

2006 Annual Report *of the* U.S. Hospital IT Market



AN INDUSTRY REPORT PROVIDED BY

Himssanalytics™ and **Himss®**

Data from HIMSS Analytics™ Database 2005 (derived from the Dorenfest IHDS+ Database™)

This historical report of the U.S. Hospital IT Market is brought to you as an online resource from the Dorenfest Institute.

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Managed by the HIMSS Foundation, the Dorenfest Institute provides a variety of detailed historical data, reports, and white papers about information technology (IT) use in hospitals and integrated healthcare delivery networks at no charge to universities, students under university license, U.S. governments (local, state and federal), and governments of other countries that will be using the data for research purposes.

The Dorenfest Institute was formed in January 2005 to further the interest in and benefits associated with ongoing research in health IT. This followed a generous donation of his company and its historical data assets to HIMSS Foundation by Sheldon I. Dorenfest to further the interest in and benefits associated with ongoing research in health IT. Sheldon I. Dorenfest is President/CEO of the Dorenfest Group in Chicago. The Dorenfest Group is a leading consultant and source of knowledge about the healthcare information technology industry.



DEAR HEALTHCARE ORGANIZATION EXECUTIVE:

2005 was a tumultuous year for the healthcare IT industry. The healthcare IT vendor and consulting marketplace is consolidating; healthcare organizations are moving forward aggressively to implement electronic medical record systems; and the federal government is focusing on the space and establishing initiatives to standardize and certify applications, providing seed funding for electronic healthcare record initiatives, and generally jawboning for accelerating the penetration of IT into healthcare.

Welcome to the 2006 Annual Report of the U.S. Hospital IT Market, produced jointly by the Healthcare Information and Management Systems Society (HIMSS) and HIMSS Analytics™ LLC, the wholly-owned market research arm of HIMSS.

As the healthcare IT industry's professional society, HIMSS has a long history of providing knowledge, advocacy, leadership, and collaboration and community affiliations to its members and the healthcare public at large. Consistent with that mission, we have provided the industry with comprehensive information about healthcare IT—what's real, what's planned, and where the industry is headed.

This publication has been accomplished through the efforts of HIMSS Analytics, a full service resource for data services, analysis, market research and consultation on IT-related subjects. HIMSS Analytics maintains the largest repository of HIT data in the U.S. to provide both the vendor and provider community with data and analysis for more informed decision making.

This year's report represents a significant expansion over the 2005 edition. Information has been gathered from 4,013 American hospitals on over 100 applications and technologies. This year we have added categories on nursing, operating room, and cardiology PACS to further extend our evaluation of financial and clinical application environments in U.S. hospitals.

We hope you find this document to be a valuable guide to help you understand the healthcare IT market, the penetration of IT applications, and where the various sectors of applications are moving in today's healthcare provider environment in the U.S.

Best regards,

A handwritten signature in blue ink that reads "David Garets".

A handwritten signature in blue ink that reads "Steve Lieber".



David E. Garets
President and CEO
HIMSS Analytics LLC



H. Stephen Lieber
President and CEO
HIMSS

Executive Summary

It's Déjà vu all over again. Not much has changed in the U.S. hospital IT market since the first annual report was published in May 2005. The industry is moving forward, but with slow incremental steps—not “big bang” advances in most cases.

IT budgets are still relatively unchanged and still under-funded. The catch 22 is that hospitals won't be able to efficiently and effectively participate in pay for performance initiatives unless they have IT environments that capture discrete data elements for reporting, but there is little money available for hospitals to make these investments. Professional staffing issues are causing tremendous strains on the operating budgets that will impact the ability of IT to increase staffing or services. The good news is that we continue to see good examples of hospitals implementing IT solutions that reduce costs and improve efficiencies in both the financial and clinical areas of operations.

The focus of most hospital IT efforts is still predominately on clinical systems. The electronic medical record (EMR) and picture archive and communication systems (PACS) environments for both radiology and cardiology are showing good growth in the market. Ancillary department systems for cardiology, the operating room, and the emergency department are also growing. But, some hospitals are driving excellent return on investment from their revenue cycle management improvement initiatives. Focusing on upstream processes (e.g., patient scheduling/medical necessity, eligibility, and Web enabled pre-registration) and downstream processes (e.g., contract management, denials management, and direct payer claims submission) has shown many successes in the revenue cycle management arena.

Patient safety is still a critical focus of executives, physicians, nurses, and boards. A couple of recent articles on the inability of computerized provider order entry (CPOE) applications to improve patient safety have surfaced, but for the most part these articles provide additional evidence that improving patient safety with any clinical application takes significant planning, process re-engineering/improvement, and flawless implementation execution. Accomplishing closed loop medication administration processes will be the most difficult due to the need to effectively integrate CPOE with pharmacy systems and electronic medication administration records (eMAR). Automating the processes of medication administration will help eliminate many of the serious medical errors that occur in hospitals everyday.

Effective application integration (AKA – interoperability) between disparate applications (e.g., from different vendors, but in some cases from the same vendor) is still not meeting the needs of most hospital organizations. The technologies and architectures to make this happen are available, robust, and being effectively implemented by other industries today. The ability of this industry to drive and adopt standards to resolve this issue once and for all is stuck in the muck of proprietary vendor systems, uncooperative standards groups, and a government unwilling to dictate effective information exchange transaction standards. This integration is not only needed for hospital systems, but to provide effective data/information exchanges between acute care, ambulatory, and long term care environments as patients flow through various modalities of care. This is the ideal painted by government officials and purveyors of electronic health records (EHRs).

Healthcare executives must take a leadership position in advancing healthcare IT to achieve the advances necessary to reduce costs and improve the quality of care. The senior executives in hospitals and health systems must become IT advocates and lead their organizations through the process transformations that are necessary to improve both financial and clinical operational shortfalls. These business and clinical service transformations need not be “big bang” implementations, but rather will be most effective as targeted, incremental process improvements that can be effectively measured to demonstrate the value of the investments made, whether financial or improvements in quality. There need to be early “wins” to satisfy not only the management and boards that IT investments can make a significant difference in the safety of patients, for example, but also to help convince skeptical clinicians that their work can be more efficient, effective, and efficacious with the assistance of information technology.

We hope you find this second HIMSS Analytics Annual Report of the U.S. Hospital IT Market to offer valuable insights into the world of healthcare IT.

2005 Hospital IT Budgets

Hospital IT operating budgets as a percentage of total hospital operating budgets are still below three percent for all hospital bed size segments except one—301–400 beds (*see Table HB1*). Many hospitals that are considered advanced for their IT capabilities have percentages of five percent or higher for their IT operating budgets as a percent of their total hospital IT budgets.

An evaluation of the percentage of hospital IT operating budgets as compared to total hospital operating budgets by region and function shows the expected higher percentages for urban, multi-hospital and academic medical facilities. There is no statistically significant difference in the percent of spending exhibited by medical/surgical facilities and other types of hospitals such as specialty cardiac hospitals (*see Table HB2*).

Multi-hospital systems and hospitals in the 301–400 bed range have the highest IT operating budget to total hospital operating expense percentages. Both are over three percent. Hospitals will need to increase their IT budgets to improve their IT capabilities for both financial and clinical systems to remain competitive and fiscally viable in the dynamic U.S. healthcare market. Over the next three to five years, hospitals that have implemented the most effective IT systems will benefit from higher service reimbursements from both commercial and government payers.

TABLE HB1 | IT Operating Budget as Percent of Total Hospital Operating Expense

Bed Size	Average Percent IT Budget/Op. Ex.
0–100	2.10%
101–200	2.39%
201–300	2.50%
301–400	3.59%
401–500	2.86%
501–600	2.59%
600+	2.77%
Average Percent IT Operating Budget/Total Operating Expense	
	2.86%

TABLE HB2 | Regional & Functional Budget Comparisons – Hospital IT Operating Budget Compared to Total Hospital Operating Budget

CBSA (Urban)	2.70%
CBSA (Rural)	1.60%
Med/Surg	2.71%
Other	2.73%
Single Hospital	2.54%
Multi Hospital	3.05%
Academic	2.75%
Non-Academic	2.69%

Revenue Cycle Management Environment

The revenue cycle management market is mature, but we are beginning to see a trend toward replacing older legacy applications in the hospital market segment. The ADT/Registration, patient billing, encoder, and electronic claims applications are almost all saturated in hospital installations. Chart deficiency and credit and collection applications are also very close to total market saturation, while two thirds to three quarters of hospitals use patient scheduling and/or contract management software. The real growth potential in the revenue cycle management market is in eligibility, electronic data interchange (authorization and other electronic notification transactions), and enterprise master person index applications (*see Figure RCM1*).

Plans for replacing existing applications or purchasing new applications for the first time show that all of the applications

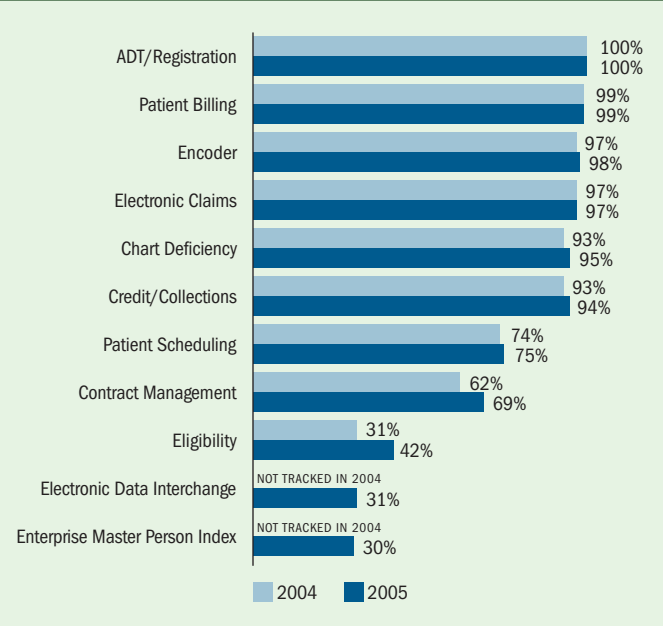
except for eligibility are replacement sales for the majority of their market segments (*see Figure RCM2*).

Segmenting these applications by region (e.g. urban or rural), function (e.g. academic, non-academic, general medical, non general medical) shows no significant differentiation relative to installed percentages for credit/collections (*see Table RCM3*), ADT/registration (*see Table RCM4*), electronic claims (*see Table RCM6*), encoder (*see Table RCM8*), and patient billing (*see Table RCM9*).

EDI/clearinghouse shows that “other” hospitals are more likely to have this application installed than medical/surgical hospitals (*see Table RCM5*), while urban hospitals are more likely to have eligibility products installed than rural hospitals (*see Table RCM7*).

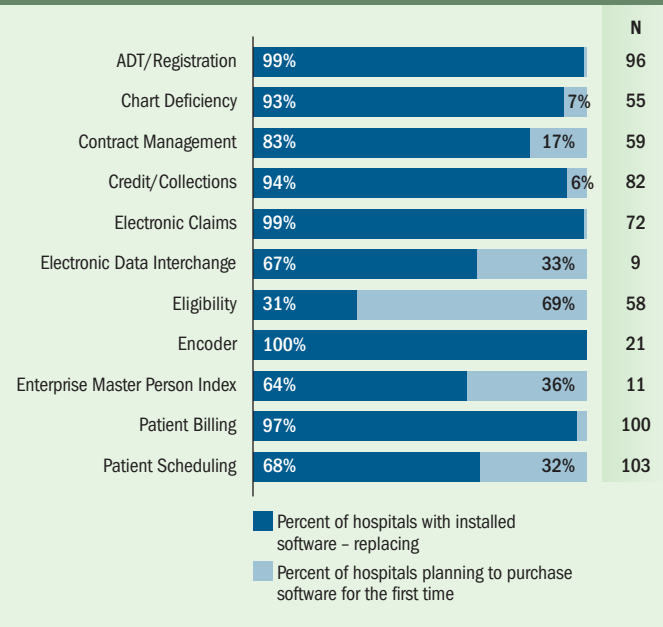
Revenue Cycle Management Environment (CONTINUED)

FIGURE RCM1 | Summary of Installation (2004/2005)



The installation rate for eligibility applications has increased significantly from 2004 to 2005, while contract management application growth has been moderate.

FIGURE RCM2 | Applications Summary of Plans 2005



Eligibility applications have the highest rate of first time software purchases for planned buying. Patient billing and patient scheduling applications have the highest numbers of planned buyers for the next 24 months.

TABLE RCM3 | Credit/Collections

	Installed or In Process	N for Segment
Multi-Hospital	90.79%	2,898
Single Hospital	86.92%	1,078
CBSA (Urban)	89.86%	3,404
CBSA (Rural)	88.99%	572
Academic/Teaching	87.69%	333
Non-Academic	89.93%	3,643
Med/Surg	90.49%	3,240
Other	86.41%	736

N = 3,568

TABLE RCM4 | ADT/Registration

	Installed or In Process	N for Segment
Multi-Hospital	93.65%	2,898
Single Hospital	95.64%	1,078
CBSA (Urban)	93.95%	3,404
CBSA (Rural)	95.63%	572
Academic/Teaching	94.89%	333
Non-Academic	94.13%	3,643
Med/Surg	93.92%	3,240
Other	95.38%	736

N = 3,745

Note—the application ADT/Registration is compared to 2004 patient registration.

TABLE RCM5 | EDI-Clearinghouse

	Installed or In Process	N for Segment
Multi-Hospital	30.91%	1,831
Single Hospital	29.95%	778
CBSA (Urban)	30.75%	2,231
CBSA (Rural)	29.89%	378
Academic/Teaching	30.54%	203
Non-Academic	30.63%	2,406
Med/Surg	28.65%	2,119
Other	39.18%	490

N = 799

TABLE RCM6 | Electronic Claims

	Installed or In Process	N for Segment
Multi-Hospital	93.86%	2,898
Single Hospital	95.18%	1,078
CBSA (Urban)	94.12%	3,404
CBSA (Rural)	94.76%	572
Academic/Teaching	97.30%	333
Non-Academic	93.93%	3,643
Med/Surg	94.29%	3,240
Other	93.89%	736

N = 3,746

Revenue Cycle Management Environment (CONTINUED)

TABLE RCM7 Eligibility		
	Installed or In Process	N for Segment
Multi-Hospital	37.16%	2,898
Single Hospital	36.55%	1,078
CBSA (Urban)	38.48%	3,404
CBSA (Rural)	28.15%	572
Academic/Teaching	42.34%	333
Non-Academic	36.51%	3,643
Med/Surg	37.93%	3,240
Other	32.88%	736

N = 1,471

TABLE RCM8 Encoder		
	Installed or In Process	N for Segment
Multi-Hospital	95.69%	2,898
Single Hospital	94.99%	1,078
CBSA (Urban)	96.36%	3,404
CBSA (Rural)	90.38%	572
Academic/Teaching	97.00%	333
Non-Academic	95.36%	3,643
Med/Surg	96.02%	3,240
Other	93.21%	736

N = 3,797

TABLE RCM9 Patient Billing		
	Installed or In Process	N for Segment
Multi-Hospital	94.69%	2,898
Single Hospital	95.55%	1,078
CBSA (Urban)	94.77%	3,404
CBSA (Rural)	95.80%	572
Academic/Teaching	95.80%	333
Non-Academic	94.84%	3,643
Med/Surg	95.25%	3,240
Other	93.48%	736

N = 3,774

TABLE RCM10 Chart Deficiency		
	Installed or In Process	N for Segment
Multi-Hospital	90.10%	2,898
Single Hospital	88.96%	1,078
CBSA (Urban)	91.66%	3,404
CBSA (Rural)	78.67%	572
Academic/Teaching	93.39%	333
Non-Academic	89.46%	3,643
Med/Surg	89.63%	3,240
Other	90.49%	736

N = 3,570

Substantial differentiation of application installations is found in chart deficiency, contract management, enterprise master person index, and patient scheduling. More urban than rural hospitals have installed the chart deficiency application (*see Table RCM10*). Urban, multi-hospital, and academic/teaching hospitals have higher installation rates for contract management (*see Table RCM11*). Urban and other (non medical/surgical facilities) have higher installation rates of enterprise master person index applications (*see Table RCM12*). Urban hospitals have significantly higher installation rates of patient scheduling applications than do rural hospitals (*see Table RCM13*).

