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The Impact of the Electronic Medical Record on Health Information Management Staff in Two Southeastern States

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Abstract

Health information management (HIM) staffs in health care facilities have a long history of managing medical records in a paper format. Since 2009, with the passage of the Health Information Technology for Economic and Clinical Health Act (HITECH), health care facilities have been rapidly changing from a paper medical record system to an electronic system. The adoption of electronic record systems has reduced or eliminated paper medical record forms which consequently changed many HIM staff's jobs. A survey of HIM professionals was conducted in two southeastern states to determine any increase or decrease in HIM staff numbers and to identify any changes in required HIM skill levels. While the response rate of the survey was low, the survey results yielded much information about the actual changes HIM staffs are experiencing with the adoption of electronic record systems in their health care facilities. This information will be valuable to HIM professionals by aiding them in developing realistic strategic plans for the future of their HIM departments.

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Chapter 1

Introduction

Traditionally, the medical record of a patient's inpatient stay in a hospital has been documented on paper. Handwritten and/or typed entries of the patient's evaluation, care, and treatment are kept together in one folder which is filed in shelving or cabinets after the patient's discharge. Maintaining the accuracy, completeness and control of these paper medical records is the responsibility of the Health Information Management (HIM) department in each facility.

In 2009, the American Recovery and Reinvestment Act of 2009 (ARRA), which was intended to stimulate all areas of the struggling United States economy, was signed into law. A section of ARRA called the Health Information Technology for Economic and Clinical Health Act (HITECH), provided for stimulus funding for the healthcare industry (Block, Malley, & Zender, 2013). In part, HITECH specified that in order for clinicians and healthcare organizations to qualify for these incentives, they must adopt an electronic medical record (EMR) system (Blumenthal & Tavenner, 2010).

With hospitals' adoption of EMR systems, inpatient medical records are being transformed. The hospital medical records' format containing the information of the patient's hospitalization is changing from paper to electronic or a hybrid of the two. It is only logical that the functions of the HIM staff of these hospitals would also change. This paper seeks to examine the impact the EMR has had on HIM staffing numbers and required skill levels of HIM staff.

Background

There is a long history of health information management (HIM) in the United States. The health information industry has been around officially since 1928 when the American College of Surgeons (ACOS) sought to increase and improve the standards of records that were created in the clinical setting– that is—during the diagnosis and treatment of healthcare patients. ACOS sought to achieve their goal for improving clinical records by establishing a professional association, the American Association of Record Librarians. At that time all medical records were kept on paper and thus these librarians were the "keepers of the books". This professional group is still in existence today under the name American Health Information Management Association (AHIMA) (Fleet 2010).

The medical record librarians and their staff, now known as Health Information Management (HIM) staff, were responsible for filing paper documents in the medical record and maintaining control of the record and its safekeeping. Eventually, the legal concept of "custodians" of the medical record came into being. The records custodian is the person responsible for keeping records in the ordinary course of business and ensuring its completeness and accuracy. Federal and state rules of evidence require an official custodian of the medical record. In most facilities, this is a responsibility of the HIM Director (Brodnik, Rinehart-Thompson, & Reynolds 2012).

Paper medical records were kept and maintained from the 1920s forward; but as the development and deployment of the computers began in the 1960 and 1970s, universities and large healthcare facilities began exploring the use of computers in recording healthcare information. Computerized healthcare systems were developed to support patient care and facility operations such as MPI (master patient index), ADT (admission, discharge, and transfer),

laboratory and radiology services. With the growth of information technology, increasing sophistication of health care, and increasing emphasis on reporting and sharing health care data, the industry's focus turned to computerizing the medical record.

With the change from paper medical record to electronic medical records, logically there would seem to be a change needed in the medical records staff that are the "keepers of the books" and the custodians of the medical record. This paper seeks to examine changes in HIM staff and their skill levels.

Purpose of the Study

The purpose of this study is to evaluate the changes in healthcare facilities' HIM staff due to the implementation of the EMR or electronic health record (EHR). By analyzing data from a survey of HIM directors and managers, this study aims to quantify those changes by measuring increases or decreases in the number of HIM staff. Additionally, the study seeks to identify the HIM staff skill levels changes that occurred because of their facilities' EMR system.

Significance of Study

This study seeks to add to the evidence of actual changes the EMR created in the numbers and skill levels of HIM staff. It is a wide spread assumption that as the paper medical record evolves into an electronic format then the need for traditional HIM staff will go away. Other studies have addressed the EMR's impact on clinical staff i.e. nurse, physicians but few studies have examined the changes that have occurred for HIM staff.

HIM professionals will benefit from this research by having a clearer picture of the actual impact EMRs have had on current HIM staff numbers and skill levels. This research will provide valuable information that will enable HIM professionals to develop valid strategic plans for their departments and hospitals. Specifically, this information can be used for developing training

modules to enhance HIM skill levels, forecasting changes in personnel budgets and planning for potential reduction of force within the HIM department.

This study has the potential to provide stronger evidence of HIM staff changes and provide a new perspective on evaluating HIM staffing for the future. Additionally, highlighting the value of experienced skilled HIM staff in an EMR setting will showcase the profession and their significance in the electronic data environment. This in turn will highlight the need for more skilled HIM staff which will empower new and experienced HIM staff to seek ways to enhance their current skill sets or branch out in a new direction.

Research Questions

This study seeks to show how much change, if any, has occurred in healthcare facilities' HIM departments because of the facilities' adoption of an EMR system.

The two specific research questions are

- Does the implementation of facilities' electronic medical/health records impact the number of HIM staff required to maintain business operations of HIM Departments?
- Does the implementation of facilities' electronic medical/health records impact the skill levels of HIM staff required to maintain business operations of HIM Departments?

The analysis of the survey data will focus on size of the hospital, full electronic or hybrid EMR and other variables. Survey data will be analyzed by computing response rates, frequencies of variables, cross tabulations, and statistical testing of designated variables.

Definitions of Key Terms

- AHIMA-American Health Information Management Association; National organization of HIM professionals.
- Chi-square test for independence-a test applied to two or more variables from a single population. It is used to determine whether there is a significant association between variables.
- e-HIM-Electronic Health Information Management-new term used to describe the shift from a paper oriented profession to electronic based HIM profession.
- FTE-Full-time equivalent employees-the number of employees on full-time schedules plus the number of employees on part-time schedules converted to full-time.
- GHIMA-Georgia Health Information Management Association-State component of AHIMA
- HITECH-Health Information Technology for Economic and Clinical Health Act that includes the EHR incentive program
- Meaningful Use (MU)-EHR incentive program established by HITECH
- REDCap-Research Electronic Data Capture-database used to capture survey results for this study.
- THIMA-Tennessee Health Information Management Association-State component of AHIMA

EMR and EHR definitions. The terms "electronic medical record" and "electronic health record" (or "EMR" and "EHR") are often used interchangeably but there are significant differences. EMRs are a digital version of paper medical records in hospitals or clinicians' offices. An EMR contains the medical and treatment history of patients' outpatient and/or inpatient encounters. EMRs have advantages over paper records. For example, EMRs have

clinical supports in place for physician prescribing. But the information in EMRs doesn't travel easily outside its originating healthcare organization. A patient's record might even have to be printed out and delivered by mail to specialists and other members of the care team who are not tapped into the same EMR system.

On the other hand, electronic health records (EHRs) does all that an EMR does and more. EHRs are built to share information with other health care providers, such as laboratories and specialists, so that information from all the clinicians involved in a patient's care is readily accessible (Garrett & Seidman, 2011). For the purposes of this paper, the term and definition of EMR will be used.

Chapter 2

Review of Literature

An extensive search of relevant literature was performed using PubMed, and CINAHL databases, Google Scholar search engine and the American Health Information Management Association's (AHIMA) Body of Knowledge. In addition, a manual search of the citations of selected articles was completed.

Search guidelines were followed for each database using keywords that reflected EMR, EHR, and Health Information Management. The keywords and combinations of the keywords used in the searches include electronic medical record, electronic health record, EMR, EHR, Return on Investment, Health Information Management, HIM, staffing, and traditional HIM departmental functions (e.g. release of information, medical record analysis and loose filing). This literature review sought to include articles that were published in the years 2005 to 2014, written in English, and addressed any impact on HIM staffing numbers or need in changing skill levels. Articles addressing EMR in an outpatient/ambulatory setting or physician practices were excluded as well as editorials, letters or website blogs.

Very few articles found in the literature search contained information on the EMR's impact on HIM functions. Of those, most addressed HIM functions in detail but their focus was how the migration to EMR is expected to change the operations of the traditional HIM departments and addressed the need for HIM staff to consider more IT related education to enhance their career options.

Findings

Adoption of EMR. The U.S. health care system faces challenges on multiple fronts, including rising costs and inconsistent quality. But health information technology, especially

electronic medical records, has the potential to improve the efficiency and effectiveness of health care providers (Jha et al 2009).

