Electronic Medical Records vs. Electronic Health Records: Yes, There Is a Difference

A HIMSS Analytics™ White Paper

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Executive Summary

Many people in the US healthcare industry, our government, and the press use the terms *electronic medical record* (EMR) and *electronic health record* (EHR) interchangeably. However, these terms describe completely different concepts, both of which are crucial to the success of local, regional, and national goals to improve patient safety, improve the quality and efficiency of patient care, and reduce healthcare delivery costs. EHRs are reliant on EMRs being in place, and EMRs will never reach their full potential without interoperable EHRs in place. It's important to understand the differences, and to reduce confusion in the market.

The EMR is the legal record created in hospitals and ambulatory environments that is the source of data for the EHR. The EHR represents the ability to easily share medical information among stakeholders and to have a patient's information follow him or her through the various modalities of care engaged by that individual. Stakeholders are composed of patients/consumers, healthcare providers, employers, and/or payers/insurers, including the government.

But before we can move to effective EHR environments, provider organizations must implement complete EMR solutions. At this point, few hospitals have EMR solutions that can effectively reduce medical errors or improve the quality and efficiency of patient care. The Clinical Transformation Staging Model has been developed by HIMSS Analytics to assess the status of clinical system/EMR implementations in care delivery organizations. This model demonstrates that US hospitals have a long journey ahead of them to achieve the EHR visions being espoused in Washington, D.C. and in the 200+ neo-CHIN Regional Health Information Organization (RHIO) initiatives in various states of development across the country.

EMR vs. EHR: Definitions

The market has confused the electronic medical record (EMR) and the electronic health record (EHR). Government officials, vendors, and consultants have propagated this confusion, in some cases unintentionally. The definitions that HIMSS Analytics proposes for these terms are as follows:

Electronic Medical Record: An application environment composed of the clinical data repository, clinical decision support, controlled medical vocabulary, order entry, computerized provider order entry, pharmacy, and clinical documentation applications. This environment supports the patient's electronic medical record across inpatient and outpatient environments, and is used by healthcare practitioners to document, monitor, and manage health care delivery within a care delivery organization (CDO). The data in the EMR is the legal record of what happened to the patient during their encounter at the CDO and is owned by the CDO.

Electronic Health Record: A subset of each care delivery organization's EMR, presently assumed to be summaries like ASTM's Continuity of Care Record (CCR) or HL7's Continuity of Care Document (CCD), is owned by the patient and has patient input and access that spans episodes of care across multiple CDOs within a community, region, or state (or in some countries,

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the entire country). The EHR in the US will ride on the proposed National Health Information Network (NHIN).

The EHR can be established only if the electronic medical records of the various CDOs have evolved to a level that can create and support a robust exchange of information between stakeholders within a community or region. While some forms of early EHRs exist today in limited environments, it will be difficult to establish effective EHRs across the majority of the US market until we have established clinical information transaction standards that can be easily adopted by the different EMR application architectures now available.

Further differentiation between the EMR and EHR is defined in Figure 1.

