Setting the Standard: EHR Quality Reporting Rises in Prominence Due to Meaningful Use

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Federal quality reporting initiatives are expected to improve our ability to measure the quality of care provided to patients. As Scottish mathematician and physicist Lord Kelvin said more than 100 years ago, "If you cannot measure it, you cannot improve it." Measurement, in turn, relies on the standard data and data formats required of electronic health records (EHRs) under the "meaningful use" EHR Incentive Program.

To determine quality of care, one must analyze end-to-end EHR processes—from data capture at the point of care to electronic reporting—and the role of standardized data in determining quality of care. The Centers for Medicare and Medicaid Services (CMS) has been taking a leadership role in the promotion of the use of standards through an open process that engages measure developers, clinician users, EHR vendors, professional societies, and other key stakeholders.

Standards are a prerequisite for functionality and are a foundational component of the strategy for quality reporting from EHRs. At the same time the ability to measure, while a prerequisite, does not guarantee improvements in care absent concurrent changes in measure definition and implementation and targeted quality improvement informed by measured results. In the future, coupling quality measurement work with EHR decision-support capabilities will provide greater payback for collecting standardized data.

CMS Moving to Quality-Based Payments

The move to widespread quality reporting closely follows the move to universal adoption of EHRs. The necessary conjunction of these two trends is the move to report quality by reusing the data from EHRs. Failure to do so would undermine the value of the EHR and would perpetuate the extensive, labor-intensive redundant data collection and reporting on the part of providers. To understand the importance of quality measures, one must understand electronic quality reporting, the critical role of data standards, and challenges in developing an effective reporting process.

CMS provided health coverage to approximately one-third of all Americans in 2011.[1] As the largest purchaser of healthcare in the world, CMS has had an increasing focus on improving the quality of healthcare for its beneficiaries using a variety of policies and levers, including performance measurement. Since 1997, CMS quality measurement initiatives have been implemented incrementally for a variety of providers and settings.

In December 2010, CMS first tied payment to performance on metrics in the End Stage Renal Disease Quality Initiative.[2] The Health Information Technology for Economic and Clinical Health Act (HITECH) component of the American Recovery and Reinvestment Act of 2009 (ARRA), and the Patient Protection and Affordable Care Act (ACA), has amplified the shift in healthcare toward paying for quality rather than volume.

HITECH set the stage for quality reporting from EHRs by paying for reporting of "meaningful" clinical quality measures derived from EHRs, while the ACA established a new Hospital Value-Based Purchasing (HVBP) program and required the development of a Physician Value Modifier, which will tie payment under the Physician Fee Schedule to performance on quality and cost metrics in the physician setting.

Table 1. National Quality Strategy Aims and Priorities

Three Aims	
Better Care	Improve the overall quality by making healthcare more patient-centered, reliable, accessible, and safe
Healthy People/Healthy Communities	Improve the health of the United States population by supporting proven interventions to address behavioral, social, and environmental determinants of health in addition to delivering higher quality care
Affordable Care	Reduce the cost of quality healthcare for individuals, families, employers, and the government
Six Priorities	
1	Making care safer by reducing harm caused in the delivery of care
2	Ensuring that each person and family is engaged as partners in their care
3	Promoting effective communication and coordination of care
4	Promoting the most effective prevention and treatment practices for the leading causes of mortality, starting with cardiovascular disease
5	Working with communities to promote wide use of best practices to enable healthy living
6	Making quality care more affordable for individuals, families, employers, and governments by developing and spreading new healthcare delivery models

Source: AHRQ. "About the National Quality Strategy (NQS)." http://www.ahrq.gov/workingforquality/about.htm.

The development of a National Quality Strategy (NQS), as required under Section 3011 of ACA, provides a quality improvement framework for the nation.[3] Published in March 2011, the NQS outlines three aims and six priorities for improvement (see Table 1). The publication of the NQS and the programmatic requirements outlined in ACA have afforded CMS the opportunity to refine its high-level principles for performance measurement (see Table 2).

