

# Best Practices in Electronic Health Records

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The American Health Information Management Association (AHIMA) is the premier association of health information management (HIM) professionals. AHIMA's 50,000 members are dedicated to the effective management of personal health information needed to deliver quality healthcare to the public. Founded in 1928 to improve the quality of medical records, AHIMA is committed to advancing the HIM profession in an increasingly electronic and global environment through leadership in advocacy, education, certification, and lifelong learning. For information about AHIMA, visit [www.ahima.org](http://www.ahima.org).

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## Executive Summary

A survey conducted by *Healthcare Informatics* in collaboration with AHIMA at AHIMA's Annual Convention in October 2004 found that more than 40 percent of respondents indicated that their organizations were extensively or partially implementing an electronic health record (EHR). In rating their personal readiness for EHR, 20% of those surveyed said they personally were at the highest level of readiness, 23% indicated high readiness, and 26% ranked their readiness at medium. (Zender 2005). Such high levels of personal preparedness for EHRs reflects that AHIMA has been a pioneer in supporting EHRs, from its investment in the Institute of Medicine patient record study in the late 1980s to numerous initiatives today that focus on member education and industry-wide support for adoption.

To further benchmark how HIM professionals participate in EHR implementation and to identify best practices which others could emulate, AHIMA contracted for a research study to identify how HIM professionals contribute to EHR implementation and adoption in their facilities. AHIMA's practice council and professional practice staff were invaluable in providing input, pilot testing, and recommendations for conducting the study.

The research study was constructed to collect information on best HIM practices that contribute to best EHR outcomes. Because there is wide variation in definitions of EHRs, especially in the hospital environment, EHR outcomes were described relative to major functional components that generally evolve into a system that many recognize as an EHR (IOM, HIMSS, HL7). Because there is also a difference between functionality being implemented (invested in and installed) and fully adopted (incorporation of the technology in their daily practice) (Fonkych and Taylor 2005), *best* outcomes were described by the frequency of use or dispersion of the functionality across the organization. Best practices for HIM professionals were described relative to the function, and generally considered the extent to which HIM professionals participated in its planning and selection, design, workflow and process improvement, data quality management relative to use of the functionality, and other.

In order to conduct a well-defined and meaningful study, the scope of this project was limited to the hospital setting only, but addressing inpatient, outpatient, and emergency department use. A total of 313 AHIMA members, or approximately 7.2% of those invited to participate, responded to the survey conducted via the web in December 2005. Hospitals represented in the survey were well-balanced among those with less than 100 beds (40%), 100 to 299 beds (34%), and 300 or more beds (27%). The vast majority of hospitals were not-for-profit (72%), with 15% being for profit, and 13% being government hospitals. Because it was thought that there might be a difference between hospitals where the majority of physicians were employed and those where physicians were not employed, this information was sought and it was found that in 69% of the hospitals fewer than 25% of the medical staff were employed.

Findings with respect to what functionality has been implemented and adopted are consistent with the very limited amount of information available in the literature. In general, it is found that the level of implementation is highest for digital dictation and electronic signature authentication (approximately 70%); then document management (approximately 52%) results reporting (35% view only and 36% with ability to trend results), and patient care charting (approximately 52%, although with only about 10% of physicians using and 35% of nurses using); next computerized provider order entry (CPOE) (approximately 20% implemented with less than 10% close to full adoption) and some form of electronic medication administration record (EMAR) (26% implementation of electronic forms and 12% implementation of bar-code system, with less than 10% adoption); and finally relatively low levels of implementation of electronic connectivity (17% provider portal) and patient access (less than 2% providing patient access to their information). Data mining is used in 41.9% of hospitals for quality improvement, 39% for executive decision support, and 19.5% in support of clinical guideline development and use. These results were compared with recent studies conducted by the Healthcare Financial Management Association (2006) and the RAND Corporation (2005). Two other studies by the Medical Records Institute and Medical Group Management Association are recent and important for the industry, but focus primarily or exclusively on EHR implementation and adoption in physician offices/medical group practices.

Other than the readiness survey conducted in 2004 previously referenced, no other study of HIM participation in EHR activities was identified in the literature. However, HIM involvement identified in this research study ranges from 37% with no involvement in some aspects of EHR, such as CPOE and EMAR, to over 70% involvement in managing record retention following adoption of an electronic document management system (EDMS) and providing workflow and process improvement support relating to use of EDMS in the HIM department. Over 60% of respondents reported that their HIM department served on the hospital's EHR steering committee and nearly 44% of respondents reported serving as EHR project manager or on an EHR project management team. Areas where HIM professionals were less involved included auditing compliance with clinical decision support alerts and reminders (12%), managing the data dictionary for changes to definitions in a controlled vocabulary (17%), auditing compliance with clinical guidelines or protocols (23%), leading or participating in data standards adoption (30%), managing access controls in EHR (35%), and designing/modifying screens/templates (36%).

In summary, HIM professionals reported implementation and adoption rates for EHR functionality that was consistent with other studies; and their personal involvement appeared to be consistent with their personal readiness as reported in the 2004 AHIMA Annual Convention survey.

## Purpose

In December 2004, AHIMA engaged MargretA Consulting, LLC and The Work Group, Inc., to conduct a formal research study for defining best practices in certain defined areas of health information management (HIM) practice. It was believed that such research would complement and supplement the best practice material already in existence within AHIMA's FORE Library: HIM Body of Knowledge. Existing best practice material that had been compiled by experts in the field was used as the basis for this next level of formal study – documenting that best practices espoused by the field actually produce better outcomes.

