

Proposal Outline:

Using the NQF Quality Data Model in the CDS Consortium Knowledge Architecture to Accelerate the Socialization of Clinical Decision Support: *The CDSC-QDM Project*

With this proposal outline BWH/PHS provides an assortment of ideas for projects that can be conducted by BWH/PHS in collaboration with NQF. The final subset of projects and scope of work will have to be finalized with ONC and NQF guidance. Final timelines and budget will be developed once the scope of work is finalized.

Background

Current US policy promotes the adoption of healthcare information technology in an effort to help simultaneously improve the quality of care, improve the patient experience, and reduce the costs of care ¹. The HITECH section of ARRA provides incentive payments to providers and hospitals adopting HIT if they achieve “meaningful use” criteria ². Achieving these criteria requires not only successful implementation of HIT but also its effective use that often requires effective using clinical decision-support. Often it is this effective use of CDS that remains a hurdle for the average user of HIT. Vendor supplied electronic medical record systems are typically provided with clinical decision support functionality which is not yet populated with the necessary clinical decision support content to provide various forms of clinical decision support to help users achieve meaningful use ³. Similarly, eligible providers and hospitals must report on their quality performance to demonstrate achievement of meaningful use objectives to receive incentive payments. For both of these requirements, however, detailed knowledge specifications for either clinical decision support, or quality measures, in a form ready for implementation are not yet generally available – often the end-user is left to his or her own devices to interpret and encode these specifications within their EMR. This may result in variable efficacy for EMR use, as well as potentially non-comparable quality reports. To fully support current US policy and promote the adoption and effective use of HIT, standard specifications for relevant CDS and eMeasures should be made widely and freely available to users and implementers of HIT alike.

CDSC-QDM Project Goals

1. Build a set of “ready to implement” knowledge artifacts for clinical decision support and quality reports (eMeasures) that target key cardiovascular disease management goals and support users of HIT in achieving meaningful use Phase 2 objectives.
2. Make this set of knowledge artifacts publicly available in the CDS Consortium Knowledge Management Portal.
3. Make recommendations for the harmonization and standardization of CDS and eMeasure Specifications building upon the NQF QDM, and ongoing maintenance and use of these resources

Approach

This project describes a unique research and development collaboration between the AHRQ supported Clinical Decision Support Consortium and the National Quality Forum.

Overview CDS Consortium

To address the challenge of fostering widespread adoption of clinical decision support is in documenting, generalizing, and finally translating the experience from these advanced sites to a broader community of care sites, investigators from Brigham and Women's Hospital, Harvard Medical School, and Partners HealthCare (PHS), have formed the AHRQ Clinical Decision Support Consortium (CDSC) in collaboration with the Regenstrief Institute, Kaiser Permanente Northwest Research Group, the Veterans Health Administration, Mayo Clinic, GE Healthcare, NextGen, Siemens Medical Solutions, University of Texas School of Health Information Science, Oregon Health Sciences University. The Mid-Valley Independent Physicians Association (MVIPA) and University of Medicine and Dentistry of New Jersey (UMDNJ) serve as corresponding sites using NextGen and GE electronic health records, respectively.

<http://www.partners.org/cird/cdsc/>. This project was funded under contract # HHS290200810010 from the Agency for Healthcare Research and Quality, U.S. Department of Health and Human Services.

The goal of the CDSC is to assess, define, demonstrate, and evaluate best practices for knowledge management and clinical decision support in healthcare information technology (IT) at scale – across multiple ambulatory care settings and EHR technology platforms⁴. Our work is guided by a series of high-value research questions; please refer to the website above. The primary objectives for the CDSC are the following:

- Members of the CDS Consortium Create a prototype national knowledge repository
- Develop a practical knowledge representation formalism supporting knowledge management and sharing
- Develop CDS Web services for remote provisioning of clinical decision support
- Develop an approach to content governance and collaborative knowledge engineering
- Develop a legal framework to support data and knowledge sharing and services with appropriate indemnifications

The objectives above have all been met and prototype CDS services, a KM Portal, and supporting documentation exist today through the efforts of the CDS Consortium⁵⁻¹⁶. Members of the CDSC are intimately involved in creating and providing CDS tools and services in electronic health records used in both academic settings as well as community-based physician office practices. These investigators share a common interest and goal of enhancing the widespread adoption of CDS tools and services to improve the delivery of healthcare both domestically and world-wide. The CDS Consortium is an Agency for Healthcare Research and Quality (AHRQ) Contract that began on March 5, 2008. We have completed the first three years of the contract, and are currently in Option Year 2, which is scheduled to end on July 8, 2012; Option Year 3 ends one year later.

Overview of the NQF Quality Data Model (QDM)

The Quality Data Model (formerly referred to as the Quality Data Set, or QDS) provides measure developers a common language to describe the information required for quality measures of structure, process and outcomes, including patient-reported outcomes, and descriptive data to evaluate for disparities. It also promotes a shared understanding across measure stewards, providers, researchers, vendors) so that measures are highly specific in detail and consistent in structure to enable clear interpretation and communication.