Adoption of EMR systems by non-federal acute care hospitals has steadily increased since the implementation of HITECH in 2009. In 2013, 59% of non-federal acute care hospitals had adopted at least a basic EMR system with clinician notes. This represents a 34% increase from the previous year and a more than five-fold increase in EMR adoption since 2008. (Figure 1) In addition, a vast majority of acute care hospitals (93%) possessed EMR technology certified as meeting federal requirements for Meaningful Use objectives (Charles, Gabriel, & Furukawa, 2014)

Large urban hospitals continue to outpace rural and nonteaching hospitals in adopting EMR systems. The increase in adoption overall suggests that the positive and negative financial incentives currently in place across the US health care system are working as intended. However, in order to access a nationwide health information technology infrastructure, small and rural hospitals need to tap into an EMR system (DesRoches et al, 2013)

In the first year of HITECH, there was a substantial increase in the adoption of either a basic or comprehensive EMR. Both types of systems showed substantial increases from 2010 to 2011, with the basic EMR systems rising from 11.5 percent to 18 percent, and comprehensive EMR systems rising from 2.6 percent to 8.7 percent (Robert Johnson Foundation 2012).

The gap in EMR adoption rates based on hospital size, teaching status, and location has become larger, indicating that hospitals with certain characteristics continue to adopt HIT at a faster rate than others. Adoption among large hospitals, for example, increased by 17.3 percentage points, as compared to 10.1 percentage points among smaller hospitals, widening the

gap in adoption from 15.0 percentage points in 2010 to 22.8 percentage points in 2011. Similar differences were found based on teaching status and location (Robert Johnson Foundation 2012).

The Center of Medicare and Medicaid Services (CMS) and the Office of the National Coordinator for Health Information Technology (ONC) collaborated to establish standards and other criteria for structured data that EMRs must meet to qualify for an incentive program. This incentive program is widely known as "Meaningful Use". For healthcare providers to receive incentive payments, they must utilize a certified EMR. Certified EHR technology (CEHRT) offers the necessary technological capability, functionality, and security to help meet meaningful use criteria. Certified EMRs are secure, maintain data confidentiality, and have some level of interoperability with other systems to share information.

The Medicare and Medicaid EHR Incentive Programs provide incentive payments to eligible professionals, eligible hospitals and critical access hospitals (CAH) as they adopt, implement, upgrade or demonstrate meaningful use of certified EHR technology (EHR incentive n.d.).

The Healthcare Information and Management Systems Society (HIMSS) is a global organization focused on better health through information technology (HIMSS n.d.). One of HIMSS' modules is HIMSS Analytics which maintains large databases of healthcare information and provides analytical support. HIMSS Analytics developed the EMR Adoption Model SM (EMRAM) which uses an eight step scale to assist hospitals to determine their status in their EMR migration efforts. (Figure 2)

Starting in 2008, the ONC compiled annual briefs describing trends in adoption of EMR systems among non-federal acute care hospitals (Charles, Gabriel, & Furukawa, 2014). The results found that hospital adoption of EMR systems varied significantly by state. For 2013, state

rates of hospital adoption of at least a basic EMR system ranged from 26% to 83% with a national average of 59.4%. The highest were Hawaii (83%), South Dakota (82%), and North Dakota (79%) with the lowest adoption rates being Utah (26%), Kansas (36%), and Nebraska (41%) (Charles, Gabriel, & Furukawa, 2014). Of note, of the two states targeted for the EMR Impact on HIM survey, Georgia had an adoption rate of 60.9% and Tennessee had a rate of 52.9% which were determined not to be significantly higher or lower than the national average.

Health Information Management and the Electronic Medical Record. Since 1994, the HIMSS Nicholas E. Davies Award of Excellence has recognized outstanding achievement in the implementation and value from health information technology, specifically EMRs. The Awards program promotes EMR adoption through sharing information and lessons learned on implementation strategies, financial return on investment and value of the EMR to improve patient care and outcomes (HIMSS Davies Awards n.d.).

The Children's Medical Center Dallas was a Davies Enterprise Award 2013 recipient. The core case study submitted for consideration of the award included a brief on the facility's Return on Investment for their implementation of its EMR system. Children's approached the project as an operations-driven performance improvement initiative. Two of their performance indicators were HIM focused. These indicators are 1) No increase in duplicate medical record numbers and 2) Decrease in delinquent medical records to the goal of less than 15%. Prior to EMR implementation, duplicate medical record numbers were at 0.14%, after 12 months of being live on their EMR system it had only dropped to 0.13%. Children's realized better results with decreasing delinquent medical records. Pre EMR, the rate was 21% and dropped to 1% after 12 months on the EMR system (HIMSS Davies: Children's, 2013).

Children's Medical Center also collected data on staffing expenditures. From 2009 - 2013, Children's realized an overall $12.5 million savings in staff reductions. Specifically, HIM staffing levels were reduced by 20 FTEs over two years through attrition and staff transition resulting in an annual savings of $1.1million (HIMSS Davies: Children's, 2013).

Another Davies Enterprise Award 2013 recipient was Texas Health Resources (THR), a multi-hospital system. In its core case study on Return on Investment (ROI), THR cited a 5 year savings of $5 million in staff reductions and a $1.9 million savings in reduced forms (paper) cost. This was achieved thru development of a comprehensive EMR transition plan. Related key metrics of the plan included 1) reduction of paper forms usage and cost and 2) increase in efficiencies in HIM and unit clerk functions. From 2005 – 2010, cost benefits from these metrics were 1) Reduced Forms cost - $1.9 million, reduced HIM FTEs - $3.7 million and Reduced Unit clerk Chart activities – $1.3 million (HIMSS Davies: Texas, 2013).

THR cited lessons learned during the EMR project. 1) When discussing the need to increase efficiencies for staffing, employees, including HIM staff became concerned that there would be a reduction in staffing. THR stressed that the intent was not to reduce staff. In reality, as efficiencies increased, the need for staff decreased but staff reductions were achieved thru attrition with no compromise to patient care. 2) As the project progressed, the roles of key staff shifted. In particular, HIM staff found their processes dramatically changed and needed assistance in defining new roles and responsibilities (HIMSS Davies: Texas, 2013).

A third Davies Enterprise Award 2013 recipient was UC Davis Health System (UCDHS). Their case study on core item Return on Investment showed a similar trend in savings as THR cited. In 2006, UCDHS HIM staff were retrieving and filing over 723,000 medical records and filing over 3.2 million pieces of paper into medical records. Related supply expenditures totaled

$835,000. After the migration to an EMR, UCDHS saw a reduction of file room staff (25.5 FTEs) resulting in a savings of $4 million. Savings in paper supplies for the chart room was calculated as $3.5 million for the same time period (HIMSS Davies: Texas, 2013).

Every HIM function performed to support the paper health record in the past has to be re-engineered in the new environment of the EMR. Traditional HIM departments will transition to e-HIM departments (AHIMA, 2010) with changes in functions and corresponding staff skill levels. Major HIM functions that will be transformed include: Analysis, Abstracting, Assembly, Coding, Forms Design, Chart Completion, Master Patient Index (MPI) maintenance, and Release of Information (ROI) (AHIMA, 2010). Examples of function and skill level changes are: 1) For the chart completion function, an e-HIM file clerk will not be filing loose material in a paper folder as in a traditional HIM department but rather will be scanning documents into an electronic format to be included in the EMR. The file clerk will need to enhance his/ her skills to include the ability to scan as well as upload and manage the scanned documents; 2) ICD-10-CM/PCS is a diagnostic and procedural coding system that will be implemented in October 2015. This will require organizations to capture detailed clinical information at the point of care (AHIMA, 2012). Proper documentation can be gathered most effectively and efficiently through the use of EMR templates. These templates will support the capture of clinical information in a standardized and structured manner (AHIMA, 2012). The creation and updating of these templates will require upgrading of the skills of current coding and forms design HIM staff; 3) The ROI section of HIMD may see an influx of requests. As the general public becomes aware of the importance of maintaining a personal health record (PHR), hospitals will see an increase in requests for copies of the patients' medical records. HIM staff will be needed to not only copy the records but also assist patients with assembling their records. In addition, HIM staff could

offer advice on what types of records should be included in a PHR. These services would be a modification for the typical ROI clerk position (Dimick, 2008).

Not only will current HIM positions change but numerous new positions have been projected for the e-HIM department. One example is "Terminology Asset Manager" (Dimick, 2008). With the growth of EMR systems, there exists a need to create maps between clinical documentation and clinical terminologies used in the EMR systems. Performing as a Terminology Asset Manager would require knowledge of informatics, terminologies and classification systems. This combination of skills is well suited for HIM professionals.