TABLE RCM11 Contract Management		
	Installed or In Process	N for Segment
Multi-Hospital	64.87%	2,898
Single Hospital	51.02%	1,078
CBSA (Urban)	64.16%	3,404
CBSA (Rural)	43.01%	572
Academic/Teaching	73.27%	333
Non-Academic	60.01%	3,643
Med/Surg	62.07%	3,240
Other	56.93%	736

N = 2,430

Note – the application Contract Management is compared to 2004 Managed Care Contract Management

TABLE RCM12 Enterprise Master Person Index		
	Installed or In Process	N for Segment
Multi-Hospital	27.58%	1,831
Single Hospital	24.55%	778
CBSA (Urban)	27.84%	2,231
CBSA (Rural)	19.84%	378
Academic/Teaching	26.11%	203
Non-Academic	26.72%	2,406
Med/Surg	23.78%	2,119
Other	39.18%	490

N = 694

TABLE RCM13 Patient Scheduling		
	Installed or In Process	N for Segment
Multi-Hospital	65.77%	2,898
Single Hospital	72.73%	1,078
CBSA (Urban)	69.89%	3,404
CBSA (Rural)	54.37%	572
Academic/Teaching	71.77%	333
Non-Academic	67.28%	3,643
Med/Surg	68.86%	3,240
Other	62.36%	736

N = 2,690

Revenue Cycle Management Environment (CONTINUED)

Temporal contracting data for revenue cycle management shows that ADT/registration, chart deficiency, contract management, credit and collections, electronic claims, encoder, and patient billing buying peaked between 1995 and 1999. More recently introduced applications such as electronic data interchange, eligibility, and enterprise master person index have shown higher purchasing percentages between 2000 and 2005 (see Table RCM14).

The market implications for hospitals regarding revenue cycle management applications is that 50 percent of all U.S. hospitals will evaluate replacing at least one component of their revenue

cycle management application suite over the next three to five years. The applications that generate the highest risk to hospitals for failed or flawed implementations are patient billing, ADT/registration, enterprise master person index, and patient scheduling. For hospitals that are highly risk averse, waiting for next generation revenue cycle management applications to stabilize is the best approach. Next generation applications have reached stability when they are being implemented on schedule and budget 90 percent of the time, and when the applications have no customer service backlogs for any critical bugs that impact operational workflows or processes.

TABLE RCM14 | Revenue Cycle Management System Temporal Contract Signing

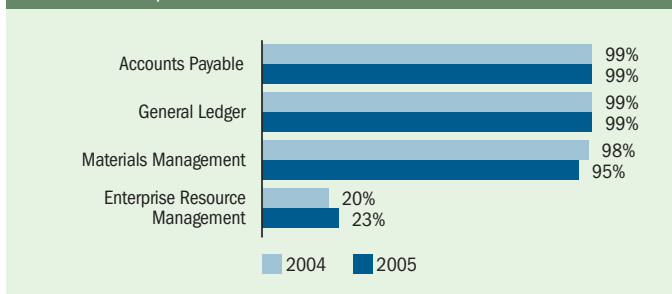
	ADT/Registration	Chart Deficiency	Contract Management	Credit Collections	Electronic Claims	Electronic Data Interchange	Eligibility	Encoder	EMPI	Patient Billing	Patient Scheduling
Prior to 1989	10.43%	8.86%	5.09%	10.09%	6.75%	3.80%	5.17%	14.99%	4.20%	12.34%	3.16%
1990 to 1994	23.17%	20.07%	18.33%	24.15%	21.38%	9.28%	11.29%	18.95%	9.16%	22.38%	12.71%
1995 to 1999	41.11%	42.88%	45.23%	39.09%	41.76%	30.80%	35.65%	40.41%	33.97%	38.93%	41.56%
2000 to 2005	25.28%	28.19%	31.36%	26.67%	30.10%	56.12%	47.89%	25.65%	52.67%	26.34%	42.57%

Financial Management Environment

The financial management hospital IT environment is saturated for legacy application such as accounts payable, general ledger, and materials management. But, enterprise resource planning (ERP) systems still have plenty of growth potential with only 23 percent of hospitals having this application installed (see Figure FM1).

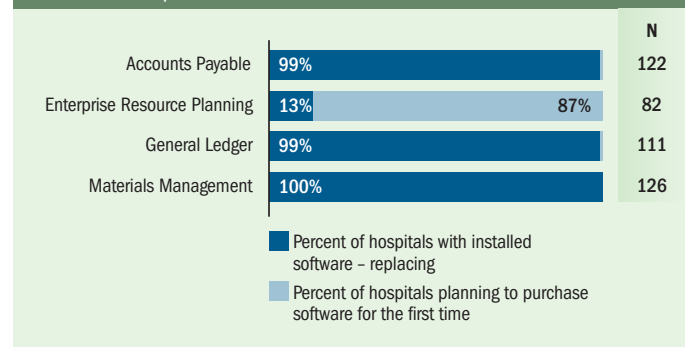
But, this market still has plenty of sales opportunity relative to replacing legacy systems (see Figure FM2). The majority of general ledger, accounts payable, and materials management application purchases will replace currently used systems. ERP systems are the one area where first time purchases are still relevant in this market.

FIGURE FM1 | Summary of Installation (2004/2005)



ERP systems continue to replace materials management applications at the middle and upper market tiers.

FIGURE FM2 | Applications of Summary Plans 2005



The majority of ERP buying is first time purchases. Almost all of the other financial management application buying is replacement purchases.

Financial Management Environment (CONTINUED)

The ERP market is the only one in which there are substantial differences in the types of hospitals that have implemented the software (see Tables FM3-6). In the ERP market, urban, multi-hospital, and non medical surgical facilities are more likely to have implemented this application.

TABLE FM3 Accounts Payable		
	Installed or In Process	N for Segment
Multi-Hospital	96.03%	2,898
Single Hospital	95.27%	1,078
CBSA (Urban)	96.33%	572
CBSA (Rural)	95.74%	3,404
Academic/Teaching	95.80%	333
Non-Academic	95.83%	3,643
Med/Surg	95.62%	3,240
Other	96.74%	736

N = 3,810

TABLE FM4 Enterprise Resource Planning		
	Installed or In Process	N for Segment
Multi-Hospital	18.67%	2898
Single Hospital	9.18%	1078
CBSA (Urban)	17.48%	3404
CBSA (Rural)	7.87%	572
Academic/Teaching	15.62%	333
Non-Academic	16.14%	3643
Med/Surg	14.60%	3240
Other	22.69%	736

N = 640

TABLE FM5 General Ledger		
	Installed or In Process	N for Segment
Multi-Hospital	95.38%	2,898
Single Hospital	95.45%	1,078
CBSA (Urban)	95.30%	3,404
CBSA (Rural)	95.98%	572
Academic/Teaching	95.50%	333
Non-Academic	95.39%	3,643
Med/Surg	95.22%	3,240
Other	96.20%	736

N = 3,793

TABLE FM6 Materials Management		
	Installed or In Process	N for Segment
Multi-Hospital	90.13%	2,898
Single Hospital	91.09%	1,078
CBSA (Urban)	90.98%	3,404
CBSA (Rural)	86.89%	572
Academic/Teaching	95.20%	333
Non-Academic	89.95%	3,643
Med/Surg	91.67%	3,240
Other	84.78%	736

N = 3,594

Evaluation of the temporal contract signing for financial management applications manifests the majority of contract signings for accounts payable, general ledger, and material management in the 1995–1999 timeframe (see Table FM7). ERP application contracts have had the majority of contracting completed in the 2000–2005 timeframe.

TABLE FM7 Financial Management System Temporal Contract Signing				
	Accounts Payable	Enterprise Resource Planning	General Ledger	Materials Management
Prior to 1989	8.58%	0.30%	8.91%	7.59%
1990 to 1994	17.38%	2.97%	17.17%	17.62%
1995 to 1999	42.57%	26.11%	43.04%	41.53%
2000 to 2005	31.47%	70.62%	30.88%	33.27%

The financial management market of saturated legacy products is being attacked by ERP vendors that provide an integrated suite of general ledger, accounts payable, and materials management applications, as well as an integrated suite of Human Resources applications (discussed in the Human Resource Environment section). ERP systems have historically been very difficult to implement. Facilities that have stabilized the ERP environment are beginning to achieve advantages in their supply chain management operations. We believe that application service provider (ASP) and outsourced solutions will begin to penetrate this market more effectively over the next three to five years.

Financial Decision Support Environment

The financial decision support environment includes the budgeting, case mix management, contract management (also included in our revenue cycle management market evaluation), cost accounting, data warehousing, and executive information system applications. Budgeting, case mix, and cost accounting are approaching market saturation in hospitals. The market growth opportunities are in the contract management, data warehousing, and executive information system market segments (see *Figure FDS1*).

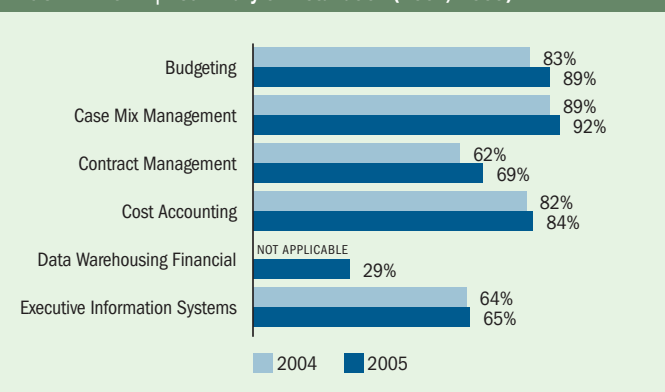
The purchasing trends for the financial decision support market continue to be lower than most other market segments relative to the numbers of both replacement and new system acquisitions (see *Figure FDS2*). The applications that are approaching market saturation (budgeting, case mix analysis, and cost accounting) are a replacement selling market. Data warehousing applications

will be driven by more new purchases, as opposed to replacement, and executive information systems show strong purchases for both replacement buying and first time purchases.

Further segmentation analysis of this market based on region (urban or rural) or function (multi-hospital/single hospital, academic/non-academic, medical surgical/other) shows that market differentiation exists for all financial decision support applications except case mix analysis (see *Tables FDS3-8*). Contract management applications show significant installation differences that result in higher installations in multi-hospital, urban, and academic organizations. The only significant difference in budgeting application installations is between multi and single hospitals; more hospitals that are part of a multi-hospital system have this software installed. Cost accounting implementation differentiation occurs in multi-hospital and urban organizations.

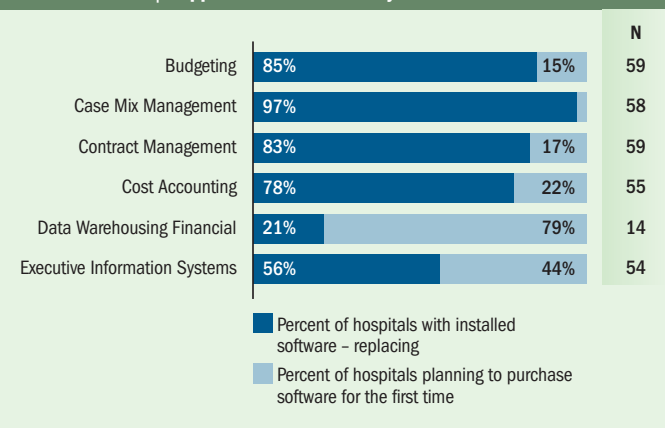
Data warehouse applications appear more in urban and other (non-medical/surgical) hospitals. Implementation differentiation for executive information systems shows up in urban and medical/surgical hospitals.

FIGURE FDS1 | Summary of Installation (2004/2005)



Applications with growth opportunities such as contract management and executive information systems are showing slow growth to this point in time.

FIGURE FDS2 | Applications of Summary Plans 2005



Executive information systems demonstrate an interesting market dynamic for an application segment that is installed in approximately two thirds of the market – there are more hospitals replacing systems than purchasing new systems over the next 24 months.

TABLE FDS3 | Contract Management

	Installed or In Process	N for Segment
Multi-Hospital	64.87%	2,898
Single Hospital	51.02%	1,078
CBSA (Urban)	64.16%	3,404
CBSA (Rural)	43.01%	572
Academic/Teaching	73.27%	333
Non-Academic	60.01%	3,643
Med/Surg	62.07%	3,240
Other	56.93%	736

N = 2,430

TABLE FDS4 | Budgeting

	Installed or In Process	N for Segment
Multi-Hospital	86.61%	2,898
Single Hospital	75.88%	1,078
CBSA (Urban)	84.43%	3,404
CBSA (Rural)	79.37%	572
Academic/Teaching	87.09%	333
Non-Academic	83.39%	3,643
Med/Surg	83.52%	3,240
Other	84.51%	736

N = 3,328

Financial Decision Support Environment (CONTINUED)

TABLE FDS5 | Case Mix Management

	Installed or In Process	N for Segment
Multi-Hospital	88.61%	2,898
Single Hospital	85.44%	1,078
CBSA (Urban)	88.75%	3,404
CBSA (Rural)	81.82%	572
Academic/Teaching	93.39%	333
Non-Academic	87.24%	3,643
Med/Surg	88.55%	3,240
Other	84.24%	736

N = 3,489

TABLE FDS6 | Cost Accounting

	Installed or In Process	N for Segment
Multi-Hospital	82.88%	2,898
Single Hospital	70.96%	1,078
CBSA (Urban)	81.40%	3,404
CBSA (Rural)	69.23%	572
Academic/Teaching	84.98%	333
Non-Academic	79.17%	3,643
Med/Surg	79.07%	3,240
Other	82.20%	736

N = 3,167

Temporal contract signing data shows that contract signing for budgeting, case mix management, contract management, cost accounting and executive information systems predominated between 1995 and 1999 (see Table FDS9). Data warehousing,

TABLE FDS7 | Data Warehouse/Mining—Financial

	Installed or In Process	N for Segment
Multi-Hospital	20.86%	1,831
Single Hospital	14.40%	778
CBSA (Urban)	20.26%	2,231
CBSA (Rural)	11.11%	378
Academic/Teaching	26.11%	203
Non-Academic	18.33%	2,406
Med/Surg	16.00%	2,119
Other	31.63%	490

N = 494

TABLE FDS8 | Executive Information Systems

	Installed or In Process	N for Segment
Multi-Hospital	63.70%	2,898
Single Hospital	57.51%	1,078
CBSA (Urban)	63.92%	3,404
CBSA (Rural)	50.70%	572
Academic/Teaching	58.56%	333
Non-Academic	62.34%	3,643
Med/Surg	64.69%	3,240
Other	50.27%	736

N = 2,466

the foundation for detailed retrospective performance analysis, has shown the most contract signing in the 2000–2005 timeframe, which is to be expected with a newer application that is more online analytical processing database technology dependent.

