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Acronyms

- Adopt, Implement, Upgrade (AIU)
- Agency for Healthcare Research and Quality (AHRQ)
- American Health Information Management Association’s (AHIMA)
- American Hospital Association (AHA)
- American Recovery and Reinvestment Act of 2009 (ARRA)
- Body Mass Index (BMI)
- Brigham and Women’s Hospitals (BWH)
- Centers for Medicare and Medicaid Services (CMS)
- Chicago Patient Navigation Research Program (C-PNRP)
- Clinical Document Architecture (CDA)
- Clinical Laboratory Improvement Advisory Committee (CLIAC)
- Computerized Provider Order Entry (CPOE)
- Continuity of Care Document (CCD)
- Controlled Risk Insurance Company (CRICO)
- Electronic Health Records (EHRs)
- Electronic Medical records (EMRs)
- Eligible Professional (EP)
- Federal Financial Participation (FFP)
- Federal Health Architecture (FHA)
- Federally Qualified Health Centers (FQHC)
- Foundation of Research and Education (FORE)
- General Electric (GE)
- Health Information Exchange (HIE)
- Health Information Exchange Organizations (HIOs)
- Health Information Security and Privacy Collaboration (HISPC)
- Health Information Security and Privacy Collaboration (HISPC)
- Health Information Technology (HIT)
- Health Information Technology Expert Panel (HITEP)
- Health Information Technology for Economic and Clinical Health Act (HITECH)
- Health Information Technology Research Center (HITRC)
- Health Level Seven (HL7)
- Health System Change (HSC)
- Healthcare Effectiveness Data and Information Set (HEDIS)
- High Value Health Care Project (HVHC)
- Institutional Review Board (IRB)
■ Interim Final Rule (IFR)
■ Longitudinal Medical Record (LMR)
■ Massachusetts General Hospital (MGH)
■ Medicare Advantage (MA)
■ National Ambulatory Medical Care Survey (NAMCS)
■ National Governors Association (NGA)
■ National Institute of Standards and Technology (NIST)
■ National Library of Medicine (NLM)
■ National Priorities Partnership (NPP)
■ National Quality Forum (NQF)
■ Nationwide Health Information Network (NHIN)
■ Nationwide Health Information Network (NHIN)
■ Notice of Proposed Rulemaking (NPRM)
■ Office of the National Coordinator for Health Information Technology (ONC)
■ Patient Protection and Affordable Care Act of 2010 (PPACA)
■ Physician Quality Reporting Initiative (PQRI)
■ President’s Information Technology Advisory Council (PITAC)
■ Prospective Payment System (PPS)
■ Providence Health & Services (PHS)
■ Public Health Service Act (PHSA)
■ Quality Alliance Steering Committee (QASC)
■ Quality Data Set (QDS)
■ Regional Extension Centers (RECs)
■ Regional Health Information Organizations (RHIOs)
■ Research Patient Data Registry (RPDR)
■ Resource Based Relative Value Scale (RBRVS)
■ Risk Management Foundation (RMF)
■ Rural Health Clinics (RHC)
■ State Designated Entities (SDE)
■ State Health Policy Consortium (SHPC)
■ State-Level Health Information Exchange (SLHIE) Consensus Project
■ Strategic Health IT Advanced Research Projects (SHARP)
■ University of Illinois Medical Center (UIMC)
■ U.S. Department of Health and Human Services (HHS)
Introduction

Catherine M. DesRoches, Dr.P.H.

Since our initial report in 2006, the widespread implementation of health information technology (HIT) has remained a major policy initiative; however adoption of HIT and electronic health records has continued to lag. This may soon begin to change with the passage of the American Recovery and Reinvestment Act (ARRA) of 2009 and the Patient Protection and Affordable Care Act of 2010 (PPACA). ARRA contains significant financial incentives for clinicians to implement these systems and the PPACA further reinforces their importance with its long-term reliance on electronically generated data for improvements in health care quality, efficiency, and overall population health.

Recognizing that gains in efficiency and quality, as well as improvements in population health will require more than simply replacing processes that were once conducted via paper with a digital format, the legislation requires clinicians to demonstrate that they are using the technology in a meaningful way, both at the point of care and for quality reporting purposes. This report, Health Information Technology in the United States: Moving Toward Meaningful Use, 2010, reflects this shift in emphasis from adoption to use. While the report continues to track the nation’s progress toward the widespread adoption of electronic health records (EHRs), this year we have a special focus on meaningful use criteria and the use of HIT for quality reporting and improvement.

Major Content

Chapter 1, Readiness for Meaningful Use, scans the most current figures for national adoption of EHRs in outpatient settings, reports the most recent 2009 American Hospital Association rates for hospital adoption of EHR and further explores barriers to adoption. Finally, this chapter presents a summary of initiatives designed by the Office of the National Coordinator for Health Information Technology to increase EHR adoption.

Chapter 2, An Update on Meaningful Use, reviews the final meaningful use rule, as well as additional regulations put forth by the Patient Protection and Affordable Care Act related to HIT. This chapter includes a discussion of the issues and challenges that lie ahead for the regulatory implementation of this rule.

In Chapter 3, Updating Health Information Exchange, we review the meaningful use criteria relevant for health information exchange (HIE) and summarize the key features of the State Health Information Exchange Cooperative Agreement Program. We then review recent research on the progress of regional health information organizations, and conclude with a discussion of the broader value that may be realized from the increased use of health information exchange.
Chapter 4, *Building a Health Information Technology Infrastructure that Effectively and Efficiently Enables Quality Measurement and Reporting*, describes an approach that will allow for the cost-effective and efficient collection and aggregation of data on the quality and costs of health care in the United States. It describes the opportunities and strategies necessary to make more rapid progress toward the widespread availability of performance results.

Chapter 5, *The Quality Supply Chain: Moving Toward Quality Measurement and Improvement Through Health Information Technology*, discusses how the development of and shift toward quality measures based on clinical data from EHRs should enable tremendous improvements in performance measurement. Specifically, the greater feasibility of collecting data associated with these EHR-based measures should facilitate the rapid development and testing of metrics used for benchmarking and quality improvement.

Finally, in Chapter 6, *What Does it Look Like When it Works? Improving the Health of Populations Using EHRs*, we present examples of what meaningful use and its measurement might look like in local health systems and in the lives of patients and health care providers. This chapter focuses on understanding how patients, providers and systems use EHRs to work together to communicate, coordinate, measure and improve health care.
Chapter 1: Readiness for Meaningful Use

Paola D. Miralles, and Catherine M. DesRoches, Dr.P.H.

Current Adoption Rates for Electronic Health Records

The modernization of our nation’s health care information technology infrastructure remains a top policy priority in ushering in the next generation of health reform. Generous recent and anticipated financial incentives and other funding opportunities are a result of federal support to improve the delivery of American health care. These monies also demonstrate an understanding of the intensive level of resources needed to spur adoption. The Centers for Medicare and Medicaid Services (CMS) estimate between $14 billion and $27 billion over 10 years will be distributed to eligible Medicare and Medicaid providers who meaningfully use their systems. As the electronic health record (EHR) adoption push continues for the 2014 goal, there is now a greater focus on the meaningful use of EHRs and their potential for high-quality and tightly coordinated health care improvements. Still, tracking the nation’s progress remains crucial to determining progress toward the overall goal of universal adoption. As a prelude to the rest of our report, this chapter scans the most current figures for national adoption of these systems in the ambulatory setting, reports the newest 2009 American Hospital Association (AHA) rates for hospital adoption of EHRs, explores barriers to adoption, and summarizes Office of the National Coordinator for Health Information Technology (ONC) initiatives designed to increase EHR adoption. This chapter and the following will be used by ONC as their annual report to Congress on the state of EHR adoption in the US.

Health Information Technology (HIT)-Related Research Developments: National Surveys

For the most current adoption rates by physicians in practices, we scanned the literature and evaluated recently published national survey data, utilizing the quality assessment methods described in earlier reports. Here we present only surveys that were rated of high quality. Findings suggest that while overall levels of adoption are low, the rate of adoption is increasing.

Physician HIT Adoption Rates Reported by National Surveys

The Health System Change (HSC) 2008 Health Tracking Physician Survey (previously the Community Tracking Study Physician Survey), asked physicians overarching questions as to how they organize and practice medicine. With input from over 4,700 physicians (response rate of 62%), the HSC Health Tracking Physician Survey found 23.8 percent of physicians reporting that their practice had an all electronic medical record (EMR) and 26.9% had a part electronic, part paper system. Below, in Table 1, we show the availability and routine use by physicians of specific functionalities. For comparison to previous reports, we organize items under Institute of Medicine (IOM) recommended core functionalities. The most available EMR function reported, one considered as a component of a basic EHR system, was viewing lab, radiology and other tests results (77.4%)
with almost 63 percent of physicians stating they routinely used this function. Another functionality of a basic EHR system, ordering prescriptions, was available to 43 percent of physicians and routinely used by 33 percent of physicians with the functionality. Accessing patient notes, medication lists or problem lists was available to 58 percent of physicians and 49 percent of physicians with the function used it routinely.

Table 1: Is Information Technology Available in YOUR PRACTICE for…

<table>
<thead>
<tr>
<th>Table 1: Is Information Technology Available in YOUR PRACTICE for…</th>
<th>Percentage Available</th>
<th>Percentage of Physicians With Functionality Reporting Routine Use</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Health Information and Data</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Accessing patient notes, medication lists or problem lists</td>
<td>58.4</td>
<td>49.4</td>
</tr>
<tr>
<td><strong>Order Entry Management</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Writing prescriptions</td>
<td>43.1</td>
<td>33.1</td>
</tr>
<tr>
<td>Transmitting prescriptions to pharmacy</td>
<td>36.1</td>
<td>22.8</td>
</tr>
<tr>
<td>Ordering laboratory, radiology or other diagnostic tests</td>
<td>55.9</td>
<td>44.6</td>
</tr>
<tr>
<td>Obtaining information on formularies</td>
<td>51.4</td>
<td>20.3</td>
</tr>
<tr>
<td><strong>Results Management</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Viewing results of laboratory, radiology or other diagnostic tests</td>
<td>77.4</td>
<td>62.7</td>
</tr>
<tr>
<td><strong>Clinical Decision Support</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Obtaining up-to-date decision support for diagnostic and treatment recommendations based on data about your patients and practice guidelines</td>
<td>67.6</td>
<td>28.6</td>
</tr>
<tr>
<td>Obtaining information on potential patient drug interactions with other drugs, allergies and/or patient conditions</td>
<td>70.8</td>
<td>41.8</td>
</tr>
<tr>
<td>Generating reminders for clinicians about preventive services</td>
<td>35.8</td>
<td>14.1</td>
</tr>
<tr>
<td>Generating reminders for clinicians about other needed patient follow-up</td>
<td>35.7</td>
<td>17.7</td>
</tr>
<tr>
<td><strong>Electronic Communication and Connectivity</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Communicating about clinical issues with patients by e-mail</td>
<td>32.4</td>
<td>6.0</td>
</tr>
<tr>
<td>Exchanging clinical data and images with other physicians</td>
<td>47.4</td>
<td>25.8</td>
</tr>
<tr>
<td>Exchanging clinical data and images with hospitals and laboratories</td>
<td>46.6</td>
<td>26.1</td>
</tr>
</tbody>
</table>

Additionally, HSC analyzed a subsample of 1,304 primary care physicians; here they found that 29 percent had a fully electronic medical record. In addition, among those with the respective functionalities 54 percent reported using physician reminders for preventive care and 34 percent generated patient reminders as management tools for patients with chronic illnesses.8

The National Ambulatory Medical Care Survey (NAMCS), conducted annually by the U.S. Census Bureau for the National Center for Health Statistics, asks about global EMR/EHR adoption as well as the adoption of specific functionalities. In 2008 and 2009, a supplementary technology-focused survey was mailed to physicians, in addition to an in-person portion of the survey. The 2008 survey found 41.5 percent of physicians reporting all or partial EMR/EHR systems (not including billing) in office-based practices.9 Approximately 17 percent of physicians had basic systems (patient demographics, patient problem lists, clinical notes, orders for prescriptions, and viewing lab/imaging results). A little over 4 percent reported using fully functional systems, which included the same functionalities found in basic systems with the addition of the following: medical history and follow-up, orders for tests, prescription and test orders sent electronically, warning of drug interactions/contraindications, out-of-range test levels and guideline-based intervention reminders.10

Preliminary estimates of the 2009 NAMCS survey indicate a rise in adoption numbers. Overall, almost 44 percent of physicians reported using all or partial EMR/EHR systems, with 20.5 percent of physicians using basic systems and 6.3% using fully functional systems. Figure 1 shows the rising trend in adoption of office-based electronic systems.11

Figure 1: Percentage of Office-Based Physicians Using Electronic Medical Records/Electronic Health Records (EMRs/EHRs): United States, 2001–2008 and Preliminary 2009

Notes: Any EMR/EHR is a medical or health record system that is either all or partially electronic (excluding systems solely for billing). The 2009 data are preliminary estimates (as shown on dashed lines), based only on the mail survey. Estimates of basic and fully functional systems prior to 2006 could not be computed because some items were not collected in the survey. Fully functional systems are a subset of basic systems. Starting in 2007, the skip pattern after the all or partial EMR/EHR systems question was removed. Includes nonfederal, office-based physicians. Excludes radiologists, anesthesiologists, and pathologists.

Baseline Measures for Outpatient Physicians Demonstrating Meaningful Use

Previous work documents barriers to adoption by physicians in outpatient practices including capital costs, inability to find systems which meet their needs, return on investment uncertainty, and systems purchased becoming obsolete.12,13 A recent analysis of the 2008 National Survey of EHRs Adoption in Ambulatory Care examines baseline meaningful use across different physician types.14 Out of 2758 physicians surveyed, Hogan et al. analyzed a subsample of 485 physicians who reported having a basic EHR system. Included in this subsample were 176 primary care practitioners, 233 medical specialists and 76 surgeons. Almost 20 percent of primary care physicians reported having a basic system, the highest group of adopters among the subsample, followed by 17.1 percent among medical specialists and 16.7 percent adoption by surgeons.

In comparing proposed measures for meaningful use vs. actual use (some or most of the time) by these physicians, Hogan et al. divided functions into four categories: patient record, clinical decision support, information exchange and public health reporting. They found that among physicians with key electronic functions available to them, most used functionalities designated under the patient record category. Seventy-five percent to 85 percent of all physicians in the subsample used electronic lists of prescriptions taken by patients, demographics, problem lists, clinical notes, orders for prescriptions, lab tests and radiology tests. Regarding clinical support EHR functions, almost 80 percent used electronic prescription warnings, out-of-range lab results and reminders for guideline based care. Between 60 percent and 85 percent could perform several information exchange functions via their EHR and more than 50 percent electronically reported public health notifications. Additionally, fewer than 30 percent of providers could provide patients with electronic access to their medical records.15

Hospital HIT Adoption Rates Reported by AHA National Survey

Our previous work for ONC noted the dearth in methodologically rigorous data for EHR adoption in the outpatient and inpatient setting.16–18 Environmental scans and qualitative assessment of available survey instruments led to the development of national surveys to provide definitive estimates of EHR adoption in physician practices and hospitals. We have previously reported, in detail, the development of both instruments.19, 20 Here we report the results of the second fielding of the hospital survey (March 2009 through September 2009).

Completed in late 2009, the AHA’s second annual IT supplement (included with their regular annual survey of hospitals), provides the basis for analysis of the latest hospital adoption rates using the previously developed definitions by expert panels for both basic and comprehensive EHRs.21

The AHA surveyed 4,493 acute-care non-federal hospitals with a response rate of 69 percent.22 Characteristically, hospitals that were large, major teaching institutions and located in the Midwest were most likely to respond. This analysis, conducted by Jha, et al., found that critical access, small, public, non-teaching and rural hospitals were less likely than other hospitals to have adopted a basic system since 2008. Overall, data analysis demonstrated modest increases in the adoption of EHRs since 2008. Figure 2 shows a comparison of hospital adoption rates of any EHR system, basic and comprehensive systems. The percentage of
comprehensive EHR adoption among hospitals almost doubled, representing the strongest gain (1.5% vs. 2.7%). Basic systems increased by two percentage points (7.2% to 9.2%). While almost 9 percent reported the adoption of any system in 2008, 2009 reports a total of almost 12 percent adoption, representing a relative increase of 32 percent (3.2% absolute increase).

Figure 2: Changes in EHR Adoption Rate From 2008 to 2009

Jha, et al. further examined the gains in adoption by key individual functionalities as they were fully implemented in at least one or all units and whether hospitals had begun the process of implementation or held future plans for implementation. Overall, modest gains between 2 percent and 5 percent were seen in the adoption of individual functionalities and are shown in detail in Table 2. Computerized physician order entry and electronic physician documentation, representing the hardest functions to adopt, had been implemented in at least one unit in one-third of hospitals. Future implementations of these functionalities were planned in one-fourth of the hospitals, while 40 percent reported no plans for implementation.
Table 2: Implementation of Individual Functionalities in U.S. Hospitals in 2009 (Change from 2008)

<table>
<thead>
<tr>
<th></th>
<th>Fully implemented in all units</th>
<th>Fully implemented in at least 1 unit</th>
<th>Began implementation or resources identified*</th>
<th>No implementation and no specific plans</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Clinical Documentation</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Medication Lists</td>
<td>47 (+3)</td>
<td>19 (+2)</td>
<td>16 (-2)</td>
<td>18 (-3)</td>
</tr>
<tr>
<td>Nursing Assessments</td>
<td>39 (+4)</td>
<td>21 (+1)</td>
<td>17 (-1)</td>
<td>23 (-4)</td>
</tr>
<tr>
<td>Physician Notes</td>
<td>15 (+3)</td>
<td>18 (+3)</td>
<td>27 (0)</td>
<td>40 (-6)</td>
</tr>
<tr>
<td>Problem Lists</td>
<td>29 (+3)</td>
<td>17 (0)</td>
<td>21 (-1)</td>
<td>33 (-2)</td>
</tr>
<tr>
<td><strong>Results Viewing</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Diagnostic Test Images</td>
<td>41 (+6)</td>
<td>12 (+1)</td>
<td>18 (-2)</td>
<td>29 (-5)</td>
</tr>
<tr>
<td>Diagnostic Test Results</td>
<td>53 (+5)</td>
<td>11 (+1)</td>
<td>14 (-1)</td>
<td>22 (-4)</td>
</tr>
<tr>
<td>Lab Reports</td>
<td>76 (0)</td>
<td>8 (+1)</td>
<td>6 (-1)</td>
<td>9 (-1)</td>
</tr>
<tr>
<td>Radiology Images</td>
<td>73 (+6)</td>
<td>11 (0)</td>
<td>8 (-2)</td>
<td>9 (-3)</td>
</tr>
<tr>
<td>Radiology Reports</td>
<td>77 (1)</td>
<td>8 (+1)</td>
<td>6 (-1)</td>
<td>8 (-1)</td>
</tr>
<tr>
<td><strong>Computerized Provider Order Entry</strong></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Laboratory Tests</td>
<td>20 (0)</td>
<td>15 (+3)</td>
<td>25 (0)</td>
<td>41 (-4)</td>
</tr>
<tr>
<td>Medications</td>
<td>20 (0)</td>
<td>15 (+3)</td>
<td>26 (0)</td>
<td>40 (-3)</td>
</tr>
<tr>
<td><strong>Decision Support</strong></td>
<td></td>
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</tr>
<tr>
<td>Clinical Guidelines</td>
<td>20 (+4)</td>
<td>12 (+3)</td>
<td>24 (-2)</td>
<td>44 (-5)</td>
</tr>
<tr>
<td>Clinical Reminders</td>
<td>24 (+3)</td>
<td>13 (+2)</td>
<td>23 (0)</td>
<td>39 (-4)</td>
</tr>
<tr>
<td>Drug Allergy Alerts</td>
<td>46 (+1)</td>
<td>17 (+2)</td>
<td>15 (-1)</td>
<td>22 (-1)</td>
</tr>
<tr>
<td>Drug-Drug Interactions</td>
<td>45 (+1)</td>
<td>18 (+1)</td>
<td>15 (-1)</td>
<td>22 (-1)</td>
</tr>
<tr>
<td>Drug-Lab Interactions</td>
<td>34 (+1)</td>
<td>16 (+1)</td>
<td>20 (0)</td>
<td>30 (-2)</td>
</tr>
<tr>
<td>Drug Dosing Support</td>
<td>32 (+2)</td>
<td>16 (+1)</td>
<td>20 (0)</td>
<td>32 (-3)</td>
</tr>
</tbody>
</table>

* Those who reported that they were either “beginning to implement in at least one unit” or “have resources identified to implement in the next year”.

Source: Jha AK, DesRoches CM, Kralovec PD and Joshi MS. “A Progress Report on Electronic Health Records in U.S. Hospitals.” *Health Affairs (Millwood)*, 29(10) (Published online August 26, 2010).

