

McGuire, M, J., Noronha, G., Samal, L., Yeh, H., Crocetti, S., & Kravet, S.

(2012).Patient Safety Perceptions of Primary Care Providers after Implementation of an Electronic Medical Record System. *Journal of General Internal Medicine, 28(2),*184-192.

O'Mahony, D., Wright, G., Yogeswaran, P., & Govere, F. (2014). *Knowledge and Attitudes of nurses in community centers about electronic medical records.* Retrieved October 5, 2014, from file:///C:/Users/Phylicia/Downloads/1150-4350-1-PB.pdf

Pomerleau, M. (2008). Electronic Health Record: Are you Ready for the Next Step? *Nursing for Women's Health, 12*(2), *150-156.*

Rhodes, P., Small, N., Rowley, E., Langdon, M., Ariss, S., & Wright, J. (2008). *Electronic Medical Records in Diabetes Consultations: Participants' Gaze as an Interactional Resource.* Retrieved October 5, 2014, from http://qhr.sagepub.com/content/18/9/1247.

Robles, J. (2009). The Effect of the Electronic Medical Record on Nurse' Work. *Creative Nursing, 15,* 31-35.

Savinon, C., Taylor, J. S., Canty-Mitchell, J., & Blood-Siegfried, J. (2012). Childhood Obesity: Can Electronic guidelines Improve Screening and Diagnosis? *JournalOf the American Academy of Nurse Practitioners, 24,* 463-

471.

Top, M., & Gider, O. (2012). Nurses' Views on Electronic Medical Records (EMR) in Turkey: An Analysis According to Use, Quality and User Satisfaction. *Journal Of Medical System, 36,* 1979-1988.

Transforming Health Care: The President's Health Information Technology Plan (2004, January 20). *In The White House: President George W. Bush. Retrieved from,* http://georgewbush-whitehouse.archives.gov/infocus/technology

Van der Vaart, R., Drossaert, C. H.C., Taal, E., & Van de Laar, M.A.F. (2013). Giving Rheumatology Patients online Home Access to their Electronic Medical Record (EMR): advantages, drawbacks and preconditions according to care providers. *Rheumatology International, 33,* 2404-2410.

Ventura, M. L., Battan, A. Zorloni, C., Abbiati, L., Colombo, M., Farina, S., et al. (2011).The electronic Medical Record: Pros and Cons. *The Journal of Maternal-Fetal And Neonatal Medicine, 24*(1), 163-166.

Watkinson-Powell, A., & Lee, A. (2012). Benefits of an Electronic Medical Records System in Rural Nepal. *Journal of Nepal Medical Association, 52*(188), 196-200.

White-Domas, M., & Marsh, E. E. (2006). Content Analysis: A Flexible. Methodology. *LibraryTrends, 55*(1), 23-44

Zieger, A. (2008). *Study: Doctors fear how gov't will use EMRs.* Retrieved October 10, 2015, from http://www.fiercehealthit.com/story/study-doctors-fear-how-govt-will-use-emrs