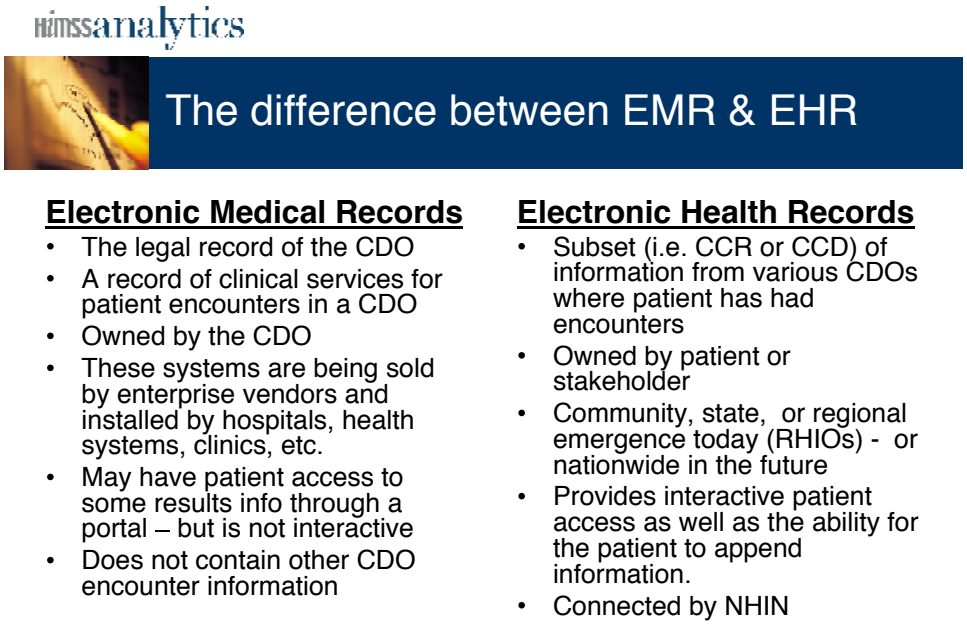

Figure 1

A Closer Look at the EMR and EHR Environments

The EMR environment is a complex and sophisticated environment (see Figure 2). Its foundation is the clinical data repository (CDR), a real-time transaction processing database of patient clinical information for practitioners.

The controlled medical vocabulary (CMV) is critical because it ensures that the practitioners who use the EMR are accessing accurate and comparable data. The CMV normalizes data from a relational and definitional hierarchy that enables other components of the EMR to optimally operate. Without a functional CMV, the clinical decision support system (CDSS) and workflow components of the EMR will not perform as expected by the clinicians in the environment.

The applications of the EMR environment are clinical documentation for all clinicians/practitioners, computerized provider order entry (CPOE) for all clinicians/practitioners,

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and pharmacy management. We believe that the pharmacy management application has transitioned from a departmental system to an application of the EMR due to the influence of patient safety/medical error reduction concerns.

A foundation of EMR applications, required to improve patient safety and reduce or eliminate medical errors, is composed of the CDR, CPOE, pharmacy management system, and the electronic medication administration record (eMAR), functionality normally found in the electronic clinical documentation systems of most vendors. Therefore, we believe that the pharmacy management system should now be counted as an application of the EMR environment.

