The impact of multiple master patient index records on the business performance of health care organizations

Cynthia L. Banton
University of Phoenix

David L. Filer
University of Phoenix

ABSTRACT

The purpose of this qualitative grounded theory study was to examine the factors that led to the creation of multiple patient record entries, and present a theory on the impact the problem has on the business performance of health care organizations. A sample of 59 health care professionals across the United States participated in an online survey allowing them to share their experience and perspective on the problem. The health care professionals served in various job roles and used the electronic medical record system to perform their daily tasks. The data gathered provided insight into the processes used to discover, manage, and resolve multiple record entries. The research produced three key findings: 1) merging and deleting multiple entries are the most critical challenge, 2) multiple entries are discovered downstream in the records management process rather than upfront when records are created, and 3) resolution of the problem is viewed as a joint responsibility between the health information services and information technology teams. Two main conclusions were drawn from the study; first, the admissions process within health care organizations needs to be reviewed and reengineered; second, a massive cleanup of the electronic medical record system data is necessary to restore the quality and integrity of master patient index records. The recommendations offered in the study presented leaders with best practices and process improvement options to develop a comprehensive, strategic plan of action to address the problem.

Keywords: Master Patient Index Records (MPI), Electronic Health Records (EHR), Health Information Technology, Health Data, Duplicate Records

INTRODUCTION

Health information technologies enable the exchange of patient data throughout health care organizations. According to Jha, Doolan, Grandt, Scott, and Bates (2008), "Health information technology (HIT) in general and electronic health records (EHRs) in particular are increasingly viewed as tools for improving the quality, safety and efficiency of health systems" (p. 848). Electronic medical record systems aid physicians in the decision-making process to determine a course of treatment and care. Electronic medical records offer numerous benefits such as "a computerized medical history, elimination of duplicate test and procedures, better access to patient histories for emergency use, elimination of reentry of historical data, and greater accuracy" (Bell & Sethi, 2001, p. 83). The cornerstone of the electronic medical record system is the master patient index record (MPI). The MPI is part of an integrated information exchange delivery system that tracks patient information and activity across the entire health care organization and various care settings (American Health Information Management Association [AHIMA], 1998).

Health care organizations gain significant value and benefits from the use of MPI records, but potential for errors exists, and the implications of errors are far-reaching throughout the organization. Wheatley (2008) asserted, "The master patient index (MPI) is HIM [Health Information Management] service's lifeline to ensuring quality care in a health care organization. If MPI data are compromised, HIM's contributions to many health care functions are slowed down or brought to a halt" (p. 78). Errors in the master patient index can impact an organization's business performance and inhibit its ability to expand externally the interoperability of the MPI record.

The problem of multiple MPI record entries created for one patient is a growing concern in health care organizations across the country. Findings from a study conducted by Fernandes (2008) on the accuracy of electronic medical records indicated the scope of this problem to be slightly less than 9% for hospitals with less than 1 million records and 10% for hospitals with 1 million or more records. This finding means that approximately one of every 20 patients who visit a hospital facility will have more than one MPI record entry linked to them (Park, Murray, & Delaney, 2006). For this reason, the problem warrants further exploration and examination into the root causes of multiple MPI record entries and the impact of the problem on the organization's business performance.

PROBLEM STATEMENT

The general problem investigated in this study was errors in MPI records. Errors in health care records cost hospitals more than $40 million annually (Bates et al., 1998). Errors have a direct impact on patient care. As many as 50% of hospitalized patients may be affected by medical errors; the human and monetary costs of these events are great (West, Tan, Habermann, Sloan, & Shanafelt, 2009). The seriousness of the problem permeates the health care industry as health care providers implement highly complex, integrative technology solutions to manage health information.

The accuracy of electronic medical records ranges between 30 and 100% (Dixon, McGowan, & Grannis, 2011). A study conducted by researchers at the IOM indicated that between 44,000 to 98,000 Americans die of medical errors in U.S. hospitals annually (Kohn et al., 2000). Causes cited for medical errors include factors such as system errors, medication

administration errors, and unnecessary surgeries. The Department of Health and Human Services Semiannual Report to Congress (HHS, 2010a) indicated $3.4 billion in expected recoveries from regulatory fines for various health care compliance violations. The average malpractice litigation settles at $521,560 (Studdert et al., 2006).