Finally, this analysis found that 56 percent of U.S. hospitals had adopted at least seven key functions that compose a basic electronic system in one or more units, a 6 percent increase compared to 2008 and less than 1 percent of U.S. hospitals met all 11 of the proposed meaningful use criteria in at least one unit.²⁹,³⁰
Barriers to Adoption by Hospitals

Although the 2009 AHA Health IT Survey did not specifically pose questions regarding barriers to hospital EHR adoption, these findings suggest that certain hospitals are facing greater barriers than others. Between 2008 and 2009, compared to other hospitals, critical access, small, public, non-teaching, rural hospitals were the least likely to have adopted even a basic EHR system. This same pattern was found for adoption of specific electronic functions, including computerized provider order entry (CPOE), physician notes and clinical guidelines. Not surprisingly, critical access, small and rural hospitals demonstrated lower levels of adoption for specific proposed meaningful use criteria for Stage I of meaningful use incentives.

Office of the National Coordinator

In May 2004, David Brailer, M.D., Ph.D. began serving as national HIT czar, mandated by President George W. Bush’s executive order. While the American Reinvestment and Recovery Act (ARRA) in February 2009 drastically reshaped ONC’s financial breadth and landscape, Brailer’s work set the foundation for the second national coordinator, David Blumenthal, M.D., M.P.P. In a recent speech, Blumenthal recapped his past year in office and described his extensive team as agents for social change, rather than mere technical adoption. A series of regulatory breakthroughs mark ONC’s efforts this past year, which we will briefly discuss, followed by an overview of specific programs implemented under Health Information Technology for Economic and Clinical Health Act (HITECH) and beyond.

The Notice of Proposed Rulemaking (NPRM) and Final Rule for Meaningful Use

Announced by CMS in December 2009 and guided by the major priorities delineated by ARRA, the NPRM drafts the vision for what should be expected of an EHR and how it may be meaningfully used. Furthermore, Medicare and Medicaid provisions to incentivize eligible professionals (EP) as a means to achieve the outlined five priority outcomes are discussed. Please refer to Chapter 2 where we discuss meaningful use in further detail, along with the details of the Final Rule for meaningful use announced on July 13, 2010.

Interim Final Rule (IFR) and Final Rule on Standards and Certification Criteria

Released in December 2009 by ONC, the IFR represents the first step in the regulatory process for the official adoption of standards, implementation specifications, and certification criteria for EHRs. Closely linked to the NPRM, the IFR delineates the required capabilities and certification of EHRs in order to meet meaningful use Stage 1 criteria for reimbursement by eligible physicians and eligible hospitals under the Medicare and Medicaid EHR incentive programs, beginning in 2011. Where possible, the IFR establishes standard vocabulary and content exchange specifics to aid in interoperability.
Notice of Proposed Rulemaking for the Establishment of Certification Programs for HIT

This notice announced in March 2010 established two certification programs for testing and certifying HIT, one temporary and one final. In June 2010 ONC issued the final rule for the temporary certification program, which organizations must follow in order to be authorized by ONC to test and certify HIT systems for the 2011 meaningful use period. The permanent certification process will evolve alongside meaningful use stages and produce an ongoing certification process to test and certify complete EHRs and EHR modules. Both certification programs aim to provide assurance to patients, providers and purchasers that their systems increase quality of care while adhering to high protection standards. ONC has worked closely with the National Institute of Standards and Technology (NIST) in developing both certification programs.

HITECH Programs

Strategic HIT Advanced Research Projects (SHARP) Program

Announced in December 2009 and funded at $60 million through HITECH provisions, SHARP programs are designed to harness innovation in HIT by conducting high-level research aimed at diminishing well-documented barriers to HIT adoption. Four cooperative agreements ($15 million each) were awarded in April 2010 and each research project includes one of four specific research agendas spanning four years. Although projects are encouraged to be collaborative and multidisciplinary, the predetermined domains to help achieve breakthrough advances in the potential of meaningful use and HIT are narrowly defined as follows:

- Security of HIT: awarded to University of Illinois at Urbana-Champaign to explore security challenges and risk mitigation policies in order to build public trust.
- Patient-centered cognitive support: awarded to The University of Texas Health Science Center at Houston to foster the integration of HIT with clinician decision-making.
- Health care application and network architectures: awarded to Harvard University to develop foundational and secure infrastructures for health information exchange (HIE).
- Secondary use of EHR data: awarded to Mayo Clinic College of Medicine to facilitate the proper use of stored HIT for the improvement of health care.

The overarching goal in each area of focus is the leveraging of research and its immediate translation into practice as tools to improve health care quality, safety and efficiency.
**HIT Workforce Development Program**

In anticipation of the demand for a highly skilled HIT workforce, provisions under HITECH promote learning collaborations to produce skilled front line workers. With shortage in workforce as a barrier to adoption, these trained individuals will provide the needed support for implementing secure, interoperable EHR systems. A total of $84 million has been designated to develop resources and work with community colleges, produce high quality educational materials to guide schools in curriculum to develop a competency exam and support for certificate and advance degree training. ONC is collaborating with the National Science Foundation, Department of Education, and the Department of Labor to ensure that qualified workers will be available as more hospitals and physicians implement these systems.

The following four programs constitute efforts in the future development of workforce.

- **Community College Consortia Program**: Nearly $70 million awarded in April 2010, through two-year cooperative agreements, to five regional consortia that will collaborate with local community colleges in developing non-degree training programs to be completed within six months for students with educational backgrounds. These programs will produce: practice workflow and information management redesign specialists; clinician/practitioner consultants; implementation support specialists; implementation managers; and technical/software support staff and trainers.

- **Curriculum Development Centers Program**: In April 2010 five non-profit organizations were awarded a total of $10 million through two-year cooperative agreements to prepare educational materials aligned with national standards and in cooperation with the Community College Consortia. In helping to standardize HIT academic programs these centers will aid in producing health care information technology professionals. Additionally, one awardee will serve as the National Training and Dissemination Center.

- **Competency Examination Program**: For individuals completing non-degree programs, examinations will assess HIT competency. A $6 million, two-year cooperative agreement will be awarded to one institution of higher learning to develop examination materials and initially administer the exam at no cost to the first 10,000 examinees.

- **University Based Training Program**: Nine competitive grants totaling $32 million were awarded in April 2010 for a 39-month period to develop university level training for the following roles: clinical/public health leader; health information management and exchange specialist; health information privacy and security specialist; research and development scientist; programmer and software engineer; and HIT sub-specialist.

**Beacon Community Cooperative Agreement Program**

The HITECH Act immediately prioritized the strengthening of the nation’s HIT infrastructure with the creation of the Beacon Community Cooperative Agreement Program. In May 2010, $220 million dollars were awarded to 15 diverse non-profit, community consortiums chosen to spearhead local implementation efforts. An additional $15 million will be designated to provide supplementary technical assistance and program evaluations. In September 2010 two more Beacon Communities were announced, funded by another $30 million. These
communities, spanning the nation, serving urban and rural populations, and addressing a multitude of populations and issues, are tasked with providing the vision of meaningfully implementing HIT.

These bodies aim to demonstrate both improvements in individual health outcomes, such as disease states and treatment approaches, as well as population health outcomes. Research evidence produced by consortiums will support specific reforms to improve patient care and delivery, as well as quality and efficiency gains. Additionally, lessons learned will serve as examples for fellow regions embarking adoption of these systems. Collaboration with Regional Exchange Centers and the State Health Information Exchange Programs in their local communities, along with leveraging several federal entities, will provide the needed support to develop and disseminate best practices for widespread use of HIT.

**Health Information Technology Extension Program**

Authorized under HITECH legislation as an amendment to the Public Health Service Act (PHSA), this program establishes Health Information Technology Regional Extension Centers (RECs) and a national Health Information Technology Research Center (HITRC) geared to aid HIT implementation.

**Regional Extension Centers (RECs)**

Sixty centers throughout the U.S., awarded as cooperative agreements, have been designated to ensure community-based technical guidance and hands-on support to accelerate providers’ efforts in becoming meaningful users of EHRs. Nearly $700 million in funds will target primary care physicians, solo and small group practices (fewer than 10 physicians), public and critical access hospitals, community and rural health centers and other providers which predominately serve uninsured, underinsured or medically underserved patients. Federal support will last for four years with the expectation that these centers will be self-sustaining afterwards. In February 2010 the first cycle of awards announced 32 recipients receiving $375 million. The remaining 28 (receiving $267 million) were announced in April. The mission of these RECs highlight HITECH’s emphasis on reducing health disparities and lessening the monetary burden for health professionals least likely to have the capital to invest in HIT. The goal is to reach 100,000 priority primary care providers within two years with intensive technical assistance. Individual awards ranged from a little over $36 million granted to the Alaska eHealth Network to nearly $29 million awarded to Quality Insights of Pennsylvania, Inc., and were given to non-profit organizations positioned to aid their communities in EHR adoption.

RECs may help enable meaningful use in the following manner:

- Unbiased guidance on vendor selection and group purchasing;
- Practice and workflow redesign;
- Functional interoperability and HIE;
- Project management and implementation;
- Privacy and security best practices;
- Local workforce support; and
- Everything involved in ensuring meaningful use of EHRs.
Furthermore, each REC will be evaluated every two years by privately sponsored U.S. Department of Health and Human Services (HHS) appointed experts and continued support will be contingent upon measured performance.

**Health Information Technology Research Center (HITRC)**

In serving as a consortium for best practices the HITRC, funded separately at $50 million, will provide support to RECs by creating a virtual community/platform for shared learning accessible to all stakeholders. In addition, the HITRC will disseminate materials to aid the reduction of health disparities and ensure that these prioritized providers will have ample support in implementing new technologies.

**State Health Information Exchange Cooperative Agreement Program**

Authorized by ARRA and established as part of HITECH under an amendment to the PHSA this four-year cooperative agreement promotes the development and advancement of secure, standards-based state level HIE (including eligible territories and State Designated Entities [SDE]) through appropriated resources and technical assistance. It is intended as a stepping stone toward nationwide interoperability. The initial goal of facilitating rapid exchange of patient-centric health information among hospitals and health professionals is intended to extend beyond state boundaries in the future as functional HIE is critical to meaningful use. ONC finalized the list of 56 state/SDE awardees in March 2010, totaling almost $567 million in award monies. The funds ranged from $600,000 awarded to American Samoa to more than $38 million to California. Beginning in 2011, states must match part of their awarded funds under the agreement. States have several tasks defined by their award agreement including: implementing relevant privacy and security policies; developing state directories and technical services; coordinating with Medicaid and state public health agencies; identifying and removing barriers to HIE; effectively modeling HIE governance and accountability; and convening stakeholders as a means to improve trust. Finally, they must implement strategic and operational plans to measure progress and work with the private sector for innovating appropriate technologies. Ultimately, the performance of each state will be evaluated by federally established metrics.
ONC Initiatives

ONC has begun several other initiatives that go beyond those put forward by HITECH.\(^41\)

**State-Level Health Initiatives**

ONC’s efforts to align federal and state initiatives in achieving the goal of HIE.

**State Health Policy Consortium (SHPC)**

- Established with RTI International in March 2010, this consortium provides a solutions forum for groups of states to resolve regional policy issues pertaining to the electronic exchange of health information. In June 2010, the first group was funded: the Upper Midwest HIE Consortium (UM-HIE), which will convene representatives from six states (Illinois, Iowa, Minnesota, North Dakota, South Dakota and Wisconsin).

**The State-Level Health Information Exchange (SLHIE) Consensus Project**

- Forum managed through a contract with the American Health Information Management Association (AHIMA) and the Foundation of Research and Education (FORE) to facilitate the alignment of federal and state HIE efforts, now in its 3rd year.
- Public-private efforts allow cooperation with a diverse set of stakeholders.
- Steering committee guides the identification of best practices for governance, accountability, financial sustainability and the dissemination of these principles to all state-wide organizations leading HIE efforts.

**The State Alliance for E-health (State Alliance)**

- National Governors Association (NGA) Center for Best Practices, along with HHS, established this collaborative body of key state-elected and appointed officials addressing the unique roles states can play in advancing interoperable state level HIT in 2006.

**The Health Information Security and Privacy Collaboration (HISPC)**

- RTI International and HHS established this collaboration in 2006 to help states and territories tackle issues concerning security and privacy related to the electronic transmission of HIT.
- Projects focus on education, state law and consent policy, and organizational policy each with the goal of developing common, replicable multistate solutions.
Nationwide Health Information Network (NHIN)

A foundation for the national HIT agenda, NHIN sets standards, protocols, legal agreements, specifications, and services to enable secure HIE over the Internet and enable health information to follow the consumer and be available to aid in clinical decisions at the point of care. Currently, NHIN Direct connects federal, state, local and regional Health Information Exchange Organizations (HIOs), along with delivery networks in order to demonstrate live health information exchange. The NHIN Direct project, created from recommendations by the NHIN Work Group, is exploring standards and services of HIT exchange at a lower complexity level (i.e., a primary care physician sending a referral to a specialist).

Federal Health Architecture (FHA)

- An e-government line of business initiatives seeking to increase efficiency and effectiveness in government operations through the support of cross-agency HIT architecture (for all agencies needing to share HIT) interoperable with private sector systems.
- Efforts to promote a unified federal approach to IT adoption, ultimately to improve citizens’ access to care, quality and costs.
- The FHA provides cohesive federal input to ONC, implementation guidance and promotes accountability.

Adoption

ONC relies upon two ongoing national surveys to measure HIT adoption rates by ambulatory physicians and hospitals: The National Ambulatory Medical Care Survey, conducted by the National Center for Health Statistics, and the American Hospital Association’s Annual Information Technology Supplement.

Clinical Decision Support (CDS) and the CDS Collaboratory

- The Road Map for National Action on Clinical Decision Support, funded by ONC and conducted by the American Medical Information Association (AMIA), details recommendations for CDS development, implementation and use.
- The Clinical Decision Support Government Collaboratory was established in 2008 and unites federal professionals in their goal of promoting CDS as a key component of HIT for promoting the quality, effectiveness, efficiency and safety of health care.
Summary

All of the surveys, both of physicians and hospitals, show an increase in their estimates of EHR adoption and use when compared to prior years. However, despite these increases, several troubling issues should be noted. First, almost all hospitals will have difficulty meeting meaningful use criteria for Stage I incentives. There is significant work ahead for the federal government, RECs, health care organizations and providers, as they work to achieve these goals. Second, it appears that the gap in adoption between hospitals and physician practices that are well-resourced and those that are not may be widening. In particular, small, public, non-teaching, rural and critical access hospitals are not keeping pace with larger hospitals in terms of their adoption of both EHRs and specific HIT functionalities. The federal government clearly recognizes this issue, giving these hospitals priority for assistance from the RECs, and ensuring that the incentives available to providers and hospitals qualifying through Medicaid are more generous than others available through Medicare. Whether these additional supports will be enough to overcome the barriers faced by these institutions is not known. These providers may need additional incentive payments or access to capital through low-interest loans to further offset financial barriers related to adoption. Finally, the implementation of the meaningful use criteria has important implications for ensuring that the digital divide does not widen further. These issues are discussed further in Chapter 2 of this report.


5. Center for Studying Health System Change.


10. ibid.

11. ibid.


15. ibid.


27. ibid.

28. ibid.

29. ibid.

30. ibid.

31. ibid.

32. ibid.

33. ibid.


Chapter 2: An Update on Meaningful Use

Taylor Burke, J.D., L.L.M., Lara Cartwright-Smith, J.D., M.P.H., Jane Hyatt Thorpe, J.D., and Sara Rosenbaum, J.D.

Introduction

The American Recovery and Reinvestment Act of 2009 (ARRA) directed the adoption and meaningful use of health information technology (HIT) as a national legislative priority in U.S. health policy. Included in ARRA is the Health Information Technology for Economic and Clinical Health (HITECH) Act, which establishes a statutory framework for the advancement of HIT, and includes provisions that amend Medicare and Medicaid to incentivize qualifying health care professionals to become meaningful users of certified electronic health records (EHR) technology. Although the Patient Protection and Affordable Care Act (PPACA) contains only limited provisions related to HIT, the health reform law effectively builds on the foundation laid by ARRA because of its long-term reliance on the generation, collection, and use of health information to improve the quality and efficiency of health care, as well as measure progress toward broad population health goals.

In July 2010, the U.S. Department of Health and Human Services (HHS), through the Office of the National Coordinator for Health Information Technology (ONC) as established under HITECH and the Centers for Medicare and Medicaid Services (CMS), released final regulations implementing the Medicare and Medicaid meaningful EHR user provisions of HITECH and establishing standards for the certification of EHR technology. This chapter reviews the final meaningful use rule, as well as additional changes made by the PPACA related to HIT. It concludes with a discussion of the issues and challenges that lie ahead in regulatory implementation.

Statutory Background of Medicare and Medicaid EHR Incentive Programs

HITECH authorizes CMS to provide financial incentives to eligible health care professionals who participate in Medicare and Medicaid to encourage the adoption and meaningful use of certified EHRs. For qualifying Medicare providers, the financial incentives consist of bonus Medicare payments for up to five years, followed by Medicare penalties for providers who fail to become “meaningful EHR user[s].” In Medicaid, the financial incentives take the form of start-up financing to assist providers in adopting, implementing or upgrading the necessary HIT, combined with bonus payments for up to five more years for providers who “demonstrate meaningful use of certified EHR technology.” Eligible hospitals may participate in both programs, while eligible professionals may only participate in either the Medicare or Medicaid incentive program. HITECH sets forth both the basic structure of the Medicare and Medicaid incentive programs and the statutory definition of “meaningful EHR user” in Medicare.
Medicare

There exist two types of eligible Medicare providers: professionals and hospitals. An eligible professional (EP) includes the following five types of non-hospital-based physicians: a doctor of medicine or osteopathy, a doctor of dental surgery or dental medicine, a doctor of podiatric medicine, a doctor of optometry, or a chiropractor. Although HITECH’s definition originally excluded a “hospital-based eligible professional . . . who furnishes substantially all of such services in a hospital setting (whether inpatient or outpatient),” Congress recently amended the definition to include in the Medicare incentive program physicians practicing in hospital outpatient settings. Eligible hospitals include acute care hospitals and critical access hospitals. Federally Qualified Health Centers (FQHC) and Rural Health Clinics (RHC), as stand-alone entities, are not included in the Medicare incentive program; however, EPs working in FQHCs and RHCs are eligible to participate to the extent they are paid in accordance with Medicare’s Resource Based Relative Value Scale (RBRVS) formula (i.e., fee-for-service). As discussed below, because most EPs working in FQHCs and RHCs are not paid through fee-for-service arrangements, these EPs are effectively shut-out of the Medicare incentive program.

If the Medicare EP is a “meaningful EHR user” of certified EHR technology, the EP may receive an incentive payment equal to 75 percent of estimated Medicare Part B charges, subject to an annual limit, with higher limits for EPs practicing in health professional shortage areas. An EP is entitled to receive incentive payments beginning in 2011 for up to five years, but must become a meaningful user before 2015 in order to receive an incentive; the amount of the annual limit for any given EP depends on when the first incentive payment was received. The maximum an individual EP can receive for the entire incentive program is $44,000, and incentive payments expire in 2016. Conversely, if an EP is not a “meaningful EHR user” by 2015, then reimbursement under the Medicare physician fee schedule is reduced by an applicable percentage, ranging from 99 percent to 97 percent, unless the EP qualifies for a “significant hardship” exception.

Eligible hospitals are entitled to receive incentive payments beginning in 2011 for up to four years, but such hospitals are also subject to penalties for failing to become “meaningful EHR user[s]” by 2015 in the form of reduced reimbursement payments. Eligible hospitals must become “meaningful EHR user[s]” before 2016 to avoid the penalty, and no payments will be made in 2017 and beyond. The incentive payment for eligible hospitals is calculated using a complex formula that is based in part on Medicare inpatient bed days. Additionally, Medicare Advantage (MA) organizations are also eligible for incentive payments for their affiliated EPs and eligible hospitals who are “meaningful EHR user[s].”

Medicaid

There exist two types of eligible Medicaid providers: professionals and hospitals. An EP is defined as a physician, dentist, certified nurse-midwife, nurse practitioner, or a physician assistant practicing in a FQHC (e.g., a community health center) or RHC that is also led by a physician assistant. At least 30 percent of a Medicaid EP’s patient volume must be attributable to Medicaid patients, unless the EP is a pediatrician or practices predominately in a FQHC or RHC. Pediatricians may be eligible for incentive payments if at least 20 percent of their patient volume is
attributable to Medicaid patients. EPs practicing predominantly (clinical location for more than 50% of the EP’s patient encounters over a period of six months occurs at the FQHC or RHC) in a FQHC or RHC are eligible if at least 30 percent of their patient volume is attributable to “needy individuals.” Eligible hospitals in the Medicaid incentive program include children’s hospitals with any Medicaid patient volume and acute-care non-children’s hospitals (which include Critical Access Hospitals [CAHs]) with at least a 10 percent Medicaid patient volume. FQHCs and RHCs, as stand-alone entities, are not included in the Medicaid incentive program; however, EPs working in FQHCs and RHCs are eligible to participate if otherwise qualified as described above.