The project has three primary goals:

1. Relate processes and contributing factors to best outcomes in key functional areas to which HIM professionals contribute.
2. Promote adoption of best practices throughout the field to improve outcomes across all organizations.
3. Initiate benchmarking practices that would permit continuation and enhancement of best practices research over time and in other types of settings and practices.

## Scope

In order to achieve a controlled study that produces solid evidence of best practices, the research study must be conducted within a well-defined and limited scope. It is hoped that once the study methodology has been established, that further studies for more narrowly focused domains or sub-domains could be conducted; and that the study could be repeated periodically. The scope of this best practices research project is limited in two critical ways:

- To specific, well-defined domains of HIM practice and, within those domains, to a majority of practice or most significantly impacted portion of practice. The first domain studied was revenue cycle management, and the area of practice was that related to hospital inpatient coding. Results were published in the *Journal of AHIMA* in March 2006 (Amatayakul and Work). EHRs is the topic of this paper, and best practices in privacy are also studied.
- To organizational practice, not individual productivity. This research is conducted to determine what processes and contributing factors help achieve best outcomes for the institution. It is not a study of

individual productivity in any of the domains to be studied. Only one HIM professional from an institution was permitted to respond, and may well have responded on behalf of several HIM professionals and the HIM department as a whole.

## Definition of Best Practices

AHIMA's 2003 Best Practices Awards Handbook and Application defines best practices as "implemented programs that meet or set new standards or introduce innovations in the management of health information. These practices have been benchmarked and tested, and outcomes have been measured, evaluated and documented."

The best practices research reflected in these results explicitly studied outcomes in relationship to processes and contributing factors in the management of health information.

## Literature Review

A RAND Corporation (2005) study observed that there are "few rigorous studies ... available today that analyze the current level and speed of adoption of IT in different types of healthcare organizations, the factors that influence adoption, and expected diffusion patterns." RAND further notes that "the sparse literature that is available shows high heterogeneity in HIT-adoption behavior among healthcare providers with different characteristics." These factors are particularly true in defining EHR in general, and what an EHR is in a hospital.

Although the following studies represent a spread of approximately 18 months in time, they illustrate the disparity in definitions, and solid information on implementation and adoption (which are often not distinguished):

The RAND study, using data from the HIMSS-Dorenfest database (2004), found that 10% of hospitals reported having installed an inpatient computerized provider order entry (CPOE) system, and that in those with CPOE, only 17% had gained significant adoption. When CPOE was combined with what they called an electronic medical record (EMR) that they defined as including a computerized patient record [CPR], clinical data repository [CDR], and clinical decision support [CDS], adoption fell to 9%. It is noted that the RAND Corporation does not further define "computerized patient record."

A study reported in February 2006 by the Healthcare Financial Management Association (HFMA) utilized the Institute of Medicine (2003) report "Key Capabilities of an Electronic Health Record System" as the basis for a study on level of EHR adoption by function. HFMA found that just under 40% of hospitals had made significant progress and another 15% were making progress toward implementing "Order Entry/Order Management."

Mathematica Policy Research, Inc., conducted a study for the Centers for Medicare & Medicaid Services (CMS) in summer 2005, and found that 49% of hospitals were using electronic lab orders and 21% were using e-prescribing, although "e-prescribing" is generally a term reserved to describe outpatient, or ambulatory care, electronic prescription writing and transmission to a retail pharmacy (eHealth Initiative 2004) and for which adoption rates of about 20% for e-fax and 2-3% for EDI were described by the pharmacy industry in testimony at the summer 2004 National Committee on Vital and Health Statistics (NCVHS).

Perhaps one gratifying note in these studies is the observation that there is beginning to be a convergence on sources of functionality. Starting with the Institute of Medicine (2003) "Key Capabilities of an Electronic Health Record System," other studies are starting to use the eight core functions identified in this report, and carried forward to the HL7 EHR System Functional Model Draft Standard for Trial Use (2004).

AHIMA has been at the forefront of not only contributing to definition, since the original Institute of Medicine patient record study published in 1991, but in promoting standards for EHRs and attempting to better measure

current state of planning and implementation. Its survey on “HIM Professionals and EHRs: Current States of Readiness” was published in *Healthcare Informatics* in 2005. The survey reported here carries that research forward to determine what is being implemented and how HIM departments participate in those implementations. Unlike other studies, this one also attempts to measure not only implementation but adoption.

## Methodology

The methodology used to conduct the best practices research was a series of steps, including:

1. Literature review to identify potential outcome factors, processes, and contributing factors.
2. Development of best practice research overview, outlining the outcome factors, processes, and contributing factors, and a proposed methodology to distinguish best practices from other practices.
3. Input from the AHIMA practice council and professional practice staff on the best practice research overview was received and a survey constructed to ensure completeness and relevancy.
4. Pilot testing of survey was performed with practice council members. Clarifications were made in a few questions.
5. Distribution of online survey to applicable members.
6. Data reduction and analysis of results.
7. Telephone interviews with a sample of respondents to validate interpretation of survey questions.
8. Finalization of conclusions in this report; and development of executive summary.