While the insight in projected needs of an e-HIM department contained in this literature review were enlightening, especially the Davies Award recipients' experiences, further studies need to be conducted on the actual effects on HIM staffing numbers. Also studies need to be conducted on the number of HIM staff who did have to enhance their skill levels to meet the needs of the e-HIM department. The Davies Award recipients measured HIM staff reductions and skill level impact for their respective individual health care organizations. Their data is noteworthy but there exists a need to gather information on a broader basis. Therefore to collect data from a larger and diverse population of healthcare facilities, the decision was made to conduct a focused survey of HIM personnel and their facilities' experiences with the migration from a paper medical record to an electronic medical record.

Chapter 3

Methodology

Research Design

A survey questionnaire (Figure 3) was developed to collect information to examine the impact that adoption and implementation of EMR is having on hospital HIM departments and staff. The final data collection tool contained the following variables:

1. Medical Facility Primary Type
2. Size of health care facility
3. Type of Medical Record
4. When did your hospital implement an electronic medical record?
5. Based on the HIMSS EMR Adoption Model (Figure 2) at what stage of EMR implementation is your facility presently?
6. Do you feel EMR implementation has impacted the staffing of your department?
7. What was the impact on staffing numbers, associated with implementation of the EMR, in the Health Information Management Department?
8. If staffing increased, how many FTEs were required to meet need?
9. If staffing decreased, how many FTEs were eliminated?
10. Did the needed skill levels/functions for Health Information Management Department's staff change?
11. What were the skill levels/functions that were needed in your HIMD because of the implementation of EMR?
12. Have you seen any of the following changes in the HIM department since implementation of the EMR?

Variables and rationale

Medical Facility Primary Type. Survey choices were: (a) Acute Care, (b) LTAC/Skilled Care, (c) Psychiatric (Long term and/or short term) and (d) Other.

Rationale: The type of hospital may be a factor in the stage of EMR adoption. The use of electronic medical record (EMR) technology by non- short term acute care facilities show EMR adoption rates behind short term acute care settings by more than half (Health IT, 2013).

Size of healthcare facility. Survey choices were: (a) 100 or less beds, (b) 101 to 200 beds, (c) 201or more beds.

Rationale: The size of the hospital may be a factor in the stage of EMR adoption. Adopting EMR systems were and are expensive. Large hospitals with bigger budgets were the front runners in adopting EMR systems. However, small hospitals lagged behind in the use of EMR systems (Thakkar & Davis 2006). Finding the capital to invest in the infrastructure, personnel, training and support required to install and maintain an EMR system can be a barrier, especially considering the lack of significant return on investment (ROI) in the beginning. Uncertainty over the long-term return on investment can exacerbate this concern.

Type of Medical Record. Survey choices were: (a) Totally electronic (paperless), (b) Hybrid (part electronic and part paper), (c) All paper

Rationale: The type of medical record used by a facility may be a factor in HIM staffing. It is a logical assumption that a paperless medical record system would have different HIM staffing needs that a paper or hybrid medical record system.

When did your hospital implement an electronic medical record? Survey choices were: (a) Within the past 12 months, (b) 1 – 3 years ago, (c) 4 – 6 years ago, (d) Over 6 years ago, (e) Do not have an EMR.

Rationale: The length of time a hospital has an EMR may have an impact on the number and skill levels of HIM staff. It is assumed that with time EMR technology in the facility would progress and thus there would be changes needed in HIM staffing.

Stage of EMR Implementation based on HIMSS adoption model. Survey choices were: Stages 0 – 7. (Figure 2)

Rationale: Like time lapse, the stage of EMR Implementation may have an impact on the number and skill levels of HIM staff.

What was the impact on staffing numbers, associated with implementation of the EMR, in the Health Information Department? Survey choices were: (a) Staffing needs increased, (b) Staffing needs decreased, (c) No change in staffing requirements.

If staffing increased, how many FTEs were required to meet need? Survey choices were: (a) 1-5 FTEs, (b) 6-10 FTEs, (c)11-15 FTEs, (d) 16 or more FTEs and (e) No increase.

If staffing decreased, **how many FTEs were decreased?** Survey choices were: (a) 1-5 FTEs, (b) 6-10 FTEs, (c)11-15 FTEs, (d) 16 or more FTEs and (e) No decrease.

Rationale: The above three questions were included in the survey tool to quantify any changes in the number of HIM staff because of the implementation of the EMR.

Did the needed skill levels/functions for HIM staff change? Survey choices were: (a) yes, (b) no.

Rationale: Literature review revealed that the skill levels of HIM staff would change to meet the needs of managing a paperless or hybrid medical record (AHIMA, 2010).

What were the skill levels/functions that were needed in your HIMD because of the implementation of EMR? Survey choices were: (a) Document imaging (scanning), (b) Uploading scanned documents into the EMR, (c) Become "Subject matter experts" for EMR

functionality, (d) Work away opportunities for some functions (i.e. coding, auditing), (e) Developing policies/procedures/protocols pertaining to the EMR, (f) Change in Release of Information formats (paper, electronic, combination), (g) Increased monitoring of EMR for completeness and timeliness of documentation, (h) No identified change in skill levels or functions because of the EMR.

Rationale: Literature review revealed that the above were common functions that were predicted to encounter changes with the implementation of EMR (AHIMA, 2010). The survey respondents were instructed to check all that apply.

Have you seen any of the following changes in the HIMD since implementation of the EMR? Survey choices were: (a) Reduction in paper supplies for manual patient chart creation, (b) Reduction/elimination of microfiche costs, (c) Reduction in storage costs for paper files, (d) Reduction in amount/time of loose filing, (e) Reduction in delinquent charts, (f) Reduction/elimination in number of charts retrieved from files.

Rationale: Literature review revealed that the above were outcomes that were predicted with the implementation of EMR (AHIMA, 2010). The survey respondents were instructed to check all that apply.

Approval

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 Science Health Center's Health Informatics and Information Management Department and Sajeesh Kumar KR, PhD, associate professor in the Health Informatics & Information Management Department. Approval was given by both professors.

Database Selection

After approval of the survey tool, selection of a database utilizing the survey data was undertaken. Upon review of available databases, it was found that REDCap (Research Electronic Data Capture) database would meet the needs of the study. REDCap is a secure, web-based application designed to support data capture for research studies and is hosted by the University of Tennessee Health Science Center (UTHSC) (Harris et al, 2009). Additionally, REDCap has many features to support the collection and analyzing of survey data.

Data collection instrument

A data collection instrument was developed in REDCap incorporating the variables discussed above. The survey was administered thru REDCap utilizing a web link that provided direct and quick access to the survey tool. This data collection method was found to be extremely user friendly and allowed for anonymity.

Population and Sample Design

AHIMA members in Georgia and Tennessee were chosen to receive the invitations to participate in the survey. Georgia was chosen because of this writer's membership in the Georgia Health Information Management Association (GHIMA) and Tennessee was chosen because it is the home state for UTHSC. The president of GHIMA was contacted to aid in establishing a list of GHIMA members to receive the survey. GHIMA based their sample size on a member's designation as a HIM manager or a HIM director.

Data Collection Procedures

A cover letter (Figure 4) with a quick link to the survey tool in REDCap was dispersed to the GHIMA sample population of 163 on April 7, 2014 via e-mail. A second reminder e-mail was sent on April 15, 2014 with a deadline of April 25, 2014.

With the help of Dr. Reynolds at UTHSC, the Tennessee Health Information Management Association (THIMA) was contacted to send out a request for participation in the survey using the same cover e-mail as was used for the GHIMA. On June 6, 2014, surveys were sent to 3146 non-vendor members of THIMA. The survey was sent out again on June 20, 2014 asking for additional respondents with a deadline of June 25, 2014.

Data Analysis

After the deadline, REDCap's data export tool was used to export the received survey data to Microsoft Excel 2010 and IBM Statistical Package for the Social Sciences (SPSS) statistics 22 software. Creation of frequency tables were tested using both Excel and SPSS. It was determined that SPSS allowed for more flexibility in computing descriptive statistics such as frequencies and cross tabulations. Therefore, SPSS was used for all data analysis in this thesis.

Chapter 4

Results

Response rate of population

In Georgia, a total of 16 responses were received via REDCap for a response rate of 9.8%. The first request to THIMA members for participation yielded 32 responses. The second request yielded 26 responses for a total of 58 (via REDCap) from THIMA for a response rate of 1.8%. The total responses from Georgia and Tennessee were 74 for an overall response rate of 2.2%. Of the 74 total responses, two were incomplete.

Frequency Tables

Summaries of the counts and percentages of the responses to each of the 12 survey questions are shown in Tables 1 through 12. The first five tables/questions provide information on the characteristics of the hospitals where the respondents worked and Tables 6 through 12 provide information on the respondents' opinions regarding the impact of EMR adoption/implementation on their HIM departments and staffs.