Medicaid EPs may receive incentive payments consisting of 85 percent of the costs of adopting, implementing or upgrading (AIU) certified EHR technology, up to $21,500 for the first year and $8,500 for each subsequent year, up to six years total. The total amount of incentive payments over the six year period is capped at varying levels based on the type of provider. After the first year’s start-up funding, the EP must demonstrate “meaningful use of certified EHR technology” in order to receive the incentive payment. For Medicaid eligible hospitals, the incentive payments are limited to amounts analogous to those for eligible hospitals in the Medicare incentive program. There are no penalties for Medicaid EPs or eligible hospitals who do not become meaningful users.

### Final Regulations Implementing HITECH’S Medicare and Medicaid EHR Incentive Programs

On July 13, 2010, ONC and CMS jointly released two sets of complementary final rules to implement the Medicare and Medicaid EHR incentive programs. The ONC regulations specify the technical capabilities that EHR technology must have to be certified and to support providers in achieving the “meaningful use” objectives. The CMS regulations implement the Medicare and Medicaid amendments by specifying the objectives that providers must achieve in 2011 and 2012 to qualify for incentive payments. These final rules build on policies developed by ONC as part of its statutory national policy development responsibilities.

#### Defining Meaningful Use

The preamble to the final rule proposes a three-staged approach to the definition of meaningful use to enable EPs and eligible hospitals to qualify for incentive payments as the infrastructure for certified EHRs develops. Stage 1 meaningful use criteria, which are set forth in the final rule and discussed more fully below, primarily address the capture of health information. Stage 2 meaningful use criteria, to be proposed by the end of 2011, would expand upon the initial criteria to include more robust requirements for health information exchange, including: 1) continuous quality improvement at the point of care; and 2) structured information exchange such as electronic transmission of orders entered using computerized provider order entry (CPOE) and electronic transmission of diagnostic test results. Stage 3 meaningful use criteria, to be proposed by the end of 2013, would make the measure of meaningful use more robust by adding criteria that focus on quality, safety and efficiency improvements, decision support for national high priority conditions, patient access to self management tools, and access to comprehensive patient data and improving population health.
The final Stage 1 meaningful use criteria build upon HITECH’s three-pronged test of whether EPs and eligible hospitals are “meaningful EHR user[s]” in the Medicare incentive program. These three prongs include: 1) the use of certified EHR technology in a demonstrably meaningful manner, such as electronic prescribing; 2) the electronic exchange of health information to improve the quality of care; and 3) reporting on clinical quality and other measures to the secretary of HHS. For Medicaid EPs and eligible hospitals, HITECH simply requires the provider to demonstrate meaningful use through a means “approved by the State and acceptable to the Secretary,” which may be based on the methodologies applied in Medicare. The final rule interprets these criteria with greater precision, clarifying that while the criteria apply to both Medicare and Medicaid incentive programs, state Medicaid agencies may add up to four specific public health-related requirements detailed in the regulations, subject to CMS approval.

The final rule implements HITECH’s definition by specifying both “core” criteria that all providers must meet to qualify for incentive payments, while also allowing provider choice among a “menu set” of additional criteria. All EPs must meet 15 core objectives and accompanying performance measures, in addition to five more selected from a list of 10 in the EP menu set (for a total of 20). Eligible hospitals must meet 14 core objectives and accompanying performance measures, in addition to five more selected from a list of 10 in the eligible hospital menu set (for a total of 19). The final rule groups these Stage 1 objectives and measures into five key policy priorities, each of which has stated care goals. The final rule pairs each major objective with a regulatory performance measurement criterion in order to assure that meaningful users are able to demonstrate their fulfillment, as set forth in Table 1 below.
<table>
<thead>
<tr>
<th>CORE SET</th>
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<tbody>
<tr>
<td><strong>Stage 1 Objectives for Eligible Professionals (EP)</strong></td>
<td><strong>Stage 1 Objectives for Eligible Hospitals and Critical Access Hospitals (CAHs)</strong></td>
<td><strong>Stage 1 Measures</strong></td>
</tr>
<tr>
<td>Health Outcomes Policy Priority: Improving quality, safety, efficiency and reducing health disparities.</td>
<td>Care Goals: (1) provide access to comprehensive patient health data for patient's health care team; (2) use evidence-based order sets and Computerized Provider Order Entry (CPOE); (3) apply clinical decision support at the point of care; (4) generate lists of patients who need care and use them to reach out to patients; and (5) report information for quality improvement and public reporting.</td>
<td>More than 30% of all unique patients with at least one medication in their medication list seen by the EP or admitted to the eligible hospital's or CAH's inpatient or emergency department (Place of Service [POS] Codes 21 or 23) during the electronic health record reporting period have at least one medication order entered using CPOE.**</td>
</tr>
<tr>
<td>Use CPOE for medication orders directly entered by any licensed health care professional who can enter orders into the medical record per state, local and professional guidelines.*</td>
<td>Use CPOE for medication orders directly entered by any licensed health care professional who can enter orders into the medical record per state, local and professional guidelines.</td>
<td>More than 30% of all unique patients with at least one medication in their medication list seen by the EP or admitted to the eligible hospital's or CAH's inpatient or emergency department (Place of Service [POS] Codes 21 or 23) during the electronic health record reporting period have at least one medication order entered using CPOE.**</td>
</tr>
<tr>
<td>Implement drug-drug and drug-allergy interaction checks.</td>
<td>Implement drug-drug and drug-allergy interaction checks.</td>
<td>The EP/eligible hospital/CAH has enabled this functionality for the entire EHR reporting period.</td>
</tr>
<tr>
<td>Maintain an up-to-date problem list of current and active diagnoses.</td>
<td>Maintain an up-to-date problem list of current and active diagnoses.</td>
<td>More than 80% of all unique patients seen by the EP or admitted to the eligible hospital's or CAH's inpatient or emergency departments (POS 21 or 23) have at least one entry (or an indication that no problems are known for the patient) recorded as structured data.</td>
</tr>
<tr>
<td>Generate and transmit permissible prescriptions electronically (eRx).*</td>
<td>N/A</td>
<td>More than 40% of all permissible prescriptions written by the EP are transmitted electronically using certified EHR technology.**</td>
</tr>
<tr>
<td>Maintain active medication list.</td>
<td>Maintain active medication list.</td>
<td>More than 80% of all unique patients seen by the EP or admitted to the eligible hospital's or CAH's inpatient or emergency departments (POS 21 or 23) have at least one entry (or an indication that the patient is not currently prescribed any medication) recorded as structured data.</td>
</tr>
<tr>
<td>Maintain active medication allergy list.</td>
<td>Maintain active medication allergy list.</td>
<td>More than 80% of all unique patients seen by the EP or admitted to the eligible hospital's or CAH's inpatient or emergency departments (POS 21 or 23) have at least one entry (or an indication that the patient has no known medication allergies) recorded as structured data.</td>
</tr>
</tbody>
</table>


* Objective provides for certain exclusions for EPs and/or eligible hospitals/CAHs for whom the objective is not applicable or cannot be complied with based on scope of practice.

** Measure with a denominator based on counting actions for patients whose records are maintained using certified EHR technology, as opposed to a denominator based on all unique patients seen by the EP or eligible hospital/CAH.
### CORE SET

<table>
<thead>
<tr>
<th>Stage 1 Objectives for Eligible Professionals (EP)</th>
<th>Stage 1 Objectives for Eligible Hospitals and Critical Access Hospitals (CAHs)</th>
<th>Stage 1 Measures</th>
</tr>
</thead>
</table>
| Record demographics:  
  - preferred language  
  - gender  
  - race  
  - ethnicity  
  - date of birth | Record demographics:  
  - preferred language  
  - gender  
  - race  
  - ethnicity  
  - date of birth  
  - date and preliminary cause of death in the event of mortality in the eligible hospital or CAH. | More than 50% of all unique patients seen by the EP or admitted to the eligible hospital's or CAH's inpatient or emergency department (POS 21 or 23) have demographics recorded as structured data. |
| Record and chart changes in vital signs:*  
  - height  
  - weight  
  - blood pressure  
  - calculate and display BMI  
  - plot and display growth charts for children ages 2 to 20, including BMI | Record and chart changes in vital signs:  
  - height  
  - weight  
  - blood pressure  
  - calculate and display BMI  
  - plot and display growth charts for children ages 2 to 20, including BMI | For more than 50% of all unique patients age 2 and over seen by the EP or admitted to eligible hospital's or CAH's inpatient or emergency department (POS 21 or 23), height, weight and blood pressure are recorded as structured data.** |
| Record smoking status for patients ages 13 or older.* | Record smoking status for patients ages 13 or older.* | More than 50% of all unique patients ages 13 or older seen by the EP or admitted to the eligible hospital's or CAH's inpatient or emergency departments (POS 21 or 23) have smoking status recorded as structured data.** |
| Report ambulatory clinical quality measures to CMS (or, for EPs seeking the Medicaid incentive payment, the States).* | Report hospital clinical quality measures to CMS (or, for eligible hospitals seeking the Medicaid incentive payment, the States).* | For 2011, provide aggregate numerator, denominator, and exclusions through attestation. For 2012, electronically submit the clinical quality measures. |
| Implement one clinical decision support rule relevant to specialty or high clinical priority along with the ability to track compliance with that rule. | Implement one clinical decision support rule related to a high priority hospital condition along with the ability to track compliance with that rule. | Implement one clinical decision support rule. |

* Objective provides for certain exclusions for EPs and/or eligible hospitals/CAHs for whom the objective is not applicable or cannot be complied with based on scope of practice.

** Measure with a denominator based on counting actions for patients whose records are maintained using certified EHR technology, as opposed to a denominator based on all unique patients seen by the EP or eligible hospital/CAH.
## CORE SET

<table>
<thead>
<tr>
<th>Stage 1 Objectives for Eligible Professionals (EP)</th>
<th>Stage 1 Objectives for Eligible Hospitals and Critical Access Hospitals (CAHs)</th>
<th>Stage 1 Measures</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Health outcomes policy priority: Engage patients and families in their health care</strong></td>
<td><strong>Care goals: Provide patients and families with timely access to data, knowledge and tools to make informed decisions and to manage their health</strong></td>
<td></td>
</tr>
<tr>
<td>Provide patients with an electronic copy of their health information (including diagnostics test results, problem list, medication lists, medication allergies) upon request.*</td>
<td>Provide patients with an electronic copy of their health information (including diagnostic test results, problem list, medication lists, medication allergies, discharge summary, procedures), upon request.*</td>
<td>More than 50% of all patients of the EP or the inpatient or emergency departments of the eligible hospital or CAH (POS 21 or 23) who request an electronic copy of their health information are provided it within three business days.**</td>
</tr>
<tr>
<td>N/A</td>
<td>Provide patients with an electronic copy of their discharge instructions and procedures at time of discharge, upon request.*</td>
<td>More than 50% of all patients who are discharged from an eligible hospital’s or CAH’s inpatient or emergency department (POS 21 or 23) and who request an electronic copy of their discharge instructions are provided it.**</td>
</tr>
<tr>
<td>Provide clinical summaries for patients for each office visit.*</td>
<td>N/A</td>
<td>Clinical summaries provided to patients for more than 50% of all office visits within 3 business days.**</td>
</tr>
<tr>
<td><strong>Health outcomes policy priority: Improve care coordination</strong></td>
<td><strong>Care goal: Exchange meaningful clinical information among professional health care team</strong></td>
<td></td>
</tr>
<tr>
<td>Capability to exchange key clinical information (e.g., problem list, medication list, medication allergies, and diagnostic test results), among providers of care and patient authorized entities electronically.</td>
<td>Capability to exchange key clinical information (e.g., discharge summary, procedures, problem list, medication list, medication allergies, diagnostic test results), among providers of care and patient authorized entities electronically.</td>
<td>Perform at least one test of certified EHR technology’s capacity to electronically exchange key clinical information.</td>
</tr>
<tr>
<td><strong>Health outcomes policy priority: Ensure adequate privacy and security protections for personal health information</strong></td>
<td><strong>Care goals: (1) ensure privacy and security protections for confidential information through operating policies, procedures, and technologies and compliance with applicable law; and (2) provide transparency of data sharing to patient</strong></td>
<td></td>
</tr>
<tr>
<td>Protect electronic health information created or maintained by the certified EHR technology through the implementation of appropriate technical capabilities.</td>
<td>Protect electronic health information created or maintained by the certified EHR technology through the implementation of appropriate technical capabilities.</td>
<td>Conduct or review a security risk analysis per 45 CFR 164.308(a)(1) of the certified EHR technology, and implement security updates as necessary and correct identified security deficiencies as part of its risk management process.</td>
</tr>
</tbody>
</table>

* Objective provides for certain exclusions for EPs and/or eligible hospitals/CAHs for whom the objective is not applicable or cannot be complied with based on scope of practice.

** Measure with a denominator based on counting actions for patients whose records are maintained using certified EHR technology, as opposed to a denominator based on all unique patients seen by the EP or eligible hospital/CAH.

### CHAPTER 2

#### MENU SET

<table>
<thead>
<tr>
<th>Stage 1 Objectives for Eligible Professionals (EP)</th>
<th>Stage 1 Objectives for Eligible Hospitals and Critical Access Hospitals (CAHs)</th>
<th>Stage 1 Measures</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Health Outcomes Policy Priority:</strong> Improving quality, safety, efficiency and reducing health disparities.</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Care Goals:</strong> (1) provide access to comprehensive patient health data for patient’s health care team; (2) use evidence-based order sets and Computerized Provider Order Entry (CPOE); (3) apply clinical decision support at the point of care; (4) generate lists of patients who need care and use them to reach out to patients; and (5) report information for quality improvement and public reporting.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Implementing drug-formulary checks.*</td>
<td>Implementing drug-formulary checks.</td>
<td>The EP/eligible hospital/CAH has enabled this functionality and has access to at least one internal or external formulary for the entire EHR reporting period.</td>
</tr>
<tr>
<td>N/A</td>
<td>Record advance directives for patients 65 years old or older.*</td>
<td>More than 50% of all unique patients 65 years old or older admitted to the eligible hospital’s or CAH’s inpatient department (POS 21) have an indication of an advance directive status recorded as structured data.**</td>
</tr>
<tr>
<td>Incorporate clinical lab-test results into certified EHR technology as structured data.*</td>
<td>Incorporate clinical lab-test results into certified EHR technology as structured data.</td>
<td>More than 40% of all clinical lab tests results ordered by the EP or by an authorized provider of the eligible hospital or CAH for patients admitted to its inpatient or emergency department (POS 21 or 23) during the EHR reporting period whose results are in either a positive/negative or numerical format are incorporated in certified EHR technology as structured data.**</td>
</tr>
<tr>
<td>Generate lists of patients by specific conditions to use for quality improvement, reduction of disparities, research or outreach.</td>
<td>Generate lists of patients by specific conditions to use for quality improvement, reduction of disparities, research or outreach.</td>
<td>Generate at least one report listing patients of the EP, eligible hospital or CAH with a specific condition.</td>
</tr>
<tr>
<td>Send reminders to patients per patient preference for preventive/ follow up care.*</td>
<td>N/A</td>
<td>More than 20% of all unique patients age 65 or older or age 5 or younger were sent an appropriate reminder during the EHR reporting period.**</td>
</tr>
</tbody>
</table>


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** Measure with a denominator based on counting actions for patients whose records are maintained using certified EHR technology, as opposed to a denominator based on all unique patients seen by the EP or eligible hospital/CAH.
### Table 1 Continued

<table>
<thead>
<tr>
<th>MENU SET</th>
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</thead>
<tbody>
<tr>
<td><strong>Health outcomes policy priority: Engage patients and families in their health care</strong></td>
<td><strong>Care goals: Provide patients and families with timely access to data, knowledge and tools to make informed decisions and to manage their health</strong></td>
<td><strong>Provide patients with timely electronic access to their health information (including lab results, problem list, medication lists, medication allergies) within four business days of the information being available to the EP.</strong></td>
<td><strong>N/A</strong></td>
</tr>
<tr>
<td><strong>Use certified EHR technology to identify patient-specific education resources and provide those resources to the patient if appropriate.</strong></td>
<td><strong>At least 10% of all unique patients seen by the EP are provided timely (available to the patient within four business days of being updated in the certified EHR technology) electronic access to their health information subject to the EP’s discretion to withhold certain information.</strong></td>
<td><strong>More than 10% of all unique patients seen by the EP or admitted to the eligible hospital’s or CAH’s inpatient or emergency department (POS 21 or 23) are provided patient-specific education resources.</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Health outcomes policy priority: Improve care coordination</strong></td>
<td><strong>Care goal: Exchange meaningful clinical information among professional health care team</strong></td>
<td><strong>The EP, eligible hospital or CAH who receives a patient from another setting of care or provider of care or believes an encounter is relevant should perform medication reconciliation.</strong></td>
<td><strong>The EP, eligible hospital or CAH who receives a patient from another setting of care or provider of care or believes an encounter is relevant should perform medication reconciliation.</strong></td>
</tr>
<tr>
<td><strong>The EP, eligible hospital or CAH who transitions their patient to another setting of care or provider of care or refers their patient to another provider of care should provide summary care record for each transition of care or referral.</strong></td>
<td><strong>The EP, eligible hospital or CAH who transitions their patient to another setting of care or provider of care or refers their patient to another provider of care should provide summary care record for each transition of care or referral.</strong></td>
<td><strong>The EP, eligible hospital or CAH who transitions or refers their patient to another setting of care or provider of care provides a summary of care record for more than 50% of transitions of care and referrals.</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Health outcomes policy priority: Improve population and public health</strong></td>
<td><strong>Care goal: Communicate with public health agencies</strong></td>
<td><strong>Capability to submit electronic data to immunization registries or Immunization Information Systems and actual submission in accordance with applicable law and practice.</strong></td>
<td><strong>Capability to submit electronic data to immunization registries or Immunization Information Systems and actual submission in accordance with applicable law and practice.</strong></td>
</tr>
<tr>
<td><strong>Performed at least one test of certified EHR technology’s capacity to submit electronic data to immunization registries and follow up submission if the test is successful (unless none of the immunization registries to which the EP, eligible hospital, or CAH submits such information have the capacity to receive the information electronically).</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


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CHAPTER 2

Quality Measurement as Component of Meaningful Use

HITECH’s third prong of its test of whether EPs and eligible hospitals are “meaningful EHR user[s]” encompasses the ability to report on clinical quality measures. Thus, the final rule also establishes a set of quality measures for use by EPs and eligible hospitals. To receive incentive payments, all EPs must report on three required core clinical quality measures,\(^\text{42}\) as well as report on three additional measures from a set list of 38 (for a total of six), without regard to payer. Eligible hospitals, by contrast, are presented with a list of 15 clinical quality measures that require reporting to the extent the eligible hospital has an applicable clinical case, without regard to payer. In identifying its quality measures, the final rule draws on prior work carried out by both the government and private entities and widely disseminated in the field.\(^\text{43}\)

Common Definition in Medicare and Medicaid

Although HITECH gives states the authority to approve the definition of meaningful use for their Medicaid programs, subject to the Secretary’s approval, the final rule establishes a common definition of meaningful use that would be the only definition of meaningful use in Medicare and the minimum standard in Medicaid.\(^\text{44}\) As discussed above, CMS will only permit states to add to the definition of meaningful use up to four specific public health-related requirements detailed in the regulations. The final rule adds that CMS may withhold approval of any state’s proposed alternative definition that would “require additional functionality beyond that of certified [EHR] technology.”\(^\text{45}\) Moreover, because eligible hospitals are permitted to participate in both the Medicare and Medicaid incentive programs (if qualified for both programs), the Secretary of HHS has exercised her power in the final rule and authorized under HITECH\(^\text{46}\) to “deem” satisfaction of the Medicare requirements as qualifying under Medicaid for such eligible hospitals in both programs.\(^\text{47}\) Thus, any of the four available additional state Medicaid requirements that have been adopted by a state would not apply to Medicaid eligible hospitals also participating in Medicare.