## Best Practice Metrics

To define outcomes and best practices for this research on hospital EHR implementation and adoption, the researchers described and sought information about user adoption and HIM participation for nine EHR functions. These functions were chosen as most representative of those recognized in various EHR definitions proposed by key industry groups as well as those in which HIM professionals would most likely have a key role. Because some of the functional components may be implemented in different levels of sophistication, some of the nine functional components was further broken down into levels of sophistication. The nine functional components and levels of sophistication within them included:

- **Electronic dictation support**, including digital dictation, speech recognition, and/or electronic signature authentication
- **Results reporting/review**, including trending/graphing capability or view only
- **Electronic document management system (EDMS)**, requiring document imaging, COLD-fed print forms, and/or management of e-fax and e-mail
- **Patient care charting**, including free text and/or template-entry of history, physical exam, nursing assessment, progress notes, or other documentation *exclusive* of order entry and medication administration recording
- **Electronic medication administration record (EMAR)**, including bar coding/RFID, electronic forms, or computer-generated paper forms
- **Computerized provider order entry (CPOE)** for all orders or medication orders only and with a full set of reminders and alerts or without a full set of reminders and alerts
- **Health information exchange (HIE)** with external sources, such as by a secure provider portal, email, or patient-carried device
- **Personal health records (PHR)** in which patients may contribute information to their record, access information from their record, obtain health educational information, update their demographic and insurance information, or request and/or schedule an appointment
- **Data mining** for development of site specific electronic or paper-based clinical guidelines/protocols, quality improvement, and/or executive decision support

Clinical decision support (CDS) was not included as a separate function because the scope of what might be included is so broad. For example, the IOM (2003) describes CDS as including reminders and prompts for preventive practices; support for drug dosing, drug selection, and screening for drug interactions; computer-assisted diagnosis and disease treatment and management; artificial neural network technology for detecting certain types of illnesses; and identification and tracking of frequency of adverse events. In addition, CDS is most effective when embedded in other functionality, such as CPOE, EMAR, and patient care charting. Mathematica Policy Research, Inc. (2006) noted in results of its study conducted for CMS that of hospitals using electronic lab results and what it called e-prescribing and included CPOE, 95% and 85% respectively included related decision support functions, such as “flagging drug interactions or providing allergy information.” While these percentages accurately reflect the results published, it is curious what decision support functions are considered to be included in electronic results, as this was not explained or illustrated. While normal values and out-of-range values may be indicated in electronic results, such information has often not been considered as on the same level of CDS as flagging drug interactions or even providing allergy information. The Mathematica report also notes that electronic reminders for guideline-based interventions and/or screenings were not common findings in its study, with only 24% of hospital reporting this capability.

Picture archiving and communications systems (PACS) were also not included simply due to space constraints and the highly specific nature of the function.

**Outcomes factors** – In order to identify best outcomes, respondents were asked to estimate the frequency with which the functions were used, as applicable. The frequency breakdown generally used was more than 75% of potential users, between 50% and 75%, between 25% and 50%, and less than 25%. An internal ranking was used to differentiate “best” outcomes.

**HIM practices** – For five of the nine functional components of an EHR surveyed in this study, the role of HIM was studied. These components included EDMS, patient care charting, EMAR, CPOE, and data mining. In each case, the survey was constructed to determine the level of involvement, from none; to participation in what might be considered more typical HIM functions, such as managing paper record retention or destruction, data quality management, or impact of the function on HIM department processes; to planning, selecting, and contributing to system design and workflow/process improvement in the target department or user community.

HIM role was not studied for electronic dictation support, results reporting/review, health information exchange, and personal health records. Due to the constraints of survey size and potential for survey fatigue, HIM role was not studied for these functional components either because it was believed that the function was primarily the domain of HIM (e.g., electronic dictation support) or the function was either widely prevalent (results/reporting/review) or very new (HIE and PHR).

**Practice area contributing factors** – In addition to the roles HIM contributed in specific functional component implementation and adoption, the extent to which HIM performed several functions that could be considered cross-cutting, or applicable to all functional components, were identified. These included:

- Audit compliance with clinical guidelines or protocols
- Audit compliance with clinical decision support alerts and reminders
- Audit that changes in electronic documentation have been made correctly
- Manage the data dictionary for changes to definitions of terms in a controlled vocabulary
- Design/modify screens/templates
- Design/revise reports
- Manage access controls in the EHR system
- Test the legal admissibility of records, including their replication on paper, retention, and durability
- Manage amendments to records
- Participate in a documentation improvement program
- Participate in a quality improvement program (such as Six Sigma, balanced scorecard, others)
- Serve on the EHR steering (or comparable) committee

- Serve as project manager or on a project management team for an EHR project
- Participate in the development of EHR functionality specifications
- Lead or participate in data standards adoption and implementation

## Findings

### Response Rate and Demographics

A total of 313 respondents participated in the survey which was administered during December 2005. An email invitation was sent to 4,356 AHIMA members for whom their membership profile indicated they worked in hospitals and who have the title and/or job responsibility of Director of HIM. A total of 313 responses represents a response rate of 7.2%, and is about double that of the response rate for the revenue cycle management best practices research. Table 1 describes the demographics of the respondents' hospitals.

**Table 1 Facility Demographics of Survey Respondents**

Hospital Ownership	No.	%	Hospital Size	No.	%
Not for profit	226	72.2%	< 100 beds	124	39.6%
For profit	48	15.3%	100 – 299 beds	105	33.5%
Government	39	12.5%	≥ 300 beds	84	26.9%
No Response	0	0		0	0
<b>Total</b>	<b>313</b>	<b>100%</b>		<b>313</b>	<b>100%</b>

Although there was some concern that “government” hospitals might be predominantly Veterans Administration (VA) facilities, which have a system-wide EHR, the respondents in this category actually represented many local and county facilities, public health, and other governmental hospitals in addition to VA facilities. It is believed that the use of EHR in the VA hospitals did not introduce any significant bias in the survey results. In fact, if there is any bias, it is most likely due to respondents' personal interest and therefore more likely involvement in EHR, although it is impossible to measure this.