Table 1

Medical Facility Type

Facility Type	No. of Respondents	Percent of Total Respondents
Acute Care	63	85.14%
LTAC/Skilled Care	1	1.35%
Psychiatric (Long term and/or short term)	5	6.76%
Other	5	6.76%
Total	74	100.00%

Table 2

Size of Health Care Facilities

Size of Facility	No. of Respondents	Percent of Total Respondents
100 or less beds	27	36.49%
101 to 200 beds	12	16.22%
201 or more beds	35	47.30%
Total	74	100.00%

Table 3

Type of Medical Record

Medical Record Type	No. of Respondents	Percent of Total Respondents
Hybrid (part electronic and part paper)	60	81.08%
Totally electronic (paperless)	14	18.92%
All paper	0	0.00%
Total	74	100.00%

Table 4

When Did Your Hospital Implement an EMR?

When EMR Was Implemented	No. of Respondents	Percent of Total Respondents
Within the past 12 months	6	8.11%
1 - 3 years ago	22	29.73%
4 - 6 years ago	18	24.32%
Over 6 years ago	24	32.43%
Do not have an EMR	4	5.41%
Total	74	100.00%

Table 5

Current Stage of EMR Implementation, based on the HIMSS EMR Adoption Model

Stage of EMR Implementation	No. of Respondents	Percent of Total Respondents
Stage 0	2	2.70%
Stage 1	13	17.57%
Stage 2	15	20.27%
Stage 3	9	12.16%
Stage 4	7	9.46%
Stage 5	9	12.16%
Stage 6	10	13.51%
Stage 7	7	9.46%
Do not have an EMR	1	1.35%
Missing/No Response	1	1.35%
Total	74	100.00%

Note. Descriptions of HIMSS' eight stages of EMR implementation are in question 5 of the survey questionnaire, a copy of which is in the appendix.

Table 6

Do You Feel that EMR Implementation Has Impacted the Staffing of the HIM Department?

Has Implementation Impacted HIM Staffing	No. of Respondents	Percent of Total Respondents
Yes	63	85.14%
No	11	14.86%
Total	74	100.00%

Table 7

Impact on HIM Dept. Staffing Numbers Associated with EMR Implementation?

Impact on HIM Staffing Numbers	No. of Respondents	Percent of Total Respondents
Staffing needs decreased	44	59.46%
Staffing needs increased	10	13.51%
No change in staffing numbers	20	27.03%
Total	74	100.00%

Table 8

If Staffing Increased, How Many More FTEs Were Required to Meet Needs?

Increase in FTEs	No. of Respondents	Percent of Total Respondents
1-5 FTEs	10	13.51%
6-10 FTEs	0	0.00%
11-15 FTEs	1	1.35%
16 or more FTEs	0	0.00%
No increase in FTEs	61	82.43%
Missing/No Response	2	2.70%
Total	74	100.00%

Table 9

If Staffing Decreased, How Many FTEs Were Decreased?

Decrease in FTEs	No. of Respondents	Percent of Total Respondents
1- 5 FTEs	26	35.14%
6-10 FTEs	14	18.92%
11 - 15 FTEs	1	1.35%
16 or more FTEs	6	8.11%
No decrease in FTEs	26	35.14%
Missing/No Response	1	1.35%
Total	74	100.00%

Table 10

Did the Needed Skill Levels/Functions for HIM Staff Change Because of EMR Implementation?

Did the Needed Skill Levels/Functions for HIM Staff Change	No. of Respondents	Percent of Total Respondents
Yes	59	79.73%
No	15	20.27%
Total	74	100.00%

Table 11

What Were the Additional Skill Levels/Functions Needed in HIM Dept.?

Additional Skill Levels/Functions Needed	No. of Respondents	Percent of Total Respondents (N=74)
Document imaging (scanning)	55	74.32%
Uploading scanned documents into the EMR	46	62.16%
Become 'Subject matter experts' for EMR functionality	38	51.35%
Work away opportunities for some functions (i.e. coding, auditing)	27	36.49%
Developing policies/procedures/protocols pertaining to the EMR	51	68.92%
Change in Release of Information formats (paper, electronic, combination)	56	75.68%
Increased monitoring of EMR for completeness and timeliness of documentation	54	72.97%
No identified change in skill levels or functions because of the EMR	9	12.16%

Note. Respondents were to select all of the above choices that were applicable.

Table 12

Have You Seen Any of the Following Changes in HIMD Since EMR Implementation?

Changes in HIMD	No. of Respondents	Percent of Total Respondents (N=74)
Reduction in paper supplies for manual patient chart creation	40	54.05%
Reduction/elimination of microfiche costs	41	55.41%
Reduction in storage costs for paper files	45	60.81%
Reduction in amount/time of loose filing	55	74.32%
Reduction in delinquent charts	31	41.89%
Reduction/elimination in number of charts retrieved from files	51	68.92%
No changes	8	10.81%

Note. Respondents were to select all of the above choices that were applicable.

Tables 13 and 14 represent the number of variable values chosen for the two multiple answer questions which were questions 11 and 12.

Table 13

Number of the Seven Additional Skills/Functions Needed on Question 11 of the Survey That Were Selected by the Survey Respondents and the Percent of Respondents Who Selected this Number

No. of the Seven Additional Skills/Functions Selected	No. of Respondents Who Selected this No. of the Skills/Functions	Percent of Respondents Who Selected this No.
0	10	13.51%
1	0	0.00%
2	3	4.05%
3	4	5.41%
4	15	20.27%
5	13	17.57%
6	19	25.68%
7	10	13.51%

Note. The mean (average) number of additional skills/functions selected was 4.42 and the median was 5.00.

Table 14

Number of the Six Changes in HIM Dept. on Question 12 of the Survey That Were Selected by the Survey Respondents and the Percent of Respondents Who Selected this Number

No. of the Six Changes Selected	No. of Respondents Who Selected this No. of the Changes	Percent of Respondents Who Selected this No.
0	8	10.81%
1	5	6.76%
2	6	8.11%
3	15	20.27%
4	13	17.57%
5	13	17.57%
6	14	18.92%

Note. The mean (average) number of additional skills/functions selected was 3.55 and the median was 4.00.

Respondent Facilities' Stages of EMR Implementation Compared with National Data

Table 15

Comparison of Stage of EMR Adoption/Implementation of Survey Respondents' Hospitals with Healthcare Information Management Systems Society (HIMSS) National Data

Stage of EMR Adoption	Percent of Respondents[a] (N=74)	Percent of U.S Hospitals as of First Quarter of 2014 (N=5449)[b]	Difference (Respondents' % minus U.S. %)
Stage 0	2.8%	5.6%	-2.8%
Stage 1	18.1%	3.2%	14.9%
Stage 2	20.8%	7.2%	13.6%
Stage 3	12.5%	27.7%	-15.2%
Stage 4	9.7%	15.7%	-6.0%
Stage 5	12.5%	24.2%	-11.7%
Stage 6	13.9%	13.3%	0.6%
Stage 7	9.7%	3.1%	6.6%

[a]The percents were calculated excluding the one respondent with no response/entry to the EMR stage question on the survey and the one respondent with the response of "Do not have an EMR."

[b]From HIMSS Analytics website (www.himssanalytics.org). The HIMSS Analytics EMR Adoption Model scores hospital participants in its database on an 8 step scale to a fully paperless environment.

Cross Tabulations of Selected Pairs of Variables

Table 16

Cross Tabulation of Size of facility by Medical Facility Type

			Medical Facility Type				
			Acute Care	LTAC/Skilled Care	Psychiatric (Long term and/or short term)	Other	Total
Size of facility	100 or less beds	Count	21	0	2	4	27
		% within Facility Type	33.3%	0.0%	40.0%	80.0%	36.5%
	101 to 200 beds	Count	10	1	1	0	12
		% within Facility Type	15.9%	100.0%	20.0%	0.0%	16.2%
	201 or more beds	Count	32	0	2	1	35
		% within Facility Type	50.8%	0.0%	40.0%	20.0%	47.3%
Total		Count	63	1	5	5	74
		% within Facility Type	100.0%	100.0%	100.0%	100.0%	100.0%

Table 17

Cross Tabulation of Current Stage of EMR Implementation by Size of Facility

			Size of facility			
			100 or less beds	101 to 200 beds	201 or more beds	Total
Current Stage of EMR Implementation	Stage 0	Count	1	0	1	2
		% within Size of facility	3.7%	0.0%	2.9%	2.8%
	Stage 1	Count	5	1	7	13
		% within Size of facility	18.5%	9.1%	20.6%	18.1%
	Stage 2	Count	10	2	3	15
		% within Size of facility	37.0%	18.2%	8.8%	20.8%
	Stage 3	Count	4	2	3	9
		% within Size of facility	14.8%	18.2%	8.8%	12.5%
	Stage 4	Count	2	4	1	7
		% within Size of facility	7.4%	36.4%	2.9%	9.7%
	Stage 5	Count	2	1	6	9
		% within Size of facility	7.4%	9.1%	17.6%	12.5%
	Stage 6	Count	2	1	7	10
		% within Size of facility	7.4%	9.1%	20.6%	13.9%
	Stage 7	Count	1	0	6	7
		% within Size of facility	3.7%	0.0%	17.6%	9.7%
Total		Count	27	11	34	72
		% within Size of facility	100.0%	100.0%	100.0%	100.0%

Note. Excludes one "Do not have an EMR" response and one missing/no response.