TABLE FDS9 | Financial Decision Support Temporal Contract Signing

	Budgeting	Case Mix Management	Contract Management	Cost Accounting	Data Warehousing (Financial)	Executive Information System
Prior to 1989	11.67%	12.20%	5.09%	15.54%	3.68%	7.70%
1990 to 1994	18.83%	19.76%	18.33%	32.68%	11.76%	22.11%
1995 to 1999	39.91%	44.42%	45.23%	59.51%	30.88%	40.31%
2000 to 2005	29.59%	23.62%	31.36%	41.53%	53.68%	29.88%

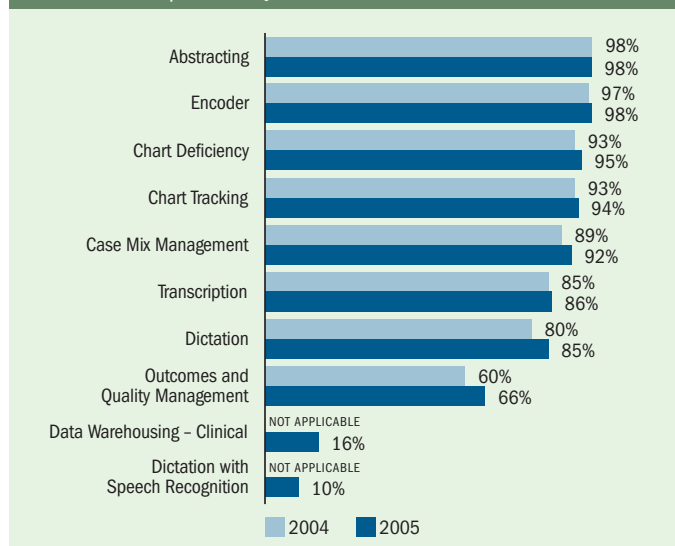
The financial decision support application market relies on the ability of these applications to effectively interface with many of the revenue cycle management and clinical systems within the hospital. This is not as difficult for applications such as budgeting, cost accounting, and data warehousing that can take batch files in formats such as Microsoft Excel. But, this

is a critical differentiator for applications such as contract management, case mix management, and executive information systems. As the industry moves toward standardizing clinical transactions, this will dramatically improve the capabilities of many of the financial decision support systems.

Health Information Management Environment

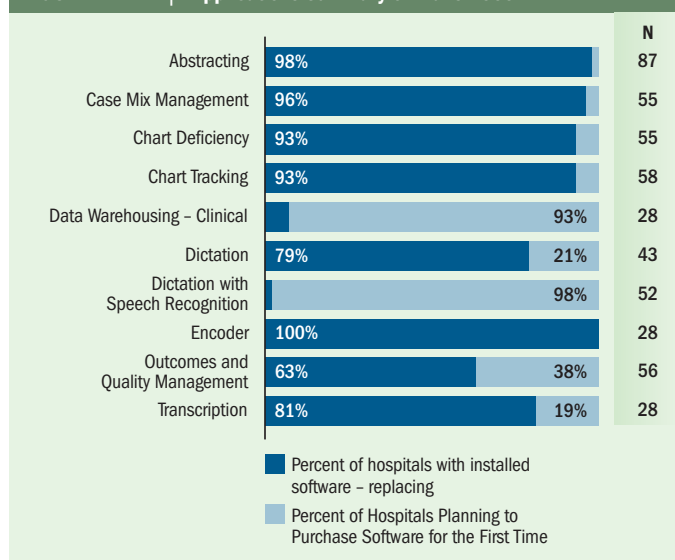
Abstracting, encoder, chart deficiency, chart tracking, and case mix management applications have achieved nearly complete saturation in the hospital health information management (HIM) market (see Figure HIM1). Transcription and dictation applications are approaching market saturation with greater than 85 percent installation rates in hospitals at this time. Dictation with back-end speech recognition and data warehousing – clinical solutions is just beginning to show market penetration at this time.

FIGURE HIM1 | Summary of Installation (2004/2005)



HIM application penetration in U.S. hospitals has reached or is reaching saturation for most applications, with the exception of dictation with back-end speech recognition and data warehousing – clinical.

FIGURE HIM2 | Applications Summary of Plans 2005



HIM application purchase plans validate the saturation of the market with the majority of purchases being replacement purchases, except for the newer applications of dictation with back-end speech recognition and data warehousing – clinical.

Purchasing plans for HIM applications in hospitals is predominantly a replacement selling market for abstracting, case mix management, encoder, chart deficiency and chart tracking products (see Figure HIM2). The dictation, transcription, and outcomes and quality management markets still have some first time purchase activity, and dictation with back-end speech recognition shows a good market growth trend.

An evaluation of the HIM market by region (urban or rural) and function (academic/non-academic, medical-surgical/other, and single/multiple hospital system) shows that differentiation for HIM applications occurs with chart deficiency, chart tracking, dictation, and dictation with speech recognition applications (see Tables HIM3-9). More urban than rural hospitals have chart deficiency and chart tracking, a larger number of medical/surgical facilities have dictation than non-medical/surgical facilities, and academic/teaching facilities have a higher percentage of dictation with back-end speech recognition implementations than do non-academic/teaching facilities. Medical/surgical facilities are also much more likely than other facilities to use transcription solutions. Other hospitals are much more likely to use data warehousing – clinical solutions than medical/surgical hospitals (see Table HIM11). Urban hospitals are much more likely to be using outcomes and quality management applications than are rural hospitals (see Table HIM12).

TABLE HIM3 | Abstracting

	Installed or In Process	N for Segment
Multi-Hospital	93.89%	2,898
Single Hospital	93.78%	1,078
CBSA (Urban)	94.48%	3,404
CBSA (Rural)	90.21%	572
Academic/Teaching	95.80%	333
Non-Academic	93.69%	3,643
Med/Surg	93.92%	3,240
Other	93.61%	736
N = 3,732		

TABLE HIM4 | Chart Deficiency

	Installed or In Process	N for Segment
Multi-Hospital	90.10%	2,898
Single Hospital	88.96%	1,078
CBSA (Urban)	91.66%	3,404
CBSA (Rural)	78.67%	572
Academic/Teaching	93.39%	333
Non-Academic	89.46%	3,643
Med/Surg	89.63%	3,240
Other	90.49%	736
N = 3,570		

Health Information Management Environment (CONTINUED)

TABLE HIM5 | Chart Tracking

	Installed or In Process	N for Segment
Multi-Hospital	89.13%	2,898
Single Hospital	89.61%	1,078
CBSA (Urban)	91.07%	3,404
CBSA (Rural)	78.50%	572
Academic/Teaching	92.49%	333
Non-Academic	88.97%	3,643
Med/Surg	89.17%	3,240
Other	89.67%	736

N = 3,549

TABLE HIM6 | Dictation

	Installed or In Process	N for Segment
Multi-Hospital	79.05%	2,898
Single Hospital	82.00%	1,078
CBSA (Urban)	80.88%	3,404
CBSA (Rural)	73.78%	572
Academic/Teaching	81.08%	333
Non-Academic	79.74%	3,643
Med/Surg	82.01%	3,240
Other	70.38%	736

N = 3,546

TABLE HIM7 | Dictation with Speech Recognition

	Installed or In Process	N for Segment
Multi-Hospital	9.07%	1,831
Single Hospital	8.61%	778
CBSA (Urban)	9.46%	2,231
CBSA (Rural)	5.82%	378
Academic/Teaching	17.24%	203
Non-Academic	8.23%	2,406
Med/Surg	8.40%	2,119
Other	11.22%	490

N = 233

TABLE HIM8 | Encoder

Also included in the revenue cycle management section.

	Installed or In Process	N for Segment
Multi-Hospital	95.69%	2,898
Single Hospital	94.99%	1,078
CBSA (Urban)	96.36%	3,404
CBSA (Rural)	90.38%	572
Academic/Teaching	97.00%	333
Non-Academic	95.36%	3,643
Med/Surg	96.02%	3,240
Other	93.21%	736

N = 3,797

TABLE HIM9 | Transcription

	Installed or In Process	N for Segment
Multi-Hospital	84.40%	2,898
Single Hospital	85.81%	1,078
CBSA (Urban)	85.37%	3,404
CBSA (Rural)	81.29%	572
Academic/Teaching	86.19%	333
Non-Academic	84.66%	3,643
Med/Surg	87.56%	3,240
Other	72.55%	736

N = 640

TABLE HIM10 | Case Mix Management

	Installed or In Process	N for Segment
Multi-Hospital	88.77%	2,859
Single Hospital	85.44%	1,078
CBSA (Urban)	88.79%	3,381
CBSA (Rural)	82.19%	556
Academic/Teaching	93.67%	332
Non-Academic	87.32%	3,605
Med/Surg	88.62%	3,207
Other	84.52%	730

N = 3,459

TABLE HIM11 | Data Warehousing/Mining - Clinical

	Installed or In Process	N for Segment
Multi-Hospital	16.48%	1,790
Single Hospital	11.90%	773
CBSA (Urban)	15.89%	2,202
CBSA (Rural)	10.25%	361
Academic/Teaching	18.72%	203
Non-Academic	14.79%	2,360
Med/Surg	11.91%	2,091
Other	29.24%	472

N = 387

TABLE HIM12 | Outcomes and Quality Management

	Installed or In Process	N for Segment
Multi-Hospital	63.24%	2,859
Single Hospital	57.79%	1,078
CBSA (Urban)	64.51%	3,381
CBSA (Rural)	44.96%	556
Academic/Teaching	65.66%	332
Non-Academic	61.39%	3,605
Med/Surg	63.33%	3,207
Other	54.79%	730

N = 2,431

Health Information Management Environment (CONTINUED)

Evaluating the temporal contract signing for HIM applications shows that the majority of contract signings occurring between 1995 and 1999 were for abstracting, chart deficiency, chart tracking, encoder, transcription applications, case mix management, and outcomes and quality management (see Table HIM13). Dictation, dictation with back-end speech recognition, and data warehousing – clinical are more technology dependent, which is manifested by higher contract signings in the 2000–2005 timeframe, the timeframe where technologies and applications dependent upon technologies have shown significant maturation improvements.

There are two transformations occurring in the HIM market. The first is the embedded encoding that is being built into electronic medical record systems. SNOMED CT appears to be the encoding system most enterprise vendors are embedding

in their clinical documentation systems. The result of embedded encoding in the EMR applications will be the ability to have real time coding of clinical interventions, which will have impacts for utilization review, abstracting, and patient billing systems. The second is the emergence of dictation technologies that convert transcription personnel into editors with the use of dictation solutions that use back-end speech recognition technologies, thereby improving the turnaround for dictated reports.

The HIM environment also seems poised to increase the amount of outsourcing that is being conducted for transcription services. These outsourcing solutions are for the most part conducted using labor within the U.S. But, hospitals evaluating outsourcing solutions must clarify where the outsourcing services are being performed to ensure it meets the service level requirements for their policies.

TABLE HIM13 | Health Information Management Temporal Contract Signing

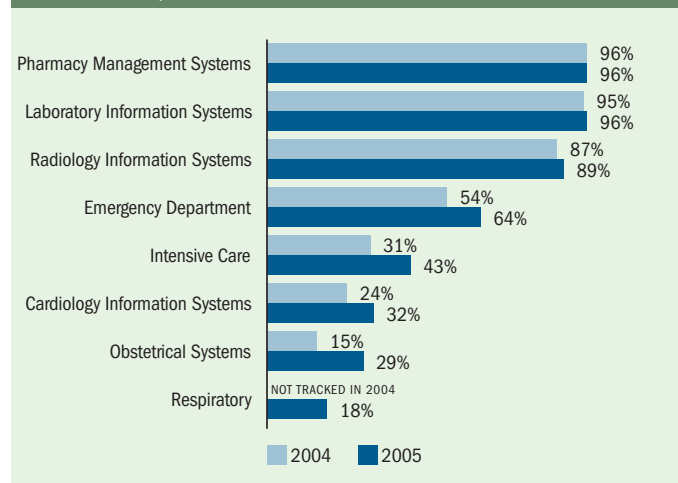
	Abstracting	Chart Deficiency	Chart Tracking	Dictation	Dictation w/ SR	Encoder	Transcription	Case Mix	Warehousing	Outcomes
Prior to 1989	11.75%	8.86%	8.76%	3.76%	0.00%	14.99%	4.08%	12.12%	2.52%	3.89%
1990 to 1994	19.54%	20.07%	18.66%	11.94%	1.05%	18.95%	23.51%	19.71%	13.45%	16.64%
1995 to 1999	42.43%	42.88%	44.74%	38.18%	6.32%	40.41%	41.38%	44.45%	29.41%	49.97%
2000 to 2005	26.28%	28.19%	27.85%	46.12%	92.63%	25.65%	31.03%	23.72%	54.62%	29.50%

Ancillary/Department Clinical Systems Environment

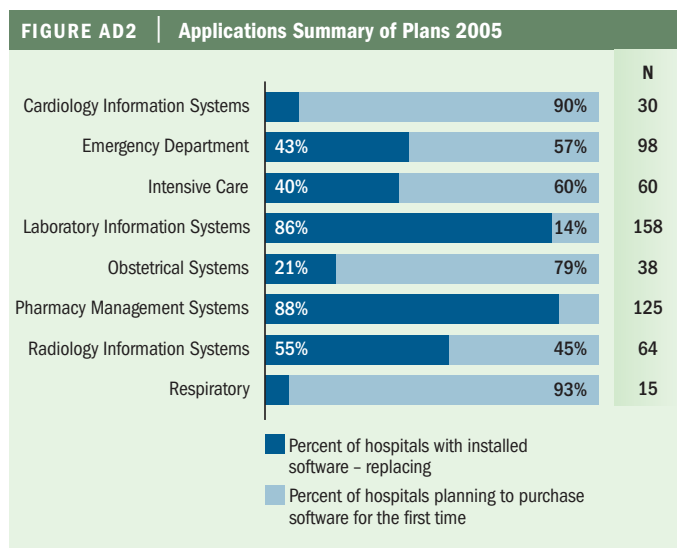
Ancillary/department clinical systems continue to be almost completely saturated for pharmacy and laboratory applications, while radiology implementations have been achieved in almost 90 percent of the market (see Figure AD1). Emergency department applications have been installed or are in the process of being installed in almost two-thirds of hospitals. A little more than four in ten hospitals have installed intensive care systems, while almost one-third of hospitals have installed cardiology information and obstetrical systems. Respiratory application installations are approaching one-quarter market penetration.

Emergency department growth between 2004 and 2005 was almost 16 percent, while intensive care and cardiology information system growth over the same period was approximately 28 and 25 percent respectively. The largest market segment growth was recorded in the obstetrical system market with approximately 48 percent growth from 2004 to 2005.

FIGURE AD1 | Summary of Installation (2004/2005)



Ancillary/Department Clinical Systems Environment (CONTINUED)



New system purchases in the ancillary department system market are more prevalent with the cardiology, emergency department, intensive care, obstetrical, and respiratory applications. The radiology, pharmacy, and laboratory systems markets are replacement selling markets (see *Figure AD2*).