Table 2 describes the demographics of the individuals responding to the survey. Although the majority of respondents are RHIA's reporting to chief financial officers (CFOs) with a baccalaureate degree and over 10 years of experience, there is certainly a strong showing of other credentials, reporting relationships, education, and tenure. As a result it is probably not appropriate to draw any conclusions with respect to these attributes and level of EHR involvement.

**Table 2 Personal Demographics of Survey Respondents**

Credential*	No.	%	Reporting Relationship	No.	%	Education	No.	%	Tenure	No.	%
RHIA	203	65.0%	CEO	40	12.8%	12 yrs	8	2.6%	< 1 yr	29	9.3%
RHIT	122	39.0%	CFO	156	49.8%	13-14 yrs	64	20.5%	1-3 yrs	65	20.8%
Other	78	25.0%	COO	21	6.7%	16 yrs	165	52.7%	3-5 yrs	57	18.1%
None	3	1.0%	CIO	24	7.7%	18 yrs	57	18.2%	5-10 yrs	66	21.2%
			Other	72	23.0%	20 yrs	1	0.2%	≥ 10 yrs	96	30.6%
						Other	18	5.8%			
<b>Total</b>	<b>406</b>	<b>130%</b>		<b>313</b>	<b>100%</b>		<b>313</b>	<b>100%</b>		<b>313</b>	<b>100%</b>

\* Several respondents have multiple credentials.

Another facility demographic that might potentially influence the rate of EHR adoption was the percent of the medical staff members that are employed by the hospital. It was hypothesized that hospitals with employed physicians might have a higher rate of adoption than those where physicians are affiliated. Table 3 shows the breakdown as reported by the survey respondents. Since the majority of respondents were from hospitals where most physicians were not employed by the hospital, this hypothesis could not be fully tested.

**Table 3 Medical Staff Employment**

<b>Extent of Employed Physicians</b>	<b>No.</b>	<b>%</b>
> 75% employed	42	13.4%
50% - 75% employed	19	6.1%
25% - 50% employed	37	11.8%
< 25% employed	215	68.7%
<b>Total</b>	<b>313</b>	<b>100%</b>

#### Practice Area Contributing Factors

In addition to specific involvement in implementation and adoption of the various functional components of an EHR, HIM professionals are involved in EHRs in a variety of ways, as illustrated in Table 4. Perhaps most unique is service on an EHR steering or comparable committee, with 60.7% of respondents indicating such involvement. Even serving as an EHR project manager or on a project management team at 43.8% is significant evidence of the important role of HIM in EHR projects.

**Table 4 HIM Involvement in Factors Contributing to an EHR**

<b>Areas Where HIM Involvement is 49% or Greater</b>		<b>Areas Where HIM Involvement is Less Than 49%</b>	
Manage amendments to records	69.0%	Serve as EHR project manager or on project management team	43.8%
Participate in documentation improvement program	66.8%	Audit that changes in electronic documentation are correct	39.3%
Serve on EHR steering or comparable committee	60.7%	Participate in quality improvement programs	39.3%
Test legal admissibility of records	49.8%	Design/modify screens/templates	36.1%
Design/revise reports	49.5%	Manage access controls in EHR	34.5%
Participate in development of EHR functionality specifications	49.2%	Lead or participate in data standards adoption	29.7%
		Audit compliance with clinical guidelines or protocols	22.7%
		Manage the data dictionary for changes to definitions in controlled vocabulary	17.3%
		Audit compliance with clinical decision support alerts/reminders	12.1%

#### EHR Functional Components and HIM Involvement

The primary focus of this research was on the extent specific EHR functional components were implemented and adopted, and the role HIM played in their support. In this section, each EHR functional component is described for all hospitals. Where applicable and available, AHIMA survey results are compared with findings from other recent surveys. In part, this information is provided to help understand how consistent the AHIMA survey findings may be in relation to other findings. Where relevant and available, comparisons are also made with respect to size of hospital. Mathematica Policy Research, Inc., describes significant variations in adoption of selected IT capabilities by hospital size as well as Joint Commission accreditation.

**Electronic dictation support** – Electronic dictation supports electronic feed of dictated documents into an electronic document management system (EDMS) and is an important component of an EHR. Survey results revealed that 69.6% of all respondents indicated use of digital dictation and 64.9% indicated electronic signature authentication for primary signatures. Less frequently used was speech recognition (23.6%) and electronic signature authentication for co-signatures (29.4%). Because this function is generally within the purview of HIM, information on the HIM role in selecting, implementing, or monitoring use was not sought.



**Results reporting/review** – Results reporting/review function is generally considered one of the earliest functions adopted by hospitals. The survey’s results revealed that fully 71.6% of hospital respondents had results reporting/review capability. This is consistent with findings from the Mathematica Policy Research, Inc. survey that was conducted for CMS, which found 88% of hospitals provided “electronic lab results.” However, it is interesting to find from the AHIMA survey that nearly half of those providing results reporting provided view-only functionality. This is also consistent with the findings of the HFMA survey, where less than 40% of hospitals had adopted “results management.” The HFMA survey used functional definitions from the IOM (2003) “Key Capabilities of an EHR System,” so that results management was defined as the ability to *interact* with results. The actual findings from the AHIMA survey are provided in Table 5.