The rationale for a common definition is administrative efficiency and avoiding burdening participating providers and states with duplicative federal and state operating and reporting requirements.\(^\text{48}\) In a 2009 Letter to State Medicaid Directors, CMS indicated that coordinating HIT incentives between the programs is necessary “in order to reduce confusion, improve administration, and maximize the ability to advance HIT across the health system.”\(^\text{49}\) The final rule supports this coordination by allowing any Medicare eligible hospital that becomes a “meaningful EHR user” under the Medicare incentive program to automatically be deemed eligible under Medicaid.\(^\text{50}\) This is applicable only to eligible hospitals, as the final rule makes clear that EPs cannot receive an incentive payment under both Medicare and Medicaid.\(^\text{51}\)
The recently enacted health reform legislation does not, by its terms, substantially alter HITECH’s Medicare and Medicaid meaningful use incentive programs. That said, a substantial number of the reform law’s new requirements focus on quality improvement and value-based purchasing in the Medicare and Medicaid programs, both of which will require the electronic reporting of certain types of data to federal and state agencies. For this reason, the success of the Medicare and Medicaid meaningful use incentive programs in expanding HIT adoption and use will be the basis for other quality and payment reforms. The following table provides a snapshot of selected PPACA provisions that either require the use of HIT or authorize value-based purchasing programs that assume some level of HIT use.
## Table 2: Affordable Care Act Provisions Regarding Health Information Technology (HIT)

<table>
<thead>
<tr>
<th>Section</th>
<th>What it does</th>
</tr>
</thead>
<tbody>
<tr>
<td>§1311. Affordable Choices for Health Benefit Plan</td>
<td>Offers HIT as an example of a quality component that state exchanges could require of participating plans.</td>
</tr>
<tr>
<td>§2703. State Option to Provide Health Homes for Enrollees with Chronic Conditions</td>
<td>Requires a Medicaid provider participating in a home health services program to use HIT to report to the state applicable measures to determine the quality of services delivered.</td>
</tr>
<tr>
<td>§3002(d). Improvements to the Physician Quality Reporting System</td>
<td>Requires the Secretary of HHS to integrate reporting on quality measures with the meaningful use reporting requirements for physicians participating in the Physician Quality Reporting Initiative.</td>
</tr>
<tr>
<td>§3011. National Strategy</td>
<td>Requires the Secretary of HHS to include in the national strategic plan quality improvement and measurement through the use of HIT required under HITECH.</td>
</tr>
<tr>
<td>§3103. Quality Measure Development</td>
<td>Requires the Secretary of HHS to award grants to develop and improve quality measures, and grantees must develop measures that require (where practicable) the relevant information to be collected and reported via HIT.</td>
</tr>
<tr>
<td>§3012. Interagency Working Group on Health Care Quality</td>
<td>Requires that a representative from ONC serve on the working group that is charged with, among other things, avoidance of inefficient duplication of quality improvement efforts and resources in addition to a streamlined process for quality reporting and compliance requirements.</td>
</tr>
<tr>
<td>§3015. Data Collection; Public Reporting</td>
<td>Requires the Secretary of HHS to align such collection and aggregation efforts with the standards for the interoperability of HIT systems.</td>
</tr>
<tr>
<td>§3024. Independence at Home Demonstration Program</td>
<td>Establishes a Medicare demonstration program requiring the Secretary of HHS to give preference to medical practices that have experience with HIT and EHRs.</td>
</tr>
<tr>
<td>§3201. Medicare Advantage Payment</td>
<td>Allows for bonus payments to Medicare Advantage plans that excel in coordination and management through the use of HIT.</td>
</tr>
<tr>
<td>§3501. Establishment of Center to Research Health Care Quality Practices</td>
<td>Establishes within AHRQ a new center that must, among other duties, assess the evolution of the meaningful use of HIT and expand demonstration projects for improving the use of HIT.</td>
</tr>
<tr>
<td>§3502. Establishing Community Health Teams to Support the Patient-Centered Medical Home</td>
<td>Requires the Secretary of HHS to award grants to states to establish community health teams to support primary care, and mandates that grantees demonstrate a capacity to implement and maintain HIT that meets the requirements of certified EHR technology under HITECH.</td>
</tr>
<tr>
<td>§5301. Training In Family Medicine, General Internal Medicine, General Pediatrics, and Physician Assistantship</td>
<td>Establishes grants for medical training programs that require training on the use of HIT.</td>
</tr>
<tr>
<td>§5405. Primary Care Extension Program</td>
<td>Requires the Secretary of HHS to consult with ONC in the implementation of this program designed to support primary care services and coordination.</td>
</tr>
</tbody>
</table>

Source: George Washington University Department of Health Policy, Hirsh Health Law and Policy Program, George Washington University School of Public Health and Health Services.
### Affordable Care Act Provisions Expanding Value-Based Purchasing in Medicare

<table>
<thead>
<tr>
<th>Section</th>
<th>What it does</th>
</tr>
</thead>
<tbody>
<tr>
<td>§3001. Hospital Value-Based Purchasing</td>
<td>Establishes a hospital value-based purchasing program in Medicare to pay hospitals based on performance on quality measures beginning in FY 2013.</td>
</tr>
<tr>
<td>§3002. Physician Quality Reporting</td>
<td>Extend the physician quality reporting incentives (PQRI) program through 2014, with penalties imposed beginning in 2015 for providers who fail to report quality information. Penalties will be a 1.5% reduction in their Medicare payments in 2015 and 2% reduction in 2016. Measures for PQRI to be integrated with measures for EHR incentives.</td>
</tr>
<tr>
<td>§3003. Physician Feedback Program</td>
<td>Requires the Secretary to improve the physician feedback program that provides confidential data on use of resources and quality of care. Will establish methodologies to group and attribute episodes of care.</td>
</tr>
<tr>
<td>§3004. Quality Reporting for Long-Term-Care Hospitals, Inpatient Rehabilitation Hospitals, and Hospice Programs</td>
<td>Requires the development of quality measures by 2012 for long-term-care hospitals, inpatient rehabilitation hospitals, and hospice programs and imposes penalties beginning in 2014 for failure to report data.</td>
</tr>
<tr>
<td>§3006. Planning for Value-Based Purchasing Program for Skilled Nursing Facilities and Home Health Agencies</td>
<td>Requires establishment of value-based purchasing programs for skilled nursing facilities and home health agencies, including consideration of measures, collection and public reporting of data, and creation of value-based payment adjustments.</td>
</tr>
<tr>
<td>§3007. Value-Based Payment Modifier Under the Physician Fee Schedule</td>
<td>Requires the establishment of a value-based payment modifier to allow payment differentials for physicians or physician groups based on quality of care.</td>
</tr>
<tr>
<td>§3008. Payment Adjustments for Hospital Acquired Infections</td>
<td>Authorizes 1% payment reduction for hospitals with high number of hospital acquired conditions (top quartile of covered hospitals) beginning in 2015. Hospitals will receive confidential reports and some information will be made public.</td>
</tr>
<tr>
<td>§3022. Medicare Shared Savings Program</td>
<td>Secretary of HHS must establish shared savings program by 01/2012 that promotes accountability for a patient population, physician and hospital care, and encourages care processes that promote high quality and efficiency. Establishes and sets criteria for Accountable Care Organizations (ACOs), groups of providers who work together to manage and coordinate care for Medicare beneficiaries.</td>
</tr>
<tr>
<td>§10301. Value-Based Purchasing Program for Ambulatory Surgical Centers</td>
<td>Requires establishment of value-based purchasing programs for ambulatory surgical centers.</td>
</tr>
</tbody>
</table>

Source: George Washington University Department of Health Policy, Hirsh Health Law and Policy Program, George Washington University School of Public Health and Health Services.

The final rule’s definition of meaningful use and the associated Medicare and Medicaid incentives will drive the nationwide adoption and use of EHR technology. PPACA clearly contemplates that the definition will serve as a national minimum standard, and the meaningful use definition will guide HIT users in reaching the new quality and reporting requirements of the reform law set forth above. The definition, now finalized, aims to serve as the foundation for the quality enterprise and will certainly drive other quality reporting and value-based purchasing programs in the private sector.
Discussion

Provider Ability to Meet Criteria to Receive Incentive Payments

The success of the incentive programs in encouraging Medicare and Medicaid providers to meaningfully use HIT will depend in part on whether or not providers participate. The criteria set forth in the final rule for Stage 1 meaningful use set a high bar, and providers must meet those criteria within the next couple of years to be eligible for any incentive payments. The criteria for Stages 2 and 3 will likely be more burdensome. Many provider organizations and state representatives have indicated that the final rule’s criteria for meaningful use are unachievable. If providers do not have confidence that they will be able to meet the standard to receive the incentive payments, they may not invest in HIT, especially Medicare providers who are not eligible for start-up funding. Providers who only treat a small number of Medicare patients may perceive that the cost of implementing an EHR is not worth the relatively small financial incentives their Medicare claims could generate. Moreover, as the incentive payments turn into penalties for Medicare providers who are not meaningful users, those providers who do not depend on Medicare funding may be even more likely to leave the Medicare program because of the additional cost of adoption and meaningful use of an EHR to get full Medicare reimbursement.

Significant Sectors of Health Care System Omitted

Many critical providers are not eligible for the EHR incentive programs. Both programs exclude certain behavioral health providers, such as clinical psychologists, clinical case workers, social workers, as well as post-acute care providers, long-term-care providers and home health providers. Nursing homes and long-term-care facilities are also excluded, and as mentioned above, FQHCs and RHCs as stand-alone entities are also not eligible providers in either the Medicare or Medicaid incentive programs as defined by HITECH. Furthermore, the Medicare incentive program is aimed at providers paid in accordance with Medicare’s RBRVS formula; by contrast, both FQHCs and RHCs are paid in accordance with a special, cost-related prospective payment system (PPS), and their clinical staffs are either “staff members” or “contract employees” who are not reimbursed directly under RBRVS. As a result, the Medicare pathway is effectively closed to these two classes of health care providers.

The consequence of omitting these providers could be significant. These providers care for a significant number of Medicare and particularly Medicaid patients. If these health care providers do not adopt EHRs at all or adopt EHRs that do not meet the same standards as those adopted by other providers—because of their omission from the incentive programs—the potential for health information exchange (HIE) with these providers will be lost. Furthermore, their patients will not receive the benefits of greater quality and efficiency that EHRs are expected to bring. However, members of Congress have proposed extending the incentive programs to various subsets of these omitted providers.32
Challenges for the States

Implementation of Medicaid EHR incentives is not a mandatory condition of state participation in the Medicaid program. Rather, states can incentivize EHR adoption at their own discretion. Thus, strong implementation of Medicaid EHR incentives depends on the extent to which individual states are engaged and interested in pushing this effort. To date, most Medicaid agencies do not have the necessary infrastructure in place to support the implementation and oversight for the incentive program. They will need systems to accept and process provider meaningful use attestations as well as verify provider eligibility based on Medicaid patient volume, monitor performance on clinical quality measures, process and distribute incentive payments to eligible providers, and attest to CMS that such payments have been made appropriately. Even with the federal matching dollars provided under HITECH (discussed below), state Medicaid agencies will need time, staffing support and resources, and infrastructure guidance to build the required systems to implement the Medicaid EHR incentive program.

This is made even more difficult by the current economic climate, which has caused Medicaid agencies to experience an increased demand for services while also experiencing lower state tax revenues (declining more than 10% in each quarter of 2009) and resulting budget shortfalls. As a result, in many cases, states have limited financial resources and secondary support services available to support the development of necessary meaningful use or HIE infrastructure. Federal financial support is available in the form of 100 percent federal financial participation (FFP) for incentive payments made to Medicaid EPs and eligible hospitals for AIU and meaningful use of certified EHR technology. States are also eligible for 90 percent FFP for costs related to the administration of the program (i.e., tracking and providing accurate payments to providers). So although Medicaid provider incentive payments will qualify for 100 percent federal financing, states will incur 10 percent of the costs related to administration. Whether they will be able to adequately support and fund these providers is unclear. Many state Medicaid programs are significantly under-resourced and the economic recession has further strained state Medicaid budgets.

Impact of Meaningful Use on Disparities

HITECH and the subsequent final regulations make the reduction of health disparities a key objective of the federal efforts to expand HIT. The statute directs ONC to take specific actions to assess the potential for HIT to reduce health disparities. In addition, CMS incorporated the objective of reducing disparities throughout the final rule with reporting requirements, building on the HIT Policy Committee’s recommendation of reduction of racial disparities as a national priority area. Indeed, CMS requires both EPs and eligible hospitals to record their patients’ race, ethnicity, preferred language and gender as part of structured data. However, the specific measures that have been finalized to demonstrate meaningful use are only first steps toward the use of HIT to reduce disparities.

Importantly, the meaningful use incentive programs may actually worsen disparities by omitting certain safety-net providers who serve a substantial number of minority patients, as discussed above. The adoption and meaningful use of HIT is expected to improve health care quality for the patients of providers who are meaningful users. However, if the providers who serve minority populations adopt HIT at lower rates, their patients will be less likely to realize the benefits.
of meaningful use. For example, some community health center physicians and rural health clinic physicians have low enough participation in Medicare and Medicaid to receive only limited incentives from Medicare (and only if the EP is individually billing under RBRVS) and none from Medicaid. Both groups are key sources of primary health care, and thus the exclusion of these providers will cause a much slower meaningful use adoption rate and a corresponding effect on the quality of care delivered. On the other hand, health center physicians that do qualify for the Medicaid incentives based on patient volume—about 99 percent—will have the opportunity to develop EHR systems that link into the large patient datasets housed in health center networks. These systems can be expected to become an increasing focus of quality improvement efforts. The actual impact of the HIT incentive programs on health care quality nationwide remains to be seen, but the potential for worsening disparities exists if the providers who serve vulnerable populations are excluded or do not participate at disproportionate rates. High rates of provider participation in the incentive programs by those who are eligible, however, are expected to reduce health care disparities because of the increase in the clinical quality of care that EHR adoption and use can bring.

**Conclusion**

HITECH and subsequent final regulations have set very ambitious goals within a very limited timeline. The criteria and standards for meaningful use of certified EHR technology will continue to evolve. Besides the final meaningful use regulations, there will be revised requirements for later stages of meaningful use and certification standards, and there will be evolving standards at the state level. Federal and state governments and health care providers face the challenge of implementing these new programs alongside health reform in a difficult economic climate. However, the incentive programs support the same goals as many of the health reform provisions aimed at improving quality and efficiency, and many of the operational details can be harmonized to minimize administrative burden. As a component of the larger federal strategy to drive quality improvement and improve the efficiency of the health care system, the incentive programs encourage the widespread adoption of HIT that will make other system reforms possible.

2. Social Security Act §1848(o)(1)(A)(i) [42 U.S.C. §1395w-4 et seq. (as added by ARRA §4101(a))]. The term “HITECH Act” refers collectively to ARRA’s Title XIII (“Health Information Technology”) of Division A and Title IV (“Medicare and Medicaid Health Information Technology; Miscellaneous Medicare Provisions”) of Division B.

3. Ibid.

4. Social Security Act §1848(o)(1)(A)(ii) [42 U.S.C. §1395w-4 et seq. (as added by ARRA §4101(a))].

5. Social Security Act §1848(a)(7)(A) [42 U.S.C. §1395w-4(a) et seq. (as added by ARRA §4101(b))].


7. Social Security Act § 1903(t)(6)(C)(i)(II) [42 U.S.C. §1396b et seq. (as added by ARRA §4201(a)(2))].

8. Social Security Act §1848(o)(5)(C) [42 U.S.C. §1395w-4 et seq. (as added by ARRA §4101(a))]. This provision references Social Security Act §1861(r) for the actual list of EPs under the Medicare incentive program.

9. Social Security Act §1848(o)(1)(C)(ii) [42 U.S.C. §1395w-4 et seq. (as added by ARRA §4101(a))].


11. Social Security Act §1886(n)(6)(B) [42 U.S.C. §1395ww et seq. (as added by ARRA §4102(a)(1))]. This provision references Social Security Act §1886(d) for the actual list of eligible hospitals under the Medicare incentive program.

12. Social Security Act §1848(o)(1)(A)(i) [42 U.S.C. §1395w-4 et seq. (as added by ARRA §4101(a))].

13. Social Security Act §1848(o)(1)(B)(iv) [42 U.S.C. §1395w-4 et seq. (as added by ARRA §4101(a))].

14. Social Security Act §1848(o)(1)(B)(v) [42 U.S.C. §1395w-4 et seq. (as added by ARRA §4101(a))].

15. Social Security Act §1848(o)(1)(B)(ii)(I) [42 U.S.C. §1395w-4 et seq. (as added by ARRA §4101(a))].

16. Social Security Act §1848(o)(1)(A)(ii) [42 U.S.C. §1395w-4 et seq. (as added by ARRA §4101(a))].

17. Social Security Act §1848(a)(7)(A) [42 U.S.C. §1395w-4(a) et seq. (as added by ARRA §4101(b))].

18. Social Security Act §1848(a)(7)(B) [42 U.S.C. §1395w-4(a) et seq. (as added by ARRA §4101(b))].

20. Social Security Act §1853(l)(1) [42 U.S.C. §1395w-23 et seq. (as added by ARRA §4101(c))]. An affiliated EP is one that is employed by an MA organization or a contracting entity, is not hospital-based, furnishes at least 80 percent of his or her professional services, and provides at least 20 hours per week of patient care services.

21. Social Security Act §1853(m)(1) [42 U.S.C. §1395w-23 et seq. (as added by ARRA §4102(c))]. An affiliated hospital is under common corporate governance with a MA organization, and is one where more than two-thirds of the Medicare beneficiaries it serves are enrolled under MA plans.

22. Social Security Act § 1903(t)(3)(B) [42 U.S.C §1396b et seq. (as added by ARRA §4201(a)(2))].

23. Social Security Act § 1903(t)(2)(A) [42 U.S.C §1396b et seq. (as added by ARRA §4201(a)(2))].

24. Social Security Act § 1903(t)(2)(A) (see above.) “Needy individuals” are defined as patients who are either covered by Medicaid or who receive uncompensated care, or for whom charges are prospectively adjusted according to ability to pay.

25. Social Security Act § 1903(t)(2)(B) [42 U.S.C §1396b et seq. (as added by ARRA §4201(a)(2))].

26. Social Security Act § 1903(t)(1) [42 U.S.C §1396b et seq. (as added by ARRA §4201(a)(2))].

27. Social Security Act § 1903(t)(4)(A) [42 U.S.C §1396b et seq. (as added by ARRA §4201(a)(2))].

28. Social Security Act § 1903(t)(4)(B) [42 U.S.C §1396b et seq. (as added by ARRA §4201(a)(2))].

29. Social Security Act § 1903(t)(6)(C) [42 U.S.C §1396b et seq. (as added by ARRA §4201(a)(2))].


36. Social Security Act §1848(o)(2)(A) [42 U.S.C. §1395w-4 et seq. (as added by ARRA §4101(a))].

37. Social Security Act § 1903(t)(6)(C) [42 U.S.C §1396b et seq. (as added by ARRA §4201(a)(2))].


40. Medicare and Medicaid Programs: Electronic Health Record Incentive Program.

41. ibid.

42. The core group of clinical quality measures are: blood pressure management, tobacco use assessment/cessation intervention, and adult weight screening and follow-up. The final rule also provides for an alternate set of core clinical quality measures that EPs must use if one of the regular core measures is not applicable to the physician’s scope of practice.

43. The vast majority of the final rule’s physician quality measures are currently being used by the Physician Quality Reporting Initiative (PQRI) and are endorsed by the National Quality Forum (NQF) or approved by the AQA (formerly the Ambulatory Care Quality Alliance). A separate set of clinical quality measures is included for hospitals. Some of the hospital quality measures included in the final rule are currently in use for the Reporting Hospital Quality Data for the Annual Payment Update Program (RHQDAPU), but many are not.


46. Social Security Act § 1903(t)(8) [42 U.S.C §1396b et seq. (as added by ARRA §4201(a)(2))].


50. Medicare and Medicaid Programs: Electronic Health Record Incentive Program, 75 Fed. Reg. 44314, 44565 (July 28, 2010) (to be codified at 42 C.F.R pt. 495.4). See also Social Security Act § 1903(t)(8) [42 U.S.C §1396b et seq. (as added by ARRA §4201(a)(2))].


54. Social Security Act § 1903(a)(3)(F)(i) [42 U.S.C §1396b et seq. (as added by ARRA §4201(a)(1))].

55. Social Security Act § 1903(a)(3)(F)(ii) [42 U.S.C §1396b et seq. (as added by ARRA §4201(a)(1))].

56. HITECH, §3001(c)(3)(a)(vii) (as part of update of Federal HIT Strategic Plan, Coordinator shall address strategies to enhance the use of HIT to reduce health disparities; §3001(c)(6)(C) (Coordinator shall assess and publish the impact of HIT in communities with health disparities and identify practices to increase use of HIT to reduce and better manage chronic diseases).

57. Medicare and Medicaid Programs: Electronic Health Record Incentive Program, 75 Fed. Reg. 44314, 44581 (July 28, 2010) (to be codified at 42 C.F.R pt. 495.316) (requiring states to submit annual reports to CMS that include a “description and quantitative data on how its incentive payment program addressed individuals with unique needs such as children); 75 Fed. Reg. 44314, 44582 (July 28, 2010) (to be codified at 42 C.F.R pt. 495.332) (requiring states to submit a “description of how the State intends to address the needs of underserved and vulnerable populations…”).


