Assessing Readiness for Meeting Meaningful Use: Identifying Electronic Health Record Functionality and Measuring Levels of Adoption

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Abstract

With the passage, in 2009, of the Health Information Technology for Economic and Clinical Health Act (HITECH), part of the American Recovery and Reinvestment Act (ARRA), over 19 Billion dollars was targeted for healthcare information technology (HIT) projects to accelerate the adoption of electronic Health Records (EHRs). Intermountain Healthcare facilities and providers are eligible for approximately $93 million in incentives from HITECH, if we use a “certified EHR” in a “meaningful way”. This paper describes the current state of our EHR functions and EHR adoption compared to those required by the HITECH act. We describe the method used to determine the gaps between our EHR functions and EHR adoption. Our analysis identified 17 significant EHR enhancements needed to become certified and identified 42 meaningful use workflow gaps.

Introduction

Early in this decade, adoption of Electronic Health Records (EHRs) was identified as an important factor in improving healthcare in the United States. In spite of this recommendation, recent EHR adoption rates are low, with only 4% of ambulatory physicians using a ‘fully functional’ electronic record system in 2008. With the passage, in 2009, of the Health Information Technology for Economic and Clinical Health Act (HITECH), part of American Recovery and Reinvestment Act (ARRA), over 19 Billion dollars was targeted for healthcare information technology (HIT) projects to accelerate the adoption of EHRs and other technology. Much of this money will be used for incentives for ambulatory physicians and hospitals that use a “certified EHR” and demonstrate “meaningful use” of HIT. At the time of this writing, the details of preliminary requirements for certified EHRs for Stage 1 were described in the Health Information Technology: Initial Set of Standards, Implementation Specifications, and Certification Criteria for Electronic Health Record Technology; Interim Final Rule (IFR). The preliminary details of Meaningful use of EHRs were roughly defined for the first stage of HITECH in the Medicare and Medicaid Programs; Electronic Health Record Incentive Program; Proposed Rule (Notice of Proposed Rule Making, NPRM). The final rules for EHR certification and meaningful use are expected to be published in mid-2010 following public comment, however the final rules were not published at the time of this writing.

Intermountain Healthcare facilities and providers are eligible for approximately $93 million in incentives from Medicare and Medicaid between 2011 and 2015. These incentives are time limited and tied to the demonstration of “meaningful use” of ARRA certified EHRs by physicians and other clinicians in hospitals and clinics. The 2011 to 2015 time frame is broken up into 3 stages; Stage 1 (2011-2012), Stage 2, 2013-14, and Stage 3, 2015. EHR functionality and Meaningful use requirements increase at each Stage, while incentive amounts decrease at each stage. Then, significant payment penalties will be imposed on practitioners and facilities that do not meaningfully implement EHRs following 2015. Obtaining these incentives will require changes to legacy and future Information clinical information systems, and more importantly, will likely require significant increase in the use of the EHR by clinicians which will be a huge cultural change for many clinicians.

Requirements for Certification of EHRs and Demonstration of Meaningful Use

There are 28 high-level functions required for Stage 1 for both inpatient and ambulatory systems, as defined in Table 1 of the IFR. Table 1, in this paper, shows an example of one requirement, CPOE. All 28 requirements must be present in order to become ARRA certified. The requirements for clinicians to demonstrate meaningful use are included in the Notice of Proposed Rulemaking (NPRM). There are 25 meaningful use criteria for Stage 1 required for eligible providers (EPs) in the ambulatory setting and 23 meaningful use requirements for the hospital setting.

Table 2 shows an example of one of the meaningful use requirements, CPOE. Only high-level requirements are available for Stage 2 and 3. It was important for our institution to determine the gap between EHR functional requirements and those required for Stage 1 of HITECH. In addition, we
needed to determine the gap between the meaningful use requirements required for Stage 1 and the current state of our EHR use.

<table>
<thead>
<tr>
<th>Stage 1 Objectives</th>
<th>Certification Criteria for Eligible Professionals (Ambulatory Providers)</th>
<th>Certification Criteria for Eligible Hospitals</th>
</tr>
</thead>
<tbody>
<tr>
<td>Use Computerized Provider Order Entry (CPOE)</td>
<td>Enable a user to electronically record, store, retrieve, and manage, at a minimum, the following order types: 1. Medications; 2. Laboratory; 3. Radiology/imaging; 4. Provider referrals.</td>
<td>Enable a user to electronically record, store, retrieve, and manage, at a minimum, the following order types: 1. Medications; 2. Laboratory; 3. Radiology/imaging; 4. Provider referrals.</td>
</tr>
</tbody>
</table>

A Complete EHR must include the capability to:

Table 1 Example of an EHR functional requirement

<table>
<thead>
<tr>
<th>Stage 1 Objectives</th>
<th>Stage 1 Measures</th>
<th>Meaningful Use</th>
</tr>
</thead>
<tbody>
<tr>
<td>Eligible Providers (EPs) (Ambulatory Providers)</td>
<td>Use CPOE</td>
<td>Use of CPOE for orders (any type) directly entered by authorizing provider (for example, MD, DO, RN, PA, NP)</td>
</tr>
<tr>
<td>Use CPOE</td>
<td>For EPs, CPOE is used for at least 80% of all orders For eligible hospitals, CPOE is used for 10% of all orders</td>
<td>Use of CPOE for orders (any type) directly entered by authorizing provider (for example, MD, DO, RN, PA, NP)</td>
</tr>
</tbody>
</table>

Table 2 Example of a Meaningful Use Requirement

This paper describes the current state of our EHR functions and EHR use and EHR adoption and compares this to those required by the HITECH act to date. We describe the method use to determine the gaps between our EHR functions, EHR adoption, and required by HITECH.

Methods

This analysis was performed at Intermountain Healthcare, a not-for-profit integrated health care delivery network which operates 22 hospitals (128,000 admissions per year), employs over 650 physicians working in 160 ambulatory clinics and insures approximately 500,000 individuals.

Intermountain’s clinical information systems are relatively extensive and have been described previously. We currently use two home-grown, legacy clinical information systems, HELP in the hospitals and HELP2 primarily in the ambulatory setting. Over 13,500 unique users access HELP to retrieve results and/or document care for over 117,000 patient records per month. Over 13,000 clinicians use the HELP2 EHR each month to access records or document care on over 258,000 unique patients. Providers access different modules for different functionality, including documentation of progress notes, problem lists, medication orders, nursing documentation, etc.

We carefully reviewed the IFR to understand the EHR functional requirements necessary to certify ambulatory and hospital systems. We also downloaded the 2011 ambulatory and inpatient ARRA EHR certification requirement spreadsheets from the Certification Commission for Health Information Technology (CCHIT) website. The 2011 CCHIT requirements were felt to be the most representative of certification requirements at the time of the analysis. We modified the CCHIT inpatient and ambulatory spreadsheets to represent the functional requirements represented in the IFR. For example, some requirements in the 2011 CCHIT ARRA files were removed in the IFR. We called these modified spreadsheets the CCHIT-IFR spreadsheets.

We assembled a team of our inpatient and outpatient clinical analysts and product managers familiar with the HELP and HELP2 EHRs. This team then completed a detailed analysis of our HELP hospital EHR functions and HELP2 ambulatory EHR functions by comparing our current functional capabilities to those in the CCHIT-IFR spreadsheets. This provided us with an EHR functional gap analysis.
We also reviewed the NPRM to understand the requirements necessary to meet meaningful use in the ambulatory and hospital settings. We used Table 2 of the NPRM to build a spreadsheet containing the meaningful use requirements for both the outpatient (ambulatory) and inpatient workflow requirements. We assembled a team of our inpatient and outpatient implementation and training teams and clinical analysts familiar with the outpatient and inpatient workflows at our clinics and hospitals. This team then completed a detailed analysis of our EHR adoption by our hospital clinicians and our EHR adoption by our ambulatory clinicians.

In addition, in order to quantify our actual EHR adoption, we pulled EHR adoption data from our EHR Utilization Data Mart. Our EHR utilization data mart contains detailed EHR usage for both inpatient and outpatient systems. For example, the number of unique ambulatory patients with a problem list entry in the last three months. The Utilization Data Mart has been described in detail previously. Using data from the Utilization Data Mart and feedback from our analysts we then compared current EHR adoption to the meaningful use adoption required in the NPRM. Whenever possible we used adoptions metrics as outlined in the NPRM Table 2. For example, we calculated the number of unique patients with an allergy list item entered in the last 90 days in each hospital and for our ambulatory physicians. This provided us a meaningful use workflow gap analysis.

Using data from the Utilization Data Mart and feedback from our analysts we then compared current EHR adoption to the meaningful use adoption required in the NPRM. Whenever possible we used adoptions metrics as outlined in the NPRM Table 2. For example, we calculated the number of unique patients with an allergy list item entered in the last 90 days in each hospital and for our ambulatory physicians. This provided us a meaningful use workflow gap analysis.

Using our functional and workflow gap analyses, and we obtained estimates from our IS EHR development and implementation and training teams to fill EHR and meaningful use workflow gaps, respectively. Estimates included the number of development resources needed to add functionality to our EHR and training resources to change clinician workflow in the time required to obtain maximum HITECH incentives.