**Table 5 Electronic Results Reporting/Review Implementation**

Results Reporting/Review Implementation	<100 Beds		100-299 Beds		≥ 300 Beds		Total		Cumulative %
	No.	Valid %	No.	Valid %	No.	Valid %	No.	Valid %	
View and trending/graphing capability	25	20.25	42	40.0%	47	56.0%	114	36.4%	36.4%
View only capability	47	37.9%	37	35.2%	26	31.0%	110	35.1%	71.6%
In planning stages only	27	21.8%	11	10.5%	5	6.0%	43	13.7%	85.3%
No plans at this time	19	15.3%	8	7.6%	5	6.0%	32	10.2%	95.5%
Do not know	6	4.8%	7	6.7%	1	1.2%	14	4.5	100%
<b>Total</b>	<b>124</b>	<b>100%</b>	<b>105</b>	<b>100%</b>	<b>84</b>	<b>100%</b>	<b>313</b>	<b>100%</b>	

Consistent with Mathematica’s findings, electronic results reporting/review implementation does vary quite significantly by hospital bed size, with larger hospital having a greater tendency to have more functionality.

In addition to whether and what electronic results reporting/review components were implemented in respondent hospitals, the level of adoption of this functionality by physicians was measured by frequency and location of use. Table 6 provides these results. Due to the nature of the question, it is not possible to determine a cumulative percent. Furthermore, it was expected that the results would have to be an estimate, rather than an exact measurement. However, it can be observed that at least a quarter of the respondents had frequent use of this capability at the nursing unit by physicians and almost the same percentage frequently accessing results remotely; with less frequent use at the point of care (defined in the survey as at a bedside terminal or mobile device during care giving). It is also observed that physicians continue to request results printed out at the nursing unit to a fair extent (18.2%).

**Table 6 Electronic Results Reporting/Review Adoption**

Extent Electronic Results Reporting/Review Used by Physicians	No.	% of Total Respondents
Frequently at nursing unit	81	25.9%
Frequently at point of care	40	12.8%
Frequently accessed remotely by physician or office staff	71	22.7%
Occasionally used at nursing unit	24	7.7%
Occasionally used at the point of care	12	3.8%
Occasionally accessed remotely by physician or office staff	25	8.0%
Used by staff on the nursing unit to generate a print out when requested by physician	57	18.2%

Once again, the role of HIM was not sought for the results reporting/review function because it was believed to be quite prevalent. Considering that only 36.4% of all respondent hospitals had the ability to interact with results data, or perform results management as described by the IOM (2003) “Key Capabilities of an EHR System,” and

that fully 28.4% of respondents indicated the hospital was in planning mode, had no plans, or did not know about results reporting may reflect an error of assumption in not designing the survey to include information on HIM role in furthering this very important function.

**Electronic document management system (EDMS)** – EDMS was defined in the survey as including document imaging, COLD-fed (computer-output to laser disk) print forms (e.g., for lab results, transcription), and/or management of e-faxes and e-mails as a part of achieving an EHR. Hospitals are using EDMS extensively and HIM departments are very involved in their implementation. Table 7 compares extent of implementation across all three bed size categories.

**Table 7 Electronic Document Management System Implementation**

EDMS Implementation	<100 Beds		100-299 Beds		≥ 300 Beds		Total		Cumulative %
	No.	Valid %	No.	Valid %	No.	Valid %	No.	Valid %	
Yes, implemented	47	37.9%	58	55.2%	58	69.0%	163	52.1	52.1%
In planning stages only	50	40.3%	32	30.5%	20	23.8	102	32.6	84.5
No plans at this time	20	16.1%	13	12.4%	5	6.0%	38	12.1	96.8%
Do not know	7	5.6%	2	1.9%	1	1.2%	10	3.2	100%
<b>Total</b>	<b>124</b>	<b>100%</b>	<b>105</b>	<b>100%</b>	<b>84</b>	<b>100%</b>	<b>313</b>	<b>100%</b>	

Over half of all bed size hospitals have implemented EDMS, and with those in the planning stages, nearly 85% are on their way to having EDMS. There is a slight difference across bed sizes, with small hospitals having somewhat EDMS implemented or being planned. Still, even in hospitals with fewer than 100 beds, nearly 40% have implemented and another 40% are in the planning stages.

The survey also sought information about the extent of EDMS adoption. Table 8 provides information on the frequency of use.

**Table 8 Extent EDMS Adoption**

Extent EDMS Adoption	No.	% of Total Respondents
Frequently used by physicians themselves to access information for inpatients	80	25.6%
Occasionally used by physicians themselves to access information for inpatients	48	15.3%
Frequently used by physicians to access info for ambulatory or emergency patients	85	27.2%
Occasionally used by physicians to access info for ambulatory or emergency patients	35	11.2%
Used for inpatients by nursing unit staff to retrieve/print previous charts	107	34.2%
Used for ambulatory or emergency service staff to retrieve/print previous charts	117	37.4%
Used to support coding and billing functions	139	44.4%
Used for archival functions	121	38.7%
Used for release of information functions	138	44.1%

Extent of EDMS adoption suggests that physicians are quite frequent users, both for inpatients and ambulatory and emergency service patients, with around 25% of physicians using EDMS frequently for both categories of patients. There is also a significant amount of nursing unit or ambulatory/emergency service staff retrieving/printing charts, with about 35% of hospitals reporting such activities. Most common use of EDMS reported was for support of coding and billing, archival, and release of information functions, with 40 to 45% of hospitals using EDMS for these functions.

HIM departments are highly involved in planning and implementing EDMS. In fact, only 1.6% of the respondents indicated that they had no role. Table 9 provides information on various roles HIM professionals play in EDMS planning and implementation.