Introduction

Health information exchange (HIE) is a central component of the meaningful use criteria for which providers and hospitals will receive incentive payments under the Health Information Technology for Economic and Clinical Health Act (HITECH) provisions of the American Recovery and Reinvestment Act (ARRA). The emphasis on the electronic flow of data between systems is supported by estimates of the potential value that could be achieved from nationwide HIE. Researchers at RAND estimated that interoperable electronic health records (EHRs) would reap more than $81 billion in savings annually\(^1\) while the Center for IT Leadership projected that fully standardized health information exchange would save $77.8 billion per year.\(^2\) Savings are derived from administrative efficiencies (e.g., fewer phone calls to request patient charts) and clinical efficiencies that are realized by avoiding redundancy, overuse and costs associated with medical errors. If broad-based HIE with sharing of key clinical data across all providers takes hold, it has the potential to be transformative: it can help improve syndromic surveillance, population health management, and performance measurement and reporting. Efforts at payment reform, especially as they relate to promotion of greater integration (through entities such as accountable care organizations) will be highly dependent on robust HIE. The value of HIE in these areas has not been quantified but is likely to far exceed the $77.8 billion per year in direct benefits.

In the final Stage 1 criteria for meaningful use of certified EHRs, a small number of objectives directly require some form of HIE and an additional set could be facilitated by HIE. The initial HIE requirements have achieved at least a basic level of penetration in the market to date (e.g., ePrescribing) or lay the foundation for ramping up HIE in the future (e.g., requiring demonstration of the capacity to exchange clinical data among providers). In contrast, Stage 2 is expected to require more robust HIE. To support the HIE criteria, additional funding was made available to states and state-designated entities to build out HIE capabilities. State plans will likely expand on the foundation created by existing efforts to support HIE at the local level. These efforts, often called Regional Health Information Organizations (RHIOs), convene stakeholders and facilitate clinical data exchange among them. RHIOs received both attention and significant funding (through federal and state grants) under the Bush Administration, and they have continued to receive support under the Obama Administration’s approach to health information technology (HIT). Thus, their continued progress is likely to be an important part of state strategies.

In this chapter, we first review the meaningful use criteria that involve HIE and summarize the key features of the State Health Information Exchange Cooperative Agreement Program. We then review recent research on the progress of RHIOs to date along with key success factors and barriers. We conclude with a discussion of the broader value that may be realized from increased HIE.
The Role of HIE in Meaningful Use

Four of the Stage 1 meaningful use criteria directly require health information exchange, and HIE is implied by an array of others. The criteria are organized into a set of 15 for eligible providers and 14 for hospitals that must be met (“core set”) along with an additional 10 that comprise the menu set from which providers and hospitals must also meet any five to receive incentive payment. During Stage 2, one of the requirements will likely be to meet the remaining five Stage 1 menu set criteria that providers opted out of in Stage 1. Table 1 summarizes the meaningful use criteria that apply to each type of entity with whom eligible providers and hospitals are expected to share data. We focus on Stage 1 requirements and indicate whether a requirement is part of the core set or the menu set. It is important to note that in Stage 1, eligible providers are only required to demonstrate that their EHR has the capability to exchange data; however, there are several core measures that will be facilitated by HIE. For example, maintaining an active medication list and conducting medication reconciliation can be done manually, but it would be much for efficient for these activities to be supported by robust data exchange.

Table 1: Meaningful Use Criteria Related to Health Information Exchange

<table>
<thead>
<tr>
<th>Pharmacy ↔ Provider</th>
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</tr>
</thead>
<tbody>
<tr>
<td><strong>Core set</strong></td>
<td>Eligible providers in the outpatient setting must generate and transmit 40% of permissible prescriptions electronically (ePrescribing) using certified electronic health records</td>
</tr>
<tr>
<td></td>
<td>Maintain an active medication list for at least 80% of patients</td>
</tr>
<tr>
<td><strong>Menu set</strong></td>
<td>Conduct medication reconciliation between care settings for more than 50% of transitions in care</td>
</tr>
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<thead>
<tr>
<th>Laboratory ↔ Provider</th>
<th></th>
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<tbody>
<tr>
<td><strong>Menu set</strong></td>
<td>Eligible providers in the outpatient setting and hospitals must receive structured results and display them in a readable format for more than 40% of results</td>
</tr>
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<table>
<thead>
<tr>
<th>Provider ↔ Provider</th>
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</thead>
<tbody>
<tr>
<td><strong>Core set</strong></td>
<td>Providers are required to demonstrate the capability to use their electronic health records to electronically exchange key clinical information among providers and patient-authorized entities</td>
</tr>
<tr>
<td><strong>Menu set</strong></td>
<td>Providers and hospitals must provide a summary care record for more than 50% of transitions of care and referrals</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Provider ↔ Regulator</th>
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<tbody>
<tr>
<td><strong>Menu set</strong></td>
<td>By 2012, providers must be able to submit quality measures to the Centers for Medicare and Medicaid Services (CMS) or states electronically</td>
</tr>
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<thead>
<tr>
<th>Provider ↔ Public health</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Menu set</strong></td>
<td>If state immunization registries are able to receive data electronically, providers and hospitals are required to demonstrate the ability to submit immunization and syndromic surveillance data</td>
</tr>
</tbody>
</table>

Source: Medicare and Medicaid Programs; Electronic Health Record Incentive Program; Final Rule. Washington: Department of Health and Human Services (HHS) and Centers for Medicare and Medicaid Services (CMS), 2010.
Beyond the incentive payments tied to meaningful use criteria, HITECH directs funding to states and state-designated entities to build out HIE capabilities. The program will build on existing efforts to advance regional and state-level health information exchange while moving toward nationwide interoperability. A total of almost $567 million in funding was awarded to 56 states, eligible territories, and qualified State Designated Entities (SDE) (which were announced in early 2010). Four-year award amounts ranged from $600,000 (American Samoa) to $38,752,536 (California). Recipients are required to match a portion of grant awards beginning in the second year of the award (2011). The State HIE Cooperative Agreement Program, as it is known, funds states’ efforts to build capacity for exchanging health information across the health care system both within and across states. Awardees are responsible for increasing the level of interoperability, enabling patient-centric information flow in order to improve the quality and efficiency of care. This requires that states put in place governance, policies, technical services, business operations, and financing mechanisms for HIE over the four-year performance period. Specifically, participating states are expected to:

- Develop and implement up-to-date privacy and security requirements for HIE with and across state borders.
- Develop state-level directories and technical services to enable interoperability within and across states.
- Coordinate with Medicaid and state public health programs to enable information exchange and support monitoring of provider participation in HIE.
- Remove barriers that may hinder effective HIE, particularly those related to interoperability across laboratories, hospitals, clinician offices, health plans and other health information exchange partners.
- Ensure an effective model for HIE governance and accountability is in place.
- Convene health care stakeholders to build trust in and support for a statewide approach to HIE.

While these tasks are specific, states still have substantial latitude in deciding how to fulfill them. The two primary, interrelated choices facing states are the governance structure that will be adopted, and the role that the state will play in the material exchange of data. The three predominant governance models are: 1) a government-centric model, in which the state government directly provides the HIE infrastructure and oversight of its use; 2) a public utility model in which the state government serves as a convener, provides oversight and regulates the private-sector provision of HIE services; and 3) a public-private partnership in which the state government collaborates with and participates as a stakeholder and advisor in the private-sector provision of HIE services. States can therefore choose to have no direct role in the provision of HIE, or, on the other extreme, be the only provider of HIE services, directly connecting to all the relevant stakeholders. If a state chooses to provide HIE services, it must decide whether it wants to serve in a purely technical role or leverage the flow of data to support care-related initiatives.

The prominent role of states in expanding HIE represents a departure from the vision for achieving nationwide HIE from several years ago. In the prior model, local and regional efforts would be interconnected into a “network-of-networks” that would form the nationwide health information network (NHIN). Under the new vision, the role of states is not only formalized but they play the central role. The benefit of such an approach is greater flexibility in designing...
an HIE strategy that can take into account state-specific differences in the legal/regulatory environment, the structure of the health care delivery market and any existing efforts to establish HIE. This approach also allows for decreased reliance on community level HIEs, which have struggled to establish themselves. A recent analysis conducted by the authors of this chapter using data on hospital participation in RHIOs sheds light on the extent of RHIO penetration. Fifty-six percent of health referral regions in the country had an operational RHIO while only 11.1 percent of hospitals participated in one. This suggests that the overall level of coverage is still low and that states have substantial work ahead of them to build out capabilities. In the next section, we discuss additional data on the progress of these local efforts, which offers a more in-depth view into their ability to serve as the foundation on which states can build their HIE capabilities.

The Current State of HIE

While the meaningful use criteria specify what types of data must be exchanged electronically, they do not stipulate under what type of organizational arrangement it must occur. The approach and resources required to comply with meaningful use criteria vary substantially by practice setting, and will be driven to a large extent by the state-specific approach. HIE may already exist for providers working in integrated delivery networks with an enterprise-wide EHR like Kaiser and Geisinger. In contrast, a small independent practice with a certified EHR would have to spend significant time and resources to directly connect to each stakeholder with which they share data. The cost of doing so would likely exceed the incentive payment. As states design their approaches to developing HIE, a potential solution is to leverage and expand local or regional infrastructures currently in place to support HIE, to which smaller stakeholders could connect at a much lower cost. Over the past five to 10 years RHIOs have emerged to bring together local stakeholders with clinical data and set up the infrastructure for exchange. They therefore offer a compelling foundation on which to scale HIE.

Previous studies of the success of these organizations, including two conducted by the authors, reflect mixed results.\textsuperscript{8–11} While the number of organizations continued to grow, the scope of data exchange remained limited and the financial viability uncertain. However, the additional funding and policy interest may help these organizations thrive. We therefore conducted a third survey of these organizations to capture a more current snapshot of activity as of December 1, 2009. We found that 80 organizations were operational (i.e., clinical data exchange was taking place between independent entities) and 82 were in the planning phase. The number of planning and operational organizations reflects a marked increase since the survey conducted 18 months prior. Organizations in the planning phase nearly doubled from our second survey, increasing from 42 to 80, while operational organizations increased from 55 to 82. Meanwhile, the failure rate (organizations that had been pursuing HIE but decided to stop) dropped from 20 percent to 9 percent.

Operational organizations had been in existence for five-and-a-half years on average while planning organizations had been around for an average of two-and-a-half years. Operational organizations were fairly evenly spread across the four regions of the U.S. while there was a smaller proportion of planning efforts in the Northeast (11%). Most organizations operated as independent entities (as opposed to operating from within another organization) and served (or planned to
serve) more than 5,000 patients. Planning organizations most commonly expected to serve 5,000 people to 49,999 people in their first year of operation (41% of planning RHIOs) while operational organizations most commonly served 50,000–500,000 (41% of operational RHIOs).

Hospitals were the most common type of data provider among operational RHIOs (in 84% of efforts) followed by laboratories and imaging facilities (in 71%). The two most common types of data receivers were hospitals and ambulatory practices (in 83% of efforts and 77% of efforts respectively). Other types of stakeholders, such as pharmacies, public health departments, and payers, provided and received data less often. Test results were the most common type of data exchanged by operational RHIOs (in 88% of efforts). Public health reports were the least common type of data exchanged (by 28% of RHIOs). Other data required by the meaningful use criteria, such as inpatient/outpatient medication lists and discharge summaries were exchanged by about half of the operational organizations.

Figure 1: Types of Entities Providing and Receiving/Viewing Data in Regional Health Information Organizations

Percentage of Operational Regional Health Information Organizations (Reporting at least one of the particular stakeholder type provides or receives data)

<table>
<thead>
<tr>
<th>Stakeholder Type</th>
<th>Provide</th>
<th>Receive</th>
</tr>
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<tbody>
<tr>
<td>Hospital</td>
<td>84%</td>
<td>83%</td>
</tr>
<tr>
<td>Independent Lab or Radiology</td>
<td>71%</td>
<td>47%</td>
</tr>
<tr>
<td>Ambulatory Practice</td>
<td>68%</td>
<td>77%</td>
</tr>
<tr>
<td>Pharmacy</td>
<td>39%</td>
<td>32%</td>
</tr>
<tr>
<td>Private Payer</td>
<td>31%</td>
<td>19%</td>
</tr>
<tr>
<td>Public Payer</td>
<td>24%</td>
<td>17%</td>
</tr>
<tr>
<td>Public Health Department</td>
<td>23%</td>
<td>39%</td>
</tr>
</tbody>
</table>

Source: Authors’ analysis of a 2010 National Survey of Regional Health Information Organizations.
Among operational RHIOs, recurring subscription- or transaction-based fees from participating entities were the most substantial form of support received after becoming operational compared to a grant, appropriation or contract from government, which were most common before becoming operational. This reflects progress towards financial sustainability. However, almost half of the operational organizations continued to cite grant funding as a moderate or substantial form of support after becoming operational. This indicates that challenges remain to achieving a sustainable revenue model.

### Success Factors

As states begin to implement strategies to expand HIE, empirical data on why some RHIOs succeed while others fail is critically important. Case studies and other literature identify building trust, engaging stakeholders early on in the process, achieving early wins, and having a clear value proposition as important success factors. A recent systematic assessment of factors associated with RHIO success that we conducted using data from our second RHIO survey found that exchanging a narrow set of data and involving a broad group of stakeholders were independently associated with a higher likelihood of being operational. When starting a new effort, engaging a broad range of participants enables the RHIO to leverage more resources. Focusing on a narrow set of data exchange simplifies the technical and potential legal obstacles. The meaningful use measures are well-tailored to this type of approach, given that a limited set of transactions are required in Stage 1, which can then be expanded over time as incentives associated with later stages come into effect.
The same study of success factors also looked at characteristics associated with financial viability, another key challenge facing RHIOs. Involving hospitals and ambulatory physicians as data receivers, and securing funding from participants before data exchange is operational were associated with a higher likelihood of financial viability. Willingness to financially support the RHIO before it is operational is a clear sign that participants value HIE, which may be the reason that these RHIOs are more likely to be financially viable. Further, ambulatory practices and hospitals have the most pressing need for easily accessible clinical data and therefore, their participation seems to be critically important to achieving viability. Thus, including stakeholders who stand to benefit from HIE is important, but securing their financial support early is an equally important and distinct advantage. Although grants may enable RHIOs to incur operating expenses early, this also may lead to spending resources beyond what participants have the appetite or ability to cover once grant funding runs out. The meaningful use criteria reinforce this approach by providing incentives to doctors and hospitals, which are the stakeholders most critical to HIE success as well as those for whom the potential benefits are more tangible.

Barriers

There are multiple, intertwining challenges faced by HIE efforts in both the planning and operational phases. Lack of funding is a commonly cited barrier, and it remained the most common barrier cited by respondents in our recent survey (cited as moderate or substantial by 90% of planning RHIOs and 73% of operational RHIOs). Like any network technology, the value provided by a RHIO grows exponentially with increasing stakeholder participation. The first set of providers that share their data realize much less value than the second, third, fourth, etc. As more providers join in, each provider has a more complete set of data on their patients. Therefore, if RHIOs are not successful at convincing stakeholders to contribute data early in the adoption process, those using the RHIO realize minimal value and may not want to pay to support it. This is complicated by the cost-structure of RHIOs. Before any HIE can take place, a capital-intensive technical infrastructure must be implemented. Stakeholders are asked to contribute potentially large sums upfront with an uncertain return on investment if broad participation does not materialize. This penalizes early adopters and sets up an incentive for stakeholders to wait to join until HIE is operational. This approach has resulted in reliance on grant funding. The meaningful use criteria help address this by creating an incentive for doctors and hospitals to participate in HIE, which in turn creates the business case for HIE that has been missing to date. Another incentive for providers to participate might come from patient protection and PPACA, which expands federal efforts to measure and publicly report on provider quality performance. Some providers might see the participation in HIE as a way to ensure that their patients are getting the care they need. However, given the other types of challenges that remain, it is not clear that the incentives will be sufficient for RHIOs to flourish.
Another commonly cited barrier is stakeholders’ concerns about privacy and security as well as legal/regulatory challenges. HIE is an emerging area with limited legal precedent and an array of state and federal regulations affecting it. RHIOs must identify the relevant laws, most of which were developed without consideration for HIE, and interpret their applicability. Potential participants are concerned about the liability they incur when they participate, and whether there are sufficient safeguards to ensure data privacy, security and proper use. Given the highly sensitive nature of patient health information, it must be clear who owns the data as well as the protocols for user authentication and access. These rules must be established in a way that satisfies both current stakeholders and future potential stakeholders. There are federal efforts focused on this set of issues, including the Health Information Security and Privacy Collaboration (HISPC), which was established by the U.S. Department of Health and Human Services (HHS) in June 2006. The collaborative included three stages: it 1) assessed variations in privacy and security related organizational-level business policies and state laws that affect health information exchange; 2) identified and proposed practical solutions, while preserving the privacy and security requirements in applicable federal and state laws; and 3) developed detailed plans to implement solutions. While HISPC participants have been implementing the policies and solutions, to help address these concerns, these issues nonetheless remained a barrier to development for the majority of respondents to our recent survey.
Stakeholder concerns about the competitive implications of participating in a RHIO and sharing their data are also prevalent. Hospitals and ambulatory practices have to weigh whether they will lose more patients than they will gain if they make it easier for patients to seek care from their competitors by participating in a RHIO. Joy Grossman and colleagues at the Center for Studying Heath System Change conducted case studies of established HIE efforts in four communities, and found that patients and their data were perceived to confer a competitive advantage that would be lost by participating in a RHIO. This was particularly salient for hospitals who viewed clinical data as “a key strategic asset, tying physicians and patients to their organization.” Organizations struggled to balance such competitive concerns with the pressure to be a “good corporate citizen.” A second study examining hospital-physician portals (in the 12 Community Tracking Study sites) found that hospitals viewed these portals as a way to tie physicians (and their patients) to their hospital while participating in a RHIO risked loss of patients. These findings suggest that concerns about competition and loss of market share will need to be addressed in order for HIE efforts to achieve broad penetration. The incentives, whether financial or regulatory, necessary to overcome competitive concerns may be substantial and likely go beyond the current levels.

The Broader Value of HIE

While RHIOs have primarily focused on enabling HIE to support direct patient care, they are uniquely positioned to leverage the data they exchange to achieve broader health care system improvement goals. There is substantial opportunity to leverage new clinical data repositories for comparative effectiveness and other forms of research. Another commonly cited example of a secondary use of electronically exchanged data is syndromic surveillance, which could identify and enable a more rapid response to disease outbreaks. RHIOs may also support chronic disease management and other population health management initiatives by aggregating data across all patients for a given provider or practice to identify problematic areas, such as low rates of blood sugar control among diabetic patients. Finally, exchanged data can be very valuable in helping create more robust performance measures that can be publicly reported or used as the basis for payment reform.

While many of these activities could also take place within an organization after adopting an EHR, aggregating data across multiple entities increases sample size, which helps improve research and performance measurement. In addition, given the fragmented nature of health care delivery, it helps ensure more complete data for the individuals whose data is exchanged than would be available within a single organization. However, important challenges accompany each of these opportunities and, in particular, there has been significant debate surrounding group and individual level performance reporting. Nonetheless current RHIOs have made some headway in these areas. Our survey data found that 37 percent of operational RHIOs support disease or chronic care management, 33 percent support quality or performance reporting, and 32 percent support public health reporting. As states develop their approach to increasing HIE, they are also likely to think broadly about the potential uses for exchanged data.
Conclusions

HITECH and the recently finalized meaningful use incentives have the potential to significantly accelerate the level of HIE in the country, which has been sluggish to date. It is clear that HITECH will not be viewed as a success if it results in an increase in the use of EHRs without the accompanying ability to exchange data between them. This is because the flow of clinical data among providers, and between providers and other stakeholders has served as the basis for some of the most optimistic estimates of the financial savings that might result from widespread adoption and use of EHRs. By including HIE requirements both directly and indirectly in the meaningful use criteria, providers and hospitals have a much more tangible return-on-investment from pursuing HIE. However, setting up the infrastructure to allow providers and hospitals to participate in HIE at a reasonable cost while simultaneously addressing technical, legal and privacy concerns remains a challenge. States will play a central role in tackling this challenge and they are likely to take varied approaches that are best suited to the particular dynamics in their state. They may be able to leverage existing RHIOs and other HIE efforts, which have struggled to-date but have the most experience and best insight into what it will take to be successful. States also have the opportunity to think more broadly about how to leverage exchanged data to support quality improvement efforts and payment reform.


7. Rossingnol P. Interoperability is Certainly the Order of the Day. What are the Actual Developments on the Field? How Close Are We to an Interoperable EHR? Minneapolis: Scottsdale Institute, 2010.


19. ibid.


Chapter 4: Building a Health Information Technology Infrastructure That Effectively and Efficiently Enables Quality Measurement and Reporting

Joachim Roski, Ph.D., M.P.H., Karen Matsuoka, D.Phil., Michael Botta, and Mark McClellan, M.D., Ph.D.