The specific problem is the impact of multiple MPI record entries for one patient on the business performance of health care organization in terms of costs, resources, time, and operational risk. Positive identification of a patient at the time of admittance is the most important step in the MPI record linking process (Williams et al., 2006). Multiple record entries create confusion among health care professionals about a patient's true identity upon admission to the health care facility.

RESEARCH QUESTIONS

The central research question for this study was as follows: What factors contribute to the creation of multiple MPI record entries for one patient? The question is investigative and was designed to obtain information about the possible root causes of multiple MPI records. Exploration and examination of the possible root causes provided direct insight into how and why the problem exists. Information obtained from this question validated the existence of the problem and highlighted the activities that contributed to the problem.

To support the central question, five sub-questions aligned with and complemented each other in a logical manner that ensured appropriate and relevant data collection:

1.How are multiple records generally discovered?
2. What is the volume of multiple MPI record entries detected monthly?
3. What is the process for resolving multiple MPI record entries?
4. What resources are required to resolve a typical multiple MPI record entry?
5. What business units are impacted by the problem?

GROUNDED THEORY DESIGN

The design method selected for this study was grounded theory design, a systematic research procedure used to generate a theory that explains a process, action, or interaction about a research problem (Creswell, 2005). The systematic design in grounded theory requires the use of data coding and analysis processes to generate a visual representation of the proposed theory.

The grounded theory design includes building a theory to explain a situation or phenomenon for which existing theories are inadequate. The theory is developed from raw data with a general theory or theories guiding the initial pattern analysis (Glaser & Strauss, 1967).

Population

The population chosen for this study was health care professionals working in health care organizations across the United States. Individuals in the targeted population worked in various job roles across their organization. Job roles ranged from admissions staff to billing specialist.

This population represented a good cross-sectional mix of job roles within organizations that use, manage, and maintain a Master Patient Index (MPI) record data contained in the electronic medical record system. They also used output information from the system to perform their jobs. This population provided valuable information about the end-to-end process of

electronic medical records use, MPI record management, and data errors to assist in theory generation. The health care professionals selected for the study worked for organizations that adopt and use innovative technologies solutions to manage business operations.

Data Collection

The survey instrument was comprised of a mix of eight open-ended and closed-ended (multiple-choice) questions. This mixed-question format was used to enhance the quality of the data and information received from participants.

Multiple-choice questions supplemented open-ended questions to further refine and clarify the responses. The participants were required to respond to each question to complete the survey. The first three questions of the survey were qualifying questions designed to gather professional demographic information about the participants. .

Next, one-on-one interviews were conducted as follow-up to the survey administration and consisted of open-ended questions. The purpose was to corroborate and expand the understanding of the data collected in the survey. The rationale supporting the dual approach was to establish a firm understanding of the data as themes and theories were formulated, accepted, or dismissed. The follow-up questions were designed as probing questions to elicit pertinent information that enabled further development and refinement of emerging theories.

A pilot test of the survey instrument was first conducted to ensure the reliability of the instrument.

Data Analysis and Interpretation

Five themes emerged as results of the data analysis from seven categories established during data collection. The seven categories were established based on commonalities and patterns in the data that emerged from the topics presented in the survey instrument. The themes provided insight about the processes used in health care organizations to detect, resolve, and manage multiple MPI records. Further analysis of the five themes revealed a dominant concept that became the basis for theory development.

The five themes that emerged from the data categories were (a) existence of multiple MPI entries, (b) most critical challenge, (c) discovery, (d) resolution, and (e) magnitude and scope. The data categories were formed with an open coding approach that allowed classification of data by identifying commonalities and patterns. The data supporting the categories enabled the emergence of themes that provided the stimulus for the development of a grounded theory.

Primary Theme: Multiple MPI record entries impact the business performance of health care organizations

Theme 1: Existence of Multiple MPI Records

Data results indicated that 39 of 59 (66%) participants believed multiple records were a problem in their organizations

The analysis of the data in this theme suggests a strong gap in the perception among system users and system managers as to the existence of the problem. A high percentage (70%) of participants in system manager roles indicated the problem did not exist. In contrast, 90% of participants in system user roles indicated the problem exists.

Theme 2: Most Critical Challenge

Data results indicated 30 of 59 (50%) participants believed the process of merging and deleting nonessential records was the most critical challenge for their organizations.

A minor outlier occurred in the data between Themes 1 and 2. In Theme 1, 39 of 59 (66%) participants indicated their organization did not have a problem with multiple MPI record entries. In Theme 2, 30 of 59 (50%) participants indicated merging and deleting nonessential records were a critical challenge related to the problem of multiple entries. The response percentage increased 13% when participants were asked about the most critical challenge of the problem.