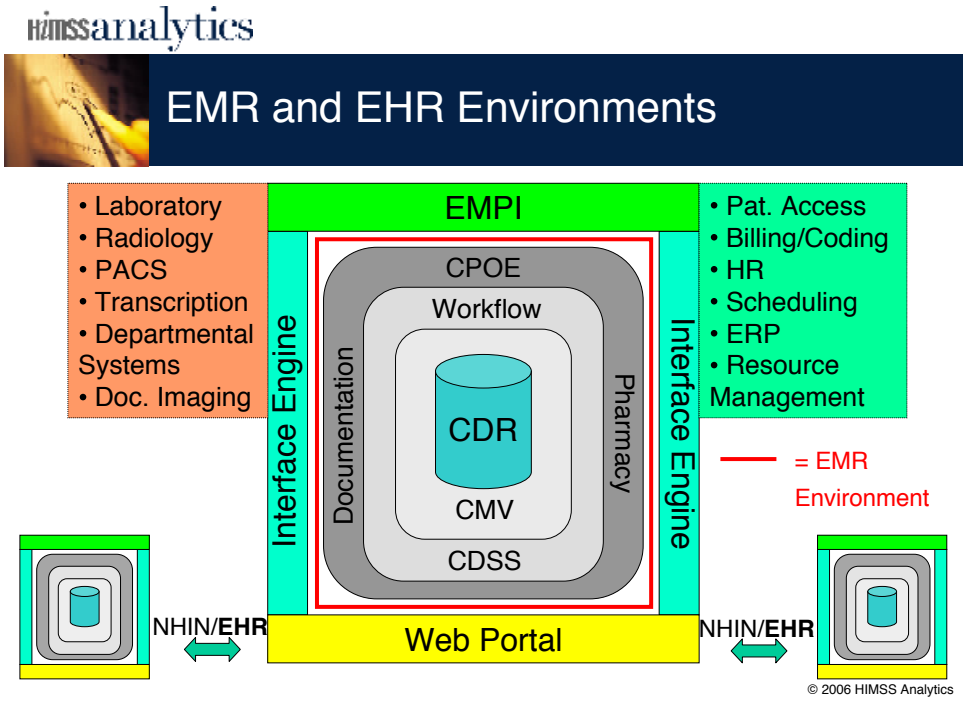

Figure 2

These applications are tightly coupled with the CDR data schema and the CMV, CDSS, and workflow components. These EMR applications are designed and built on the same architecture as the EMR components. We believe that CDOs need to establish a solid EMR foundation with nursing adoption of CPOE and clinical documentation applications before physician CPOE use can be effectively established.

The EHR environment relies on functional EMRs that allow care delivery organizations to exchange data/information with other CDOs or stakeholders within the community, regionally, or nationally. As noted in the executive summary, stakeholders are composed of patients/consumers, healthcare providers, employers, and/or payers/insurers, including the government. The evolving NHIN standards are integral to establishing effective data/information flows between CDOs and stakeholders. Currently, few EHRs exist, but early prototypes include the EHR environments in Santa Barbara, Calif., and Marion County, Indiana. In the future, CDOs may utilize portlets,

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which can display relevant content to provide information exchange with their various stakeholders.[1]

EMR Adoption Model: A New EMR Penetration Assessment Tool

Understanding the level of EMR capabilities in hospitals is a challenge in the US healthcare IT market today. HIMSS Analytics has created an EMR Adoption Model that identifies the levels of EMR capabilities ranging from the initial CDR environment through a paperless EMR environment. HIMSS Analytics has developed a methodology and algorithms to automatically score the approximately 4,000 hospitals in our database relative to their IT-enabled clinical transformation status, to provide peer comparisons for CDOs as they strategize their path to a complete EMR and participation in an EHR. The stages of the model are as follows:

Stage 0: Some clinical automation may be present, but all three of the major ancillary department systems for laboratory, pharmacy, and radiology are not implemented.

Stage 1: All three of the major ancillary clinical systems are installed (i.e., pharmacy, laboratory, radiology).

Stage 2: Major ancillary clinical systems feed data to a clinical data repository (CDR) that provides physician access for retrieving and reviewing results. The CDR contains a controlled medical vocabulary, and the clinical decision support/rules engine for rudimentary conflict checking. Information from document imaging systems may be linked to the CDR at this stage.

Stage 3: Clinical documentation (e.g. vital signs, flow sheets) is required; nursing notes, care plan charting, and/or the electronic medication administration record (eMAR) system are scored with extra points, and are implemented and integrated with the CDR for at least one service in the hospital. 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 archive and communication systems (PACS) is available for access by physicians via the organization's intranet or other secure networks outside of the radiology department confines.

Stage 4: Computerized Practitioner/Physician 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 in at least one patient care service area. The eMAR and bar coding or other auto

[1] Introduction to JSR 168 – The Java Portlet Specification, White Paper, Sun Microsystems, 2003.

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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 radiology PACS systems provides medical images to physicians via an intranet and displaces all film-based images.

Stage 7: The hospital has a paperless EMR environment. Clinical information can be readily shared via electronic transactions or exchange of electronic records with all entities within a regional health network (i.e., other hospitals, ambulatory clinics, sub-acute environments, employers, payers and patients). This stage allows the HCO to support the true electronic health record as envisioned in the ideal model.

The majority of US hospitals are in the early stages of EMR transformation. Currently 19 percent of US hospitals have not achieved Stage 1 and are at Stage 0, 21 percent have achieved Stage 1, 50 percent have achieved stage 2, approximately eight percent have achieved stage 3, approximately two percent percent have achieved Stage 4, and less than one percent of hospitals have achieved stage 5 and stage 6 (see Figure 3).