Results

Our EHR gap analysis identified 17 significant enhancements that need to be added to our current legacy EHRs out of the total 28 ARRA requirements. One function is unique to the inpatient system, five functions are unique to the ambulatory system, and 11 others are functional gaps required of both ambulatory and inpatient systems. See Table 3 for EHR requirement categories and gaps required to meet ARRA EHR certification requirements. Some examples of functional deficiencies include computerized provider order entry (CPOE) functionality and medication reconciliation functionality.

<table>
<thead>
<tr>
<th>EHR System</th>
<th>Requirement Category</th>
<th>Number of requirements gaps</th>
</tr>
</thead>
<tbody>
<tr>
<td>I=Inpatient</td>
<td>PATIENT ELECTRONIC ACCESS TO HEALTH INFORMATION</td>
<td>1</td>
</tr>
<tr>
<td>O=Outpatient</td>
<td>CMS QUALITY REPORTING</td>
<td>3</td>
</tr>
<tr>
<td>O=Outpatient</td>
<td>PATIENT REMINDERS</td>
<td>1</td>
</tr>
<tr>
<td>O=Outpatient</td>
<td>PATIENT ELECTRONIC COPY OF HEALTH INFORMATION</td>
<td>1</td>
</tr>
<tr>
<td>O=Outpatient</td>
<td>COMPUTER PHYSICIAN ORDER ENTRY</td>
<td>1</td>
</tr>
<tr>
<td>O=Outpatient</td>
<td>ELECTRONIC SYNDROMIC SURVEILLANCE</td>
<td>2</td>
</tr>
<tr>
<td>O=Outpatient</td>
<td>PROBLEM LIST</td>
<td>1</td>
</tr>
<tr>
<td>O=Outpatient</td>
<td>DEMOGRAPHICS</td>
<td>1</td>
</tr>
<tr>
<td>O=Outpatient</td>
<td>CMS QUALITY REPORTING</td>
<td>1</td>
</tr>
<tr>
<td>O=Outpatient</td>
<td>CLINICAL DECISION RULE</td>
<td>1</td>
</tr>
<tr>
<td>O=Outpatient</td>
<td>INSURANCE ELIGIBILITY</td>
<td>1</td>
</tr>
<tr>
<td>O=Outpatient</td>
<td>ELECTRONIC CLAIMS SUBMISSION</td>
<td>1</td>
</tr>
<tr>
<td>O=Outpatient</td>
<td>MEDICATION RECONCILIATION</td>
<td>1</td>
</tr>
<tr>
<td>O=Outpatient</td>
<td>REPORTABLE PUBLIC HEALTH SUBMISSION</td>
<td>1</td>
</tr>
</tbody>
</table>

Table 3 EHR System Functional Gaps by Requirement Category and EHR System Location

Our workflow analysis identified 42 meaningful use workflow gaps; 21 inpatient gaps and 21 ambulatory gaps, shown in Table 4. Unique outpatient workflow gaps included EPrescribing, provision of clinical summaries, and summary care records, and ambulatory CPOE. Unique inpatient workflow gaps included CPOE, provision of discharge instructions to patients, provision of clinical summaries to patients, and (entry of and) submission of immunizations to registries. There were 16 similar workflow gaps that were identified in both outpatient and inpatient
locations (Noted by “O and I” in Table 4.) In several cases, EHR functionality and the workflow was present for some of these items, however, often the criteria for meeting meaningful use was not met. For example, the meaningful use criteria for Problem list requires that 80% of patients have a recorded, coded problem.