An evaluation of the market by segments by region or function provides additional insights into the ancillary clinical department environment. Cardiology information systems present market differentiation that manifests higher installs in urban and academic/teaching hospitals (see *Table AD3*). Emergency department information systems (EDIS) show more installations in urban and medical/surgical hospitals (see *Table AD4*). Intensive care implementations for intensive care units (ICU) are higher in the academic/teaching hospitals (see *Table AD5*). Laboratory (see *Table AD6*) and obstetrical (OB) systems (see *Table AD7*) have higher implementation percentages in urban hospital settings. Urban and medical/surgical hospitals have higher installation rates for pharmacy applications (see *Table AD8*), while urban and academic/teaching hospitals have higher installation rates for radiology systems (see *Table AD9*). Currently, we can find no differentiation for implementations for respiratory systems based on region or function (see *Table AD10*).

TABLE AD3 | Cardiology Information Systems

	Installed or In Process	N for Segment
Multi-Hospital	29.07%	2,859
Single Hospital	29.22%	1,078
CBSA (Urban)	31.91%	3,381
CBSA (Rural)	12.05%	556
Academic/Teaching	44.28%	332
Non-Academic	27.71%	3,605
Med/Surg	29.59%	3,207
Other	26.99%	730

N = 1,146

TABLE AD4 | Emergency Dept. Information System

	Installed or In Process	N for Segment
Multi-Hospital	53.13%	2,859
Single Hospital	51.58%	1,078
CBSA (Urban)	54.57%	3,381
CBSA (Rural)	41.37%	556
Academic/Teaching	59.34%	332
Non-Academic	52.09%	3,605
Med/Surg	55.25%	3,207
Other	41.51%	730

N = 2,075

TABLE AD5 | ICU Information System

	Installed or In Process	N for Segment
Multi-Hospital	34.17%	2,859
Single Hospital	36.55%	1,078
CBSA (Urban)	35.94%	3,381
CBSA (Rural)	28.06%	556
Academic/Teaching	44.88%	332
Non-Academic	33.90%	3,605
Med/Surg	35.30%	3,207
Other	32.74%	730

N = 1,371

TABLE AD6 | Laboratory Information System

	Installed or In Process	N for Segment
Multi-Hospital	89.75%	2,859
Single Hospital	90.45%	1,078
CBSA (Urban)	91.81%	3,381
CBSA (Rural)	78.60%	556
Academic/Teaching	95.48%	332
Non-Academic	89.43%	3,605
Med/Surg	90.83%	3,207
Other	86.03%	730

N = 3,541

Ancillary/Department Clinical Systems Environment (CONTINUED)

TABLE AD7 | OB Systems

	Installed or In Process	N for Segment
Multi-Hospital	21.69%	2,859
Single Hospital	26.90%	1,078
CBSA (Urban)	24.82%	3,381
CBSA (Rural)	12.77%	556
Academic/Teaching	27.11%	332
Non-Academic	22.75%	3,605
Med/Surg	24.48%	3,207
Other	17.12%	730

N = 910

TABLE AD8 | Pharmacy Information System

	Installed or In Process	N for Segment
Multi-Hospital	81.95%	2,859
Single Hospital	89.42%	1,078
CBSA (Urban)	85.63%	3,381
CBSA (Rural)	74.10%	556
Academic/Teaching	90.06%	332
Non-Academic	83.44%	3,605
Med/Surg	86.34%	3,207
Other	73.70%	730

N = 3,307

A review of buying patterns as manifested in contract signings over the years demonstrates that the newer ancillary systems represented by cardiology, emergency, intensive care, and obstetrical departments have taken place in the 2000 to 2005 time frame (*see Table AD11*). Laboratory, radiology, and respiratory departments had the highest application buying in the 1995–1999 timeframe. The pharmacy department is interesting in that it demonstrates approximately the same amount of buying across the 1995–1999 and 2000–2005 timeframes.

The ancillary/department clinical systems market is populated by legacy applications that have achieved near market saturation (laboratory, radiology, pharmacy), emerging departmental applications (cardiology, emergency, intensive care, and obstetrical), and slower penetration applications (respiratory therapy). Pharmacy applications represent in some cases legacy applications

TABLE AD9 | Radiology Information System

	Installed or In Process	N for Segment
Multi-Hospital	80.94%	2,859
Single Hospital	84.60%	1,078
CBSA (Urban)	85.00%	3,381
CBSA (Rural)	63.31%	556
Academic/Teaching	93.37%	332
Non-Academic	80.89%	3,605
Med/Surg	83.10%	3,207
Other	76.85%	730

N = 3,226

TABLE AD10 | Respiratory Therapy Information System

	Installed or In Process	N for Segment
Multi-Hospital	15.70%	1,790
Single Hospital	20.83%	773
CBSA (Urban)	18.03%	2,202
CBSA (Rural)	12.47%	361
Academic/Teaching	25.12%	203
Non-Academic	16.57%	2,360
Med/Surg	17.36%	2,091
Other	16.74%	472

N = 442

that are being replaced by next generation pharmacy applications that are more tightly coupled with electronic medication administration records (eMAR) and computerized provider order entry (CPOE) systems to affect improved patient safety. Departments that are revenue generators (e.g. cardiology and emergency), or high cost/high risk environments (e.g. intensive care and obstetrical units) are showing good growth factors for the market.

While ancillary/department clinical systems do not require purchase from enterprise electronic medical record (EMR) vendors to ensure good clinical data integration, selection of applications from niche vendors requires that a hospital perform the appropriate architectural analysis to ensure that these systems can be effectively integrated with EMR environments that exist in the hospitals. This is especially important for the pharmacy applications as discussed above for the improvement of patient safety.

TABLE AD11 | Ancillary Clinical Department System Temporal Contract Signing

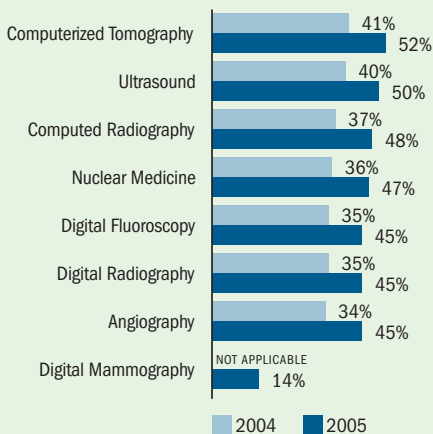
	Cardiology IS	EDIS	Intensive Care (ICU)	Laboratory	Obstetrical Systems	Pharmacy IS	Radiology IS	Respiratory
Prior to 1989	0.88%	2.26%	4.11%	10.51%	2.12%	6.24%	6.33%	1.82%
1990 to 1994	5.25%	7.98%	12.00%	19.65%	9.79%	15.52%	14.55%	7.88%
1995 to 1999	25.60%	39.68%	38.86%	38.85%	26.19%	38.97%	42.72%	49.70%
2000 to 2005	68.27%	50.08%	45.03%	31.00%	61.90%	39.26%	36.40%	40.61%

Radiology PACS Environment

The radiology picture archive and communication systems (PACS) market continues to show good growth as most of the modalities have achieved or are close to achieving a 50 percent implementation percentage in the hospital market (see Figure RPACS1). Growth rates among the modalities from 2004 to 2005 range from 25 to 32 percent, which reflects the continued rapid growth of this market.

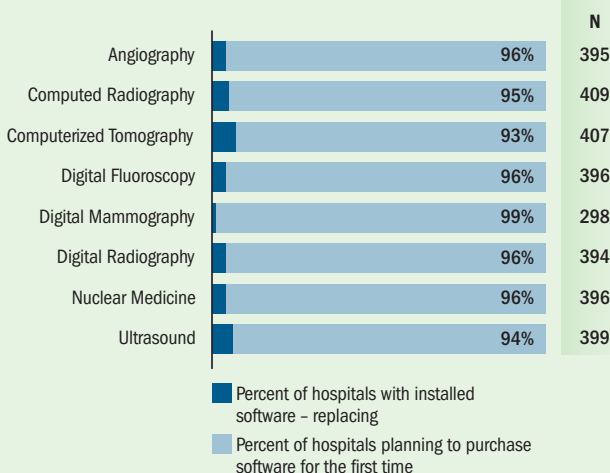
Rapid growth of this market is also demonstrated in the purchase plans for radiology PACS. All modalities show that at least 93 percent of the buying is for first time purchases (see Figure RPACS2). Approximately 400 hospitals have plans for buying all modalities except for digital mammography, with approximately 300 hospitals looking to buy digital mammography for the first time.

FIGURE RPACS1 | Summary of Installation (2004/2005)



It appears that hospitals are implementing the majority of modalities for radiology PACS at the same time.

FIGURE RPACS2 | Applications of Summary Plans 2005



An evaluation of market segmentation by region (urban vs. rural) and function (multi-hospital – single hospital, academic/teaching – non-academic, and medical/surgical – other) provides additional insights into where specific modalities are being implemented. Urban and academic/teaching hospitals manifest the largest implementation differentiation in the data for all modalities except for digital mammography (see Tables RPACS3-10). Digital mammography has a significant differentiation with applications only in the academic/teaching – non-academic segment.

TABLE RPACS3 | Angiography

	Installed or In Process	N for Segment
Multi-Hospital	34.10%	2,859
Single Hospital	35.81%	1,078
CBSA (Urban)	38.07%	3,381
CBSA (Rural)	13.31%	556
Academic/Teaching	67.47%	332
Non-Academic	31.54%	3,605
Med/Surg	33.12%	3,207
Other	40.96%	730

N = 1,361

TABLE RPACS4 | Computed Radiography

	Installed or In Process	N for Segment
Multi-Hospital	36.48%	2,859
Single Hospital	38.78%	1,078
CBSA (Urban)	40.31%	3,381
CBSA (Rural)	17.63%	556
Academic/Teaching	70.78%	332
Non-Academic	34.01%	3,605
Med/Surg	35.42%	3,207
Other	44.52%	730

N = 1,461

TABLE RPACS5 | Computerized Tomography

	Installed or In Process	N for Segment
Multi-Hospital	39.52%	2,859
Single Hospital	44.90%	1,078
CBSA (Urban)	44.16%	3,381
CBSA (Rural)	21.76%	556
Academic/Teaching	74.40%	332
Non-Academic	37.92%	3,605
Med/Surg	39.44%	3,207
Other	47.81%	730

N = 1,614

Radiology PACS Environment (CONTINUED)

TABLE RPACS6 | Digital Fluoroscopy

	Installed or In Process	N for Segment
Multi-Hospital	34.56%	2,859
Single Hospital	36.55%	1,078
CBSA (Urban)	38.36%	3,381
CBSA (Rural)	15.29%	556
Academic/Teaching	68.67%	332
Non-Academic	32.01%	3,605
Med/Surg	33.43%	3,207
Other	42.47%	730

N = 1,382

TABLE RPACS7 | Digital Mammography

	Installed or In Process	N for Segment
Multi-Hospital	10.17%	1,790
Single Hospital	13.20%	773
CBSA (Urban)	12.22%	2,202
CBSA (Rural)	4.16%	361
Academic/Teaching	23.65%	203
Non-Academic	10.00%	2,360
Med/Surg	10.52%	2,091
Other	13.56%	472

N = 284

TABLE RPACS8 | Digital Radiography

	Installed or In Process	N for Segment
Multi-Hospital	34.52%	2,859
Single Hospital	35.71%	1,078
CBSA (Urban)	38.12%	3,381
CBSA (Rural)	14.93%	556
Academic/Teaching	67.47%	332
Non-Academic	31.84%	3,605
Med/Surg	33.21%	3,207
Other	42.05%	730

N = 1,372

TABLE RPACS9 | Nuclear Medicine

	Installed or In Process	N for Segment
Multi-Hospital	35.19%	2,859
Single Hospital	39.80%	1,078
CBSA (Urban)	39.99%	3,381
CBSA (Rural)	14.93%	556
Academic/Teaching	67.77%	332
Non-Academic	33.56%	3,605
Med/Surg	35.17%	3,207
Other	42.05%	730

N = 1,435

TABLE RPACS10 | Ultrasound

	Installed or In Process	N for Segment
Multi-Hospital	38.09%	2,859
Single Hospital	42.86%	1,078
CBSA (Urban)	42.65%	3,381
CBSA (Rural)	19.60%	556
Academic/Teaching	70.48%	332
Non-Academic	36.53%	3,605
Med/Surg	38.01%	3,207
Other	45.48%	730

N = 1,551

A review of temporal contract signing shows the recent purchases of radiology PACS applications with the significantly higher percentages taking place in the 2000–2005 timeframe (*see Table RPACS11*). That is expected as PACS is a newer technology, and one that is obviously demonstrating value in hospitals.

Radiology PACS has become a stable solution that is being rapidly adopted by hospitals across all market segments. It is also interesting to note that most hospitals that install radiology PACS are installing the majority of the modalities at one time. This is one environment where the “big bang” approach to implementations appears to work.

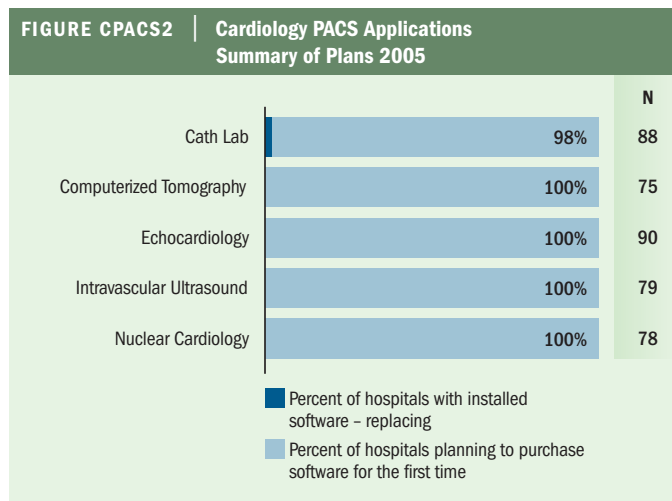
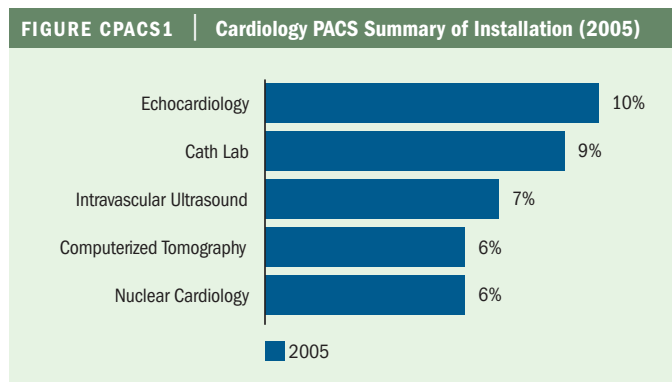
TABLE RPACS11 | Temporal Contract Signing

	Angiography	Computed Radiography	Computerized Tomography	Digital Fluoroscopy	Digital Mammography	Digital Radiography	Nuclear Medicine	Ultrasound
Prior to 1989	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
1990 to 1994	0.29%	0.26%	0.24%	0.28%	0.00%	0.28%	0.27%	0.25%
1995 to 1999	10.37%	10.83%	10.31%	10.44%	9.50%	10.19%	10.20%	10.88%
2000 to 2005	89.34%	88.91%	89.45%	89.28%	90.50%	89.53%	89.53%	88.87%

Cardiology PACS Environment

In 2005, HIMSS Analytics began to track more detailed modality information on cardiology picture archive and communications systems (PACS). At the present time more hospitals have installed echocardiology and catheter laboratory systems than other modalities, but the other modalities are not far behind these leaders (*see Figure CPACS1*). It is still too early to tell in this emerging market if cardiology PACS will follow the same implementation path as radiology PACS – implementing the majority of the PACS modules at the same time (e.g. big bang implementation).