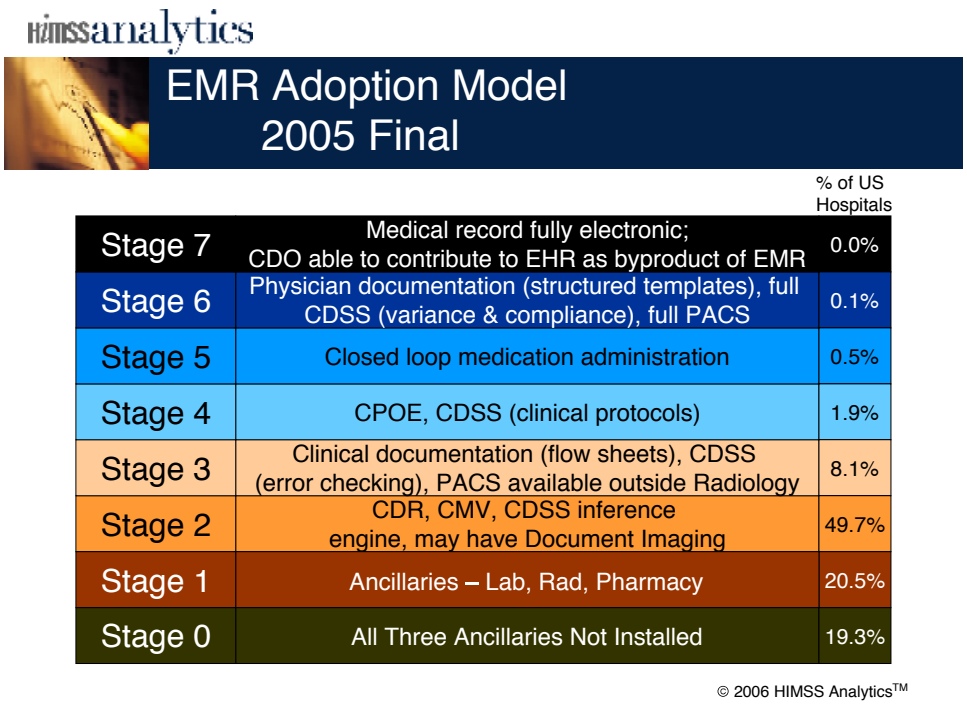

Figure 3

The US EMR Market Today: Challenges for EHRs

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The majority of US hospitals are in the early stages of EMR adoption. Currently, approximately 61 percent of the US hospital market has some level of EMR applications installed to support care delivery (stage 2 or higher). A further evaluation of the market shows the percentage of EMR adoption by stage (see Table 1).

Stage	Hospitals In a Stage	% of 3917 Total Hospitals
Stage 0	754	19.25%
Stage 1	804	20.53%
Stage 2	1945	49.66%
Stage 3	318	8.12%
Stage 4	73	1.86%
Stage 5	18	0.46%
Stage 6	5	0.13%
Stage 7	0	0.00%
Total	3917	100.00%

Table 1

Table 1 shows that the vast majority of US hospitals have not transformed beyond stage 2 of the EMR Adoption Model. It also shows that 19.25% of American hospitals don't even have all three ancillary systems (laboratory, radiology, and pharmacy) installed, much less components of the EMR. It will be impossible for those organizations to participate in an EHR initiative in their community or region without manually entering summary care record information into the EHR system.

Table 2 provides an overview of the stage 1 hospitals. Hospitals with 400 beds or fewer represent the majority of stage 1 hospitals, with a close approximation of percentages between the respective segments. This is not surprising as this segment of the market represents approximately 90 percent of hospitals in the US market. Most hospitals represented in the stage 1 demographic are integrated delivery systems (IDSs), urban, general medical, and non-academic hospitals.

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Stage 1	20.53%	of US Hospitals		
Bedsize Category	**Stage 1**	**% of Stage 1**	**Total Hospitals**	**% of Total**
0-100	252	31%	1355	19%
101-200	223	28%	1019	22%
201-400	229	28%	1044	22%
401-600	72	9%	334	22%
>600	28	3%	165	17%
Total	804	100%	3917	21%
IDS?	**Stage 1**	**% of Stage 1**	**Total Hospitals**	**% of Total**
No	275	34%	1149	24%
Yes	529	66%	2768	19%
Urban?	**Stage 1**	**% of Stage 1**	**Total Hospitals**	**% of Total**
No	112	14%	605	19%
Yes	692	86%	3312	21%
Academic?	**Stage 1**	**% of Stage 1**	**Total Hospitals**	**% of Total**
No	751	93%	3599	21%
Yes	53	7%	318	17%
General Medical?	**Stage 1**	**% of Stage 1**	**Total Hospitals**	**% of Total**
No	90	11%	735	12%
Yes	714	89%	3182	22%