Table 18

Cross Tabulation of Current Stage of EMR Implementation by Impact on HIM Staffing Numbers Associated with EMR Implementation

			Impact on HIM Staffing Numbers			
			Staffing Needs Increased	Staffing Needs Decreased	No Change in Staffing Number Requirements	Total
Current Stage of EMR Implementation	Stage 0	Count	0	1	1	2
		% within the impact on HIM staffing	0.0%	2.3%	5.3%	2.8%
	Stage 1	Count	3	5	5	13
		% within the impact on HIM staffing	30.0%	11.6%	26.3%	18.1%
	Stage 2	Count	2	7	6	15
		% within the impact on HIM staffing	20.0%	16.3%	31.6%	20.8%
	Stage 3	Count	3	3	3	9
		% within the impact on HIM staffing	30.0%	7.0%	15.8%	12.5%
	Stage 4	Count	0	6	1	7
		% within the impact on HIM staffing	0.0%	14.0%	5.3%	9.7%
	Stage 5	Count	0	8	1	9
		% within the impact on HIM staffing	0.0%	18.6%	5.3%	12.5%
	Stage 6	Count	1	7	2	10
		% within the impact on HIM staffing	10.0%	16.3%	10.5%	13.9%
	Stage 7	Count	1	6	0	7
		% within the impact on HIM staffing	10.0%	14.0%	0.0%	9.7%
Total		Count	10	43	19	72
		% within the impact on HIM staffing	100.0%	100.0%	100.0%	100.0 %

Note. Excludes one "Do not have an EMR" response and one missing/no response.

Table 19

Cross Tabulation of Current Stage of EMR Implementation by Whether or Not Needed Skill/Functions for HIM Staff Changed Because of EMR Implementation

			Did the Needed Skill Levels/Functions for HIM Staff Change		
			Yes	No	Total
Current Stage of EMR Implementation	Stage 0	Count	1	1	2
		% within whether or not needed skill levels/functions changed	1.7%	7.1%	2.8%
	Stage 1	Count	9	4	13
		% within whether or not needed skill levels/functions changed	15.5%	28.6%	18.1%
	Stage 2	Count	13	2	15
		% within whether or not needed skill levels/functions changed	22.4%	14.3%	20.8%
	Stage 3	Count	7	2	9
		% within whether or not needed skill levels/functions changed	12.1%	14.3%	12.5%
	Stage 4	Count	6	1	7
		% within whether or not needed skill levels/functions changed	10.3%	7.1%	9.7%
	Stage 5	Count	7	2	9
		% within whether or not needed skill levels/functions changed	12.1%	14.3%	12.5%
	Stage 6	Count	9	1	10
		% within whether or not needed skill levels/functions changed	15.5%	7.1%	13.9%
	Stage 7	Count	6	1	7
		% within whether or not needed skill levels/functions changed	10.3%	7.1%	9.7%
Total		Count	58	14	72
		% within whether or not needed skill levels/functions changed	100.0%	100.0%	100.0%

Note. Excludes one "Do not have an EMR" response and one missing/no response

Table 20

Cross Tabulation of When Hospital Implemented an EMR by Size of Facility

			Size of Facility			
			100 or less beds	101 to 200 beds	201 or more beds	Total
When did hospital implement an EMR?	Within the past 12 months	Count	2	1	3	6
		% within Size of Facility	8.0%	10.0%	8.6%	8.6%
	1 - 3 years ago	Count	14	3	5	22
		% within Size of Facility	56.0%	30.0%	14.3%	31.4%
	4 - 6 years ago	Count	6	5	7	18
		% within Size of Facility	24.0%	50.0%	20.0%	25.7%
	Over 6 years ago	Count	3	1	20	24
		% within Size of Facility	12.0%	10.0%	57.1%	34.3%
Total		Count	25	10	35	70
		% within Size of Facility	100.0%	100.0%	100.0%	100.0%

Note. Excludes four "Do not have an EMR" responses.

Table 21

Cross Tabulation of Decrease in HIM FTEs by Size of Facility

			Size of Facility			
			100 or less beds	101 to 200 beds	201 or more beds	Total
If staffing decreased because of EMR implementation, how many FTEs were decreased?	Decrease of 1 – 5 FTEs	Count	10	3	13	26
		% within Size of Facility	37.0%	25.0%	38.2%	35.6%
	Decrease of 6 - 10 FTEs	Count	0	1	13	14
		% within Size of Facility	0.0%	8.3%	38.2%	19.2%
	Decrease of 11 - 15 FTEs	Count	0	1	0	1
		% within Size of Facility	0.0%	8.3%	0.0%	1.4%
	Decrease of 16 or more FTEs	Count	2	1	3	6
		% within Size of Facility	7.4%	8.3%	8.8%	8.2%
	No decrease in FTEs	Count	15	6	5	26
		% within Size of Facility	55.6%	50.0%	14.7%	35.6%
Total		Count	27	12	34	73
		% within Size of Facility	100.0%	100.0%	100.0%	100.0%

Note. Excludes one missing/no response

Results of Chi-Square Tests of Association between Pairs of Variables

Table 22

Summary of Results of Chi-Square Tests of Association between Facility Bed Size/HIMSS Stage of EMR Implementation/Years Since Hospital Implemented EMR and Each of the Variables in Column One

	P Value from Chi-Square Test		
Variable and Variable Values Used	Facility Bed Size[a]	Stage of EMR Implementation[b]	Years Since Hosp. Implemented EMR[c]
Facility Bed Size: 1. less than or equal 200 beds 2. 201 or more beds	Not Applicable	0.021*	0.000*
Years Since Hospital Implemented EMR: 1. 3 or less years 2. 4 to 6 years 3. 6 or more years	0.000*	0.001*	Not Applicable
Stage of EMR Implementation: 1. HIMSS Stage 0 to 2 2. HIMSS Stage 3 to 5 3. HIMSS Stage 6 to 7	0.021*	Not Applicable	0.001*
Impact on HIM Staffing Associated with EMR: 1. No. of staffing needed decreased 2. No. of staffing needed increased 3. No change in required no. of staff	0.008*	0.159	0.124
In Question 11 of the Survey, No. of the Available Choices for Additional Skills/ Functions Needed in HIM That Were Selected: 1. 0 to 3 choices selected 2. 4 to 5 choices selected 3. 6 to 7 choices selected	0.425	0.035*	0.001*
Question 11 - Responses to the Individual Choices for Additional Skills/Function Needed (available responses for each choice were "checked" or "unchecked"):			
1. Document Imagining (Scanning)	0.994	0.319	0.146
2. Uploading Scanned Documents into the EMR	0.716	0.284	0.310
3. Become "Subject Matter Experts" for EMR functionality	0.061	0.051	0.039*
4. Work away opportunities for some functions	0.118	0.033*	0.055
5. Developing Policies/Procedures/Protocols Pertaining to EMR	0.148	0.039*	0.009*
6. Change in Release of Information Formats	0.173	0.029*	0.000*
7. Increased Monitoring of EMR for Completeness and Timeliness of Documentation	0.810	0.243	0.005*
In Question 12 of the Survey, No. of the Available Choices for HIM Changes That Were Selected: 1. 0 to 2 choices selected 2. 3 to 4 choices selected 3. 5 to 6 choices selected	0.004*	0.017*	0.043*
Question 12 - Responses to the Individual Choices for HIM Changes (available responses for each choice were "checked" or "unchecked")			
1. Reduction in Paper Supplies for Manual Patient Chart Creation	0.057	0.056	0.494
2. Reduction/Elimination of Microfiche Costs	0.002*	0.008*	0.015*
3. Reduction in Storage Costs for Paper Files	0.413*	0.019*	0.878
4. Reduction in Amount/Time of Loose Filing	0.008*	0.021*	0.023*
5. Reduction in Delinquent Charts	0.012*	0.092	0.049*
6. Reduction/Elimination in No. of Charts Retrieved from Files	0.051	0.019*	0.054

[a]Facility Bed Size: less than or equal 200 beds and 201 or more beds.

[b]Stage of EMR Implementation: HIMSS Stage 0 to 2, HIMSS Stage 3 to 5, and HIMSS Stage 6 to 7.

