

# Essentials of the U.S. Hospital IT Market

## Sixth Edition

### EMR Adoption Model Trends<sup>SM</sup> (2009–2010)

Stage	Cumulative Capabilities	2009 Final	2010 Final
Stage 7	Complete EMR*; CCD* transactions to share data; data warehousing; data continuity with ED*, ambulatory, OP*	0.7%	1.0%
Stage 6	Physician documentation (structured templates), full CDSS* (variance & compliance), full RPACS*	1.6%	3.2%
Stage 5	Closed loop medication administration	3.8%	4.5%
Stage 4	CPOE*, CDSS (clinical protocols)	7.4%	10.5%
Stage 3	Nursing/clinical documentation (flow sheets), CDSS (error checking), PACS* available outside radiology	50.9%	49.0%
Stage 2	Clinical data repository, controlled medical vocabulary, CDSS, may have document imaging, HIE* capable	16.9%	14.6%
Stage 1	Ancillaries—laboratory, radiology, pharmacy—all installed	7.2%	7.1%
Stage 0	All three ancillaries not installed	11.5%	10.1%

Data from HIMSS Analytics™ Database © 2011

N = 5,235

N = 5,281

# The EMR Adoption Model

## An EMR Market Transformation Assessment Tool

## The EMR Adoption Model

### Assessment Tool

Understanding the level of electronic medical record (EMR) capabilities in hospitals has been a challenge in the U.S. healthcare information technology (IT) market. In 2005, HIMSS Analytics created the EMR Adoption Model™ (EMRAM), which identifies the levels of EMR capabilities ranging from the initial clinical data repository (CDR) environment through an EMR environment where all care processes are supported with electronic documentation, and paper documentation is no longer used.

HIMSS Analytics has developed a methodology and algorithms to automatically score the more than 5,200 U.S. hospitals and approximately 700 Canadian hospitals in our database (where we have captured the relevant clinical information to date to be able to score the facilities) relative to their progress in implementing the components of an EMR. From this data, we also provide peer comparisons to care delivery organizations as they strategize their path to a complete EMR. The data are also provided to vendors, in aggregate, to help them judge their products' positions in the EMRAM. The EMRAM is a tool that we will use to evaluate the impact of the American Recovery and Reinvestment Act of 2009 (ARRA) funding on EMR adoption over the next five years.

The stages of the model are as follows:

- **Stage 0:** Some clinical automation may be present, but none of the three major ancillary department systems for laboratory, pharmacy and radiology are implemented. Systems that are in place are departmentally focused, not patient-centered via a common patient record.
- **Stage 1:** Major ancillary clinical systems are installed (i.e., pharmacy, laboratory, radiology).
- **Stage 2:** Major ancillary clinical systems feed data to a clinical data repository that provides physician access for retrieving and reviewing results. The CDR contains a controlled medical vocabulary, and the clinical decision support/rules engine. Information from document imaging systems may be linked to the CDR at this stage. Sharing data with health information exchanges can be initially accommodated at this level.
- **Stage 3:** Clinical documentation (e.g., vital signs, flow sheets, nursing notes, eMAR) are required; care plan charting is scored with extra points. These components must be implemented and integrated with the CDR for at least one

service in the hospital. The first level of clinical decision support is implemented to conduct error checking with order entry (i.e., drug/drug, drug/food, drug/lab conflict checking normally found in the pharmacy). Some level of medical image access from picture archiving and communication systems (PACS) is available for access by physicians outside the radiology department via the organization's intranet.

- **Stage 4:** Computerized practitioner order entry (CPOE) for use by any clinician is added to the nursing and CDR environment along with the second level of clinical decision support capabilities related to evidence-based medicine protocols. If one patient service area has implemented CPOE and completed the previous stages, then this stage has been achieved.
- **Stage 5:** The closed loop medication administration environment is fully implemented. The eMAR and bar coding or other auto-identification technology, such as radio frequency identification (RFID), are implemented and integrated with CPOE and pharmacy to maximize point-of-care patient safety processes for medication administration.
- **Stage 6:** Full physician documentation/charting (structured templates) is implemented for at least one patient care service area. Level three of clinical decision support provides guidance for all clinician activities related to protocols and outcomes in the form of variance and compliance alerts. A full complement of PACS systems provides medical images to physicians via an intranet and displaces all film-based images.
- **Stage 7:** The hospital no longer uses paper charts to deliver and manage patient care and has a mixture of discrete data, document images and medical images within its EMR environment. Clinical data warehouses are being used to analyze patterns of clinical data to improve quality of care and patient safety. Clinical information can be readily shared via standardized electronic transactions (i.e., the continuity of care document, or CCD) with all entities that are authorized to treat the patient, or a health information exchange (i.e., other non-associated hospitals, ambulatory clinics, sub-acute environments, employers, payers and patients in a data-sharing environment). The hospital demonstrates summary data continuity for all hospital services (e.g., inpatient, outpatient, emergency department and with any owned or managed ambulatory clinics).