Table 2

The majority of stage 2 hospitals also included hospitals of 400 beds or fewer (see Table 3). As with stage 1 hospitals, the majority of stage 2 hospitals are IDS, urban, general medical, and non-academic hospitals.

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Stage 2	49.66%	of US Hospitals		
Bedsize Category	**Stage 2**	**% of Stage 2**	**Total Hospitals**	**% of Total**
0-100	525	27%	1355	39%
101-200	564	29%	1019	55%
201-400	600	31%	1044	57%
401-600	169	9%	334	51%
>600	87	4%	165	53%
Total	1945	100%	3917	50%
IDS?	**Stage 2**	**% of Stage 2**	**Total Hospitals**	**% of Total**
No	559	29%	1149	49%
Yes	1386	71%	2768	50%
Urban?	**Stage 2**	**% of Stage 2**	**Total Hospitals**	**% of Total**
No	205	11%	605	34%
Yes	1740	89%	3312	53%
Academic?	**Stage 2**	**% of Stage 2**	**Total Hospitals**	**% of Total**
No	1773	91%	3599	49%
Yes	172	9%	318	54%
General Medical?	**Stage 2**	**% of Stage 2**	**Total Hospitals**	**% of Total**
No	284	15%	735	39%
Yes	1661	85%	3182	52%

Table 3

The demographics of stage 3 hospitals are shown in Table 4. Hospitals with between 201-400 beds represent the majority of stage 3 hospitals. As with stages 1 and 2, the majority of hospitals in stage 3 are IDS, urban, general medical, and non-academic hospitals.

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Stage 3	8.12%	of US Hospitals		
Bedsize Category	**Stage 3**	**% of Stage 3**	**Total Hospitals**	**% of Total**
0-100	56	18%	1355	4%
101-200	83	26%	1019	8%
201-400	107	34%	1044	10%
401-600	53	17%	334	16%
>600	19	6%	165	12%
Total	318	100%	3917	8%
IDS?	**Stage 3**	**% of Stage 3**	**Total Hospitals**	**% of Total**
No	102	32%	1149	9%
Yes	216	68%	2768	8%
Urban?	**Stage 3**	**% of Stage 3**	**Total Hospitals**	**% of Total**
No	25	8%	605	4%
Yes	293	92%	3312	9%
Academic?	**Stage 3**	**% of Stage 3**	**Total Hospitals**	**% of Total**
No	287	90%	3599	8%
Yes	31	10%	318	10%
General Medical?	**Stage 3**	**% of Stage 3**	**Total Hospitals**	**% of Total**
No	43	14%	735	6%
Yes	275	86%	3182	9%

Table 4

Stage 4 hospitals show some interesting diversions from the other stages. While the majority of hospitals are in the 101-200 bed size segment, the second leading segment of hospitals is the 201-400 bed range (see Table 5). The demographics of the majority of these hospitals follow those of the previous stages: IDS, urban, general medical, and non-academic hospitals.

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Stage 4	1.86%	of US Hospitals		
Bedsize Category	**Stage 4**	**% of Stage 4**	**Total Hospitals**	**% of Total**
0-100	14	19%	1355	1%
101-200	16	22%	1019	2%
201-400	15	21%	1044	1%
401-600	12	16%	334	4%
>600	16	22%	165	10%
Total	73	100%	3917	2%
IDS?	**Stage 4**	**% of Stage 4**	**Total Hospitals**	**% of Total**
No	19	26%	1149	2%
Yes	54	74%	2768	2%
Urban?	**Stage 4**	**% of Stage 4**	**Total Hospitals**	**% of Total**
No	5	7%	605	1%
Yes	68	93%	3312	2%
Academic?	**Stage 4**	**% of Stage 4**	**Total Hospitals**	**% of Total**
No	44	60%	3599	1%
Yes	29	40%	318	9%
General Medical?	**Stage 4**	**% of Stage 4**	**Total Hospitals**	**% of Total**
No	37	51%	735	5%
Yes	36	49%	3182	1%

Table 5

The majority of stage 5 hospitals are in the 201 – 400 bed range, and the 401 – 600 bed hospitals represent the second largest number in this stage (see Table 6). The majority of these hospitals are urban, academic, general medical, and belong to an IDS.