Buying patterns in this market show a similar number of hospitals evaluating the cardiology PACS applications for first time purchase (*see Figure CPACS2*). This is another indicator that the implementation for cardiology PACS may follow what we have historically seen with radiology PACS.



An evaluation of market segments by region (urban vs. rural) and function (multi-hospital – single hospital, academic/teaching – non-academic, and medical/surgical – other) provides insights into which market segments are more focused on these applications. Currently the academic/teaching and urban hospitals are more likely to install all modalities of cardiology PACS (*see Tables CPACS3-7*). This is not surprising, as academic/teaching and urban hospitals are more likely to be the pioneers for implementing new healthcare IT applications.

TABLE CPACS3 | Cath Lab

	Installed or In Process	N for Segment
Multi-Hospital	8.21%	1,790
Single Hospital	10.35%	773
CBSA (Urban)	10.08%	2,202
CBSA (Rural)	1.39%	361
Academic/Teaching	24.63%	203
Non-Academic	7.50%	2,360
Med/Surg	7.99%	2,091
Other	12.71%	472

N = 227

TABLE CPACS4 | CT (Computerized Tomography)

	Installed or In Process	N for Segment
Multi-Hospital	5.20%	1,790
Single Hospital	7.12%	773
CBSA (Urban)	6.49%	2,202
CBSA (Rural)	1.39%	361
Academic/Teaching	14.78%	203
Non-Academic	5.00%	2,360
Med/Surg	5.40%	2,091
Other	7.42%	472

N = 149

TABLE CPACS5 | Echocardiology

	Installed or In Process	N for Segment
Multi-Hospital	9.50%	1,790
Single Hospital	8.93%	773
CBSA (Urban)	10.45%	2,202
CBSA (Rural)	2.49%	361
Academic/Teaching	22.66%	203
Non-Academic	8.18%	2,360
Med/Surg	8.66%	2,091
Other	12.29%	472

N = 239

► Cardiology PACS Environment (CONTINUED)

A review of temporal contract signing demonstrates the relative adolescence of cardiology PACS applications, as the vast majority has been implemented in the 2000–2005 timeframe (see Table CPACS8).

Cardiology PACS is an emerging market that may parallel the implementations of modality PACS solutions in radiology.

Radiology PACS implementations are characterized by a model where all of the modalities are implemented at the same time – often called a “big bang” implementation. Hospitals looking to implement these applications would be well advised to consult peer organizations that have already implemented cardiology PACS solutions to determine the best vendor solutions and implementation approaches.

TABLE CPACS6 Intravascular Ultrasound		
	Installed or In Process	N for Segment
Multi-Hospital	6.31%	1,790
Single Hospital	6.99%	773
CBSA (Urban)	7.40%	2,202
CBSA (Rural)	1.11%	361
Academic/Teaching	13.30%	203
Non-Academic	5.93%	2,360
Med/Surg	7.32%	2,091
Other	6.78%	472

N = 167

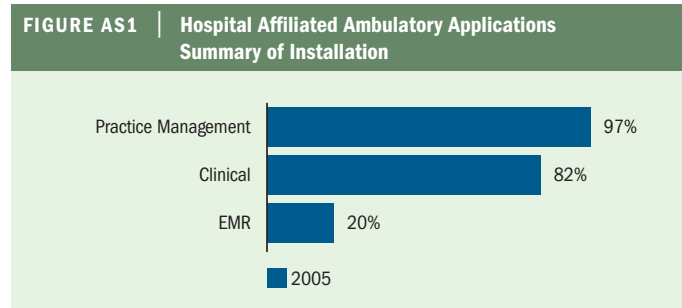
TABLE CPACS7 Nuclear Cardiology		
	Installed or In Process	N for Segment
Multi-Hospital	4.75%	1,790
Single Hospital	6.21%	773
CBSA (Urban)	5.77%	2,202
CBSA (Rural)	1.66%	361
Academic/Teaching	11.82%	203
Non-Academic	4.62%	2,360
Med/Surg	4.97%	2,091
Other	6.14%	472

N = 133

TABLE CPACS8 Cardiology PACS System Temporal Contract Signing						
	Cath Lab	CT (Computerized Tomography)	Echocardiology	Intravascular Ultrasound	Nuclear Cardiology	
Prior to 1989	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
1990 to 1994	0.00%	0.00%	1.03%	0.00%	0.00%	0.00%
1995 to 1999	7.48%	7.81%	4.12%	7.58%	6.67%	6.67%
2000 to 2005	92.52%	92.19%	94.85%	92.42%	93.33%	93.33%

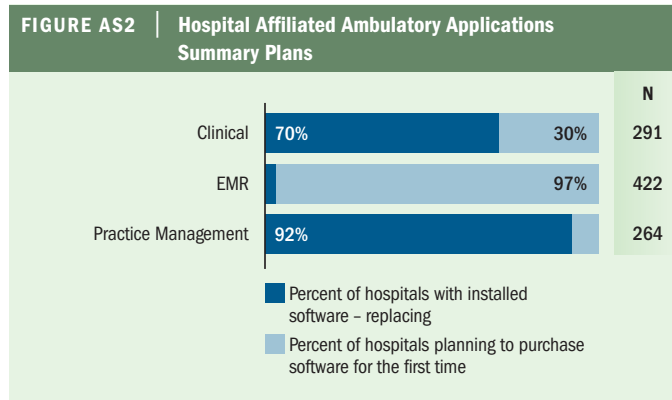
► Hospital Affiliated Ambulatory System Environment

The hospital affiliated ambulatory systems environment represents applications that support practice management and the clinical and electronic medical record (EMR) components of clinics that are owned or operated by a hospital or health system. These ambulatory facilities are almost saturated with practice management applications, and have achieved implementations for eight in 10 facilities for clinical applications (e.g. lab, pharmacy, radiology). But, only 20 percent of these facilities have implemented an EMR at this time (see Figure AS1).



Hospital Affiliated Ambulatory System Environment (CONTINUED)

The purchasing activity for applications in this market reveals a high percentage of replacement acquisitions for practice management and clinical applications, while the EMR market is still a first-time purchase for the majority of ambulatory clinics affiliated with hospitals or health systems (see Figure AS2).



An evaluation of market segmentation by region (urban vs. rural) and function (multi-hospital – single hospital, academic/teaching – non-academic, and medical/surgical – other) provides additional insights into where specific hospital affiliated ambulatory application components show segmentation differentiation. Ambulatory clinical applications are more prevalent in clinics that are owned or operated by either non-academic or medical

TABLE AS3 | Ambulatory Clinical

	Installed or In Process	N for Segment
Multi-Hospital	48.71%	5,487
Single Hospital	47.19%	3,160
CBSA (Urban)	48.64%	7,733
CBSA (Rural)	44.35%	914
Academic/Teaching	37.60%	1,164
Non-Academic	50.34%	7,483
Med/Surg	52.90%	6,919
Other	35.41%	1,728

N = 8,647

TABLE AS4 | Ambulatory Practice Management

	Installed or In Process	N for Segment
Multi-Hospital	55.69%	6,273
Single Hospital	65.58%	4,391
CBSA (Urban)	59.70%	9,492
CBSA (Rural)	56.91%	1,173
Academic/Teaching	46.74%	1,447
Non-Academic	62.01%	9,217
Med/Surg	61.21%	8,006
Other	54.47%	2,658

N = 10,664

surgical hospitals (see Table AS3). Practice management applications show differentiation in that they have higher implementation rates in clinics owned and operated by either single hospitals or non-academic hospitals (see Table AS4). There is no significant implementation differentiation for any segment for EMR applications (see Table AS5).

A review of temporal contract signing demonstrates more contracting activity for the hospital affiliated ambulatory systems related to clinical and EMR products and that most of these applications were purchased in the 2000–2005 timeframe, while practice management applications had approximately the same percentage of acquisition over the 1995–1999 and 2000–2005 timeframes (see Table AS6).

Ambulatory facilities associated with hospitals have high percentages of practice management and clinical applications installed, but appear to be signaling a trend whereby replacement activity is becoming commonplace. As hospitals begin to integrate more of their inpatient and outpatient service flows, the requirement for well-integrated acute care and ambulatory applications will become more demanding. The ambulatory EMR market is still emerging relative to system implementations, but continues to be driven by payer and employer demands for capturing and sharing secure personal health information of patients.

TABLE AS5 | Ambulatory EMR

	Installed or In Process	N for Segment
Multi-Hospital	6.49%	731
Single Hospital	7.80%	522
CBSA (Urban)	6.96%	1,106
CBSA (Rural)	7.13%	147
Academic/Teaching	4.68%	145
Non-Academic	7.45%	1,108
Med/Surg	7.96%	1,041
Other	4.34%	212

N = 1,253

TABLE AS6 | Ambulatory Systems Temporal Contract Signing

	Clinical	EMR	Practice Management
Prior to 1989	5.32%	1.04%	5.17%
1990 to 1994	10.24%	3.03%	12.01%
1995 to 1999	35.95%	7.58%	40.02%
2000 to 2005	48.49%	88.35%	42.81%

Electronic Medical Record Environment

The electronic medical record (EMR) environment for the purposes of this research consists of the key applications that are required to create and manage the clinical data generated by patient treatment services in hospitals. We are also introducing a new application term – enterprise EMR. The enterprise EMR is an application that contains all of the components of the EMR, but transcends a single modality or hospital with its functions and features. By measuring enterprise EMR activity we can determine the market demand for the complete environment. By measuring specific components (order entry, clinical data repository, clinical decision support, computerized provider order entry, physician documentation, and medical terminology), we can begin to delineate the paths that hospitals are taking as they make the journey toward an enterprise EMR. We also consider clinical documentation a component of the EMR, but we will review that application as part of the nursing application environment.

Order entry applications represent the one true legacy application in the EMR environment. This application was created to capture billing charges more than to improve patient care. But over time, order entry systems became more sophisticated by adding rules engines for conflict checking, and the ability to link several orders to one master order (e.g. exploding orders). Order entry systems could be used to establish work-lists for departments (e.g. order communications) and to even create entries on scheduling systems. Currently almost all hospitals have order entry systems, and have made good progress in the implementation of clinical data repository (CDR), clinical decision support systems (CDSS), and enterprise EMR systems, as all of these applications have better than a 50 percent implementation rate. (see *Figure EMR1*).

Applications such as CPOE and physician documentation require a more significant EMR infrastructure to be successfully implemented in most cases, and therefore, will lag behind the market implementation of other EMR components.

Medical terminology applications (e.g. controlled medical vocabularies) are becoming more established, and in many cases are embedded in the CDR applications of vendors. These applications are extremely important to the EMR environment because they normalize data that is received from several sources. Normalized data can be used more effectively with all of the other EMR components, but most importantly to feed clinical decision support systems.

A study of purchase plans for the EMR market shows significant activity for CDR, CPOE, enterprise EMR, and order entry. Clinical decision support and physician documentation are showing a good level of interest, while medical terminology interest is just beginning to come to the forefront (see *Figure EMR2*).

Evaluation of the EMR market by region and function segments shows differentiation across several fronts for the applications. The CDR market has more urban than rural facilities with implementations (see *Table EMR3*), and CDSS is implemented in more multi-hospitals and urban hospitals (see *Table EMR4*).

FIGURE EMR1 | Summary of Installation (2004/2005)

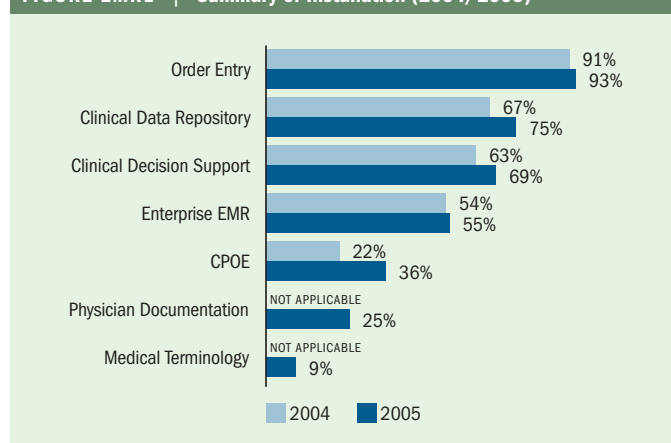
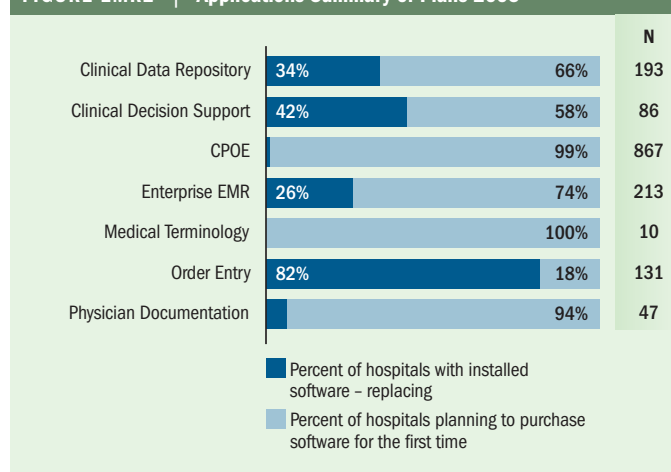


FIGURE EMR2 | Applications Summary of Plans 2005



► Electronic Medical Record Environment (CONTINUED)

The implementation of CPOE provides expected results of higher percentages for urban and academic/teaching facilities, but also shows that specialty hospitals (non-medical/surgical) are more likely to have this application (see Table EMR5). The enterprise EMR is most likely to be implemented in urban and academic/teaching hospitals (see Table EMR6). Order entry and physician documentation applications are most likely to be implemented in urban hospitals (see Tables EMR8 and EMR9). There is no segmentation differentiation for medical vocabulary applications (see Table EMR7).