**Table 9 HIM Role in Planning and Implementing EDMS**

HIM Role in Planning and Implementing EDMS	No.	% of Total Respondents
Provide workflow and process improvement support within the clinical care setting	146	46.6%
Provide workflow and process improvement support within HIM department	218	69.6%
Responsible for planning and selecting EDMS vendor	119	38.0%
Responsible for implementing and training	158	50.5%
Responsible for paper record retention following adoption	224	71.6%
Other roles	22	7%
No role in planning and implementing EDMS	5	1.6%

The most frequently cited roles were providing workflow and process improvement support within the HIM department and responsibility for paper record retention following adoption (both at approximately 70%). Other roles included qualifications or variations on one of the specified roles (e.g., provide workflow and process improvement support within the clinical care setting with the nursing department). In addition, roles such as system administration, forms management, and quality control were mentioned.

There are many other questions that could have been asked about EDMS. Because the focus of this survey was on EHR overall and there was concern about survey fatigue if too many questions were asked, no additional information was sought. However, certainly it would be very interesting to find out the schedule of when documents are scanned, percent of documents that can be COLD fed, system capabilities (e.g., manual vs. automated indexing, nature of workflow tools), and whether any studies on the quality of the images have been performed and their results.

The next section of the survey addressed EHR components that are somewhat newer and rely upon direct clinician interaction to achieve desired benefits. The components addressed included patient care charting, electronic medication administration recording (EMAR), and computerized provider order entry (CPOE).

For purposes of the survey, electronic patient care charting was defined as a variety of free text and/or template-entry of history, physical exam, nursing assessment, progress notes, or any other documentation *exclusive of* order entry and medication administration record. Results are provided in Table 10. As might be expected, there is a fairly significant difference among bed sizes, with large hospitals having the greatest extent of implementation and small hospital the least.

**Table 10 Extent of Electronic Patient Care Charting**

Electronic Patient Care Charting Implementation	<100 Beds		100-299 Beds		≥ 300 Beds		Total		Cumulative %
	No.	Valid %	No.	Valid %	No.	Valid %	No.	Valid %	
Yes, implemented	47	37.9%	61	58.1	55	65.5%	163	52.1%	52.1%
In planning stages only	50	40.3%	32	30.5	25	29.8%	107	34.2%	86.3%
No plans at this time	27	21.8%	10	9.5	4	4.8%	41	13.1%	99.4%
Do not know			2	1.9			2	0.6%	100%
<b>Total</b>	<b>124</b>	<b>100%</b>	<b>105</b>	<b>100%</b>	<b>84</b>	<b>100%</b>	<b>313</b>	<b>100%</b>	

Adoption rates reported for electronic patient care charting are provided in Table 11.

**Table 11 Extent of Electronic Patient Care Charting Adoption**

Extent Electronic Patient Care Charting Adoption	>75%	50%-75%	25%-50%	<25%
Frequency of use by physicians - inpatient	29 (9.3%)	6 (1.9%)	15 (4.8%)	113 (36.1%)
Frequency of use by physicians - ambulatory	18 (5.8%)	7 (2.2%)	15 (4.8%)	123 (39.3%)
Frequency of use by physicians – ED	32 (10.2%)	9 (2.9%)	11 (3.5%)	111 (35.5%)
Frequency of use by nurses & other clinicians	96 (30.7%)	14 (4.5%)	19 (6.1%)	34 (10.9%)

It was observed that quite a significant number (52.1%) of hospitals reported electronic patient care charting, with many also in the planning stages (another 35%). Although adoption rates reported in the survey characterize adoption as primarily by nurses and other clinicians, still other surveys and personal experience of the researchers suggested that these numbers seemed high (e.g., HFMA reported just under 25% of hospitals had “Electronic Health Information/Data Capture” functionality). There was also some concern that the fact that the set of questions appearing prior to questions on CPOE and EMAR might have caused confusion.

As a result of concerns about the results, the researchers conducted a follow-up telephone survey with a sample of respondents. To determine what type of patient care charting was being performed, information was sought about the vendor and whether interactive templates were used at the point of care to guide either narrative or structured data entry. Although interviews were sought from 29 respondents, or about 18% of those indicating they had electronic patient care charting implemented, only eight people accepted the interview opportunity, or 5.0% of eligible respondents. In some cases, respondents were no longer on the job, were on vacation at the time of the interviews, or were simply unreachable. However, of the eight respondents interviewed, only one was found to have patient care charting being performed by physicians as defined in the survey, and that was in a behavioral healthcare facility. Another three facilities had nurses using templates for patient care charting other than for EMAR. The other four respondents were considering digital dictation, interaction with document imaging, CPOE, or EMAR use as patient care charting. If the results of the telephone survey can be extrapolated to all 163 respondents, then it can be suggested that about half of those respondents, or about 26% of the total respondents to the survey have patient care charting as defined by the survey.

HIM roles in planning and implementing electronic patient care charting are described in Table 12.

**Table 12 HIM Role in Planning and Implementing Electronic Patient Care Charting**

<b>HIM Role in Planning and Implementing Electronic Patient Care Charting</b>	<b>No.</b>	<b>% of Total Respondents</b>
Active participant in planning and selecting	93	29.7%
Active participant in designing screens and templates	77	24.6%
Active participant in workflow and process improvement relating to use	129	41.2%
Active participant in data quality management	121	38.7%
Other role	28	8.9%
No role in planning and implementing EDMS	65	20.8%

Other roles identified included various forms management functions, integration with EDMS, and consultation regarding documentation and the legal medical record. Some respondents indicated they primarily focused on physician documentation and had no role to play in nursing documentation.