Table 2. CMS' Overarching Quality Measurement Principles

1	Use the National Quality Strategy as a measurement framework

2	Ensure each of the six domains of measurement are included in all programs over time
3	Align measures across programs where appropriate and feasible
4	Move toward core sets of "measures that matter," that are aligned across programs and settings where appropriate
5	Balance parsimonious sets of measures with the need to have measures that address all specialties
6	Move toward patient-centered measures (patient experience of care, patient-reported outcomes) and remove measures that are no longer appropriate for use in payment or reporting programs
7	Move toward measurement at multiple levels of accountability (individual, practice setting, community) using "families" of measures for clinical concepts
8	Develop measures that are focused on filling gaps across the six domains as well as measures that are most meaningful in a value-based purchasing construct

With the shift toward linking the goals and priorities of the NQS to fee-for-service payments on a national scale, precision and standardization in quality measurement is more critical than ever. Measures of patient-centered outcomes and patient experience, rather than clinical process measures, are critical to achieving value.[4,5] Providers skeptical of quality reporting programs will have even greater concern in a new environment that reimburses them based on quality metrics.

The science of electronic EHR-derived quality measure development is younger than that of claims or chart-based abstraction measures, but is rapidly evolving. The first generation of electronic quality measures were "re-tooled" from existing claims-based measures. Experience has shown that this method of development is fraught with problems, including changes to the meaning of the measure. "De novo" electronic quality measures are designed from the outset to leverage EHR data to measure outcomes and changes in patient status (i.e., blood pressure, symptoms, function) over time. Electronic quality measures developed in accordance with HITECH standardized data and data formats set the stage for end-to-end electronic quality reporting, minimizing redundant data entry, and the burden of data collection.

To achieve provider acceptance and maximum accuracy in quality measurement, CMS is working with its federal and private-sector partners to identify measures appropriate for a value-based purchasing construct that are reliable, valid, and feasible, and that are important to patients and providers. Measures that incorporate richer clinical and patient-reported information are possible, and in use today, with the use of EHR-generated information.

Standards Alphabet Soup

Key standards include QRDA-I (Quality Reporting Document Architecture for Individual Patient Data);[6] HQMF/eMeasure (Health Quality Measures Format);[7] and QRDA-III (Quality Reporting Document Architecture for Aggregate Patient Data).[8] These data standards for the unambiguous representation and exchange of patient data and quality measures are developed by the Health Level Seven International (HL7) nonprofit standards development organization. HL7 uses an open consensus-based approach that encourages the engagement of key stakeholders, including measure developers, clinician users, EHR vendors, and professional societies in the development process.

QRDA-I, HQMF/eMeasure, and QRDA-III are data standards and interoperability standards—they define the data elements to be communicated depending on the quality measure(s) in question, and they define the exact format by which those data

elements are packaged and communicated from one computer to another. Each of these standards are designated "Draft Standard for Trial Use" (DSTU) by HL7, allowing for more rapid enhancements as the healthcare industry's collective experience with quality reporting from EHRs continues to grow.

Quality Measure Approach through Meaningful Use

The corollary to Lord Kelvin's maxim on improvement is the belief that "If you cannot standardize it, you cannot measure it." Quality reporting relies on the standardization of data and data formats required of EHRs under the HITECH meaningful use program.[9] Obtaining standardized data from EHRs is the key enabler of the end-to-end processes, from data capture at the point of care to electronic quality reporting.

Recognizing the foundational role of standards in quality reporting, CMS has sponsored development of key interoperability standards and has created an open process that engages key stakeholders including measure developers, clinician users, EHR vendors, and professional societies.

Leveraging HITECH Meaningful Use

EHRs must adopt certain interoperability standards to be certified under the meaningful use program. Providers must, in turn, use certified EHRs to be eligible for incentive payments from CMS through the program. This alignment between quality reporting standards and interoperability standards required under meaningful use is critical to the success of the effort.