<table>
<thead>
<tr>
<th>EHR System Location</th>
<th>Meaningful Use Workflow Gaps</th>
</tr>
</thead>
<tbody>
<tr>
<td>O=Outpatient</td>
<td>E-prescribing</td>
</tr>
<tr>
<td>O=Outpatient</td>
<td>CPOE Ambulatory</td>
</tr>
<tr>
<td>O=Outpatient</td>
<td>Provide a clinical summary</td>
</tr>
<tr>
<td>O=Outpatient</td>
<td>CPOE Inpatient</td>
</tr>
<tr>
<td>O=Outpatient</td>
<td>Provide patients with electronic access to their information</td>
</tr>
<tr>
<td>O=Outpatient</td>
<td>CPOE Inpatient</td>
</tr>
<tr>
<td>O=Outpatient</td>
<td>Provide patients with electronic access to their information</td>
</tr>
<tr>
<td>I=Inpatient</td>
<td>Provide patients with electronic discharge instructions</td>
</tr>
<tr>
<td>I=Inpatient</td>
<td>CPOE Inpatient</td>
</tr>
<tr>
<td>I=Inpatient</td>
<td>Submit immunization registries</td>
</tr>
<tr>
<td>O AND I</td>
<td>Check insurance eligibility</td>
</tr>
<tr>
<td>O AND I</td>
<td>Drug Prescribing Alerts</td>
</tr>
<tr>
<td>O AND I</td>
<td>Exchange clinical information</td>
</tr>
<tr>
<td>O AND I</td>
<td>Generate patient lists based on specific conditions.</td>
</tr>
<tr>
<td>O AND I</td>
<td>Implement 5 clinical decision rules</td>
</tr>
<tr>
<td>O AND I</td>
<td>Maintain allergy list</td>
</tr>
<tr>
<td>O AND I</td>
<td>Maintain Active Medication List</td>
</tr>
<tr>
<td>O AND I</td>
<td>Maintain problem list</td>
</tr>
<tr>
<td>O AND I</td>
<td>Medication reconciliation</td>
</tr>
<tr>
<td>O AND I</td>
<td>Record demographics</td>
</tr>
<tr>
<td>O AND I</td>
<td>Record smoking status</td>
</tr>
<tr>
<td>O AND I</td>
<td>Record vital signs</td>
</tr>
<tr>
<td>O AND I</td>
<td>Send reminders to patients</td>
</tr>
<tr>
<td>O AND I</td>
<td>Submit insurance claims</td>
</tr>
<tr>
<td>O AND I</td>
<td>Submit reportable lab results to public health agencies</td>
</tr>
<tr>
<td>O AND I</td>
<td>Submit syndromic surveillance data to public health agencies</td>
</tr>
</tbody>
</table>

Table 4 Meaningful Use Gaps by EHR System Location

Adoption metrics showed approximately 61% of ambulatory patients with a problem list entry in 90 days, while the percentage for inpatients was less than 5%. Allergy entry was over 95% in some hospitals, but as low as 54% in others (meeting meaningful use requires that 80% of patients have a coded allergy). Vital Signs were recorded in one hospital on only 14% of patients, while another hospital recorded vitals on 95% of patients. Therefore some of our 22 hospitals would meet meaningful use requirements, but those with less than 80% would not qualify. If all of our hospitals or clinics in toto did not meet the workflow requirement, we listed it as a gap.

Discussion

Our gap analyses demonstrates that we have significant work to do to close the EHR functional gaps and the meaningful use gaps. While the brunt of the work to close the EHR gaps will fall to our Information Systems group, filling the gaps for meaningful use will primarily fall on the shoulders of the physicians, nurses and other clinicians. For example, we do not yet have high adoption of the Problem List module in the inpatient setting, Increasing the number of patients with a problem list to 80% in the inpatient setting will require significant workflow changes. At the time of this writing, all EHR and meaningful use gaps must be filled to obtain any incentives, it is an all-or-nothing proposition.

Using our gap analyses, and we obtained estimates from our IS EHR development teams and Implementation and training teams to fill EHR and meaningful use workflow gaps, respectively. This analysis projected that to comply with all Stage 1, we estimate that it will take 20 months of 24 Full Time Equivalents (FTEs) to fill our EHR gaps (development, quality assurance, interfaces, vocabulary, project planning, etc.). In order to get our clinicians up to speed on new functionality, change workflows, configure systems, we conservatively estimated that it will take 20 to 30 FTEs over 20 months to meet meaningful use in our hospitals and clinics. This assumes Intermountain postpones any ongoing non-ARRA legacy IT development projects immediately and all non-ARRA implementation for the next 20 to 32 months. In addition, and importantly, we are not staffed at this time to accomplish this level of work on the development and implementation fronts. Our estimation is that at our staffing level, we would need at least an additional 18 months to reach Stage I as defined meeting all requirements, which also includes certifying our EHR systems as required by ARRA/HITECH. In addition, several of the
Meaningful Use requirements are likely to be deemed lower in priority than some of our current and planned projects. Many of these high-priority competing projects are regulatory in nature and support ARRA in some fashion, including ICD-10 implementation, e-prescribing implementation and bolstering of systems to comply with ARRA HIPAA requirements.

The estimates for EHR and meaningful use gaps are being used to help prioritize our roadmap for development and implementation of our clinical systems functionality implementation strategy. We expect to revisit this gap analysis once the final rules are released by CMS (Centers for Medicare and Medicaid Services). These rules are expected in the late summer, 2010.

Conclusion

This paper describes the current state of our EHR functions and EHR adoption compared to those required by the HITECH act. We describe the method use to determine the gaps between our EHR functions, EHR adoption, and required by HITECH. We also described an estimation of work required to fill the gaps in order to meet HITECH EHR and workflow requirements.

References