For electronic medication administration record (EMAR), the survey asked a set of questions similar to those for electronic patient care charting. However, a distinction was made between types of EMAR. The most sophisticated form of EMAR is that which utilizes bar code or radio frequency identification (RFID) to completely automate the medication administration record processing and assure the medication five rights (right patient, right time, right drug, right dose, right route). Sometimes this is referred to as BC-MAR. Another option is where there is point-of-care charting, but the full cycle of positive identification is not included. Finally, computer generation of medication administration forms on which nurses make manual entries is a final form. Table 13 provides information on the extent of EMAR implemented by type, and the level of adoption for BC-MAR. It is clear that even when BC-MAR has been reported as implemented, about 25% of hospitals have not fully adopted it on all nursing units.

**Table 13 Extent of EMAR Implementation**

EMAR Implementation	<100 Beds		100-299 Beds		≥ 300 Beds		Total		Cumulative %
	No.	Valid %	No.	Valid %	No.	Valid %	No.	Valid %	
Yes, bar code or RFID for EMAR implemented	3	2.4%	17	16.2%	19	22.6%	39	12.5%	12.5%
- On all nursing units	3	2.4%	13	12.4%	12	14.3%	28	8.9%	
- On >1 unit, but not all	0	0%	4	3.8%	7	8.3%	11	3.5%	
Yes, point-of-care data entry for EMAR	7	5.6%	11	10.5%	10	11.9%	28	8.9%	21/4%
Yes, computer-generated forms for EMAR	36	29.0	28	26.7%	20	23.8%	84	26.8%	48.1%
In planning stages only	54	43.5%	35	33.3%	30	35.7%	119	38.0%	86.3%
No plans at this time	19	15.3%	9	8.6%	3	3.6%	31	9.9%	96.2%
Do not know	5	4.0%	5	4.8%	2	2.4%	12	3.8%	100.0%
<b>Total</b>	<b>124</b>	<b>100%</b>	<b>105</b>	<b>100%</b>	<b>84</b>	<b>100%</b>	<b>313</b>	<b>100%</b>	

**Table 14 HIM Role in Planning and Implementing EMAR**

HIM Role in Planning and Implementing EMAR	No.	% of Total Respondents
Active participant in planning and selecting	15	4.8%
Active participant in workflow and process improvement relating to use	17	5.4%
Active participant in data quality management	21	6.7%
Other role	11	3.5%
No role in planning and implementing	115	36.7%

A final major component of EHR is computerized provider order entry (CPOE). CPOE is being implemented in a variety of ways in hospitals, including for all orders or only medication orders, and with or without a full set of reminders and alerts (clinical decision support). Survey questions focused on the nature of orders entered via CPOE (see Table 15) and extent of adoption (see Table 16).

**Table 15 Extent of CPOE Implementation**

CPOE Implementation	<100 Beds		100-299 Beds		≥ 300 Beds		Total		Cumulative %
	No.	Valid %	No.	Valid %	No.	Valid %	No.	Valid %	
Yes, for all orders with full set of reminders & alerts	5	4.0%	12	11.4%	8	9.5%	25	8.0%	8.0%
Yes, for all orders, but not with all reminders & alerts	8	6.5%	6	5.7%	6	7.1%	20	6.4%	14.4%
Yes, for medication orders only with full set of reminders & alerts	1	0.8%	2	1.9%	3	3.6%	6	1.9%	16.3%
Yes, for medication orders only, but with all reminders & alerts	5	4.0%	3	2.9%	3	3.6%	11	3.5%	19.8%
In planning stages only	61	49.2%	67	63.8%	53	63.1%	181	57.8%	77.6%
No plans at this time	33	26.6%	10	9.5%	10	11.9%	53	16.9%	94.6%
Do not know	11	8.9%	5	4.8%	1	1.2%	17	5.4%	100.0%
<b>Total</b>	<b>124</b>	<b>100%</b>	<b>105</b>	<b>100%</b>	<b>84</b>	<b>100%</b>	<b>313</b>	<b>100%</b>	

Where AHIMA survey results seemed high relative to patient care charting, they seem somewhat low in implementation of CPOE. For example, HFMA reported about 40% of all hospitals had made significant progress in implementing CPOE; although when combined with those making some progress (70% in total), they are generally consistent with AHIMA's cumulative percentage of those with some form of implementation and in

planning (77.6%). As previously noted, implementation and adoption are not necessarily the same, and Table 16 tells this story.

**Table 16 Extent of CPOE Adoption**

<b>Extent CPOE Adoption</b>	<b>&gt;75%</b>	<b>50%-75%</b>	<b>25%-50%</b>	<b>&lt;25%</b>
Frequency of use by physicians - inpatient	25 (8.0%)	5 (1.6%)	6 (1.9%)	26 (8.3%)
Frequency of use by physicians - ambulatory	11 (3.5%)	8 (2.6%)	6 (1.9%)	37 (11.8%)
Frequency of use by physicians – ED	15 (4.8%)	5 (1.6%)	3 (1.0%)	39 (12.5%)

Table 17 describes the role HIM departments play in planning for and implementing CPOE.

**Table 17 HIM Role in Planning and Implementing CPOE**

<b>HIM Role in Planning and Implementing CPOE</b>	<b>No.</b>	<b>% of Total Respondents</b>
Active participant in planning and selecting	50	16%
Active participant in workflow and process improvement relating to use	62	19.8%
Active participant in data quality management	71	22.7%
Other role	18	5.8%
No role in planning and implementing	118	37.7%

Other roles identified include those relating to electronic signature advisement. Several of those identifying “other role” indicated “undetermined,” as though they may have been appointed to a committee or expect to be involved but were not sure how at this time.