This alignment is illustrated in Figure 1. On the left of the diagram is a meaningful use-certified EHR. Because it is certified, it has certain implied capabilities—such as the ability to communicate standardized medications, problems, allergies, and lab results. The vertical bar represents the bar established by meaningful use, and can also be thought of as a standardized interface. Quality reporting criteria, such as "patient is in the denominator if they had a hospital discharge diagnosis of acute myocardial infarction" within an electronic quality measure written to this interface can be consumed by the EHR and applied to patients in order to determine those that meet or fail to meet the criteria. In a similar fashion, decision-support rules, such as "patient has an admitting diagnosis of acute myocardial infarction—consider aspirin administration" written to this interface can be invoked by the EHR or suppressed if the recommended action has already occurred. Successive versions of meaningful use essentially raise the bar by requiring a certified EHR to be able to communicate additional standardized data elements. In parallel, quality criteria and decision-support rules can successively be made more expressive and better able to measure more complex clinical processes and outcomes.

Table 3. Meaningful Use Stage 2 Final Rule Excerpt

The following excerpt defines "Quality Reporting Capabilities Required of Certified EHRs" in the meaningful use final rule.

(1) Clinical quality measures—capture and export	
(i) Capture	For each and every CQM for which the EHR technology is presented for certification, EHR technology must be able to electronically record all of the data identified in the standard specified at §170.204(c) that would be necessary to calculate each CQM. Data required for CQM exclusions or exceptions must be codified entries, which may include specific terms as defined by each CQM, or may include codified expressions of "patient reason," "system reason," or "medical reason."

(1) Clinical quality measures—capture and export	
(ii) Export	Improve the health of the United States population by supporting proven interventions to address behavioral, social, and environmental determinants of health in addition to delivering higher-quality care.
(2) Clinical quality measures—import and calculate	
(i) Import	EHR technology must be able to electronically import a data file formatted in accordance with the standard specified at §170.205(h) and use such data to perform the capability specified in paragraph (c)(2)(ii) of this section. EHR technology presented for certification to all three of the certification criteria adopted in paragraphs (c)(1) through (3) of this section is not required to meet paragraph (c)(2)(i).
(ii) Calculate	EHR technology must be able to electronically calculate each and every clinical quality measure for which it is presented for certification.
(3) Clinical quality measures—electronic submission	
Enable a user to electronically create a data file for transmission of clinical quality measurement data: (i) In accordance with the standards specified at §170.205(h) and (k); and (ii) that can be electronically accepted by CMS.	

Source: HHS. "Health Information Technology: Standards, Implementation Specifications, and Certification Criteria for Electronic Health Record Technology, 2014 Edition; Revisions to the Permanent Certification Program for Health Information Technology." *Federal Register* 77, no. 171 (September 4, 2012): 54163. http://www.gpo.gov/fdsys/pkg/FR-2012-09-04/pdf/2012-20982.pdf.

Electronic Quality Reporting Under Meaningful Use

In Table 3, the verbatim requirements of the quality reporting capabilities required of certified EHRs under the second stage of meaningful use are illustrated. In this process, data is captured (i.e., at the point of care) into an EHR. From there, quality data on individual patients is exported in a standardized data format. These standardized reports can be consumed by a calculation engine. The engine, driven by standardized electronic clinical quality measures that contain computer-processable logic and population criteria, consume the individual patient data reports and calculate aggregate scores such as the total number of patients in the denominator, or the total number of patients in the numerator. These aggregate scores can be communicated in a standardized aggregate data reporting format.

While the technical details of these quality reporting standards—individual patient data report, electronic clinical quality measure, aggregate quality report—are beyond the scope of this article, several aspects are worth noting.