TABLE EMR3 Clinical Data Repository		
	Installed or In Process	N for Segment
Multi-Hospital	63.87%	2,898
Single Hospital	62.62%	1,078
CBSA (Urban)	66.39%	3,404
CBSA (Rural)	46.50%	572
Academic/Teaching	74.77%	333
Non-Academic	62.50%	3,643
Med/Surg	62.56%	3,240
Other	67.80%	736

N = 2,526

TABLE EMR4 Clinical Decision Support Systems		
	Installed or In Process	N for Segment
Multi-Hospital	61.39%	2,898
Single Hospital	51.02%	1,078
CBSA (Urban)	61.13%	3,404
CBSA (Rural)	43.36%	572
Academic/Teaching	66.67%	333
Non-Academic	57.84%	3,643
Med/Surg	57.13%	3,240
Other	64.95%	736

N = 2,329

TABLE EMR5 CPOE		
	Installed or In Process	N for Segment
Multi-Hospital	15.91%	2,898
Single Hospital	16.33%	1,078
CBSA (Urban)	17.39%	3,404
CBSA (Rural)	7.69%	572
Academic/Teaching	36.64%	333
Non-Academic	14.11%	3,643
Med/Surg	13.49%	3,240
Other	27.04%	736

N = 636

TABLE EMR6 Enterprise EMR		
	Installed or In Process	N for Segment
Multi-Hospital	48.72%	2,859
Single Hospital	54.17%	1,078
CBSA (Urban)	52.35%	3,381
CBSA (Rural)	37.23%	556
Academic/Teaching	63.25%	332
Non-Academic	49.02%	3,605
Med/Surg	50.33%	3,207
Other	49.73%	730

N = 1,971

TABLE EMR7 Medical Terminology/Controlled Medical Vocabulary		
	Installed or In Process	N for Segment
Multi-Hospital	8.10%	1,790
Single Hospital	7.89%	773
CBSA (Urban)	8.27%	2,202
CBSA (Rural)	6.65%	361
Academic/Teaching	7.39%	203
Non-Academic	8.09%	2,360
Med/Surg	7.41%	2,091
Other	10.81%	472

N = 206

TABLE EMR8 Order Entry (Includes Order Communications)		
	Installed or In Process	N for Segment
Multi-Hospital	86.60%	2,859
Single Hospital	84.42%	1,078
Urban	88.52%	3,381
Rural	70.68%	556
Academic/Teaching	88.25%	332
Non-Academic	85.80%	3,605
Med/Surg	86.62%	3,207
Other	83.29%	730

N = 3,386

TABLE EMR9 Physician Documentation		
	Installed or In Process	N for Segment
Multi-Hospital	20.50%	1,790
Single Hospital	19.15%	773
CBSA (Urban)	21.62%	2,202
CBSA (Rural)	10.80%	361
Academic/Teaching	28.57%	203
Non-Academic	19.36%	2,360
Med/Surg	19.66%	2,091
Other	22.03%	472

N = 515

Electronic Medical Record Environment (CONTINUED)

TABLE EMR10 | EMR Temporal Contract Signing

	Clinical Data Repository	Clinical Decision Support	CPOE	Enterprise EMR	Medical Terminology	Order Entry	Physician Documentation
Prior to 1989	2.80%	4.70%	0.48%	2.24%	0.00%	7.85%	1.69%
1990 to 1994	11.86%	16.94%	1.93%	11.71%	0.00%	20.47%	10.17%
1995 to 1999	42.98%	42.92%	10.63%	33.96%	26.47%	41.39%	26.55%
2000 to 2005	42.36%	35.44%	86.96%	52.10%	70.59%	30.29%	61.58%

An analysis of temporal contract signing timeframes shows clinical decision support and order entry had the biggest buying cycles in 1995–1999, which makes sense since many order entry systems had first generation decision support capabilities (e.g., drug interactions). Newer EMR applications such as CPOE, the enterprise EMR, medical terminology, and physician documentation have had the highest purchasing numbers in the 2000–2005 timeframe. Of special note is that the CDR buying activity across the 1995–1999 and 2000–2005 timeframes has remained relatively strong (see Table EMR10). The CDR numbers could also represent some of the replacement buying that is taking place for older generations of the CDR products that were purchased in the 1995–1999 timeframe.

The EMR environment for hospitals is still emerging. Most hospitals are still working on creating the necessary infrastructure of the CDR, CDSS, ancillary department systems, and medical terminology applications to support the more complex clinical documentation, CPOE, and physician documentation applications. HIMSS Analytics has created an EMR Adoption Model that measures and tracks the deployment of clinical system

applications in healthcare. This model demonstrates that most hospitals have not progressed past infrastructure implementations of clinical applications or EMR components at this time (see Figure EMR11).

FIGURE EMR11 | EMR Adoption Model V3

	% of U.S. Hospitals
STAGE 7 Medical record fully electronic; CDO able to contribute to EHR as byproduct of EMR	0.0%
STAGE 6 Physician documentation (structured templates), full CDSS (variance & compliance), full PACS	0.1%
STAGE 5 Closed loop medication administration	0.5%
STAGE 4 CPOE, CDSS (clinical protocols)	1.9%
STAGE 3 Clinical documentation (flow sheets), CDSS (error checking), PACS available outside Radiology	8.1%
STAGE 2 CDR, CMV, CDSS inference engine, may have Document Imaging	49.7%
STAGE 1 Ancillaries – Lab, Rad, Pharmacy	20.5%
STAGE 0 All three ancillaries not installed	19.3%

Bar Code Technology Environment

Bar code technology is critical for reducing or eliminating medication errors, improving operational efficiency, and reducing cost. The bar code usage (26.7 percent) from our last report (May 2005) has increased to 37.3 percent of hospitals in our database (see *Table BC1*). In 2005, we improved our definitions for the use of bar code technology to ensure we were capturing accurate data. The number of hospitals using bar code technology in their materials management operations has increased from 10.6 percent to 18.2 percent over the last seven months.

TABLE BC1 Bar Code Data		
Bar codes are used at 1,482 hospitals out of 3,976 hospitals = 37.3%		
	Percent of Hospitals Using Bar Codes	Percent of All Hospitals
Materials Management Current	48.8%	18.2%
Materials Management Planned	25.8%*	9.6%*
RFID Materials Management	1.2%	0.4%
Nursing Current	43.5%	16.2%
Nursing Planned	35.9%*	7.8%*
FDA Regulations In Pharmacy Current	24.6%	9.2%
FDA Regulations In Pharmacy Planned	77.5%	28.9%
Pharmacy Dispensing Planned	26.4%	9.8%
Pharmacy Administration Current	2.0%	0.7%
Pharmacy Administration Planned	1.2%	0.4%

* Includes only those hospitals that plan to use this type of bar code technology in the future, but do not currently use it.

Radio frequency identification (RFID) technologies are rarely used in hospitals at this time (less than one percent of hospitals are using this technology), but we expect this technology to be more readily adopted by the healthcare industry once the cost of the technology begins to decline as other industries increase their volume of use of this technology.

Approximately 44 percent of hospitals using bar codes are using it in nursing care environments. These environments include the use of bar codes for identification purposes on patients, nurses, and medications. While few hospitals have the entire closed loop medication process implemented using bar code technology, 16 percent of hospitals have implemented some form of bar code technology in their nursing care environments.

The planned purchase of bar code technology for both materials management and nursing care environments shows good activity with approximately 26 percent of hospitals planning to purchase materials management bar code solutions over the next 24 months, and 36 percent of hospitals planning to purchase bar code technology for nursing care environments.

The FDA bar code regulations relative to medication labeling are beginning to drive some hospitals forward with purchasing solutions. While only nine percent of hospitals have compliant FDA bar code technology in the pharmacy, 25 percent of hospitals using bar code solutions have FDA bar code technology for pharmacy. Approximately 29 percent of all hospitals plan to add FDA bar code solutions for pharmacy over the next 24 months, while approximately 78 percent of hospitals currently using bar code technology plan to add FDA compliant bar code technologies.

Less than one percent of hospitals are using bar code technology for pharmacy administration processes (e.g. giving patients medications), while approximately two percent of hospitals that use bar code technologies have addressed this process. The planned purchase of pharmacy administration bar code solutions is also less than one percent for hospitals over the next 24 months. This is not unexpected as the FDA bar code regulations will have an effect on pharmacy administration processes as well as bar code technology implications. Hospitals are beginning to drive implementation of bar code solutions in pharmacy dispensing operations. Approximately 10 percent of U.S. hospitals plan to implement bar code solutions for pharmacy dispensing over the next 24 months. Approximately 26 percent of hospitals that currently use bar code technologies are planning to implement bar code solutions for pharmacy dispensing.

The majority of hospital bar code implementations are being done on a controlled basis to evaluate the benefits of the technology while minimizing the impact to operations. Hospitals that do not think they have a key operational need for bar code technologies will implement bar code technologies as driven by government regulations. Over time, hospitals will begin to realize the benefits of bar code technologies to measure and improve care delivery processes.

Nursing Applications Environment

The applications that HIMSS Analytics tracks in the nursing applications environment are patient scheduling (also tracked in revenue cycle management), nurse staffing, nurse documentation (care plans, nursing notes, vital signs, flow sheets), electronic medication administration record (eMAR), nursing acuity, and radio frequency identification (RFID) patient tracking. Currently 70 percent of hospitals have implemented patient scheduling, while over four in ten hospitals have installed nurse staffing, almost a third of hospitals have implemented nurse documentation and eMAR, 16 percent have installed nursing acuity, and only two percent have installed RFID for patient tracking (see Figure NA1).

An evaluation of future purchases of nursing applications depicts a higher replacement selling market than new purchase market for patient scheduling and nurse staffing applications (see Figure NA2). It is also apparent that hospitals have a focus on patient safety with the largest number of plans being in the eMAR application segment.

FIGURE NA1 | Nursing Application Summary of Installations

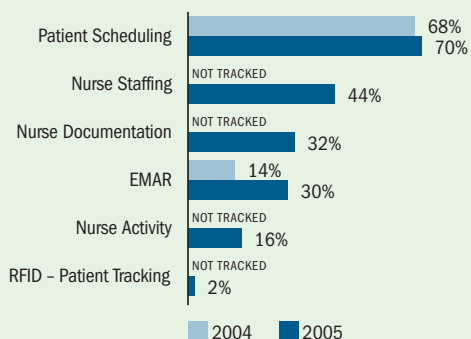
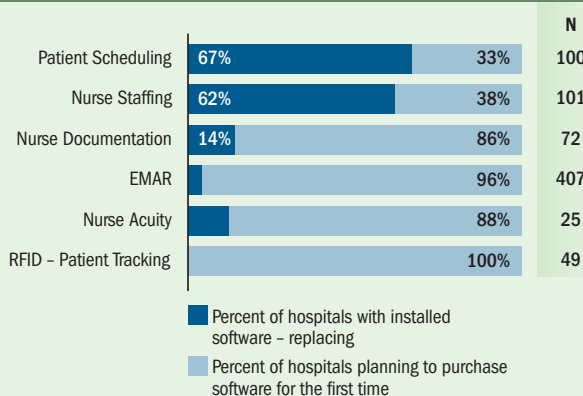


FIGURE NA2 | Nursing Applications Summary of Plans 2005



An evaluation of market segments by region (urban vs. rural) and function (multi-hospital – single hospital, academic/teaching – non-academic, and medical/surgical – other) provides insights into where these nursing applications are being implemented. With the exception of RFID – patient tracking (an emerging solution), all nursing applications have a higher rate of implementation in urban hospital settings, and eMAR and nurse staffing applications are also more likely to be installed in academic/teaching hospitals (see Tables NA3-8).

TABLE NA3 | eMAR

	Installed or In Process	N for Segment
Multi-Hospital	38.94%	1,790
Single Hospital	34.28%	773
CBSA (Urban)	39.83%	2,202
CBSA (Rural)	23.55%	361
Academic/Teaching	47.29%	203
Non-Academic	36.69%	2,360
Med/Surg	38.45%	2,091
Other	33.47%	472

N = 962

TABLE NA4 | Nurse Acuity

	Installed or In Process	N for Segment
Multi-Hospital	13.63%	1,790
Single Hospital	17.72%	773
CBSA (Urban)	15.71%	2,202
CBSA (Rural)	9.70%	361
Academic/Teaching	17.73%	203
Non-Academic	14.62%	2,360
Med/Surg	14.20%	2,091
Other	17.80%	472

N = 381

TABLE NA5 | Nurse Staffing/Scheduling

	Installed or In Process	N for Segment
Multi-Hospital	68.66%	2,859
Single Hospital	60.85%	1,078
CBSA (Urban)	70.28%	3,381
CBSA (Rural)	43.71%	556
Academic/Teaching	84.04%	332
Non-Academic	64.91%	3,605
Med/Surg	67.01%	3,207
Other	64.38%	730

N = 2,619

► Nursing Applications Environment (CONTINUED)

TABLE NA6 | Nursing Documentation

	Installed or In Process	N for Segment
Multi-Hospital	28.27%	1,790
Single Hospital	34.28%	773
CBSA (Urban)	31.20%	2,202
CBSA (Rural)	23.27%	361
Academic/Teaching	33.50%	203
Non-Academic	29.79%	2,360
Med/Surg	31.90%	2,091
Other	22.03%	472

N = 771

TABLE NA7 | Patient Scheduling

	Installed or In Process	N for Segment
Multi-Hospital	65.77%	2,898
Single Hospital	72.73%	1,078
CBSA (Urban)	69.89%	3,404
CBSA (Rural)	54.37%	572
Academic/Teaching	71.77%	333
Non-Academic	67.28%	3,643
Med/Surg	68.86%	3,240
Other	62.36%	736

N = 2,690

TABLE NA8 | RFID – Patient Tracking

	Installed or In Process	N for Segment
Multi-Hospital	2.74%	1,790
Single Hospital	1.29%	773
CBSA (Urban)	2.23%	2,202
CBSA (Rural)	2.77%	361
Academic/Teaching	2.96%	203
Non-Academic	2.25%	2,360
Med/Surg	2.30%	2,091
Other	2.33%	472

N = 59

An evaluation of temporal contract signings for nursing applications shows that the highest percentages of acquisition were in the 2000–2005 timeframe, while nurse acuity, nurse staffing/scheduling, nursing documentation, and patient scheduling demonstrated good activity in the 1995–1999 timeframe (*see Table NA9*).

The nursing application environment is a critical foundation for implementing an electronic medical record (EMR). Nursing applications are key components to building an infrastructure that can support provider order entry and closed loop medication administration processes. Patients are admitted to hospitals for nursing care – not physician care. Therefore, it is our position that this is an environment that hospital executives should focus on and evaluate before moving too far forward with any physician applications beyond results reporting.

TABLE NA9 | Nursing System Temporal Contract Signing

	EMAR	Nurse Acuity	Nurse Staffing/Scheduling	Nursing Documentation	Patient Scheduling	RFID – Patient Tracking
Prior to 1989	1.51%	7.76%	18.12%	3.15%	3.16%	0.00%
1990 to 1994	2.38%	5.17%	21.28%	7.57%	12.71%	12.50%
1995 to 1999	9.50%	31.90%	29.59%	33.44%	41.56%	25.00%
2000 to 2005	86.61%	55.17%	31.01%	55.84%	42.57%	62.50%

Operating Room Environment

The operating room (OR) environment manifests a growing installed base of the various operating room applications which consist of scheduling, pre-operative, peri-operative, and post-operative components. Currently three quarters of U.S. hospitals have pre-operative applications installed, while approximately half have implemented peri-operative and post-operative charting applications. More than three in ten have installed operating room scheduling applications (*see Figure OR1*), and some hospitals are using enterprise patient scheduling systems to schedule operating room activities.

A review of purchasing plans by hospitals shows that OR scheduling and pre-operative charting applications have a higher percentage of replacement buying activity than first time acquisitions for these applications (*see Figure OR2*). However, as nearly two-thirds of the purchases of peri and post operative charting software will be first time purchases, the OR environment represents a growing market for application acquisitions.

FIGURE OR1 | Operating Room Summary Installation

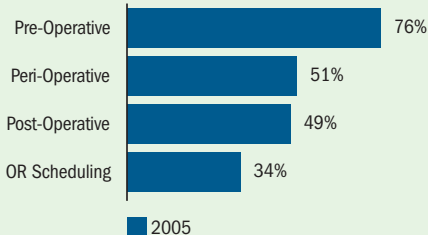
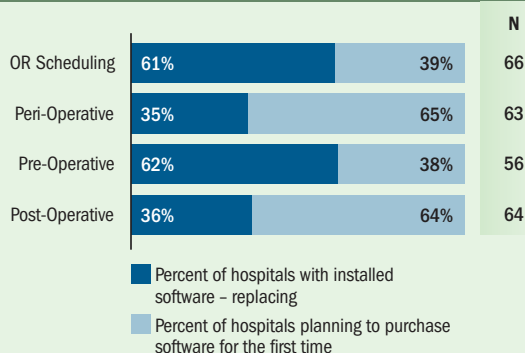


FIGURE OR2 | Operating Room Applications Summary of Plans - 2005



Almost two thirds of hospitals are in the market to replace their existing OR scheduling and pre-operative applications.