[c]Years Since Hosp. Implemented EMR: 3 or less years, 4 to 6 years, and 6 or more years.

*p <0.05. Null hypothesis of no association between the two variables is rejected.

Chapter 5

Analysis and Discussion

Eighty-five percent (85%) of the respondents were from acute care hospitals; only 11 were from the other three categories and none of these categories had more than 5 hospitals (Table 1).

Forty-seven percent (47%) of the hospitals represented had 201 or more beds, 37% had 100 or less beds and 16% had 101 to 200 beds (Table 2).

Eighty-one percent (81%) of the hospitals had a part-electronic and part-paper medical record and the other 19% had a totally electronic (paperless) medical record system (Table 3).

Thirty-eight percent (38%) of the hospitals implemented their EMR within the past three years, 24% implemented four (4) to 6 years ago and 33% over 6 years ago; five percent (5%) of the respondents indicated that their hospitals had no EMR (Table 4).

Fifty-three percent (53%) of the respondents reported that their hospitals were at Stage 3 or below on HIMSS' eight stages of EMR adoption/implementation, 35% reported that they were at Stage 4, 5 or 6 and nine percent (9%) reported that they were at Stage 7 (the most advanced stage); one response was “Do not have an EMR” and there was one missing/no response (Table 5).

Eighty-five percent (85%) of the respondents felt that EMR implementation has impacted the staffing of the HIM Department (Table 6).

Fifty-nine percent (59%) of the respondents indicated that the number of needed HIM Dept. staff decreased, 14% indicated that the number of needed staff increased and 27% responded that there was no change in the number of staff needed (Table 7).

Only 11 (or 15%) of the 74 respondents reported an increase in FTEs for HIM and the response of 10 of these 11 respondents was an increase of 1-5 FTEs; 61 (or 82%) of the respondents checked "No increase in FTEs"; there were two missing/no responses (Table 8).

Thirty-five percent (35%) of the respondents reported a decrease of 1-5 FTEs for HIM, 19% reported a decrease of 6-10 FTEs, 8% reported a decrease of 16 or more FTEs and one reported a decrease of 11-15 FTEs; 35% reported no decrease and there was one missing/no response (Table 9).

Eighty percent (80%) of the respondents said that the needed skill levels/functions for HIM staff changed because of EMR implementation (Table 10).

In survey question 11, five (5) of the available choices for additional skills/functions needed were selected by more than 60 percent of the respondents; the most selected choice was "Change in Release of Information formats" (selected by 76%), followed closely by "Document imaging (scanning)" (selected by 74%) and "Increased monitoring of EMR for completeness and timeliness of documentation" (selected by 73%); the least selected choice was "Work away opportunities for some functions (i.e. coding, auditing)" (selected by 36%); 12% of the respondents reported "No identified change in skill levels or functions because of the EMR" (Table 11).

In survey question 12, three (3) of the available choices for changes in the HIM dept. (since EMR) were selected by more than 60 percent of the respondents; the most selected choice was "Reduction in amount/time of loose filing" (selected by 74%), followed by "Reduction/elimination in number of charts retrieved from files" (selected by 69%) and "Reduction in storage costs for paper files" (selected by 61%); the least selected choice was

"Reduction in delinquent charts" (selected by 42%); 11% of the respondents reported "No changes" (Table 12).

Questions 11 and 12 were multiple-response questions in which the respondent was to select all of the choices that were applicable to his/her situation. Tables 11 and 12 presented the number and percentage of respondents who selected each available choice. Another way to examine the responses to questions 11 and 12 is to look at data on the count (number) of the different available choices that each respondent selected. These data are summarized in Tables 13 and 14. In survey question 11, there were eight choices (including the "None" choice) and in Table 13 we see that seventy-seven percent (77%) of the respondents selected 4 or more of the available choices and 23% selected 3 or fewer of the choices. The mean (average) number of choices selected by respondents was 4.42 and the median was 5.00. In survey question 12, there were seven choices (including the "None" choice) and in Table 14 we see that seventy-four percent (74%) of the respondents selected 3 or more of the available choices and 26% selected 2 or fewer of the choices. The mean (average) number of choices selected by respondents was 3.55 and the median was 4.00.

Comparison of Stage of EMR Implementation for Respondents' Hospitals with National Data

Table 15 shows the percentages of the hospitals represented by the respondents that were reported to be in each of the HIMSS eight stages of EMR adoption/implementation compared with HIMSS' summary data for 5,449 U.S. hospitals in its database as of the first quarter of 2014 (Figure 5). The total percentage of the survey respondents' hospitals in the first four stages (Stage 0-3) was higher than the U.S. hospitals in the HIMSS database (54.2% versus 43.7%), while the total percentage was lower in the more advanced four stages (Stage 4-7) (45.8% versus

56.3%), although the respondents' hospitals had slightly higher percentages in the top two advanced stages (Stages 6 & 7).

Table 19 shows a cross tabulation of the stage of EMR implementation by whether or not needed skill/functions for HIM staff changed because of EMR implementation. Needed skill level changes were indicated by 80.5% of the survey respondents. Combining the EMR stage data in the cross tabulation table into 2 groups (stages 0-3 and stages 4-7) showed that there was little difference in the numbers of yes and no answers to question 11 – "What were the skill levels/functions that were needed in your HIMD because of the implementation of EMR?". Stages 0-3 show the Yes responses as 30 (41.7%) and Stages 4-7 show the Yes responses as 28 (38.9%).

Cross tabulations of Various Pairs of Survey Questions/Variables

Table 16 through 21 displays the relationship between various pairs of the survey questions/variables. In Table 16, the types of medical facilities represented by the survey respondents are shown by bed size. About half of the acute care facilities had 200 or less, with the other half having more than 200 beds. The largest number of facilities (35) was in the 201 or more bed category; the smallest number (12) was in the 101 to 200 bed category. There were a total of only 11 non-acute care facilities; eight of them had 200 or less beds and three had more than 200 beds.

The counts and percentages of facilities at the eight HIMSS stages of EMR implementation by size of facility are presented in Table 17. Looking at the column percentages, the larger the hospital the higher percent at the four more advanced stages (Stage 4 to 7). Fifty-nine percent (59%) of the facilities with 201 or more beds were at Stages 4-7, 55% of the 101 to 200 bed facilities were at these stages, but only 26% of the 100 or less bed facilities were here.

This compares favorably with the literature review stating that larger facilities started earlier than smaller facilities in their EMR adoption process and logically would be farther along in the process and thus in the higher stages.

From Table 18, we can see that 43 respondents reported that the number of needed HIM staff decreased and that 63% of these respondents were from facilities at Stages 4-7 of EMR implementation (more advanced stages). Conversely, ten (10) respondents reported the number of needed HIM staff increased and eight (8) of these were from hospitals at Stage 0-3 (less advanced stages). There were 19 respondents who reported no change in the required number of HIM staff and 79% of these were from facilities at Stages 0-3.

In response to the question as to whether the needed skill/function levels of HIM staff have changed because of EMR implementation, the results were evenly spread with 52% of the respondents from facilities at Stage 0-3 responded affirmatively and 48% of respondents from facilities at Stage 4-7 responded similarly (Table 19).

From the data in Table 20, there seems to be a clear association between the size of a facility and when the facility implemented an EMR. Seventy-seven percent (77%) of the facilities with 201 or more beds implemented their EMR four or more years ago, whereas only 36% of the 100 or less bed facilities implemented their EMR four or more years ago; the percent was 60% for facilities with 101 to 200 beds.

A cross tabulation table of the decrease in HIM staff (FTEs) by facility size is shown in Table 21. There isn't much difference by hospital size in the percentage of respondents who reported decreases of one to five FTEs. Generally, a greater percentage of the larger hospitals reported decreases of six or more FTEs.

The Pearson Chi-Square test was used to determine whether there is a statistical association/relationship between pairs of selected survey variables at the 0.05 level of significance. The test was accessed through the SPSS Crosstab menu. Using the original variable values/categories, most of the chi-square tests produced results that indicated a high percentage (usually well above 20%) of the variable categories (crosstab cells) with expected frequencies of less than 5. According to information in SPSS, in using the chi-square test, the expected frequencies for each category should be at least 1 and no more than 20% of the categories should have expected frequencies of less than 5. Thus, most of the tests on the original variable values/categories did not meet the last SPSS assumption/requirement. The likely reasons for this are: (a) there was a small number of responses for some categories of data (for example, a total of only 11 respondents in the three non-acute care facility types, a total of only 12 respondents in the 101-200 facility bed size, etc.), (b) five of the survey questions had more than three choices/categories (excluding the multiple-response questions 11 and 12), and (c) the eight stages/categories of EMR implementation creates a lot of cells for just 74 responses.