This outlier presents an interesting conflict in the data results. The conflict resulted when participants indicated that multiple MPI entries were not a problem, yet they also indicated merging or deleting multiple entries was a critical issue. The interpretation of these answers is that a critical issue exists for a nonexistent problem. An explanation for this outlier is that participants were not offered a response option to indicate no critical issues occurred. Eight participants commented on the omission of this response option in the survey.

Theme 3: Discovery

Data results for this theme were split evenly with 18 of 59 (30%) participants indicating they believed multiple record entries were discovered by admissions staff during the patient check-in process, and 18 of 59 (30%) participants indicating physicians, nurses, or other medical staff discovered multiple entries when performing treatment. Data in this theme suggested that multiple record entries are generally discovered by frontline, patient-facing health care professionals.

Theme 4: Resolution

The data in Theme 4 suggested organizations have a distinct reliance on the health information services and information technology teams to manage and maintain system data through a continual process of reconciliation and data cleanup. The data further indicated that multiple record entries are resolved reactively downstream in the records management process and at admissions where the record is created.

Theme 5: Magnitude and Scope

Data results from this theme provided minimal information other than 59 of 59 (100%) participants responded to the question, and responses varied greatly. Responses given on the estimated quantity of total MPI records contained in the EMR system ranged from 3 records to 1 million records. Responses given on the estimated quantity of MPI records resolved monthly ranged from 1 record to 10,000 records. Tables 1 and 2 show the breakdown of study participant responses.

Table 1

Participant Responses—Total Number of Records in the Organization's EMR System

Responses	Record Quantity	Response	Response

		Percentage	Count
Total number of records in your organization's electronic medical record system			
	1 - 10,000	35	21
	10,001 - 100,000	10	6
	100,001 - 300,000	5.5	3
	300,001 - 1,000,000	5.5	3
Respondent indicated he or she did not know the record quantity			
	N/A	44	26
Total			59

Table 2
Participant Responses—Total Number of Multiple Master Records Resolved Monthly

Responses	Record Quantity	Response Percentage	Response Count
Total number of "multiple" master record entries your organization resolves monthly			
	1 - 20	18.8	11
	21 - 50	8.4	5
	51 - 100	8.4	5
	101 – 1,000	3.4	2
	1,001 – 5,000	5.1	3
Respondent indicated he or she did not know the record quantity			
	N/A	55.9	33
Total			59

Data results from Theme 5 were inconclusive. The immense span of the response ranges was too broad to quantify or generate a reasonable theme or finding. Three assumptions were made as possible explanations for lack of substantial quantifiable data were rendered from the data. First, the majority of participants had minimal knowledge of quantity information; second, the number of participants who managed the system was too low to provide sufficient data; and third, the open-ended format of the survey question was not appropriate for capturing the required data.

In the follow-up interviews, one of the three assumptions was confirmed; the majority of participants had little to no knowledge of MPI record quantity information. All participants interviewed could not provide quantity data. Either they did not know the information or they declined to provide a number because they felt even their best guess would be wildly inaccurate.

Data saturation was achieved at approximately 75% of data collection. At this point in the collection phase, 44 surveys had been returned, and the data maintained consistency with the established commonalities and themes. No new categories or themes emerged during the remainder of the data collection process, but data continued to be collected to confirm the themes. Additional information received through the follow-up interviews with the participants supported triangulation of the data achieved upon conclusion of the data collection process and contributed to the reliability and validity of the findings.

CONCLUSION (THEORY GENERATION)

Data and information collected from the online surveys, follow-up interviews, coding procedures, and resulting themes were the basis from which the theories were derived. The culmination of the five themes revealed the following new theories:

1. Healthcare professionals have a general lack of awareness and perception of the scope and magnitude of the problem.
2. The quality and integrity of MPI record data is highly compromised.
3. The process used to discover and detect duplicate records and overlays is an informal, ad hoc process.
4. No formal process for MPI data management exists.
5. Healthcare organizations rely heavily on the logic algorithms of the EMR system to detect multiple records and overlays.
6. Health information management teams have been slow to address the problem in its entirety.
7. Healthcare organizations, specifically health information management teams, have no formal initiatives in place to address the problem.
8. The effort is viewed as massive and costly.

The theories outlined in this section represent the interrelations and predominant messages between the data and data categories. The theories represent the perspective of health care professionals on the problem. The core concept of the collective theories is the process of MPI data management and the need to improve the process. The core concept has a direct impact on the business performance of health care organizations, which is the primary theme of this research study.