Introduction

The recently enacted Patient Protection and Affordable Care Act (PPACA) includes multiple provisions intended to improve the quality of care in the United States while simultaneously lowering costs. These provisions incorporate incentive and reporting programs, quality improvement initiatives, and involvement of key stakeholders in these activities. In conjunction with the health information technology (HIT) provisions of the American Recovery and Reinvestment Act (ARRA) the PPACA holds the promise of bringing us closer to achieving a high-value health care system in which providers will be able to reliably access and use electronic data, performance feedback, and decision support to continuously monitor and improve health care quality and coordination based on the best available evidence, while “bending” the cost curve. Similarly, consumers and patients will be able to use comparative information on treatments, providers, health plans, and benefit packages and participate actively in their health care. For this to work, public and private sector payers will contribute data to support care coordination and improvement, provide and align incentives and evidence-based benefit designs, support consumers in shared decision-making and self-management, and continuously evaluate payment and delivery reforms.

These aims will require the consistent collection and aggregation of data on the quality and costs of health care in an effective and efficient manner. This chapter lays out a feasible strategy and approach that could widely generate such performance information over the next several years across the United States by systematically and pragmatically building on best practices already in use around the country. Building on Chapter 5 in the Robert Wood Johnson Foundation (RWJF) 2009 HIT Report, we describe opportunities and strategies to catalyze progress on making performance results more widely available now. The strategy laid out in this chapter was informed through efforts and pilot activities in conjunction with the High Value Health Care Project (HVHC) funded by RWJF and directed by the Engelberg Center for Health Care Reform at the Brookings Institution.

HIT and Performance Measure

The primary goal in implementing HIT is to support and improve direct patient care, allowing providers jointly involved in the care of a patient to record, store, and exchange pertinent clinical data. Thus, an effective way to think about performance measurement is that it should follow from and be directly integrated with efforts to improve care, not merely as a stand-alone or after-the-fact monitoring process. This insight requires using data generated as part of patient care as a basis for performance measures. A side benefit of such an approach is that only those directly involved in a patient’s care will generally have access to
sensitive individual health information, as performance reporting depends only
on summary measures. Effective secondary use for measurement purposes of the
same core data can support multiple policy aims, including performance feedback
to clinicians and providers, enabling consumers to make more informed choices
about where to seek care, and supporting payment policies that provide incentives
to continuously improve outcomes while lowering costs.

Consistently and comprehensively accessing and linking such data for measurement
purposes can be challenging in a health care system where information is widely
distributed across physician offices, hospitals, payers (public and private),
pharmacies, clinical laboratories, and other such entities. Historically, the solution
has been to rely on the “aggregate data analysis model” where patient-level data is
collected from multiple sources and stored in large centralized “data warehouses”
where data is cleaned and then analyzed. While such a model may have been
appropriate when only the most powerful computers and mainframes could process
large volumes of data, such centralization is generally not necessary today given the
current computing power of typical electronic medical record systems. Moreover,
such a centralized warehouse model can be slow and time-consuming, and it
can create challenges in protecting the privacy and security of sensitive patient
information and the legitimate business interests of data suppliers.

Distributed or federated data models represent a viable alternative approach
to aggregate (pooled individual) health care data for secondary use purposes,
such as health care quality and cost measurement. In these distributed models,
personal health information is retained by entities directly involved in a patient’s
care. Measurement and benchmarking are supported by multiple data suppliers
calculating results of care consistently based on detailed measure specifications.
Summary results from particular data suppliers are submitted to a third party to
aggregate them with other relevant summary results. Such approaches have been
successfully used in the past and are being expanded by the U.S. Department of
Health and Human Services (HHS) to support other policy aims, such as post
marketing surveillance of drugs.

Performance Measurement and Health Care Reform

Well coordinated performance measurement and improvement activities include
several key components: priority setting, measure development, measure
endorsement, data collection and aggregation, use of results, and evaluation.
Many organizations and stakeholders have important roles in successfully
supporting such activities. This clarification of roles and responsibilities is
necessary to facilitate effective collaboration of organizations across these
components. Figure 1 highlights the interconnected activities in such a quality
enterprise and the major organizations with responsibilities for carrying out
these tasks. This concept of an interconnected measurement and improvement
enterprise, and the need for these two objectives to be well-aligned, has been
substantially reflected in the quality provisions of PPACA.

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a Summary measures require the data owners (e.g., physician offices) to calculate performance rates
(denominator and numerator) before those results are submitted to an entity that adds all performance rates
and links results for the same providers across all submitted performance rates from different data owners.
The PPACA contains multiple provisions intended to support better consumer decision-making, public reporting, and value-based purchasing and incentive programs. To carry out these goals, PPACA calls for the Secretary of HHS to identify relevant priorities for health care improvement, the development of performance measures appropriate to these priorities, consensus-based endorsement of meaningful measures, and consultative processes to advise HHS on how to deploy them for payment reform or public reporting purposes. The PPACA also requires the secretary to develop consistent data collection and aggregation processes that can support the implementation of comparable and
meaningful performance measures. While not appropriated yet, the legislation calls on the Secretary of HHS to make grant funds available to entities collecting and transmitting summary performance data—rather than patient-level data—as well as to a multistakeholder supported entity to provide the necessary coordination. Such activities could be constructed similarly to data collection and aggregation steps currently being implemented in conjunction with post market surveillance of pharmaceutical products briefly mentioned earlier. However, the legislation does not detail what a continuously evolving data collection and aggregation system would look like, and how it could best support quality improvement and better HIT systems nationwide.

This chapter lays out an approach to finding conceptual and technical solutions for secondary use of HIT to make compelling performance measure results available quickly. These solutions could inform the Secretary of HHS strategy and approach for implementation. To that end, the chapter will draw on experiences and deliberations of the Quality Alliance Steering Committee (QASC). The QASC, a multistakeholder effort to improve the coordinated, effective and efficient collection of performance data across care sectors and communities, has worked to ensure that perspectives of both national and regional stakeholder representatives shaped its discussions and efforts. Over the last several years, QASC addressed many challenges and opportunities the Secretary of HHS will likely face in identifying a nationally consistent data collection and aggregation approach, as required by PPACA. QASC has also carried out critical pilot efforts to identify best practices as part of HVHC.

Collecting and Aggregating Data Today

Currently there are multiple public and private sector efforts in place to collect performance measure results around the country. For several years, the Centers for Medicare & Medicaid Services (CMS) and most states have required the transmission of performance results by health plans, hospitals and others as a condition for Medicare/Medicaid program participation by providers, or to capture all payment updates. More recently, CMS has also offered financial incentives to clinicians and providers to report performance results on a confidential basis through the Physician Quality Reporting Initiative (PQRI). Private sector employers have required the reporting of standardized health plan performance results (Healthcare Effectiveness Data and Information Set [HEDIS]) for many years. In addition, private sector health plans and some community and regional initiatives have undertaken efforts to measure the performance of physicians and physician organizations to support greater transparency and to link financial incentives to measured performance levels.

To date, more rapid expansion of these efforts has been impeded by the general non-availability of electronic clinical data necessary to compute performance results in an efficient manner. In the absence of a nationally consistent framework and approach, regional and local efforts have had to rely on developing their own detailed collection and aggregation approaches and methods to generate needed performance results. These efforts have yielded useful information at the local level. However, many of these local efforts have to divert scarce resources to solve

b For more information about QASC visit: www.healthqualityalliance.org
methodological and technical challenges to data collection rather than actually improve care. Moreover it is unclear if currently collected performance results across different communities and regions can be compared. PPACA calls for the CMS to implement multiple payment reform programs intended to serve as a catalyst for improving quality of care around the country. These programs must rely on the availability of nationally consistent, comparable performance results across communities.

Creating Consistent Data Collection and Aggregation Approaches

While PPACA and ARRA create a much stronger potential link between adoption and meaningful use of HIT through incentives, a strategy is needed to turn this opportunity into making more and better performance results widely available. The local and regional measurement efforts described above represent an opportunity to identify consistent data collection and aggregation approaches that lead to comparable performance results across different regions and communities. Through the efforts and leadership of provider organizations, employers, health plans, community/regional initiatives and others, much has been learned about effective data collection and aggregation efforts. These practices and lessons learned can provide key input to identifying nationally consistent data collection approaches as laid out in PPACA. On an ongoing basis, approaches to data collection and aggregation could be evaluated and incorporated into a continuously evolving data collection/aggregation system to produce better information about the performance of health care delivery in the U.S. Such a system should:

■ Rely on technically sound, broad-based, and feasible data collection and aggregation approaches that can produce patient-centered and longitudinal information about results of care;

■ Support consistency with and be reinforced by the implementation of related reform efforts: “meaningful use” of HIT, pay-for-reporting, pay-for-performance;

■ Coordinate public and private sectors and initiatives through a multi-stakeholder effort;

■ Build on existing progress and account for alternative sources in exchanging data and generating functionally equivalent performance information;

■ Reduce unnecessary burden on providers by utilizing electronic data that is already used for care coordination for performance measurement;

■ Identify nationally consistent methods and approaches through pilots prior to nationwide implementation; and

■ Effectively cover a vast majority of providers and patients in a timely fashion.

The following sections lay out opportunities to identify national data collection and aggregation approaches consistent with such an overall system. In addition, the sections illustrate what performance results could be made more widely available through an evolving approach that over time will rely on increasingly available clinical data.

c The QASC road map and three-year plan are available at: www.healthqualityalliance.org/resource-library
Developing a Framework, Technical Approaches and Plans to Make Progress

As part of its initial efforts, the QASC developed consensus around a road map and subsequent three-year plan to make performance results more widely available across the United States. The road map is based on stakeholder consensus around the critical tasks and functionalities of a well coordinated quality measurement and improvement enterprise that needs to be in place to support that goal. Figure 1 (see above) displays the shared vision developed by QASC for such an enterprise. The road map focused in particular on developing collaborative, technologically sound processes for data collection and aggregation to generate compelling performance measure results on a wider scale, and ensuring that these results fit into an overall quality improvement strategy. For each identified objective, the QASC identified key organizations and stakeholders involved in addressing the gap and laid out a time line for solutions. The road map addressed which of these objectives are best met through a national focus and which are best met through a regional focus. Table 1 shows examples of key challenges to improving care through more effective performance measurement identified in the road map.

Table 1: Examples of Key Challenges to Producing Performance Information to Improve Care Identified in QASC Road Map

<table>
<thead>
<tr>
<th>Challenge</th>
<th>Description</th>
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<tbody>
<tr>
<td>Consistent identification of providers across data sources possible</td>
<td></td>
</tr>
<tr>
<td>Consistent methodological approaches (provider-attribution, sample size, risk/case mix adjustments, etc.) to implement performance measures</td>
<td></td>
</tr>
<tr>
<td>Consistent methods for providers’ verification or appeal of performance results identified.</td>
<td></td>
</tr>
<tr>
<td>Coordinated processes to aggregate and integrate performance information identified which protect privacy and “data ownership” (distributed data models).</td>
<td></td>
</tr>
</tbody>
</table>

Source: The Engelberg Center for Health Care Reform, The Brookings Institution

A hallmark of the road map and three-year plan has been the identification of consensus based, pragmatic and feasible approaches to accessing already available electronic data (e.g., best practices in linking administrative and registry-based data to support setting-spanning performance measurement). Additionally, approaches have been identified that demonstrate how to link such data with clinical data that is already widely available, such as data from clinical registries. The need for detailed measure specifications and associated data collection and aggregation rules were identified to solve major technical problems, such as provider matching across different databases, and attributing patients to physicians. Best practices in use across the country or demonstrated in efforts supported by HVHC were identified as viable solutions to these challenges.

HVHC also identified regulatory and financial barriers to making performance measurement information more widely available, as well as recommendations for overcoming them. For example, in response to QASC’s/HVHC’s recommendations to clarify laboratory regulations that were widely interpreted to hinder data exchange between laboratories and physicians, the Clinical Laboratory Improvement Advisory Committee (CLIAC) issued clarifications that support greater data exchange and integration between laboratories, third-party intermediaries including health information exchange functions, health plans, and physician offices.
The QASC laid out a plan describing which broadly supported performance measures could be computed today based on already available administrative and clinical data, how greater exchange and integration of such data could be achieved, and how these steps could provide a foundation for more sophisticated performance measurement and quality improvement activities. This has allowed for the identification of viable approaches to making more performance results available immediately. For example, by querying administrative databases from private and public payers in a consistent fashion, producing summary outputs, and allowing a third-party aggregator to combine the component summary results to an overall result, consistent and compelling performance results could be made available immediately. Such solutions now stand ready to be more widely adopted and leveraged through private and public sector applications, such as pay-for-reporting/performance programs, public reporting requirements, and meaningful use assessment.

Table 2 illustrates what measures could be made more available when pursuing such an approach.
## Table 2: Examples of Existing and Potential Performance Measures Relying on a Basic, Intermediate or Advanced Health Information Technology (HIT) Infrastructure

<table>
<thead>
<tr>
<th>Priority areas</th>
<th>HIT Infrastructure: Basic Phase CLAIMS-BASED MEASURES Medical, pharmacy and laboratory claims from payers</th>
<th>HIT Infrastructure: Intermediate Phase LIMITED CLINICAL AND SURVEY MEASURES Specific clinical data (e.g., electronic laboratory results) and limited survey data</th>
<th>HIT Infrastructure: Advanced Phase COMPREHENSIVE PATIENT-FOCUSED MEASURES More complete clinical data (electronic records, registries, etc.) and robust patient-generated data (Health Risk Appraisals, functional status)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Care Effectiveness/ Population Health</td>
<td>▪ Cancer Care Screenings &lt;br&gt;▪ Diabetes care (LDL and H1c tests, eye exams, etc.) &lt;br&gt;▪ Coronary Artery Disease care (LDL test)</td>
<td>▪ Immunization rates for children and adolescents &lt;br&gt;▪ Patients with diabetes whose blood sugar (H1c) are in control &lt;br&gt;▪ Patients with diabetes or ischemic vascular disease whose lipids (LDL) are in control &lt;br&gt;▪ Patients with hypertension whose blood pressure are in control</td>
<td>▪ Comprehensive health risk summary score (BMI, blood pressure, cholesterol, smoking, exercise, alcohol) &lt;br&gt;▪ Stage-specific quality of life and functional outcomes for common cancers &lt;br&gt;▪ Quality of life and functional outcomes for common conditions (e.g., AMI, hip replacement, diabetes)</td>
</tr>
<tr>
<td>Safety</td>
<td>▪ High-risk medication for the elderly &lt;br&gt;▪ Appropriate monitoring for patients using high-risk medications</td>
<td>▪ “Never events” in hospitals</td>
<td>▪ Hospital infection and risk adjusted mortality rates &lt;br&gt;▪ Outpatient medication errors</td>
</tr>
<tr>
<td>Patient Engagement</td>
<td>N/A</td>
<td>▪ Physician instructions understood (from the Consumer Assessment of Healthcare Providers and Systems (CAHPS) survey) Care received when needed (CAHPS)</td>
<td>▪ Care plans—patient activation and engagement in chronic/other conditions &lt;br&gt;▪ Preference sensitive conditions- level of information communicated regarding patient choice (e.g., knee surgery) &lt;br&gt;▪ Patient-preferences—adherence to design and execution of care plan (e.g., advanced directives)</td>
</tr>
<tr>
<td>Overuse/ Efficiency</td>
<td>▪ Imaging for low back pain (in absence of “red flags”) during first 30 days &lt;br&gt;▪ Inappropriate antibiotic prescribing &lt;br&gt;▪ Utilization rates of select services (e.g., C-section)</td>
<td>▪ Episode-based resource use—linked to quality measures for common medical (e.g., diabetes, AMI) and common surgical conditions (e.g., hip replacement)</td>
<td>▪ Episode-based resource use- linked to quality of life, functional and patient engagement measures for common medical (e.g., diabetes, AMI) and surgical conditions (e.g., hip replacement) &lt;br&gt;▪ Total risk-adjusted cost/patient</td>
</tr>
</tbody>
</table>

Source: The Engelberg Center for Health Care Reform, The Brookings Institution
As Table 2 illustrates, producing useful and consistent performance results could progress rapidly even without much wider adoption of electronic medical records or personal health records. For this basic phase, already available public and private sector administrative data could be accessed more consistently and widely to produce results.

In the intermediate phase, administrative data is combined with only a few clinical data elements such as electronically available laboratory results, or clinical data maintained by many providers in specific practice-based or national registries. Here, widespread adoption of interoperable electronic health records may still not be required for the production of important performance results, such as laboratory test results, blood pressure readings, or immunizations. These measures cover priority chronic conditions such as diabetes, cardiovascular disease and hypertension, or measures pertaining to population health, such as immunization status. Gathering care experience data at the point of care or through a follow-up patient survey will also make available important measures of patient-centered care.

In the advanced phase, electronic infrastructure allows for comprehensive access to clinical data collected through widely deployed and interoperable electronic health records. Data aggregated in this advanced stage can be used to track and measure patients’ longitudinal outcomes and experience across multiple care settings, such as inpatient care, tertiary/long-term care, specialty outpatient care, and primary care. The measures listed in Table 3 and an associated data collection/aggregation approach could immediately support critical reform efforts including creating and incentivizing accountable care organizations, medical homes, or the meaningful use incentive program. By aligning and linking all of these incentive programs the effects of these individual incentive programs could be multiplied and consequently have a much greater impact on care coordination and improvement.
Continuously Pursuing Advanced Best Practices

QASC has also identified the need to continuously develop and pursue improved practices in data collection and aggregation while simultaneously promoting those which have already been identified and could be implemented now. The road map and three-year plan have laid out how additional progress can be made in making performance results more widely available in the near future. Pilot efforts can explore critical technical issues involved in collecting and combing data across different data sources. Table 3 highlights examples of such technical challenges and associated benefits.

Table 3: Focus of Additional Pilot Activities and Their Benefits

<table>
<thead>
<tr>
<th>Potential Methods to Pilot</th>
<th>Links to</th>
</tr>
</thead>
<tbody>
<tr>
<td>■ Consistent summary reporting methods from regional information exchanges, integrated record systems, registries, health plans (building on existing distributed analysis network methods)</td>
<td>■ Measurable improvements in patient outcomes, error reductions, and other aspects of quality of care</td>
</tr>
<tr>
<td>■ Reductions in additional quality reporting burdens, beyond data integration required for delivery of care</td>
<td>■ Better evidence on best practices, and further resulting improvements in care</td>
</tr>
<tr>
<td>■ Methods to assure complete reporting (i.e., all patients represented) and no double counting</td>
<td>■ Demonstrated reductions in administrative burdens on providers and others for quality reporting</td>
</tr>
<tr>
<td>■ Feedback mechanisms to providers, to ensure measure accuracy</td>
<td>■ Demonstrated improvement in resource use and efficiency</td>
</tr>
<tr>
<td>■ Ability to capture and use information on race, ethnicity, language, experience, preference, etc.</td>
<td>■ Greater confidence in adopting payment reforms and other reforms based on value, rather than volume and intensity</td>
</tr>
<tr>
<td>■ Demonstrated reductions in administrative burdens on providers and others for quality reporting</td>
<td>■ Greater returns on investments in improving quality and value</td>
</tr>
</tbody>
</table>

Source: The Engelberg Center for Health Care Reform, The Brookings Institution

Effective coordination and collaboration across the public and private sectors is required to carry out both the measure deployment and pilot functions. PPACA similarly envisions public-private partnership efforts in realizing an effective, continuously evolving data collection and aggregation approach that can produce increasingly sophisticated, patient-centered performance measures. In that partnership, the public and private sectors take on distinct roles and responsibilities. Table 4 describes a potential division of labor.

Table 4: Public and Private Sector Roles and Functions in a Well-Coordinated Effort to Consistently Collect and Aggregate Performance Data

<table>
<thead>
<tr>
<th>Public Sector/Federal</th>
<th>Private Sector/Payers &amp; Providers</th>
</tr>
</thead>
<tbody>
<tr>
<td>■ Establishes strategic vision, methods, and timelines for covering patients and providers</td>
<td>■ Collaborate with the public sector through multistakeholder engagement to determine vision, methods and timelines</td>
</tr>
<tr>
<td>■ Implements quality measurement, health information technology and payment that are consistent and mutually reinforcing</td>
<td>■ Participate in electronic data sharing activities to improve care coordination and patient care</td>
</tr>
<tr>
<td>■ Partners with and supports public-private collaborations</td>
<td>■ Share in public-private efforts to improve coordination and patient care</td>
</tr>
<tr>
<td>■ Supports coordination of data aggregator “network”</td>
<td>■ Support pilot activities to identify successful, innovative methods to calculate measures</td>
</tr>
<tr>
<td>■ Builds capacity to receive data from different sources</td>
<td>■ Contribute expertise and data to identify successful and sustainable methods</td>
</tr>
<tr>
<td>■ Releases timely public-sector data to support care coordination</td>
<td>■ Assures resources are available to support these tasks</td>
</tr>
</tbody>
</table>

Source: The Engelberg Center for Health Care Reform, The Brookings Institution
Identifying and testing continuously evolving advanced best practices requires a systematic and pragmatic evaluation of such opportunities before promoting their wider deployment. Such newly identified practices could in turn support future requirements for assessing meaningful use of HIT or future performance requirements for accountable care organizations and other value-based purchasing programs. For example, over time, meeting meaningful use requirements is likely to require an increased ability of providers to generate (intermediate) outcome measures. Desired results for such outcome measures can only be achieved by effective care coordination and reliance on necessary electronic data capture and exchange among those providing care for a patient across the care continuum. Piloting the ability to generate such data would also inform future requirements to trigger meaningful use incentive payment to providers. The same patient-centered outcomes could also be relied upon for pay-for-performance or value-based purchasing programs (e.g., accountable care organizations, medical homes, physician-payment modifier). Such increasingly sophisticated, patient-centered outcome measurement approaches can over time replace current provider-centric measurement approaches that focus on the provision of specific care processes by individual providers.