Figure 2 illustrates the difference between HQMF/eMeasure and QRDA-I. The HQMF/eMeasure standard is used to formalize a clinical quality measure's criteria. In this example, the criteria for inclusion in the measure's denominator are a discharge diagnosis of ischemic stroke, age 18 or older, and a history of atrial fibrillation or atrial flutter. The criteria for

inclusion in the measure's numerator is anticoagulation prescribed at discharge. The QRDA-I standard is used to communicate individual patient data for one or more HQMF/eMeasures, and would include those data elements that allow a calculation engine to conclude whether or not the patient meets the denominator criteria or the numerator criteria. In this example, the QRDA-I file for a patient would contain their age, details of their encounter (encounter type, encounter date, encounter discharge diagnoses, discharge medications), and their problem list.

The Process for Standards-Based Reporting

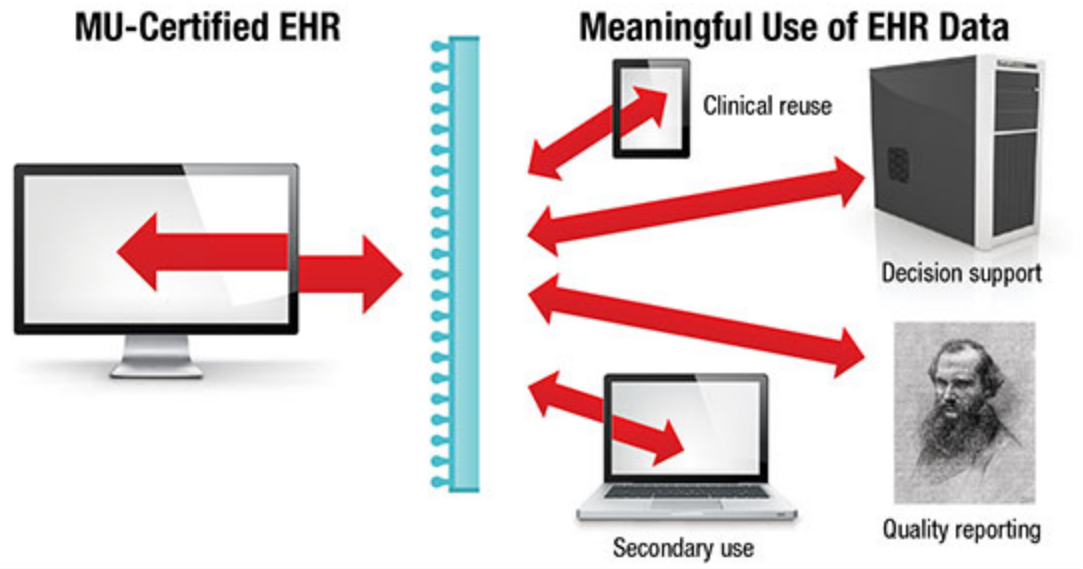
Data capture is a potential Achilles' heel for all quality reporting, and not just from EHRs. Divergent data requirements across quality measures, decision-support rules, or clinical practice guidelines can leave providers overwhelmed, resistant, and skeptical about the clinical return on investment. Standards address the data capture issue head-on by providing an authoritative source of truth for software vendors, measure developers, and quality analysts.

In standards-based electronic reporting, data is captured once at the point of care and communicated using the QRDA-I standard, reducing redundant data entry to a minimum. Stage 2 meaningful use requires that an EHR be capable of capturing and recording data elements required for quality reporting. The regulation does not preclude the capture and inclusion of data from other systems in the construction of quality reports. Some data may be more readily captured in systems outside the EHR, such as practice management or lab systems, or via a health information exchange (HIE). Interoperability standards widen the range of data capture modalities and applications consistent with quality reporting and data reuse.

Standardization establishes and promotes convergence on and alignment around key data elements needed for transitions in care, quality reporting, and decision support. This sets a clearer path for vendors and user interface designers, and lessens the data capture burden on clinicians, focusing data capture on data elements known to be of value for a variety of purposes.