An evaluation of market segmentation by region (urban vs. rural) and function (multi-hospital – single hospital, academic/teaching – non-academic, and medical/surgical – other) provides additional insights into where specific OR application components are being implemented. Peri-operative, post-operative, and pre-operative charting applications are more prevalent in urban, academic/teaching, and medical/surgical hospitals (*see Tables OR3-5*).

TABLE OR3 | Operating Room (Surgery) - Peri-Operative

	Installed or In Process	N for Segment
Multi-Hospital	45.47%	1,790
Single Hospital	43.34%	773
CBSA (Urban)	47.55%	2,202
CBSA (Rural)	28.25%	361
Academic/Teaching	56.65%	203
Non-Academic	43.81%	2,360
Med/Surg	46.72%	2,091
Other	36.44%	472

N = 1,149

TABLE OR4 | Operating Room (Surgery) - Post-Operative

	Installed or In Process	N for Segment
Multi-Hospital	44.25%	1,790
Single Hospital	41.01%	773
CBSA (Urban)	46.09%	2,202
CBSA (Rural)	26.04%	361
Academic/Teaching	52.71%	203
Non-Academic	42.46%	2,360
Med/Surg	45.34%	2,091
Other	34.11%	472

N = 1,109

TABLE OR5 | Operating Room (Surgery) - Pre-Operative

	Installed or In Process	N for Segment
Multi-Hospital	70.84%	1,790
Single Hospital	67.66%	773
CBSA (Urban)	74.11%	2,202
CBSA (Rural)	44.04%	361
Academic/Teaching	88.18%	203
Non-Academic	68.31%	2,360
Med/Surg	72.02%	2,091
Other	60.38%	472

N = 1791

▶ Operating Room Environment (CONTINUED)

TABLE OR6 Operative Room (Surgery) – Scheduling		
	Installed or In Process	N for Segment
Multi-Hospital	34.80%	2,859
Single Hospital	28.39%	1,078
CBSA (Urban)	35.26%	3,381
CBSA (Rural)	19.60%	556
Academic/Teaching	44.58%	332
Non-Academic	31.98%	3,605
Med/Surg	34.18%	3,207
Other	28.08%	730

N = 1,301

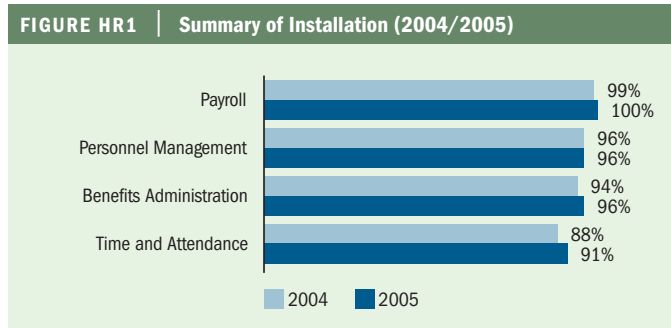
A review of temporal contract signing demonstrates that the majority of contracts for post, pre and peri-operative applications took place between 2000 and 2005 (see Table OR7). This is to be expected as the maturity of the pre/peri/post operative charting applications have improved in function/feature capabilities over the last five years.

The OR application market will continue to grow as the applications become more stable and sophisticated in the management of a significant revenue generating component of a hospital's operations. Over time, with the exception of OR scheduling products, we believe that the OR charting applications that are components of an EMR architecture will dominate niche OR departmental applications.

TABLE OR7 Operating Room Environment Temporal Contract Signing				
	Scheduling	Post-Operative	Pre-Operative	Peri-Operative
Prior to 1989	4.24%	1.89%	8.60%	2.02%
1990 to 1994	15.47%	11.55%	18.55%	11.29%
1995 to 1999	43.18%	35.08%	31.18%	33.67%
2000 to 2005	37.10%	51.47%	41.67%	53.02%

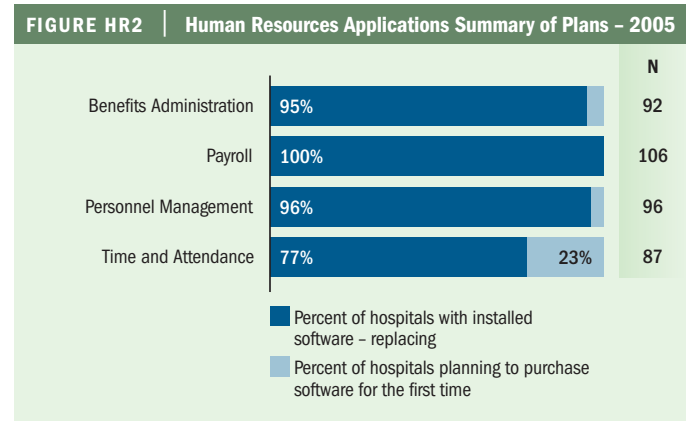
▶ Human Resource Environment

The human resource IT environment in hospitals shows near saturation or saturated penetration rates for payroll, personnel management, benefits administration, and time and attendance systems (see Figure HR1). This should not be a surprise, as these applications are extremely important in managing the payments and benefits for employees. As the industry continues to experience significant staffing shortfalls for nurses, pharmacists, laboratory scientists, and other clinical professionals, it is critically important to provide above average human resource services.



Near market saturation and minimal growth are the hallmark of the human resource IT application market in the hospital market.

Because of the saturated application environment in this market segment, almost all of the purchases of applications will be replacement buying (see Figure HR2). Time and attendance purchases have the highest percentage of new system purchase plans for the HR market. We project that most HR buying will be related to the acquisition of enterprise resource planning system acquisitions, or outsourced services.



The vast majority of purchasing in a saturated market is replacement buying as indicated in this figure. Time and attendance represents the only market with even moderate first time application purchases.

Human Resource Environment (CONTINUED)

The evaluation of the HR market relative to region (urban or rural) or function (multi-hospital/single hospital, academic/non-academic, general medical/other) segments does not show any significant differentiation (*see HR3-6 Tables*).

TABLE HR3 Benefits Administration		
	2005 Data	Number of Hospitals
Multi-Hospital	93.75%	2,898
Single Hospital	87.11%	1,078
CBSA (Urban)	92.69%	3,404
CBSA (Rural)	87.59%	572
Academic/Teaching	94.29%	333
Non-Academic	91.74%	3,643
Med/Surg	91.79%	3,240
Other	92.66%	736

N = 3,656

TABLE HR4 Time & Attendance		
	2005 Data	Number of Hospitals
Multi-Hospital	88.37%	2,898
Single Hospital	81.17%	1,078
CBSA (Urban)	87.69%	3,404
CBSA (Rural)	78.85%	572
Academic/Teaching	87.99%	333
Non-Academic	86.28%	3,643
Med/Surg	86.17%	3,240
Other	87.50%	736

N = 3,436

TABLE HR5 Payroll		
	2005 Data	Number of Hospitals
Multi-Hospital	94.96%	2,898
Single Hospital	96.10%	1,078
CBSA (Urban)	95.21%	3,404
CBSA (Rural)	95.63%	572
Academic/Teaching	95.20%	333
Non-Academic	95.28%	3,643
Med/Surg	95.09%	3,240
Other	96.06%	736

N = 3,788

TABLE HR6 Personnel Management		
	2005 Data	Number of Hospitals
Multi-Hospital	94.20%	2,898
Single Hospital	88.68%	1,078
CBSA (Urban)	93.63%	3,404
CBSA (Rural)	87.24%	572
Academic/Teaching	94.89%	333
Non-Academic	92.51%	3,643
Med/Surg	92.62%	3,240
Other	93.07%	736

N = 3,686

HR applications are one area where hospitals may have some outsourced services currently (e.g. payroll), and present an opportunity for additional successful outsourced services if vendors provide the appropriate level of service level agreements and application flexibility.

Appendix

Application	% of 1,368 hospitals		% of 1,019 hospitals		% of 606 hospitals		% of 441 hospitals		% of 206 hospitals		% of 137 hospitals		% of 160 hospitals	
	0 to 100 Beds		101 to 200 Beds		201 to 300 Beds		301 to 400 Beds		401 to 500 Beds		501 to 600 Beds		600+ Beds	
Abstracting	1,244	90.94%	966	94.80%	570	94.06%	414	93.88%	191	92.72%	128	93.43%	150	93.75%
Accounts Payable	1,306	95.47%	972	95.39%	577	95.21%	414	93.88%	196	95.15%	130	94.89%	148	92.50%
ADT/Registration	1,282	93.71%	958	94.01%	563	92.90%	407	92.29%	185	89.81%	125	91.24%	150	93.75%
Anatomical Pathology	359	26.24%	388	38.08%	256	42.24%	192	43.54%	85	41.26%	60	43.80%	73	45.63%
Benefits Administration	1,221	89.25%	929	91.17%	556	91.75%	411	93.20%	189	91.75%	132	96.35%	151	94.38%
Blood Bank	364	26.61%	418	41.02%	271	44.72%	207	46.94%	92	44.66%	60	43.80%	67	41.88%
Budgeting	1,074	78.51%	854	83.81%	523	86.30%	378	85.71%	180	87.38%	120	87.59%	141	88.13%
Business Intelligence	194	14.18%	177	17.37%	108	17.82%	90	20.41%	31	15.05%	21	15.33%	20	12.50%
Cardiology – Cath Lab	16	1.17%	53	5.20%	35	5.78%	36	8.16%	21	10.19%	24	17.52%	19	11.88%
Cardiology – CT (Computerized Tomography)	13	0.95%	30	2.94%	26	4.29%	22	4.99%	15	7.28%	14	10.22%	11	6.88%
Cardiology – Echocardiology	27	1.97%	50	4.91%	48	7.92%	33	7.48%	21	10.19%	21	15.33%	18	11.25%
Cardiology – Intravascular Ultrasound	15	1.01%	39	3.83%	38	6.27%	23	5.22%	15	7.28%	11	8.03%	13	8.13%
Cardiology – Nuclear Cardiology	11	0.80%	29	2.85%	26	4.29%	19	4.31%	14	6.80%	10	7.30%	9	5.63%
Cardiology Information System	220	16.08%	279	27.38%	224	36.96%	186	42.18%	96	46.60%	59	43.07%	74	46.25%
Case Mix Management	1,117	81.65%	915	89.79%	550	90.76%	403	91.38%	188	91.26%	119	86.86%	148	92.50%
Chart Deficiency	1,127	82.38%	944	92.64%	561	92.57%	412	93.42%	189	91.75%	128	93.43%	145	90.63%
Chart Tracking/Locator	1,129	82.53%	937	91.95%	553	91.25%	409	92.74%	188	91.26%	127	92.70%	144	90.00%
Clinical Data Repository	741	54.17%	685	67.22%	412	67.99%	300	68.03%	134	65.05%	96	70.07%	128	80.00%
Clinical Decision Support	682	49.85%	629	61.73%	371	61.22%	285	64.63%	124	60.19%	92	67.15%	117	73.13%
Computerized Provider Order Entry (CPOE)	135	9.87%	123	12.07%	96	15.84%	66	14.97%	40	19.42%	27	19.71%	49	30.63%
Contract Management	637	46.56%	647	63.49%	435	71.78%	303	68.71%	157	76.21%	99	72.26%	115	71.88%
Cost Accounting	1,004	73.39%	817	80.18%	492	81.19%	370	83.90%	173	83.98%	118	86.13%	140	87.50%
Credit/Collections	1,206	88.16%	929	91.17%	538	88.78%	387	87.76%	179	86.89%	116	84.67%	142	88.75%
CRM – Customer Service	28	2.05%	22	2.16%	19	3.14%	14	3.17%	7	3.40%	5	3.65%	4	2.50%
CRM – Marketing	17	1.24%	17	1.67%	10	1.65%	10	2.27%	5	2.43%	5	3.65%	2	1.25%
Data Warehousing/ Mining – Clinical	131	9.58%	90	8.83%	51	8.42%	48	10.88%	28	13.59%	9	6.57%	14	8.75%
Data Warehousing/ Mining – Financial	154	11.26%	117	11.48%	67	11.06%	65	14.74%	30	14.56%	18	13.14%	17	10.63%

Appendix (CONTINUED)

Application	% of 1,368 hospitals		% of 1,019 hospitals		% of 606 hospitals		% of 441 hospitals		% of 206 hospitals		% of 137 hospitals		% of 160 hospitals	
	0 to 100 Beds		101 to 200 Beds		201 to 300 Beds		301 to 400 Beds		401 to 500 Beds		501 to 600 Beds		600+ Beds	
Dictation	1015	74.20%	834	81.85%	508	83.83%	369	83.67%	172	83.50%	112	81.75%	130	81.25%
Dictation with Speech Recognition	62	4.53%	58	5.69%	37	6.11%	22	4.99%	16	7.77%	10	7.30%	18	11.25%
Electronic Claims - Clearing House Vendor	1264	92.40%	968	95.00%	561	92.57%	415	94.10%	193	93.69%	129	94.16%	152	95.00%
Electronic Data Interchange (EDI) - Clearing House Vendor	295	21.56%	213	20.90%	107	17.66%	90	20.41%	36	17.48%	16	11.68%	32	20.00%
Electronic Medication Administration Record (EMAR)	249	18.20%	226	22.18%	153	25.25%	128	29.03%	56	27.18%	40	29.20%	43	26.88%
Eligibility	399	29.17%	387	37.98%	248	40.92%	207	46.94%	86	41.75%	58	42.34%	72	45.00%
Emergency Department Information System (EDIS)	532	38.89%	578	56.72%	352	58.09%	254	57.60%	124	60.19%	75	54.74%	111	69.38%
Encoder	1257	91.89%	994	97.55%	583	96.20%	427	96.83%	201	97.57%	134	97.81%	150	93.75%
Enterprise EMR	558	40.79%	523	51.32%	322	53.14%	236	53.51%	118	57.28%	82	59.85%	99	61.88%
Enterprise Master Person Index (EMPI)	249	18.20%	166	16.29%	98	16.17%	76	17.23%	21	10.19%	21	15.33%	30	18.75%
Enterprise Resource Planning	196	14.33%	164	16.09%	118	19.47%	78	17.69%	30	14.56%	23	16.79%	23	14.38%
Executive Information System	735	53.73%	681	66.83%	408	67.33%	279	63.27%	128	62.14%	86	62.77%	104	65.00%
General Ledger	1297	94.81%	965	94.70%	575	94.88%	416	94.33%	195	94.66%	130	94.89%	150	93.75%
Intensive Care/Medical Surgical	457	33.41%	414	40.63%	289	47.69%	200	45.35%	106	51.46%	60	43.80%	75	46.88%
Intensive Care/Critical Care (ICU)	384	28.07%	340	33.37%	237	39.11%	169	38.32%	86	41.75%	53	38.69%	73	45.63%
Intensive Care/Neonatal (NICU)	101	7.38%	94	9.22%	68	11.22%	55	12.47%	24	11.65%	16	11.68%	14	8.75%
Laboratory Information System	1126	82.31%	950	93.23%	559	92.24%	412	93.42%	194	94.17%	129	94.16%	149	93.13%
Materials Management	1152	84.21%	941	92.35%	565	93.23%	404	91.61%	194	94.17%	128	93.43%	150	93.75%
Medical Staff Credentialing	232	16.96%	277	27.18%	164	27.06%	130	29.48%	65	31.55%	35	25.55%	44	27.50%
Medical Terminology/Controlled Medical Vocabulary	87	6.36%	49	4.81%	22	3.63%	20	4.54%	10	4.85%	7	5.11%	10	6.25%
Microbiology	394	28.80%	451	44.26%	272	44.88%	199	45.12%	89	43.20%	59	43.07%	70	43.75%
Nurse Acuity	104	7.60%	96	9.42%	78	12.87%	55	12.47%	17	8.25%	10	7.30%	16	10.00%
Nurse Staffing/Scheduling	695	50.80%	688	67.52%	454	74.92%	337	76.42%	170	82.52%	110	80.29%	140	87.50%
Nursing Documentation	182	13.30%	207	20.31%	136	22.44%	105	23.81%	43	20.87%	30	21.90%	32	20.00%
Obstetrical Systems (Labor and Delivery)	198	14.47%	241	23.65%	166	27.39%	151	34.24%	62	30.01%	37	27.01%	45	28.13%
Operating Room (Surgery) – Peri-Operative	272	19.88%	304	29.83%	218	35.97%	156	35.37%	70	33.98%	43	31.39%	50	31.25%
Operating Room (Surgery) – Post-Operative	263	19.23%	301	29.54%	211	34.82%	145	32.88%	70	33.98%	40	29.20%	45	28.13%