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Stage 5	0.46%	of US Hospitals		
Bedsize Category	**Stage 5**	**% of Stage 5**	**Total Hospitals**	**% of Total**
0-100	3	17%	1355	0%
101-200	3	17%	1019	0%
201-400	7	39%	1044	1%
401-600	4	22%	334	1%
>600	1	6%	165	1%
Total	18	100%	3917	0%
IDS?	**Stage 5**	**% of Stage 5**	**Total Hospitals**	**% of Total**
No	3	17%	1149	0%
Yes	15	83%	2768	1%
Urban?	**Stage 5**	**% of Stage 5**	**Total Hospitals**	**% of Total**
No	0	0%	605	0%
Yes	18	100%	3312	1%
Academic?	**Stage 5**	**% of Stage 5**	**Total Hospitals**	**% of Total**
No	14	78%	3599	0%
Yes	4	22%	318	1%
General Medical?	**Stage 5**	**% of Stage 5**	**Total Hospitals**	**% of Total**
No	5	28%	735	1%
Yes	13	72%	3182	0%

Table 6

Stage 6 hospital are almost equally distributed by bed size, but currently there are more of these hospitals in the <600 bed range (see Table 7). The hospitals are urban, part of an IDS, and are slightly more academic and non-general medical.

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Stage 6	0.13%	of US Hospitals		
Bedsize Category	**Stage 6**	**% of Stage 6**	**Total Hospitals**	**% of Total**
0-100	1	20%	1355	0%
101-200	1	20%	1019	0%
201-400	1	20%	1044	0%
401-600		0%	334	0%
>600	2	40%	165	1%
Total	5	100%	3917	0%
IDS?	**Stage 6**	**% of Stage 6**	**Total Hospitals**	**% of Total**
No	0	0%	1149	0%
Yes	5	100%	2768	0%
Urban?	**Stage 6**	**% of Stage 6**	**Total Hospitals**	**% of Total**
No	1	20%	605	0%
Yes	4	80%	3312	0%
Academic?	**Stage 6**	**% of Stage 6**	**Total Hospitals**	**% of Total**
No	2	40%	3599	0%
Yes	3	60%	318	1%
General Medical?	**Stage 6**	**% of Stage 6**	**Total Hospitals**	**% of Total**
No	3	60%	735	0%
Yes	2	40%	3182	0%

Table 7

Conclusion

There are a total of 754 acute care hospitals that have not fully implemented a base of major clinical ancillary department applications (e.g., laboratory, pharmacy, radiology) to qualify for stage 1 designation. This represents approximately 19 percent of the hospitals in the database. Most hospitals occupy the stage 1 and stage 2 levels of the EMR Adoption Model. The combined percentage of hospitals in these two stages is approximately 71 percent.

At this time, there are only 414 US hospitals that are stage 3-6 of the EMR Adoption Model. This shows the tremendous amount of work and investment that must be done by US hospitals to implement clinical systems to enable their participation in EHR initiatives. More importantly, further implementation of higher stage EMR applications will enable the reduction or elimination of medical errors, while providing the "digital environment". The higher stages of the model represent the facilitation of not only improved patient care, but also improvements in efficiency and effectiveness with which patient care services are delivered by clinicians.

Once we begin to deliver these capabilities within the healthcare organizations, we can begin to focus on sharing patient care information among all of the healthcare stakeholders. Currently, the

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hype surrounding healthcare IT has the "cart before the horse." How can we discuss the potential of EHRs, much less implement them, until we have implemented effective EMRs, not only in hospitals, but in all care delivery organizations including physician practices?

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