## Scoring Format

An EMR score is represented by the following format: *S.nnnn*, where *S* equals the current stage achieved for the model and *.nnnn* is the weighted score representing the implementation of the higher-stage clinical applications that must be implemented before the higher stage is considered to have been achieved. In this model, all applications required from previous stages and the current targeted stage must be implemented before the current stage can be achieved. For example, if CPOE Stage 4 is implemented before clinical documentation in Stage 3 and the organization has a CDR, its EMRAM score would be *2.nnnn*, where the *.nnnn* would represent the weighted score for CPOE and any other upper-level stage applications that have been implemented. Once the clinical documentation applications have been implemented in a service, the hospital would automatically become a Stage 4 facility, because it has then accomplished what is required for that stage as well as for Stage 3.

## EMRAM Comparison 2009–2010

An overall evaluation of the U.S. hospital market trend for the EMRAM scores, by individual stage from 2009 to 2010, is shown in Figure EMR1. This figure clearly shows that nearly half of U.S. hospitals have met the Stage 3 threshold, which provides the foundation for automating CPOE, closed loop medication administration with bar codes and physician documentation. More importantly, more hospitals are migrating to higher stages, while the percentage of hospitals in Stages 0 to 2 is decreasing. For example, the percentage of hospitals that have achieved Stage 4 increased by 3 percent from 2009. This demonstrates that U.S. hospitals are advancing their EMR capabilities to meet new market demands and requirements, such as receiving funding related to the ARRA meaningful use requirements.

Stage 5 of the EMR Adoption Model is among the most difficult to achieve, because of the integration/interoperability requirements, technology integration requirements and re-engineering efforts that are required to implement point-of-care, bar-coded closed loop medication administration and management. This stage requires significant investments in capital, executive commitment and cultural adoption with process redesign.

Stages 4 through 6 have the highest impact on physician and clinician work flows and therefore require the highest levels of communication and implementation execution to ensure that disruptions to patient care routines is minimized.

Our observations since 2006 lead us to believe that the EMR's return on investment (ROI) and benefits are not realized until Stage 5 has been achieved. Stages 6 and 7 dramatically improve EMR ROI and benefit realization from what we have seen in these organizations.

EMR Adoption Model Trends <sup>SM</sup> (2009–2010)			
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\* CCD = continuity of care document; CDSS = clinical decision support system; CPOE = computerized practitioner order entry  
 ED = emergency department; EMR = electronic medical record; HIE = health information exchange; OP = outpatient; PACS = picture archiving and communications system; RPACS = radiology picture archiving and communications system

Figure EMR1

## National Review of EMR Scores

The majority of U.S. hospitals are in the early stages of EMR transformation. An evaluation of U.S. hospitals' current EMR capabilities using different market segments provides a more complete analysis of what types of hospitals are advancing in their pursuit of a complete EMR environment (see Table EMR1). As in 2009, hospitals continued to make a significant advancement in Stage 3 achievements in 2010. Academic hospitals are the only hospital segment to have achieved an **average** EMRAM score of greater than 4.0000 in 2010. Other hospital segments with an average EMRAM score of 3.0000 are general medical/surgical, urban and integrated delivery system (IDS) hospitals, and hospitals with more than 100 beds.

Academic medical centers are the only hospital segment to reach an EMRAM score of 4.0000 or greater. All other hospital segments achieved a **median** EMRAM score of 3.0000, with the exception of rural hospitals and critical-access hospitals. Hospital segments that achieved an **average** EMRAM score of 3.0000 include general medical/surgical, urban hospitals and hospitals that are part of an IDS.