Figure 1. Leveraging Meaningful Use for Quality Reporting

Lord Kelvin (bottom, right) watches over the way meaningful use is used for improving quality initiatives and reporting.



Supporting the Standards

Feedback on stage 1 meaningful use for the Medicare and Medicaid EHR Incentive Programs made it clear that more support is needed for stakeholders to fully succeed in the program, particularly for providers who report quality measures as "meaningful users" of EHR technology and for the EHR vendors who support them. Providers indicated that stage 1

meaningful use eMeasures did not include critical information. For example, the human-readable portion of the eMeasure did not include plain English statements covering which patients were included or excluded from the measure population. The provider had to decipher the computer formalisms that contained this information.

Providers were more comfortable using chart-abstracted measures that have manuals describing how and where to collect all of the required information. Similarly, vendors noted there was insufficient information on how to process an HQMF/eMeasure. Their questions and comments addressed measure logic, codes, and the definition of the patient population.

To address these and other concerns, CMS established a multi-stakeholder collaborative in September 2011. This group is composed of measure developers, medical societies, CMS contractors, and federal agencies involved in the development of eMeasures. The group's ongoing purpose is to provide guidance on HQMF/eMeasure implementation and to advance the specifications to achieve successful and accurate reporting of quality measures from EHR technology.

The group prioritized the most pressing issues on the eMeasure specifications themselves and areas cited by the providers and EHR vendors for incorporation in stage 2 meaningful use quality measures. They addressed conventions for calculating patient age, expanded the human-readable section of the eMeasure to include all the information needed by both clinicians and EHR vendors written in plain English, and assigned a convention for measure version numbers. They further developed proposals for the eMeasure specification to add clinical and demographic information such as payer, race, ethnicity, and gender variables, as well as many other technical improvements.

The primary CMS CQM website, www.cms.gov/Regulations-and-Guidance/Legislation/EHRIncentivePrograms/ClinicalQualityMeasures.html, provides the latest guidance from CMS, such as the Guide for Reading Eligible Professional and Eligible Hospital eMeasures (available at www.cms.gov/Regulations-and-Guidance/Legislation/EHRIncentivePrograms/Downloads/Guide_Reading_EP_Hospital_eCQMs.pdf).

Figure 2. HQMF/eMeasure (criteria) vs. QRDA-I (patient data)

HQMF/eMeasure (criteria)	QRDA-I (patient data)

• DENOM
  ◦ Discharge diagnois of ischemic stroke
  ◦ Age >= 18
  ◦ Hx of Afib/Aflutter
• NUMER
  ◦ Anticoagulation prescribed at discharge
	• Age
	• Encounter type
	• Encounter admit date
	• Encounter d/c diagnoses
	• Problem list
	• Discharge medications

Quality Measures Helpful, But No Guarantees

The shift toward purchasing healthcare based on value rather than volume is underway in both the public and private sector. With provider payments at stake, accuracy in quality measurement is more important than ever and can only be achieved through collaborative development of measurement standards. Interoperability standards are what make it possible for an EHR to export, calculate, and report on quality measures.

Such standards are a prerequisite for EHR functionality and are a foundational component of the strategy for quality reporting from EHRs. CMS, recognizing this foundational role, has taken a leadership position as evidenced through their sponsorship of several key initiatives, including standards development and convening a multi-stakeholder collaboration to improve these standards.

Developing and implementing quality measures, while a prerequisite, does not guarantee improvements in care. Coupling quality measurement work with EHR decision-support capabilities will likely be a prominent feature of stage 3 meaningful use. Efforts are underway to define shareable decision-support rules that interoperate with certified EHRs similar to the approach being taken with electronic quality measures. On the near horizon, interoperability standards that support measurement not only for quality reporting but also for point-of-care decision support will be required to drive improved patient outcomes.

Notes

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