Other Health Information Technology

There is a growing trend toward consumer interest in personal health records. Especially following the hurricane disasters of 2005, the federal government has put significant emphasis on consumer empowerment, “health in the community,” and health information exchange. This survey sought information about personal health record usage as may be supported by hospitals. The topic was introduced by noting that there are many interpretations of personal health records. Table 18 identifies various forms of PHR and how they may be supported by hospitals. These findings are certainly consistent with HFMA’s findings that only about 1%-3% of hospitals support “patient access” and another 5%-6% are in the planning stages.

**Table 18 Personal Health Record Support by Hospitals**

<b>Personal Health Record Support by Hospitals</b>	<b>No.</b>	<b>% of Total Respondents</b>
Patients may contribute information to their inpatient hospital record	53	16.9%
Patients may access all or part of their inpatient hospital record online	6	1.9%
Patients may contribute information to their hospital-based ambulatory care record online	10	3.2%
Patients may access all or part of their hospital-based ambulatory care record online	6	1.9%
Patient educational information is available from the hospital Web site	78	24.9%
Patient may access and update their demographic and insurance information	9	2.9%
Patients may request an appointment in an ambulatory care clinic of the hospital	18	5.8%
Patients may schedule an appointment in an ambulatory care clinic of the hospital	11	3.5%
Other (e.g., make release of information requests online, piloting a commercial PHR )	8	2.6%
PHR is in the planning stages only	56	17.9%
There are no plans currently for PHR	129	41.2%
Do not know	24	7.7%

Information about other forms of health information exchange (HIE) was also sought via the survey. Table 19 summarizes the information found. Even in this category, there is not a huge amount of activity, with provider portals probably being the most prevalent.

**Table 19 Other Forms of Health Information Exchange (HIE)**

<b>Other Forms of Health Information Exchange (HIE)</b>	<b>No.</b>	<b>% of Total Respondents</b>
Information exchange occurs widely through a secure provider portal	53	16.9%
Information exchange occurs widely through e-mail	12	3.8%
Information exchange occurs widely through a patient-carried device (e.g., flash drive, CD)	6	1.9%
Provider portal is available, although it is only minimally used	28	8.9%
Secure e-mail is permitted, although it is only minimally used	23	7.3%
A small number of providers give patients a flash drive, CD, or other patient-carried device	12	3.8%
Other forms of health information exchange are in the planning stages only	77	24.6%
No plans for other forms of health information exchange at this time	106	33.9%
Do not know	23	7.3%

Because of the hybrid state (records partially on paper and partially electronic) in which many hospitals exist, information was sought about how this was currently being managed. Table 19 provides a summary of what type of hybrid record exists in hospitals for inpatients. Clearly, the results indicate we have not done away with paper as an industry!

**Table 20 Hybrid Record Management**

<b>Hybrid Record Management</b>	<b>No.</b>	<b>% of Total Respondents</b>
Some parts on paper only and some parts electronic only (never printed to paper)	95	30.4%
Some parts on paper only, some parts electronic (but ultimately printed to paper)	125	39.9%
Some parts on paper only and some parts electronic only, but printouts are routinely requested during patient care episode and end up being filed in paper chart or scanned	55	17.6%
None of the above	52	16.6%

#### Other Roles of HIM Departments

A final set of questions dealt with the role of HIM department in planning and implementing data mining, especially as pay-for-performance is looming, if not somewhat present already in some markets. Table 20 addresses what roles HIM departments play in this important activity.

**Table 21 HIM Role in Planning and Implementing Data Mining**

<b>HIM Role in Planning and Implementing Data Mining</b>	<b>No.</b>	<b>% of Total Respondents</b>
Provide data analysis	24	7.7%
Manage data dictionary/controlled vocabulary	36	11.5%
Review reports for accuracy	83	26.5%
Explain reports to users	71	22.7%
Other (e.g., in planning, in training soon, provide reports when needed)	16	5.1%
No role in data mining	49	15.7%

## **Conclusions**

The results of this survey clearly indicate that hospitals are moving forward with electronic health records, and perhaps to a somewhat lesser extent other forms of health information technology. HIM departments play

important roles in these activities, especially in areas of data quality and in some areas of workflow and process improvement.

The results of this survey are consistent with those of other surveys – always with some margin of error in every survey. This is gratifying, as results that are significantly different would suggest that the industry has yet to even settle on definition of functionality, let alone ability to implement systems. This is not to suggest that there is not a long way yet to go. Differences between hospital sizes are striking in some cases; in general, smaller hospitals lag behind larger hospitals. There are also differences in implementation in comparison to adoption. Where implementation may appear to be strong, it is clear that adoption may be more limited, not only by number of users but by nature of use (e.g., view-only results capability, or CPOE only for medication orders or without clinical decision support, or only pre-printed EMAR forms). Hospitals also continue to be confronted with hybrid records, although as physician adoption in their offices seems to be accelerating (according to RAND) and with the support of the CMS DOQ-IT program administered by the quality improvement organizations, this also is poised to change.

## **Recommendations**

Perhaps the most important recommendations to be drawn from this survey are, 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 could only touch on key factors but is possibly more comprehensive than any other survey of its kind. This is important not only for the HIM profession, but for the healthcare industry as whole, as progress toward adoption of health information technology is of critical importance and forward progress needs to be monitored.

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