By bed segment, hospitals with 600 or more beds have achieved a **median** EMRAM score of 4.000; all other bed size segments have achieved a **median** score of 3.000. With regard to **average** EMRAM scores, the under 100 bed hospital segment is the only one that has an average score of less than 3.000. All regions in the U.S. have now achieved **median** EMRAM scores of more than 3.0000.

<b>4th Quarter, 2010 EMR/SEHR* Adoption Model Scores</b>					
<i>Based on 5,281 U.S. hospitals, with a minimum score of 0.0000 and maximum score of 7.0710</i>					
Segment	Mean	Min.	Max.	Median	Number
<b>Hospital Segment</b>					
Academic/Teaching	4.1016	1.2860	7.0710	4.2000	223
Non-academic	2.8969	0.0000	7.0710	3.1835	5,058
General Medical/Surgical	3.2404	0.0000	7.0710	3.2750	3,212
Others	2.4936	0.0000	7.0710	3.0750	2,069
Rural	2.1160	0.0000	6.0710	2.1160	1,169
Urban	3.1842	0.0000	7.0710	3.2550	4,112
IDS	3.1612	0.0000	7.0710	3.2440	3,233
Independent Hospital	2.6108	0.0000	7.0630	3.1255	2,048
Critical Access	2.1150	0.0000	6.0470	2.1230	1,302
<b>Bed Segment</b>					
Under 100 Beds	2.4032	0.0000	7.0630	3.0750	2,719
101–200 Beds	3.2377	0.0050	7.0710	3.2600	986
201–300 Beds	3.6150	0.0550	7.0710	3.3550	620
301–400 Beds	3.6275	0.1750	7.0710	3.3630	409
401–500 Beds	3.6552	2.0150	7.0470	3.3930	214
501–600 Beds	3.9236	2.1700	7.0710	3.4390	149
600+ Beds	4.0698	2.0710	7.0470	4.1450	184
<b>Regions (U.S. Census-defined)</b>					
East North Central	3.2323	0.0050	7.0710	3.2555	834
East South Central	2.6661	0.0000	6.0710	3.1400	447
Middle Atlantic	3.2661	0.0050	7.0390	3.2670	489
Mountain	2.6005	0.0000	6.0710	3.1390	421
New England	3.7169	0.0700	7.0630	3.3210	203
Pacific	3.1120	0.0000	7.0630	3.1920	584
South Atlantic	3.2161	0.0000	7.0710	3.3170	786
West North Central	2.6701	0.0000	7.0310	3.1510	701
West South Central	2.4709	0.0000	7.0470	3.0835	816
<b>All Hospitals</b>					
<b>Total</b>	<b>2.9478</b>	<b>0.0000</b>	<b>7.0710</b>	<b>3.2000</b>	<b>5,281</b>

\* shared electronic health record

Table EMR1

**Key to Census Regions, Table EMR1:**

East North Central: MI, OH, IN, IL, WI

East South Central: KY, TN, MS, AL

Middle Atlantic: NY, NJ, PA

Mountain: ID, CO, WY, MT, NV, UT, AZ, NM

New England: MA, ME, VT, RI, CT, NH

Pacific: WA, CA, OR, AK, HI

South Atlantic: MD, DE, DC, WV, VA, NC, SC, GA, FL

West North Central: MN, IA, MO, KS, ND, SD, NE

West South Central: TX, LA, AR, OK

An evaluation of the **median** scores by state for the EMRAM shows that Connecticut is the only state with a median score greater than 4.0000 (see Table EMR2). Only seven states have a **median** EMRAM score below 3.000.