Summary of the Findings

Several key findings were interpreted from the themes identified in this study. The first finding is participants' belief that multiple MPI record entries were not a problem in their organizations and also the belief that merging or deleting records was the organization's biggest challenge. System users had a limited view of the MPI record data on a holistic level. They worked mainly on the front-end of the MPI record process where they encountered a minimal number of multiple record entries daily. From the user's perspective, multiple record entries are not a problem because they believe the entries are a *necessary evil* of the EMR system, and they have adapted to it.

This finding is an anomaly when compared to the consensus of the findings presented in previous literature. Extensive research in previous literature suggested health care organizations have an 8 to 12% MPI duplication rate (Brooks & Wheatley, 2012; Wheatley, 2008). This finding is significant to leaders of health information management organizations for two reasons because (a) it clearly demonstrates a divide in the awareness and perception of the problem between system users and system managers in the organization and (b) it emphasizes the need for leaders to take the appropriate steps to track and monitor MPI record overlays and duplications more closely to determine the magnitude of the problem in their organizations.

The second key finding is the discovery and detection of duplicate entries and overlays happens during the admissions process or when physicians and nurses are preparing to treat a patient. The manner in which multiple record entries are discovered and detected suggested a downstream, reactive process of records management rather than upfront when MPI records are created. Upon discovery and detection of the multiple entries, resolution was viewed as a shared

responsibility between the information technology and health information management teams. The participants did not believe it was their job to resolve multiple entries.

The interpretation of this finding revealed multiple MPI record entries are both an administrative and operational problem that participants found to be a time-consuming, ongoing, reactive process. Industry experts in previous literature cited the administrative aspects of managing multiple MPI record entries as a significant problem for system users and patients. This finding is important to leaders in health information management because it provides insight into the issue users find most challenging. It also lends insight into how the problem impacts other areas of the organization.

The third key finding of the study was the participants 'lack of knowledge about the scope and magnitude of the problem in their organizations. Findings in this area of the study were inconclusive because the data collected from the survey responses were too broad in numerical range to quantify a reasonable conclusion. To gain perspective on this topic area of the research, study findings and discussions in previous literature were used to quantify the scope and magnitude of the problem. Findings on the magnitude and scope of the problem provide leaders with a sense of the size and severity of this widespread problem and the associated risks. Obtaining an objective view of the problem may prompt leaders to assess and evaluate the problem in their own organizations and take meaningful action toward resolution.

Recommendations for Leaders in Health Information Management

Leaders of HIM work closely with members of executive leadership across the organization to understand and deliver the data and information required to meet their business needs. Leaders of health information management organizations must work jointly with leaders of the information technology team to ensure the appropriate technology systems are in place to support the organization's health information exchange processes.

The results of the current study provide HIM leaders the foundational framework used to develop a holistic strategic plan of action to address the problem proactively. A starting point consists of addressing the root causes of the procedural and systematic challenges that impact the organization's business performance. The results of the study provide insight into the level of awareness of the problem from the perspective of system users and system managers. The identification of MPI challenges, particularly from the users' perspective, will be instrumental in formulating an effective response to the problem.

Leaders can use the results of this study to address the problem of multiple MPI record entries aggressively through the following activities:

1. Reengineering and standardizing the admissions process;
2. Developing process and system training programs;
3. Monitoring and conducting regular audits on system data;
4. Monitoring critical path workflow processes to identify MPI error patterns;
5. Developing and launching an extensive, organization-wide MPI record cleanup project;
6. Gaining commitment and sponsorship from the executive leadership team to support the cleanup of MPI records;
7. Establishing a cross-functional steering committee tasked with driving and enforcing the MPI data integrity effort;
8. Creating data quality standards, goals, and metrics for MPI record data; and

9. Identifying limitations with the EMR system detection logic to recommend necessary enhancements.

Implementing one or more of the recommendations would be the first step in building a strategic plan of action to address the problem.

The process is time-consuming and tedious, but the effort ensures record entries in the database are accurate and complete. The process ensures that data integrity is restored and risks to patient care and safety are reduced significantly. Recent studies indicate cleanup projects can decrease existing data errors from 10 to 5% or below (AHIMA, 2009). This effort requires strong support and commitment from members of the executive leadership team. Support and commitment from executive leadership encourages team members to take action, ownership, and accountability in the cleanup effort.

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