The recently launched Beacon Community program may provide the opportunity to identify, test and implement advanced best practices in data collection and aggregation (See Chapter 1 for more information). These efforts could test how innovative measurement solutions could be feasibly implemented in these communities, and thus inform “road-tested” meaningful use requirements applying to broad sections of providers in the future.

**Conclusions**

Collaboration with national and regional stakeholders and building on identified best practices could support the goals and evolving requirements laid out in PPACA to build a nationally consistent approach to collect and aggregate data for measurement purposes. This approach takes advantage of already existing data sources rather than presenting a strategy that is contingent upon more widespread adoption of electronic health records or electronic medical records. Over time, as HIT becomes more generally available, data from these sources can be integrated into this strategy. This approach has the further advantage of being able to produce performance results based on data sources that are already accessible and, thus, providing performance measurement solutions immediately. To sustain such measurement efforts they must be effectively linked with mutually reinforcing incentive/support programs between public and private sector programs, including meaningful use, value-based purchasing, and public reporting efforts. A clear plan for expanding the available set of compelling performance measures through focused measure development activities will allow for the deployment of increasingly sophisticated patient-centered measures. Finally, developing a data collection and aggregation infrastructure that is aligned with additional policy goals such as comparative effectiveness or post marketing product safety surveillance is critical. Such alignment will afford additional opportunities to reduce the overall burden and administrative costs by following the basic premise to efficiently collect data once and use it multiple times and to support multiple purposes.
Endnotes


Introduction

Health information technology (HIT) has long been recognized as a critical underpinning of a safe and high-quality health care system. Though adoption of electronic health records (EHRs) has been lagging, new incentives introduced through the American Recovery and Reinvestment Act (ARRA) and Health Information Technology for Economic and Clinical Health Act (HITECH) may significantly drive EHR implementation. However, reaping the benefits of HIT is challenging. Recognizing this, ARRA wisely tied financial incentives and reimbursement to “meaningful use” of HIT. The Office of the National Coordinator for Health Information Technology (ONC) Policy and Standards Committee recommended a set of performance measures tied to achieving national priorities and goals, established by leading national efforts including the National Priorities Partnership convened by the National Quality Forum (NQF). Fundamental to the vision of a high-performing health care system is the use of HIT systems to drive performance measurement and improvement.

The combination of evidence on “what works,” performance results that can drive improvement, and real-time clinical decision support provide a critical “supply chain” that can drive fundamental improvement in the health care system. The evidence base is used as the foundation for clinical guidelines that are the drivers of both quality measurement and clinical decision support. Using EHRs for performance measurement should increasingly support measures that focus on the clinical guideline branch points where there is significant variation in performance or overall poor performance. As performance measurement moves toward measures based on high-quality clinical information from EHRs and outcomes of care, clinical decision support can facilitate intervention in real time at the critical branch points where it would be most appropriate. By working together, those developing clinical guidelines and measures, and clinical decision support authors can more clearly identify the essential electronic information—clinical content and data standards—needed for both measurement and improvement.

With the move toward measures based on high-quality data from electronic health records, performance measurement should make a quantum leap forward. The ability to incorporate clinical information, as well as patient-reported data, across the continuum of care should enable the next generation of performance measures. The greater feasibility of collecting data associated with EHR-based measures also should facilitate rapid turnaround of metrics for benchmarking and quality improvement.

To fulfill their potential, HIT systems need to support patient care through clinical decision support and quality improvement, as well as through public reporting, public health surveillance, and clinical effectiveness research. Secondary users in particular (i.e., those using such data for surveillance and research)
require consistency and standardization of both the information and the tools. Information should increasingly be captured as a byproduct of direct care delivery, whether originating from devices (e.g., blood pressure monitors, glucometers), from external or ancillary services (e.g., laboratory or imaging services), or entered directly by a clinician or a patient. Clinical decision support, quality measurement, clinical effectiveness research, and public health surveillance all require these same data (Figure 1). To reduce the burden of data collection for these secondary uses, a standard method is required to store and communicate these clinical data.

Figure 1: **Standardization of Secondary Sources Needed to Help Reduce Burden**

Collaboration and coordination across these sectors are essential to making advances in health care quality. In 2008, the Agency for Healthcare Research and Quality (AHRQ) realized the critical importance of building quality EHRs that could facilitate performance measurement and supported the NQF Health Information Technology Expert Panel (HITEP), which defined the kinds of information required for an initial set of 82 high-priority measures. The panel reconvened in 2009 to extend a wider set of current and future measure concepts. HITEP was positioned at the critical interface between performance measurement—including the dozens of measure developers—and the HIT enterprise, including vendors and standard development organizations. The product of HITEP was the Quality Data Set (QDS). The QDS provides a framework for identifying key data elements and reliable data sources needed to measure performance.
The QDS (Figure 2) is a classification system used to describe clinical information so it can be used for quality measurement, clinical research, and public health—all of which repurpose information recorded during clinical care. Specifically, the QDS defines the types of data necessary to develop standardized, consistent and comparable performance measures and ensures common terminology across EHRs. These data “building blocks” will help everyone speak the same language and define words the same way, which in turn will enable more standardized quality measurement and reporting and more consistent use and communication of EHRs for direct patient care.

Figure 2: The QDS: Foundation for Creating and Developing Measures

For example, if a goal is to assess whether patients having a heart attack received aspirin in a timely fashion upon arrival at the hospital, the hospital HIT system would need to capture the following data: 1) diagnosis on admission from the physician coded in ICD-9-CM or SNOMED and entered on the diagnosis or problem list; and 2) medications administered (aspirin) coded in one of the 11 coding systems incorporated in the National Library of Medicine (NLM) medication terminology, RxNorm. Certain contextual information also will be needed, such as whether the medication was prescribed, dispensed or administered (including the interval from the time of arrival at the hospital). Specifications for calculating the performance measure also will be needed, including whether the medication was not administered due to contraindications or patient refusal. The QDS allows the measure developer to state exactly what is necessary, and in what context (e.g., active diagnosis of heart attack, aspirin administered), so the measures can be written in a format that can be implemented within EHRs.
For the EHR vendor and implementer, the QDS provides a clear, unambiguous description of quality measures so that variability is removed and output consistent. The value sets incorporated into each QDS data element provide a translation mechanism so that different clinical systems can understand QDS generated information from other systems. The QDS allows the clinician to understand in relatively simple language what is needed for the quality measure, letting the vendor or implementer manage the specifics of HIT. For those who purchase care on behalf of consumers, the QDS should ensure the performance report includes consistent information without the variability that can occur from differing interpretations of manual abstraction guidance documents. For the IT standards community (Health Level Seven [HL7], etc.), the QDS provides the requirements for harmonization where standards are unclear and also uses cases to fill gaps identified by the expanding requirements for outcome measures.

The QDS allows for greater consistency and comparability across performance measures and will clearly define programming needs for EHR vendors, which will reduce the costs, time, and manual burden of current processes and programs with paper-based measures. For example, the QDS will allow measures to be standardized, refined, and delivered in a “machine-readable” fashion so individual vendors are not required to develop or translate specifications for every measure. Collectively, all of these benefits will promote delivery of more appropriate, cost-effective, and evidence-based care and, ultimately, improved health outcomes.

In its initial development, the QDS focuses narrowly on quality measurement as it exists today. It reflects the current state of performance measurement and the somewhat “siloed” nature of the health care delivery system. As the portfolio of NQF-endorsed measures evolves to include, for example, more patient outcomes and population health measures, the QDS also will need to evolve. For it to remain useful, it must evolve to support new types of performance measures that cross sites and providers, such as measures of care transitions and patient engagement in decision making. The QDS will require regular updates to support these new kinds of measures. Its current foundation should be very helpful to measure developers, but value sets need to be specified to reduce the cost of measure development and maintenance further and to promote harmonization and consistency in how measures are specified. In addition, it is now evident the QDS has broader applicability and will play a key role in supporting other emerging areas of measurement, care delivery, and secondary data uses, such as population health, clinical research, and public reporting. The newly established NQF Health Information Technology Advisory Committee (HITAC) will extend the QDS model well into the future, defining a framework of information required to manage health that incorporates shared decision making as well as behavioral and environmental information.
The Transition to EHR Measurement and Improvement

The transition to using EHRs for performance measurement will require retooling existing measures and developing new metrics in EHRs and personal health records (PHRs). In the short term, the focus has been on retooling existing measures into EHRs based on paper medical records or alternative coding systems. While initial efforts to retool existing measures for EHRs have moved toward standardizing data types and value sets, they have not taken full advantage of the functionality and capacity of EHR systems, and the conceptual frameworks have been largely carried forward from data sources consisting of claims records, paper charts and paper consumer surveys.

While the focus remains on retooling the current measurement paradigm into new electronic systems, critical opportunities for standardization exist that will inform the next generation of electronic measures.

eMeasures

With support from the U.S. Department of Health and Human Services (HHS), NQF took the first step in transitioning measures into electronic formats. Performance measures need to be written in a computer-readable format—the Health Quality Measure Format—commonly referred to as an “eMeasure.” It is hoped that eMeasures will promote greater consistency in implementing performance measures and measuring and comparing performance results, and also will reduce costs and time for measure developers and EHR vendors. For example, eMeasures provide more exact requirements or specifications about where information should be collected in an electronic record. This will drive greater measure standardization and data collection and greater confidence in comparing outcomes and overall provider performance. In addition, eMeasures will reduce the workload, time and overall burden for data abstractors, vendors and measure developers, which will ultimately save money for the health care system.

The eMeasure is also based on the same standard recommended for sharing routine clinical information among clinical systems (interoperability), the Continuity of Care Document (CCD), and the broader standard on which it is based, Clinical Document Architecture (CDA) (Figure 3).
**Measure Authoring Tool**

NQF is collaborating with other quality stakeholders to launch a user-friendly eMeasure authoring tool for measure developers. This tool will allow developers to describe their measures in a highly structured format by applying health care industry standard value sets to the QDS to create eMeasures. The authoring tool will allow measure developers to create appropriate, standardized measures without in-depth programming knowledge of EHRs.

**Value Sets**

Another critical building block of eMeasures is the establishment of the value sets required to express the common concepts for both clinical care and secondary uses. Each value set and the vocabulary from which it originates must be routinely updated as clinical care and evidence evolve. Some vocabularies, such as RxNorm medication coding, are updated as frequently as every week; others, less often. The current practice of each measure developer or clinical decision support rule developer creating and managing its own value sets is costly, and that cost can be reduced significantly by identifying the common concepts and subsequently developing value sets. Standardizing value sets in performance measures also will support the critical need for harmonized measures.
Measure Testing

All performance measures require validity and reliability testing. While the concepts of reliability and validity apply equally to measures derived from EHRs, the electronic health record presents additional issues related to measure testing. Widespread EHR data are not yet available for measure development and testing. Numerous EHR systems present the challenge of ensuring that the selected data fields of interest for any particular measure are comparable among different EHRs. Synthetic test data sets can be constructed to assess measure logic in EHRs, though the idealized environment would not capture differences that may result from differential implementation and use of EHRs in practice. The use of natural language processing software to analyze information from text fields also has not been standardized. In addition, it will be critical to examine whether performance results produced using eMeasures are comparable with results produced from paper records or clinically enriched administrative data.

The Future State of EHR Measurement and Improvement

The HITECH program is supporting the largest expansion of EHRs in clinical practice in our nation’s history. The quality measures selected for the 2011 Meaningful Use program primarily reflect a clinician’s or organization’s successful progress toward data capture and sharing.4 (Please see Chapter 2 for a complete discussion of the final meaningful use criteria). Without achieving this more basic HIT system capability, it will be difficult to move toward measures reflecting more advanced clinical processes that make greater use of the rich clinical data available in EHRs and ultimately improved outcomes that take full advantage of all that is available in both EHRs and PHRs.

The ability to capture key data from EHRs has major implications for measurement. Using diagnoses from the automated EHR problem list, rather than from coding on billing records, should increase the reliable identification of the target population. EHRs can readily calculate measures that would have been difficult to obtain widely using paper charts, such as the automatic calculation of a body mass index (BMI) or cardiac risk assessment. In fact, the near-complete capture of BMI in EHRs stands in sharp contrast to the low rates of BMI measurement in paper charts. However, to make a true quantum leap in measurement, interoperable systems will be required to track patients across providers and sites of care. And, although less feasible in the short term, PHRs and patient web portals should provide an important window for patients to self-report on medication use, outcomes, patient experience, and decision quality. In time, these electronic modalities may replace paper and telephone surveys as the main sources of consumer experience and functional status input.

The next generation of performance measures for EHRs should be focused on those issues of greatest importance to the nation. NQF has focused on a two-dimensional framework built on the work of the National Priorities Partnership (NPP) and NQF’s patient-focused episode framework. The first dimension includes the six cross-cutting priorities that impact all types of patients and clinical areas, such as care coordination, while the other dimension reflects patient-focused episodes. The episode focus lends itself to important measurement domains, such as patient-level outcomes, functional status, patient experience of care, and patient preferences throughout the care experience. It also highlights the importance of measuring
care transitions and coordinating care across settings. A core foundation of the National Priorities is a focus on reducing health disparities. The opportunity to link the clinical information in EHRs to demographic data should allow for routine assessment of disparities in all we do. As noted in the diagram below (Figure 4), the patient-focused episode approach, along with the National Priorities, moves us toward a new measurement paradigm that can build on the strength of interoperable EHR systems. This two-dimensional framework provides the measurement concepts that can be used to identify the next generation of eMeasures.

Figure 4: A New Measurement Paradigm

In addition to the focus of performance measures, recognition is increasing that EHR-based measures will gradually reflect the true capacity of interoperable HIT systems. A taxonomy for EHR-based measures of provider quality/performance, or eMeasures, has been proposed by Weiner, Fowles and Chan. The levels of the taxonomy reflect greater use of the EHR functionalities. Level 1 eMeasures are based on EHR data sources but do not require a full set of functionalities as they reflect translations of traditional claims or paper record-based measures. Level 2 eMeasures are EHR facilitated and largely based on automated extraction of data available within these systems. These measures would include routine capture of BMI, drugs ordered, lab results, and blood pressure. While these Level 2 measures are conceptually possible with paper medical records, they would not generally be considered feasible on a wide-scale basis without HIT support. Level 3 measures are those truly innovative EHR-enabled measures that tap into
measurement domains only present within comprehensive, interoperable EHRs—such as measures reflecting the time or space surrounding information exchange (e.g., closing a referral loop)—and take advantage of the advanced features of HIT, such as clinical decision support (CDS) and provider order entry (POE). These innovative measures, both conceptually and practically, could not be captured using a paper record and take advantage of the breadth and depth of data from interoperable systems. In the near future, many organizations with advanced HIT capacity should be able to apply Level 3 HIT enabled innovative eMeasures based in part on achieving high-level function of EHR systems. The typology also includes eMeasures that reflect the functional level of the HIT system itself, and safety problems in part brought about by the HIT system. These measures of “e-iatrogenesis” should become part of an organization’s standard safety monitoring indicator set as the implementation of HIT could have unintended consequences and introduce safety hazards.

Measures derived from interoperable health systems also have the capacity to improve the efficiency of care. The President’s Information Technology Advisory Council (PITAC) estimated that every seventh admission may be unnecessary and every fifth lab test unnecessary. Interoperable health systems and data sharing across health information exchanges can form the basis for a new generation of novel metrics, such as repeat blood tests and imaging tests. Important conceptual work funded by the Commonwealth Fund has generated new EHR-based care coordination measures, such as closing the referral loop.

Clinical decision support also can serve as a driving force for improvement. Building on the QDS foundation, it should be possible to develop a classification system for the CDS information to ensure the provider tracks and acts upon “necessary events” (e.g., required screenings or contraindications). This classification will be based on the QDS and used to trigger alerts and activate guidelines to enable providers with the right information, at the right time, for the right patient. Consideration also should be given to adapting the measure authoring tool (currently under development) for use in specifying CDS rules. The CDS community and the NQF Clinical Decision Support Expert Panel have started work on a CDS taxonomy that includes: 1) input data, 2) triggers, 3) interventions, and 4) action steps. The QDS data types are identical to the data types for measures; hence, extension of the performance measure authoring environment will provide a basic method for authoring CDS rules and logic. One possible future scenario would be for measure stewards to specify CDS rules (using the adapted authoring tool) that would be paired with NQF-endorsed measures. More explicit pairing of measures and the associated CDS tools that can help providers improve should accelerate the pace of quality improvement.

Figure 5 below provides a high-level overview of the relationship among CDS, quality measures, and the QDS Model. As the figure shows, clinical research advances the development of clinical knowledge, which is often represented in clinical guidelines of care. The guidelines frequently include algorithms with decision points requiring clinician or patient input. These decision points often are the subject of quality measures and CDS rules. The data inputs required to determine whether a specific rule or measure applies to a given patient or user at a specific place and time are defined by the QDS. The CDS rules and interventions promote improvements in both data capture and clinical performance. A result is a quality report that indicates the level of performance with respect to quality measures.
Data availability and consistency are essential components to public health surveillance activities. Such activities include syndromic surveillance to identify new patterns of disease epidemiology, reporting and trending of known pathogens, determining the frequency and incidence of conditions in local and aggregated populations, and vital health, behavioral and wellness information. The QDS could evolve to support these public health functions more directly while simultaneously providing greater availability of the same information within electronic clinical systems. Leveraging the QDS as a model of information, we can increase access to data sources in a standardized way without interrupting the patient care process and minimize the burden of data collection for state and federal government and public health professionals, thereby decreasing cost. This in turn would drive and streamline public health reporting and access to pertinent, comprehensive, and timely data, and more easily and effectively recognize public health priorities like emerging disease outbreaks, clinical outcomes, and health of a population.

**Future Measurement Challenges**

While HIT has great promise as the source of both measurement and improvement, significant barriers and methodological concerns need to be addressed. Numerous methodological issues emerge as e-measures embrace the new measurement paradigm. A series of such issues need to be addressed to fully utilize new and innovative eMeasures. The following list of illustrative methodological issues likely will expand as implementation of e-measures moves forward:

- **The use of “delta” measures:** There is great interest in measures that track change in outcomes across time (e.g., “delta” of HbA1c at two points). Numerous methodological issues emerge from the use of these change measures. For example, with multiple results in a given time period, do you select the best, worst or average performance?

- **Incorporation of patient risk:** The potential for clinical risk information in EHRs provides an important opportunity to stratify performance measures. This risk stratification could be used to identify patients most at risk for poor outcomes and deploy targeted decision support and other quality improvement strategies.
Patient-reported information: The use of PHRs and web portals offers great potential for further incorporating the patient’s voice into performance measures. Further work is needed to understand potential differences in measure performance depending upon mode of entry. For patient-entered clinical information via PHRs/web-based interfaces, further work is needed to understand how best to reconcile conflicting information from patients and providers (e.g., medication lists).

Moving toward interoperability: While many innovative measures can be constructed using interoperable EHRs, some health systems may not have achieved fully interoperable systems. Matching the measure’s level to the capacity of the health system using the performance measure will be important.

Measure evolution: As measures move toward a fully interoperable electronic platform, comparing providers across different data platforms will be difficult. Further methodological work exploring the differences found for the same providers across different data platforms would further understanding of the impact of data source. In the interim, results on performance measures generated from different data platforms should not be considered comparable.

Measure harmonization: The shift to an electronic platform likely will lead to measure harmonization concerns. For example, measures developed with detailed specifications for one platform (e.g., paper medical records, administrative claims data) may not work for EHRs. In addition, relatively simple conventions, such as calculation of age and period of measurement, will require further standardization.

Use of measures across EHRs: Methodological issues may emerge when measures developed for a specific EHR, often homegrown systems, are generalized to a broader set of commercial products. Many of the leading systems have built on years of development and refinement.