<b>4th Quarter, 2010 EMR/SEHR* Adoption Model Scores</b>					
<i>By state, based on 5,281 U.S. hospitals, with a minimum score of 0.0000 and maximum score of 7.0710</i>					
<b>United States</b>	<b>Mean</b>	<b>Min.</b>	<b>Max.</b>	<b>Median</b>	<b>Number</b>
Connecticut	3.8923	1.0390	6.0710	4.0960	34
Delaware	3.8016	2.1550	6.0470	3.5250	9
Maryland	3.8742	1.0710	6.0630	3.4075	48
Rhode Island	4.1744	2.1030	6.0710	3.4000	11
Virginia	3.7633	0.0790	7.0710	3.3850	84
Vermont	3.4542	1.0710	6.0710	3.3790	14
New Jersey	3.3911	0.0550	6.0710	3.3510	85
South Carolina	3.3272	0.2100	6.0710	3.3360	70
Maine	3.7787	1.3650	6.0390	3.3320	37
Florida	3.0666	0.0050	6.0560	3.3200	233
Indiana	3.2752	0.0050	6.0550	3.3175	136
Massachusetts	3.7546	0.0700	7.0630	3.3040	81
North Carolina	3.1549	0.0100	6.0560	3.3010	123
Wisconsin	3.4040	0.0100	7.0710	3.2825	136
Georgia	3.0377	0.0000	6.0710	3.2670	158
Illinois	3.3199	0.0050	7.0710	3.2670	197
New York	3.2861	0.0050	6.0710	3.2600	207
Oregon	3.1547	0.0420	7.0230	3.2600	61

Table EMR2

<b>4th Quarter, 2010 EMR/SEHR* Adoption Model Scores</b>					
<i>By state, based on 5,281 U.S. hospitals, with a minimum score of 0.0000 and maximum score of 7.0710</i>					
<b>United States</b>	<b>Mean</b>	<b>Min.</b>	<b>Max.</b>	<b>Median</b>	<b>Number</b>
Iowa	3.0185	0.0050	6.0710	3.2550	119
Minnesota	3.0381	0.0000	6.0710	3.2520	135
New Hampshire	3.2298	0.0960	6.0470	3.2515	26
Washington	3.0232	0.0050	6.0710	3.2400	93
Missouri	3.1664	0.0050	7.0310	3.2390	129
Ohio	3.1215	0.0100	6.0710	3.2370	206
Pennsylvania	3.1911	0.0050	7.0390	3.2320	197
Tennessee	2.9668	0.0000	6.0710	3.2090	140
Michigan	3.0840	0.0050	6.0710	3.2000	159
Nevada	2.4797	0.0000	4.2670	3.1950	41
Arizona	2.9506	0.0250	6.0630	3.1920	83
Colorado	2.7271	0.0050	5.1350	3.1810	84
California	3.1985	0.0000	7.0630	3.1760	388
West Virginia	2.9666	0.0050	6.0470	3.1650	51
Kentucky	2.7750	0.0400	6.0630	3.1470	106
Utah	3.1275	0.0000	6.0710	3.1470	49
Wyoming	2.6492	0.0150	6.0230	3.1470	27
South Dakota	2.3771	0.0000	6.0470	3.1395	52
Alaska	2.7729	0.0050	4.2130	3.1390	17
Texas	2.5746	0.0000	7.0470	3.1350	467
Alabama	2.6967	0.0000	5.1110	3.1040	103
District of Columbia	2.4827	0.0050	4.2770	3.0895	10
New Mexico	2.6628	0.0000	6.0230	3.0715	38
Nebraska	2.2842	0.0000	6.0390	3.0440	86
Idaho	2.5137	0.0000	5.0960	3.0400	43
Louisiana	2.3158	0.0050	6.0710	3.0280	142
Arkansas	2.3853	0.0050	6.0710	2.3020	87
Kansas	2.0943	0.0000	6.0710	2.1980	137
Oklahoma	2.3131	0.0000	6.0710	2.1820	120
North Dakota	2.0232	0.0000	5.1350	2.1350	43
Mississippi	2.0865	0.0050	6.0710	2.1020	98
Hawaii	2.2266	0.0050	6.0470	2.0940	25
Montana	1.5196	0.0000	4.3430	1.1525	56

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Table EMR2, concl.

The ARRA funding for EMR adoption will continue to drive the EMRAM scores to increase dramatically through 2015. From this increased rate of EMR adoption, the United States should realize improved quality outcomes and patient safety. Hospitals will be reporting more clinical results to the government, and from this data the government should be able to derive effective evidence-based medicine protocols that will improve outcomes and drive down costs.

HIMSS Analytics updates EMRAM scores for all of these market segments quarterly and these updates can be found on our web site from the following link:

[http://www.himssanalytics.org/hc\\_providers/emr\\_adoption.asp](http://www.himssanalytics.org/hc_providers/emr_adoption.asp).



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