One way to try and address the issue described in the above paragraph (chi-square tests with more than 20% of categories having expected frequencies of less than 5) is to logically group (SPSS recode) some of the categories together within a variable (thereby reducing the number of variable categories) and then reanalyze with SPSS Crosstab and Chi-Square Test. Through trial and error, it was discovered that, for the survey variable categories and the 74 total survey responses, crosstabs of greater than three by three usually produced chi-square results that exceeded the 20%. Category groupings that were made to facilitate more reliable chi-square results included: the three bed size categories were grouped into two bed size categories (200 or less beds and 201 or more beds); the eight stages/categories of EMR implementation were

grouped into three categories (Stage 0-2, Stage 3-5 and Stage 6-8), and the five categories of when facility implemented an EMR were grouped into three categories (3 or less years ago, 4 - 6 years ago and 6 or more years ago).

After grouping some variable categories as described in the above paragraph, the chi-square test was used to determine whether there is an association/relationship between facility bed size and selected other variables, between stage of EMR implementation and the same selected other variables, and between years since the facility implemented an EMR and the same other selected variables. All of the results met the less than 20% threshold discussed previously and are summarized in Table 22. In each case, the null hypothesis was that there is no association between the pair of variables being tested and the alternate hypothesis was that there is an association. At the 0.05 level of significance, a number of the variables were found statistically to be associated with each other, including: years since facility EMR was implemented and facility bed size, stage of EMR implementation and facility bed size, stage of EMR implementation and years since facility implemented EMR, stage of EMR implementation and the number of the available choices selected in Question 11 for additional skills/functions needed in HIM, and years since facility EMR was implemented and the number of the available choices selected in Question 11 for additional skills/functions needed in HIM. Each of the three (facility size, stage of EMR and years since EMR implemented) was associated with reduction/elimination of microfiche costs, reduction in the amount/time of loose filing, and the number of the available choices selected in Question 12 for HIM changes.

Limitations

There are important limitations of the study to be considered.

- The literature review revealed a limited number of peer reviewed articles addressing the research topic, "The impact of the EMR on hospital HIM departments". The scarcity of information does not allow for a broad comparison of the Georgia/Tennessee survey data with other studies.
- The survey conducted for this study was not nationwide but confined to two contiguous states (Georgia and Tennessee). A nationwide survey would have yielded a larger sample of responses.
- Individual members of GHIMA and THIMA were surveyed not individual hospitals. Therefore, potentially the data may contain more than one response per facility. However, the participants' responses are possibly influenced by their job level within the organization and their own perceptions of the changes in HIM.
- The increase or decrease of HIM staffing and implementation of the EMR does not necessarily have a direct cause and effect relationship. There may be other factors that contributed to HIM staffing number changes. The facility may have upsized or downsized services offered by the facility. For example, during EMR implementation a facility may have opened an oncology center that required more HIM support or a facility may have closed a skilled nursing unit that decreased the need for HIM services. In these situations, it is difficult to ferret out how many FTES were actually impacted by the EMR.
- There were some inconsistencies among the survey responses. In Table 4, four survey participants indicated there was not an EMR at their facility but in Table 5, only one

responded that their facility did not have an EMR. In Table 7, ten respondents indicated an increase in staffing but Table 8 shows 11 responses of increase in FTEs. Also, in Table 7, 44 respondents indicated a decrease in HIM staffing, but Table 9 shows 47 responses indicating a decrease in HIM staffing.

- Different hospitals are in different stages of EMR implementation which does not allow for generalized conclusions about the EMR's impact on HIM staff. The survey data provides a snapshot of the HIM staff and needed skill levels. Additionally, because the electronic medical record is still a relatively new concept in the hospital setting, not enough time has passed to realize the long term effects on HIM departments.
- Survey data may be influenced by feelings of fear in the HIM staff because of the threat of losing their jobs due to increased technology or outsourcing of HIM functions.
- The survey response rate was low (2.2%) from a combined Georgia and Tennessee HIM professionals population of 3309.

Chapter 6

Conclusion and Recommendations

Summary of findings

An indication of the wide scope of new skill levels needed is evidenced in the survey by the low number of responses to "No identified change in skill levels or functions because of the EMR". Only 14% of the respondents chose this answer. Therefore, 86% of the respondents indicated new skills were needed in the new EMR environment. Surprisingly, the survey's least selected skill level was "Work away opportunities for some functions (i.e. coding, auditing)". The higher amount of information available electronically (via the EMR) lends itself to remote job opportunities. Other factors that may influence the reason as to why this change is lower than anticipated per the literature review is (a) individual hospital's human resources policies and (b) health information technology security issues.

The majority of the HIM changes noted in the survey were reduction in filing, reduction/elimination of records retrieved from the file area and reduction in storage costs. These are all directly related to the paper record. With the change of the medical record format from paper to electronic, these functions are either no longer needed (in the case of a totally electronic record (19% of survey responses) or are drastically reduced in facilities with a hybrid record (81% of survey responses).

The Georgia/Tennessee survey's lowest indicated change noted was a reduction of delinquent records (42%). This is in contrast to the Davies Award 2013 recipient, Children's Medical Center Dallas who experienced a large drop in delinquent records (21% to 1% after 12 months on their EMR system). However, this cannot be viewed as a direct one to one

comparison; Children's is one hospital system in one state and the survey included many different healthcare facilities over a broader geographical area.

Conclusions

As cited earlier, the two research questions for this study are:

- Does the implementation of a facilities' electronic medical/health record impact the number of HIM staff required to maintain business operations of the HIM Department?
- Does the implementation of a facilities' electronic medical/health record impact the required skill level of HIM staff required to maintain business operations of the HIM Department?

The Georgia/Tennessee EMR Impact survey provided enough data to answer the two research questions in the affirmative.

The results of this survey clearly indicate that healthcare facilities are moving forward with electronic medical records and HIM departments are changing with the movement. The survey findings are consistent with the anticipated changes found in the literature review. For example, in 2010, AHIMA published a practice brief that described anticipated changes that would transform traditional HIM departments into an e-HIM Department. The Georgia/Tennessee survey data supports many of the changes named in the practice brief. New skills of scanning and uploading documents were listed in the practice brief and also were new skills frequently chosen by the survey respondents (Table 11).

A statistically significant association/relationship was found between the variables of (a) years since facility EMR was implemented and facility bed size, b) stage of EMR implementation and facility bed size, and (c) stage of EMR implementation and years since facility implemented EMR. Of particular interest is (a) the association of the stage of EMR

implementation and the number additional skills/functions needed in HIM, and (b) the number of years since facility EMR was implemented and the number for additional skills/functions needed in HIM. These associations imply that as a healthcare facility progress through the HIMSS stages and the longer an EMR is in place the more additional skills HIM staff need to acquire. Each of the three (facility size, stage of EMR and years since EMR implemented) variables demonstrated statistical association with the following changes from Question 12: (a) reduction/elimination of microfiche costs and (b) reduction in the amount/time of loose filing.

Implications of the Study

HIM professionals will benefit from this study by having a clearer picture of the actual impact the EMR has had on HIM staff in terms of numbers and skill levels. The study results provide valuable information that will enable HIM professionals to develop valid strategic plans for their departments and hospitals. Specifically, this information can be used to develop training modules to enhance HIM skill levels, forecast changes in departmental budgets and plan for potential reductions in force within a HIM department.

Recommendations

The survey conducted in Georgia and Tennessee gathered data on the total FTEs increased or decreased based on the facilities current stage of EMR adoption. But the data does not indicate which stage the change in FTEs occurred. For example, a facility is currently in stage six and answered the survey with a decrease of 11-15 FTEs. The data does not indicate at what stage the decrease occurred. The decrease could have been spread evenly over the six stages or could have happened mostly in the earlier stages. A subsequent survey could revise the question so as to capture the number of FTEs lost as they happened in each stage of implementation.

The most important recommendation to be drawn from the Georgia/Tennessee survey is, first, to consider it a baseline from which to measure progress through subsequent surveys; and second, to recognize the wealth of information contained therein. This survey touched on key EMR related factors but is unique in its focus on actual changes for HIM staff rather than speculation of HIM changes.