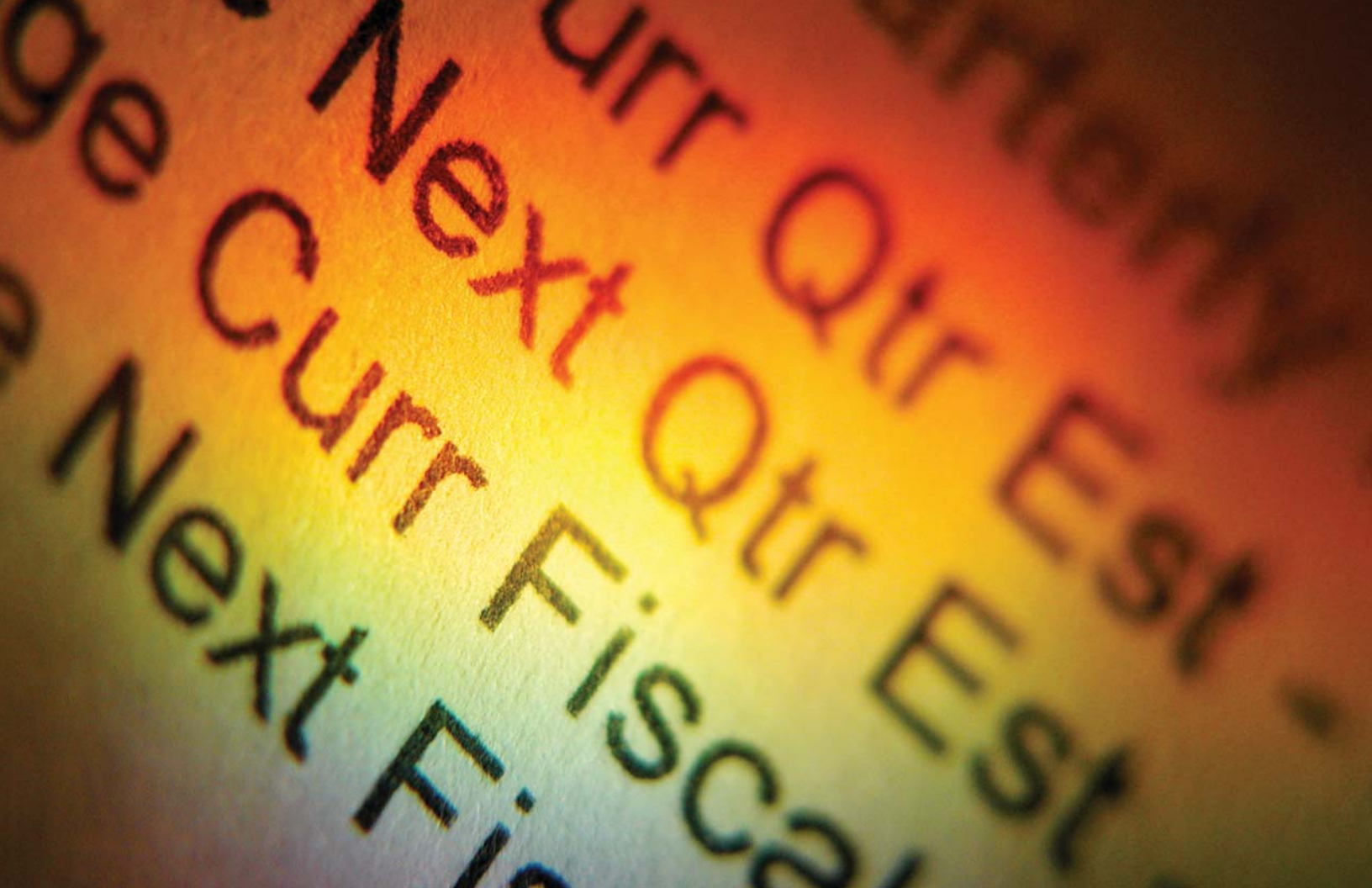
Appendix (CONTINUED)

Application	% of 1,368 hospitals		% of 1,019 hospitals		% of 606 hospitals		% of 441 hospitals		% of 206 hospitals		% of 137 hospitals		% of 160 hospitals	
	0 to 100 Beds		101 to 200 Beds		201 to 300 Beds		301 to 400 Beds		401 to 500 Beds		501 to 600 Beds		600+ Beds	
Operating Room (Surgery) – Pre-Operative	422	30.85%	513	50.34%	318	52.48%	245	55.56%	110	53.40%	73	53.28%	86	53.75%
OR Scheduling	307	22.44%	321	31.50%	253	41.75%	183	41.50%	91	44.17%	64	46.72%	76	47.50%
Order Entry (Includes Order Communications)	1056	77.19%	918	90.09%	538	88.78%	396	89.80%	180	87.38%	119	86.86%	141	88.13%
Outcomes and Quality Management	692	50.58%	659	64.67%	425	70.13%	307	69.61%	141	68.45%	84	61.31%	114	71.25%
Patient Billing	1276	93.27%	975	95.68%	570	94.06%	413	93.65%	185	89.81%	126	91.97%	151	94.38%
Patient Scheduling	813	59.43%	699	68.60%	444	73.27%	320	72.56%	148	71.84%	107	78.10%	117	73.13%
Payroll	1300	95.03%	966	94.80%	567	93.56%	410	92.97%	193	93.69%	134	97.81%	152	95.00%
Personnel Management	1226	89.62%	939	92.15%	564	93.07%	411	93.20%	193	93.69%	133	97.08%	152	95.00%
Pharmacy Management System	1007	73.61%	904	88.71%	537	88.61%	378	85.71%	178	86.41%	116	84.67%	145	90.63%
Physician Documentation	130	9.50%	122	11.97%	82	13.53%	61	13.83%	35	16.99%	19	13.87%	23	14.38%
Radiology – Angiography	230	16.81%	313	30.72%	231	38.12%	199	45.12%	113	54.85%	81	59.12%	114	71.25%
Radiology – CR (Computed Radiography)	264	19.30%	332	32.58%	250	41.25%	200	45.35%	120	58.25%	90	65.69%	121	75.63%
Radiology – CT (Computerized Tomography)	314	22.95%	385	37.78%	267	44.06%	220	49.89%	131	63.59%	95	69.34%	123	76.88%
Radiology – DF (Digital Fluoroscopy)	241	17.62%	320	31.40%	235	38.78%	194	43.99%	116	56.31%	81	59.12%	114	71.25%
Radiology – Digital Mammography	42	3.07%	57	5.59%	39	6.44%	40	9.07%	26	12.62%	13	9.49%	25	15.63%
Radiology - DR (Digital Radiography)	238	17.40%	316	31.01%	232	38.28%	193	43.76%	117	56.80%	84	61.31%	114	71.25%
Radiology – MRI (Magnetic Resonance Imaging)	282	20.61%	358	35.13%	259	42.74%	214	48.53%	126	61.17%	91	66.42%	120	75.00%
Radiology – Nuclear Medicine	244	17.84%	344	33.76%	248	40.92%	204	46.26%	121	58.74%	85	62.04%	111	69.38%
Radiology – U.S. (Ultrasound)	296	21.64%	374	36.70%	263	43.40%	207	46.94%	127	61.65%	87	63.50%	119	74.38%
Radiology Information System	928	67.84%	874	85.77%	534	88.12%	401	90.93%	185	89.81%	126	91.97%	146	91.25%
Respiratory Care Information System	123	8.99%	115	11.29%	80	13.20%	58	13.15%	24	11.65%	13	9.49%	21	13.13%
RFID – Patient Tracking	15	1.01%	11	1.08%	8	1.32%	10	2.27%	3	1.46%	2	1.46%	3	1.88%
RFID – Supply Tracking	23	1.68%	8	0.79%	6	0.99%	7	1.59%	4	1.94%	1	0.73%	0	0.00%
Staff Scheduling	205	14.99%	163	16.00%	106	17.49%	92	20.86%	35	16.99%	25	18.25%	26	16.25%
Telemedicine – Pathology	19	1.39%	25	2.45%	12	1.98%	11	2.49%	6	2.91%	5	3.65%	4	2.50%
Telemedicine – Radiology	103	7.53%	74	7.26%	51	8.42%	34	7.71%	17	8.25%	11	8.03%	10	6.25%
Time and Attendance	1130	82.60%	879	86.26%	521	85.97%	396	89.80%	187	90.78%	124	90.51%	149	93.13%
Transcription	1072	78.36%	887	87.05%	529	87.29%	400	90.70%	179	86.89%	119	86.86%	140	87.50%

Appendix (CONTINUED)

Document Management	% of 1,368 hospitals		% of 1,019 hospitals		% of 606 hospitals		% of 441 hospitals		% of 206 hospitals		% of 137 hospitals		% of 160 hospitals	
	0 to 100 Beds		101 to 200 Beds		201 to 300 Beds		301 to 400 Beds		401 to 500 Beds		501 to 600 Beds		600+ Beds	
Admissions Forms	104	7.60%	128	12.56%	62	10.23%	57	12.93%	20	9.71%	14	10.22%	10	6.25%
Admissions Documents	138	10.09%	140	13.74%	95	15.68%	76	17.23%	31	15.05%	22	16.06%	22	13.75%
Human Resources Forms	51	3.73%	51	5.01%	31	5.12%	35	7.94%	12	5.83%	6	4.38%	6	3.75%
Human Resources Documents	69	5.04%	78	7.65%	55	9.08%	47	10.66%	17	8.25%	6	4.38%	17	10.63%
Medical Records Forms	76	5.56%	112	10.99%	64	10.56%	55	12.47%	16	7.77%	19	13.87%	12	7.50%
Medical Records Documents	249	18.20%	249	24.44%	167	27.56%	127	28.80%	69	33.50%	38	27.74%	49	30.63%
Business Office Forms	83	6.07%	112	10.99%	62	10.23%	51	11.56%	16	7.77%	15	10.95%	10	6.25%
Business Office Documents	148	10.82%	170	16.68%	108	17.82%	84	19.05%	38	18.45%	24	17.52%	31	19.38%
Information Systems Forms	61	4.46%	59	5.79%	38	6.27%	39	8.84%	12	5.83%	8	5.84%	6	3.75%
Information Systems Documents	68	4.97%	64	6.28%	44	7.26%	38	8.62%	17	8.25%	7	5.11%	17	10.63%
Bar Code Applications – Materials Management	% of 1,368 hospitals		% of 1,019 hospitals		% of 606 hospitals		% of 441 hospitals		% of 206 hospitals		% of 137 hospitals		% of 160 hospitals	
	0 to 100 Beds		101 to 200 Beds		201 to 300 Beds		301 to 400 Beds		401 to 500 Beds		501 to 600 Beds		600+ Beds	
Materials Management Printing	146	10.67%	147	14.43%	73	12.05%	70	15.87%	25	12.14%	23	16.79%	22	13.75%
Materials Management Scanning	190	13.89%	181	17.76%	95	15.68%	92	20.86%	31	15.05%	29	21.17%	29	18.13%
Bar Coding Applications – Nursing	% of 1,368 hospitals		% of 1,019 hospitals		% of 606 hospitals		% of 441 hospitals		% of 206 hospitals		% of 137 hospitals		% of 160 hospitals	
	0 to 100 Beds		101 to 200 Beds		201 to 300 Beds		301 to 400 Beds		401 to 500 Beds		501 to 600 Beds		600+ Beds	
Nursing Bar Code Printing	52	3.80%	63	6.18%	45	7.43%	45	10.20%	21	10.19%	6	4.38%	14	8.75%
Nursing Bar Code Scanning	65	4.75%	74	7.26%	50	8.25%	54	12.24%	22	10.68%	6	4.38%	16	10.00%
Ambulatory Applications*	% of 681 HCOs		% of 1,804 HCOs		% of 2,130 HCOs		% of 2,949 HCOs		% of 1,122 HCOs		% of 1,231 HCOs		% of 8,045 HCOs	
	0 to 100 Beds		101 to 200 Beds		201 to 300 Beds		301 to 400 Beds		401 to 500 Beds		501 to 600 Beds		600+ Beds	
Ambulatory Practice Management	583	85.61%	1,654	91.69%	2,031	95.35%	2,773	94.03%	1,000	89.13%	1,186	96.34%	7,407	92.07%
Ambulatory Clinical	475	69.75%	1,379	76.44%	1,140	53.52%	2,551	86.50%	855	76.20%	1,077	87.49%	6,326	78.63%
Ambulatory EMR	123	18.06%	304	16.85%	252	11.83%	305	10.34%	326	29.06%	335	27.21%	1,487	18.48%
Home Health Applications*	% of 168 HCOs		% of 232 HCOs		% of 236 HCOs		% of 183 HCOs		% of 94 HCOs		% of 76 HCOs		% of 841 HCOs	
	0 to 100 Beds		101 to 200 Beds		201 to 300 Beds		301 to 400 Beds		401 to 500 Beds		501 to 600 Beds		600+ Beds	
Home Health Administrative	155	92.26%	218	93.97%	229	97.03%	174	95.08%	80	85.11%	72	94.74%	788	93.70%
Home Health Clinical	126	75.00%	186	80.17%	206	87.29%	151	82.51%	73	77.66%	66	86.84%	647	76.93%

*Based on the number of corporate beds associated with the total number of ambulatory facilities by segment.



ABOUT HIMSS

The Healthcare Information and Management Systems Society (HIMSS) is the healthcare industry's membership organization exclusively focused on providing leadership for the optimal use of healthcare information technology (IT) and management systems for the betterment of human health. Founded in 1961 with offices in Chicago, Washington D.C., and other locations across the country, HIMSS represents more than 17,000 individual members and over 275 member corporations that employ more than 1 million people. HIMSS frames and leads healthcare public policy and industry practices through its advocacy, educational and professional development initiatives designed to promote information and management systems' contributions to ensuring quality patient care.

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ISBN 0-9761277-6-8
Order Code: 486