If the critical links in the quality supply chain can be supported—next generation eMeasures across the full continuum of care, rapid result feedback for benchmarking, and real-time improvement through CDS—meaningful quality improvement through HIT should be achievable.
Endnotes


The promise of the electronic health record (EHR) has been a fascination for decades, and our nation is currently making a substantial investment to see if that promise can be fulfilled. Adoption of EHRs in our nation’s hospitals and physician offices is increasing, but the transition has been slower than some would hope. Recent reports make it clear that it is difficult on a national scale to measure improvements in the quality or efficiency of care attributable to EHRs.1–3

While it may be difficult to measure the improvements in health care that result from the implementation of EHRs, anecdotes of the usefulness of these technologies abound. Recently finalized meaningful use criteria make clear that physicians and health systems will have to demonstrate that these systems are being used “to improve the health of Americans and the performance of their health care system” with a focus on five health care goals: 1) to improve the quality, safety and efficiency of care while reducing disparities; 2) to engage patients and families in their care; 3) to promote public and population health; 4) to improve care coordination; and 5) to promote the privacy and security of EHRs. Detailed descriptions of specific meaningful use criteria are elsewhere in this report (please see Chapter 2), but the criteria make clear that progress must be quantifiable.

We set out to find examples of what meaningful use and its measurement might look like in local health systems and in the lives of patients and health care providers. We focused on understanding how patients, providers and systems used EHRs to work together, to communicate, coordinate, measure and improve health care. In this chapter, we describe four initiatives where we have seen snapshots of meaningful use that affect the lives of tens of thousands of patients and providers.

Cases

Patient Navigation: Improving Quality, Reducing Disparities
Key Informants: Elizabeth A. Calhoun, Ph.D., and Julie Darnell, Ph.D., M.H.S.A., Division of Health Policy & Administration, School of Public Health, University of Illinois at Chicago

Setting
The University of Illinois Medical Center (UIMC), located on the southwest side of Chicago, is a 491-bed hospital serving a diverse patient population. The city of Chicago has nearly 3 million people, 37 percent of whom are Black, 26 percent Hispanic or Latino and 42 percent White. Elizabeth Calhoun, Ph.D., an experienced health services researcher at the medical center, has been studying cancer disparities in this patient population for many years, working
in conjunction with a large organization of Federally Qualified Health Centers (FQHC) to understand and overcome patient barriers to cancer screening, diagnosis and treatment. In recent years, she has focused on patient navigation programs and the measurement of their success in improving patient access to and outcomes of care. She relies on electronic health records to study screening, follow-up and treatment patterns in this population, and to create population interventions that will improve the health of community health center patients.

**Background**

The existence of health disparities has long been evident in lower survival rates, higher mortality rates and greater incidences of some cancers in minority and low income populations in the U.S. For example, in the city of Chicago, a 2007 study noted that racial differences in breast cancer mortality had persisted for decades with Black women having a 63 percent higher mortality rate than White women. In recent years several published reports have pointed to the potential for patient navigation programs to assist patients to overcome system and individual barriers to getting needed health care services. These navigation programs may take many different forms, tailored to local needs, in an effort to address patients’ particular circumstances. The diversity of programs, and challenges of measuring outcomes, have led to efforts to create more systematic measures of the processes and outcomes of navigation in helping to improve the quality of care and reduce disparities in cancer screening, treatment, and outcomes.

**Investigation**

Calhoun and her Chicago colleagues are participants in the multisite National Cancer Institute’s Patient Navigation Research Program. This program will bring together data from the funded sites in the U.S. to measure the effectiveness of patient navigation in breast, cervical, colorectal and prostate cancers. The purpose of the Chicago Patient Navigation Research Program (C-PNRP) is to develop a patient navigation intervention for low-income patients in Chicago who need follow-up care for positive cancer screening and diagnostic tests of the prostate, breast and cervix. Patient navigators assist patients through the health care system to ensure that they receive a timely diagnosis, and if necessary, treatment. Using a quasi-experimental design, they assign one group of patients to navigation, and use controls identified through electronic medical records to investigate the effectiveness of the PNRP.

**Use of EHRs**

As in many centers, the health information technology (HIT) environment has been changing over the course of this research. At UIMC providers use a comprehensive EHR. Providers at the FQHC initially used an online clinical record that allowed them to view patient information. The main medical record system at the FQHC was a paper system. During the course of the study, however, the FQHC has been transitioning to a fully functional EMR (Meditech). Throughout the study, electronic records systems in place have allowed the capture of patient demographics, clinical information on services and date of services and results, key research data elements needed for both cases and controls, including test findings for determination of study eligibility, test dates, test results, diagnosis (cancer, non-cancer) and (if applicable) stage at diagnosis. As paper records are made electronic, the amount of personnel time to abstract and capture data will decrease even further.
Findings
To date, the program has enrolled 1,043 subjects into their study (440 Navigated/Experimental, 603 medical-records based controls balanced with cases by age, race/ethnicity, gender and insurance). Preliminary analyses by Calhoun and colleagues reveal encouraging results for the patient navigation model. Among patients with both abnormal breast and cervical cancer screening tests, navigated patients are significantly more likely to get follow up care and have a definitive diagnosis (88.4% vs. 67.5% for abnormal breast findings, 98.2% vs. 75.5% for abnormal cervical findings). The expansion of HIT at the FQHC will allow investigators to easily identify patients who are non-adherent to screening or to abnormal test follow-up protocols and expedite efforts to navigate people to care that is more timely.

Comment
Calhoun comments: “Electronic medical records (EMRs) allow the medical care staff an accessible comprehensive patient history. Surgical procedures, test results, pathology reports, clinic visits and contact information are all readily available to the treating provider. With available patient information pertaining to all facets of their medical care, EMRs can reduce delays in service that result in waiting for records to arrive from other clinics and facilities. Additionally, providers can communicate with one another via the electronic medical record alerting providers of treatment updates and decisions.” Beyond the value of the EMR to the providers and patients, the electronic capture of key data for this study makes an intervention project of this scale feasible.

Specialty Referrals, Communication and Coordination of Care
Key Informant: Katharine Zuckerman, M.D., M.P.H., Oregon Health and Science University

Setting
Katharine Zuckerman, M.D., M.P.H., was a practicing pediatrician in the Massachusetts General Hospital (MGH) Chelsea Community Health Center who noted that several of the children she referred for specialty evaluation returned to see her in later months having never had their consultations. As a pediatric health services research fellow interested in health disparities, Zuckerman decided to investigate rates of completion of specialty referrals from pediatric practices at MGH Chelsea Healthcare Center and MGH Revere Healthcare Center, two community health centers providing primary care in communities just outside of Boston, Mass.

Background
Multiple studies have demonstrated substantial socioeconomic disparities in access to pediatric specialists. On national surveys, children from families who are poor or near-poor, of Black or Hispanic race/ethnicity, or are uninsured report less use of pediatric specialty care. In addition, multiple studies have shown that children with chronic conditions exhibit unmet needs for specialty care that are even greater than their substantial unmet needs for primary care. Children with special health care needs from families with limited English proficiency report an even greater lack of specialty care than other children with special health care needs.
Investigation
Zuckerman and her colleagues sought and received research funding from the Controlled Risk Insurance Company (CRICO) / Risk Management Foundation (RMF) Patient Safety Research grant program at Partners Healthcare. The study design was two-pronged: an analysis of the completion of referrals using electronic chart review, and an investigation into perceived individual and system referral barriers through a survey of parents and providers. In the first phase, 577 patient referrals in 19 specialties were analyzed for a seven-month period in 2008 through 2009 to determine rates of incomplete referral and risk factors. Covariates obtained from the longitudinal medical record (LMR) for each patient included patient age, gender, race, ethnicity, language, insurance, comorbid chronic illnesses, interval to appointment, health center and provider. In the second phase, 299 matched provider and parent surveys were completed about specific referrals, perceived necessity for the referral, importance of the problem, communication, and barriers to referral completion. Patient surveys were completed in English and Spanish by telephone; physician surveys were completed electronically.

Use of EHRs
The LMR is the ambulatory electronic medical record system used across Partners Healthcare System, an integrated health care delivery system co-founded by Massachusetts General Hospital (MGH) and Brigham and Women’s Hospitals (BWH). Physicians and staff of the referring community health centers use the LMR, as do consulting specialist physicians at MGH’s main Boston campus. The LMR has structured patient clinical data and tools such as patient registration information, charting, result management, and order entry. At the time of this study, it was not fully integrated with the patient scheduling and referral systems. The Research Patient Data Registry (RPDR) is a centralized clinical data registry, or data warehouse that includes data from the LMR, billing records, and other hospital legacy systems and stores it in one place. Researchers access this data using the RPDR online Query Tool to look at de-identified aggregate data, and, with proper Institutional Review Board (IRB) approval, obtain medical record data for patient sets. By contrast with traditional chart review, which may return entire records to researchers who need only focused and selected data elements, the RPDR affords more privacy. For this study, all requests for patient data from the LMR were submitted through the RPDR mechanism for identified patient sets, only after IRB approval of the plan for data requests.

Findings
The results from the secondary analysis of EHR chart review indicate that nearly one-third of children studied had an incomplete referral, with wide variation by specialty clinic type. Age, insurance status and child health status were significantly associated with incomplete referrals, as were system factors of waiting time for and rescheduling of appointments. The factors predicting incomplete referrals are further explained by data from the parent and provider surveys, documenting the importance of parent-provider communication about the necessity and importance of referrals. The results have been published and presented to leadership of the MGH and the community health centers who are planning further efforts to improve communications about referrals with patients and improve referral tracking and feedback.34, 17
Comment
Zuckerman comments that the key elements of success of her study, as it pertains to the EHR, were “the ability to quickly abstract medical records, appointment scheduling, and claims data, generate lists of patients who had a referral for specialty care, have up-to-date contact information for the patients to facilitate survey response rates and to be able to examine referral completion across disparate clinical sites. Despite having a very advanced EHR system, the project still required a great deal of “elbow grease” to clean data, in part because data entry at different clinical sites was not always uniform even though providers were using the same EHR system.”

Secure, Reimbursed Patient-Physician Communication
Key Informant: Trista Johnson, Ph.D., M.P.H., Director of Quality and Outcomes, Providence Medical Group

Setting
Providence Health & Services (PHS) in Oregon is a not-for-profit network of hospitals, health plans, physicians, clinics, home health services and affiliated health services. PHS-Oregon is part of the greater Providence Health & Services, with services in Alaska, Washington, Oregon, Montana and California. PHS-Oregon employs more than 16,000 people as well as more than 3,400 active medical staff. From 2008 through 2010 the Office of the National Coordinator for Health Information Technology (ONC) funded pilot studies of the use of secure messaging in the ambulatory care setting to improve patient-provider communications through the use of secure email technology and financing of e-visits. Goals included 24/7 access to and submission of health care information, improved patient/physician satisfaction, and reduced dependence on paper, fax and telephone communications. PHS was one of three pilot sites selected, offering secure messaging through its patient portal, known as MyProvidence.

Background
Secure Messaging is an application that aids in the collaboration among health care providers, staff and patients with secure electronic information sharing. To secure health care information delivered electronically, health care organizations need to implement technology solutions to verify individual identity, confirm authorization, ensure information integrity, track and record delivery, and implement electronic signatures in order to continue reliance on electronic documents, and encrypt information delivered via the Internet. While many also see the theoretical efficiency of an e-visit for more routine care with established patients, saving time, travel and visits to the office or clinic, testing was also needed to assess the security and feasibility of these visits and their payment. At PHS, leadership and clinicians interviewed at the start of the project were eager to see if very busy practices, in some cases closed to new patients, could better serve patients by reimbursable e-visits. Several patients expressed the hope of avoiding interrupting physicians with phone calls and avoiding extra clinic visits through the use of email communication with physicians.
Implementation
At PHS, the MyProvidence patient portal page was used to offer the secure messaging option, the link to which is featured prominently on the page. Messages are triaged by medical assistants. Physicians determine if e-visits are appropriate after reading secure messages designated for them. An e-visit was defined by three criteria: the patient has a medical problem potentially requiring a provider intervention and the data are transmitted to the clinic by electronic means; the provider needs to see the patient chart to evaluate the patient message; and the provider had to formulate, document and communicate a new or modified existing care plan to the patient. Patients with chronic illnesses eligible for e-visits included people with diagnoses of diabetes, chronic heart failure, coronary artery disease, asthma and depression. During the first year of the pilot, 50 physicians participated in seven clinic practices and were paid $10 per e-visit.

Use of EHRs
PHS has been using Logician since the 1990s, and now uses the next generation General Electric (GE) Healthcare’s Centricity EMR. The system can capture time data at each step in the process, allowing for an incremental analysis of time saved through use of the secure messaging technology. All seven of its hospitals and clinics, as well as outside local clinicians using Centricity EMR, collect, share and access critical patient information through a standards-based health information exchange that can be used across PHS.

Findings
In May 2010, after one year of implementation, 11,000 patients (6% of patients in the pilot practices, 8.8% of diabetic patients in the practices) had signed up to use secure messaging and had sent a total of 25,452 messages through the secure system. Approximately 50 percent of messages were notes to providers, 18 percent had medication questions, 11 percent concerned prescription refills and 7 percent were appointment related. After a year, providers were receiving about 600 messages per month, twice as many as near the start of the pilot. Overall, preliminary data in the participating practices showed no decrease in telephone calls, but in a majority of participating practices routine and urgent office visits decreased, while emergency visits appeared to stay the same. Secure messaging and e-visit functions were also made available outside of the pilot study, with no reimbursement to physicians for visits. One hundred fifty physicians use these functions, but the rate of visits in this unreimbursed group is about 11 per month.

Comment
Johnson notes that patients and physicians report satisfaction with the messaging and e-visit system. Established patients report that it saves them trips to the physician office, which has particular value for people who need regular follow-up for chronic conditions. Preliminary assessment shows that the system does not add work, but substitutes for other work in the office. There is little question that the e-visit payment is a major driver of physician participation, and that usage is significantly lower where the service is not reimbursed.
Engaging and Informing Patients

Key Informants: Alice Grippe, R.N., C.P.H.R.M., Director, Risk Management NorthShore University HealthSystem; Bob Tavares, Vice President of Care Management and Michael Bechtel, Director of Account Management, Emmi Solutions

Setting
NorthShore University HealthSystem is a four hospital health system in Illinois with more than 500 physicians practicing in 80 to 100 affiliated groups or sites of care and seeing approximately 315,000 unique patients annually. Alice Grippe, R.N., C.P.H.R.M., and her colleagues, as part of a system-wide assessment of informed consent practices, noted high variability in the types of patient education materials, handouts, online tools and other information sources provided to patients across the care continuum. NorthShore wanted to improve patient information to augment and facilitate patient conversations with physicians about their medical procedures and conditions. They wanted to be able to track and document patient usage of the materials, where possible.

Background
Patients seek and receive their health information from many different sources. In nearly equal measure they look to health professionals and public sources for what they need.19, 20 In recent years, we have seen the evolution of the concept of “information therapy” within the literature on shared decision-making between patients and providers. Researchers in this field envision that the future of engaging consumers and patients is in “getting the right information to the right person at the right time.”21 For the most part, this still happens at office visits and in face-to-face interactions or offline when the patient and family seek information away from the point of care. Nationally, fewer than 10 percent of patients report communicating electronically with their providers, and few have access to patient gateways or personal health records.22 While patient-specific education does not come under mandatory objectives in the new meaningful use rules, one optional objective does include “use of certified EHR technology to identify patient-specific education resources and provide those resources to the patient if appropriate”, with a measure of success being that “more than 10 percent of all unique patients seen by the eligible provider or admitted to the eligible hospital’s or critical access hospital’s inpatient or emergency department are provided patient-specific education resources.”23

Implementation
NorthShore provides all physicians in its system access to a suite of interactive multimedia programs from Emmi Solutions, a Chicago-based company that provides their Emmi® programs and services through subscription agreements with major hospitals, health systems, physician groups, and care management organizations.24 At NorthShore, Emmi® programs are available to any physician through the EHR system or through standard patient information libraries and are prescribed by physicians to patients via an email invitation to view the materials. Emmi programs are available for nearly 200 topics including test preparation, pre- and post- procedures, shared decision-making, and chronic condition management. Physician specialists have access to a defined set of programs relevant to their practice and patient populations. Programs are available in English or Spanish and may be viewed by patients and family members via secure
login using a unique access code. In the event that a patient does not have email, the instructions and unique access code can be printed for inclusion in after-visit summaries. Emmi Solutions provides interfaces with the EMR to document if and when a patient logs in to view the program, and to document if the program is completed. Patients can use the tool to generate a list of questions to review with their physician at a visit. Patient usage is tracked and reported back to physicians.

Use of EHRs
NorthShore providers use the Epic EHR system for all inpatient care and all care provided by physicians employed by the health system. Not all independent physicians use the system as yet, though all sites have access to Emmi® programs whether or not they have Epic access. Emmi Solutions has also integrated with Cerner, NextGen, AllScripts and other leading EHRs at other sites of care.

NorthShore offers “NorthShore Connect”, a patient portal where patients can view test results, communicate with health providers, schedule appointments, request medication refills, etc. While initially providers prescribed Emmi® programs and reported information back to NorthShore, patients will now be connected to Emmi programs for either procedure or chronic health management information through this portal. Right now, individual physicians recommend programs to individual patients, but the technology exists for patients to self-select programs, or for systems to send a program to all relevant patients with a specific condition or information need.

Findings
Since the program was implemented at NorthShore, 156 physicians have prescribed over 45,000 Emmi® programs. Use is highest in cardiology, general surgery and gastrointestinal disease specialties. Among those patients to whom programs have been prescribed, 55 percent have started the program, and 85 percent of those patients who start a program finish a program. One-third of programs are prescribed to adults ages 50 to 64 and starting and completion rates are highest in that group, but are also strong in the ages 65 to 79 age group and lowest among young adults (41% started, 78% completed).

Comment
Grippe at NorthShore comments that their system is committed to providing patients with accessible, clear insight to medical care options and that this program “augments the informed consent process which is rooted in patient/physician discussions. Its user-friendly format coupled with clear and concise content provides details that may not be absorbed during conversations that occur in the doctors’ offices. The patients can view the content in their homes, with family members as often as desired, to further their understanding of the recommended plan of care”.

Discussion
Individually and collectively, these short case examples illustrate several health system efforts to use technology in their efforts to understand and improve patient care. Several themes emerge for our consideration.

■ In each case, we see the potential for using data from EHRs to understand the patient and provider interaction on a large scale. One only has to remember
(or imagine) the effort and expense required to extract by hand, as many as 40 to 60 data elements at multiple time intervals from the records of hundreds or thousands of patients to appreciate the use of the EHRs and data repositories described here.

- Efforts described here arose from several different loci within organizations—clinicians, researchers, risk management professionals, quality and outcomes improvement—and the use of EHRs to gather data, to monitor and coordinate care are of interest across a range of disciplines and roles.

- In most cases, even though these organizations are actively using EHRs with extensive functionality, all of the organizations are still changing and evolving their systems, adding functions, interfacing with new vendors. In most cases, paper records are still in the mix somewhere.

- What are the incentives for participation and research in these tests and trials of new technologies? Zuckerman’s research and NorthShore’s efforts were funded in part or in whole through risk management budgets. From that perspective, the ability to use these technologies to reduce variation in care, to assure that people get the follow-up care they need and do not get lost in the system—may provide the motivation for technology adoption. Without the financial incentive for e-visits, Providence physicians were less likely to use secure messaging—yet small incremental payments yielded consistent use, and in certain cases helped to decrease more costly utilization.

- For all the excitement of the possibilities of using technology to understand and enhance patient and provider interactions, we are still left with the reality that effective human communication is still critical in these research findings. Even with electronic scheduling and referral notes, patient-provider communication is a primary driver of specialty referral completions in Boston and it took a patient/provider survey linked to the record analysis to reach that understanding. Patients are identified for patient navigation and monitored through records, but at the core is the patient navigation interaction to assist the patient. Secure messaging and interactive educational tools are communication facilitators, but the human interaction, face-to-face, must come first in order for those tools to be well-used. We know EHRs are more likely to be used in large group practices, and in those contexts are seen as communication enhancers among staff.

- To date, patient reported outcomes data are only available for one of these projects, though survey efforts are planned by all organizations. The voice of the patient needs to be heard in order to reflect on these new tools.

In summary, what we see here seems less a revolution than an evolution. We are beginning to see what is possible, and what will remain difficult. Evaluation of these processes of change is critical, and the ratio of investment in the development of these tools to the assessment of their effectiveness demonstrates a far greater appetite to build and adopt than to measure outcomes. Meaningful use of EHR systems is surely underway in some places in the U.S. We await the upcoming assessment of just how widespread it is, and will be.
Endnotes


This report was produced by a team of researchers at the Mongan Institute for Health Policy at Massachusetts General Hospital, the Harvard School of Public Health and the School of Public Health and Health Services at George Washington University. Report editors: Catherine M. DesRoches, Dr.P.H. and Michael W. Painter, J.D., M.D.

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