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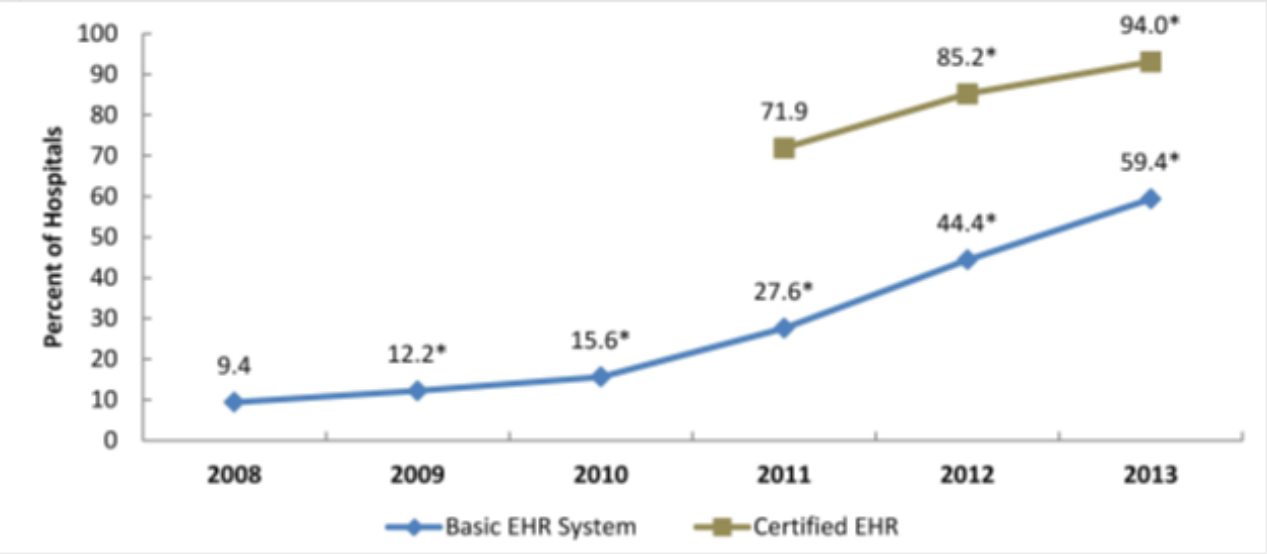
Appendix

Figure 1

Percent of non-federal acute care hospitals with adoption of at least a Basic EHR system and possession of a certified EHR: 2008-2013



NOTES: Basic EHR adoption requires the EHR system to have a set of defined EHR functions. A certified EHR is EHR technology that has been certified as meeting federal requirements for some or all of the hospital objectives of the CMS EHR Incentive Program. Possession means that the hospital has a legal agreement with the EHR vendor, but is not equivalent to adoption.
*Significantly different from previous year ($p < 0.05$).
SOURCE: ONC/American Hospital Association (AHA), AHA Annual Survey Information Technology Supplement

Figure 2

HIMSS EMR Adoption Model Stage Description

0	Some clinical automation may exist. • Laboratory and/or pharmacy and/or radiology not installed.
1	• All three major ancillaries (laboratory, pharmacy and radiology) installed.
2	Major ancillary clinical systems feed data to clinical data repository (CDR) that provides physician access for retrieving and reviewing results. CDR contains a controlled medical vocabulary (CMV) and the clinical decision support system and rules engine for rudimentary conflict checking. • *Optional for extra points* - Information from document imaging systems may be linked to the CDR.
3	Clinical documentation installed (e.g. vital signs, flow sheets, nursing notes, care plan charting, and/or the electronic medication administration record (eMAR) system are scored with extra points and are implemented and integrated with the CDR for at least one service in the hospital. First level of clinician decision support is implemented to conduct error checking with order entry (i.e. drug/drug, drug/food, drug/lab, conflict checking normally found in the pharmacy). Some level of medical image access from picture archive and communication systems (PACS) is available for access by physicians via the organization's intranet or other secure networks.
4	Computerized practitioner/physician order entry (CPOE) for use by any clinician added to nursing and CDR environment. Second-level of clinical decision support related to evidence-based medicine protocols implemented. • If one patient service area has implemented CPOE and completed previous stages, this stage has been achieved.
5	• The closed loop medication administration environment is fully implemented in at least one patient care service area. The eMAR and bar coding or other auto-identification technology, such as radio frequency identification (RFID), are implemented and integrated with CPOE and pharmacy to maximize point-of-care patient safety processes for medication administration.
6	Full physician documentation/charting (structured templates) are implemented for at least one patient care service area. A full complement of radiology PACS systems is implemented (i.e. all images, both digital and film-based, are available to physicians via an intranet or other secure network.
7	• Clinical information can be readily shared via electronic transactions or exchange of electronic records with all entities within a regional health network (i.e., other hospitals, ambulatory clinics, sub-acute environments, employers, payers and patients).

Figure 3

Survey Questionnaire: EMR Impact on HIM Survey

1. Medical Facility Primary Type
___ Acute Care
___ LTAC/Skilled Care
___ Psychiatric (Long term and/or short term)
___ Other

2. Size of health care facility
___ 100 or less beds
___ 101 to 200 beds
___ 201 or more beds

3. Medical Record type
___ Totally electronic (paperless)
___ Hybrid (part electronic and part paper)
___ All paper

4. When did your hospital implement an electronic medical record?

___ Within the past 12 months
___ 1 – 3 years ago
___ 4 – 6 years ago
___ Over 6 years ago
___ Do not have an EMR

5. Based on the HIMSS EMR Adoption Model, at what stage of EHR implementation is your facility presently?
___ Stage 0
___ Stage 1
___ Stage 2
___ Stage 3
___ Stage 4
___ Stage 5
___ Stage 6
___ Stage 7

6. Do you feel EMR implementation has impacted the staffing of your department?
___ Yes
___ No

7. What was the impact on staffing numbers, associated with implementation of the EMR, in the Health Information Department?
___ Staffing needs increased
___ Staffing needs decreased
___ No change in staffing requirements

8. If staffing increased, how many FTEs were required to meet need?
____ 1-5 FTEs ___6-10 FTEs ___11-15 FTEs ___16 or more FTEs
____ No increase in FTEs

9. If staffing decreased, how many FTEs were eliminated?
____ 1-5 FTEs ___6-10 FTEs ___11-15 FTEs ___16 or more FTEs
____ No decrease in FTEs

10. Did the needed skill levels/functions for HIM staff change?
__ Yes
__ No

11. What were the skill levels/functions that were needed in your HIMD because of the implementation of EMR? Check all that apply

___ Document imaging (scanning)
___ Uploading scanned documents into the EMR
___ Become "Subject matter experts" for EMR functionality
___ Work away opportunities for some functions (i.e. coding, auditing)
___ Developing policies/procedures/protocols pertaining to the EMR
___ Change in Release of Information formats (paper, electronic, combination)
___ Increased monitoring of EMR for completeness and timeliness of documentation.
___ No identified change in skill levels or functions because of the EMR

12. Have you seen any of the following changes in the HIM Department since implementation of the EMR? Check all that apply

___Reduction in paper supplies for manual patient chart creation
___Reduction/elimination of microfiche costs
___Reduction in storage costs for paper files
___Reduction in amount/time of loose filing
___Reduction in delinquent medical records
___Reduction/elimination in number of charts retrieved from files
___No changes

Figure 4

Cover Letter: EMR Impact on HIM Department Survey

My name is Betsy Bradley, RHIA, CCS and I am a Masters' degree candidate in Health Informatics and Information (HIIM) at the University of Tennessee Health Science Center (UTHSC). I am completing my thesis and need your help.

My thesis topic is EMR's impact on HIM departments in hospitals. Below is a link to a survey about changes or no-changes occurring in inpatient HIM departments. The survey is short, confidential and anonymous. One question refers to the EMR stages. Please refer to the table below for definitions.

Please note that this survey has been reviewed and approved by the president of GHIMA, Ralph Morrison and by the director of the HIIM program at UTHSC, Dr. Rebecca Reynolds.

If you would be so kind as to complete and submit the survey by (date), I would be very appreciative. It should only take a few minutes.

If you have questions, my e-mail address is betsywbradley@gmail.com.

The link to the survey is http://j.mp/PS0B67

Thank you.

Figure 5

HIMSS' US EMR Adoption Model; 2014 Quarter 1

US EMR Adoption Model℠			
Stage	**Cumulative Capabilities**	**2013 Final**	**2014 Q1**
Stage 7	Complete EMR; CCD transactions to share data; Data warehousing; Data continuity with ED, ambulatory, OP	**2.9%**	**3.1%**
Stage 6	Physician documentation (structured templates), full CDSS (variance & compliance), full R-PACS	**12.5%**	**13.3%**
Stage 5	Closed loop medication administration	**22.0%**	**24.2%**
Stage 4	CPOE, Clinical Decision Support (clinical protocols)	**15.5%**	**15.7%**
Stage 3	Nursing/clinical documentation (flow sheets), CDSS (error checking), PACS available outside Radiology	**30.3%**	**27.7%**
Stage 2	CDR, Controlled Medical Vocabulary, CDS, may have Document Imaging; HIE capable	**7.6%**	**7.2%**
Stage 1	Ancillaries - Lab, Rad, Pharmacy - All Installed	**3.3%**	**3.2%**
Stage 0	All Three Ancillaries Not Installed	**5.8%**	**5.6%**
Data from HIMSS Analytics™ Database © 2014		N = 5,458	N = 5,449