The QDM is basically the grammar that allows measure developers to state directly what is required for an electronic clinical application such as an EHR to calculate their measures and where and how the data should be found, enabling more standardized, less burdensome quality measurement and reporting. Details can be found at:

[http://www.qualityforum.org/Topics/Health_Information_Technology_\(HIT\).aspx](http://www.qualityforum.org/Topics/Health_Information_Technology_(HIT).aspx). In 2010, the NQF Clinical Decision Support expert panel determined that the QDM provided the requirements for the input data in the CDS taxonomy. That taxonomy specified the CDS requirements of triggers, input data, interventions and action steps. The report, Driving Quality and Performance Measurement – A Foundation for Clinical Decision Support can be accessed at: http://www.qualityforum.org/Publications/2010/12/Driving_Quality_and_Performance_Measurement_-_A_Foundation_for_Clinical_Decision_Support.aspx.

Example of use of NQF QDM in CDS development:

Researchers in the CDSC have found it useful to employ elements of the QDM in their knowledge engineering work to create detailed specifications of the knowledge used in rules and alerts. For example, if one considers the NQF eMeasure 0059 which evaluates whether or not the HgA1c in adults with Type 1 or Type 2 diabetes is maintained at <9%, this measure has a specification that defines the class of adults with diabetes who had an encounter within the last year and relevant laboratory test results. These definitions refer to a variety of value sets sourced from terminologies such as SNOMED, ICD9, ICD10, CPT, RxNorm and LOINC.

In the Clinical Decision Support Consortium, we have crafted a rule set that can leverage the QDM value set definitions. CDS content, in addition, must define the set of triggers and interventions that can assist the care-giver to achieve this performance target. For example:

- 1) If last [HgA1c] in the [Type 1 or Type 2 DM] adult is within target range and hasn't been resulted in 6 months, notify that HgA1c is overdue and recommend HgA1c testing
- 2) If last [HgA1c] in the [Type 1 or Type 2 adult] is within target range and between 5 and 6 months old, notify that HgA1c is almost overdue and recommend HgA1c testing
- 3) If last [HgA1c] in the [Type 1 or Type 2 adult] is above target range and between 3 and 5 months old, notify that HgA1c is above target range and recommend more frequent testing
- 4) If adult is on [Diabetic Medications] and does not have [Type 1 or Type 2 DM] on the problem list, and does not have [Steroid-dependent DM or Polycystic Ovary Disease or Gestational DM] on the problem list, notify caregiver that patient is on diabetic medications and does not have DM on the problem list and recommend the addition

Each of the bracketed elements above defines a clinical state, or condition that must be precisely defined to be implemented in CDS. Thus, when looking at a clinical performance goal such as glycemic control, the development of logic for measurement and the logic for clinical management courses along two parallel paths that primarily overlap in the sharing of certain logic statements, or value set definitions. Leveraging the value set definitions for both CDS and eMeasure implementations could dramatically facilitate the knowledge engineering burden, and ideally specifications could be shared in both directions – from the CDS world to the eMeasure world and vice versa. Secondarily, the CDSC vision includes providing a measure specification for each and every CDS intervention so that the efficacy of the CDS intervention may be assessed in practical use. The following diagram depicts schematically how the logic of eMeasures and CDS may be built upon a common value set framework:

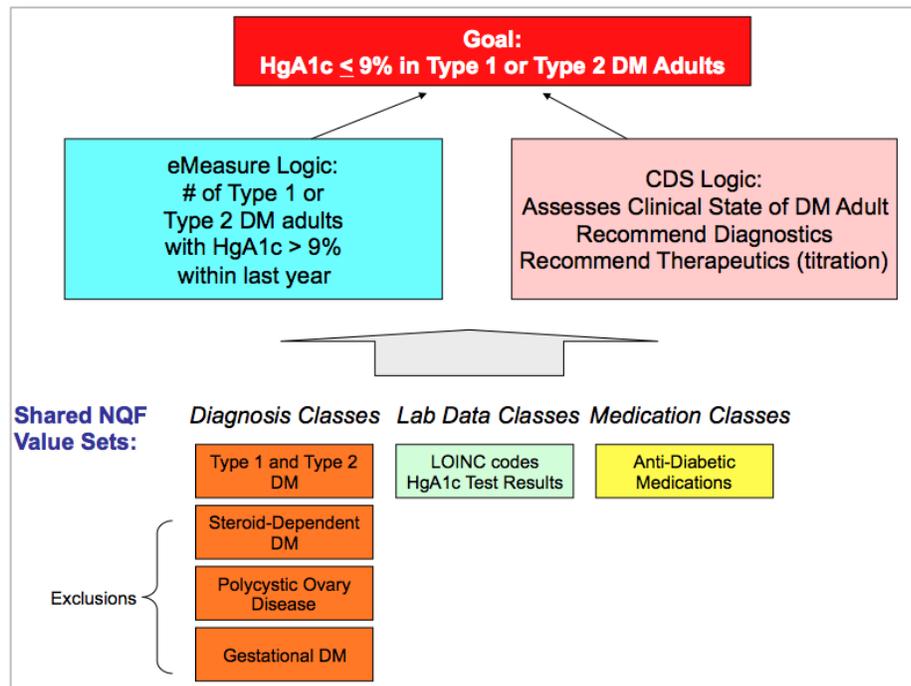


Figure 1. Conceptual relationships between NQF QDM Value sets, eMeasure specifications, and CDS logic specifications

Opportunities for Improving Process (Automation)

The component knowledge objects used in both eMeasures and CDS logic specifications are perhaps the most valuable part of the puzzle, and the most difficult for the average end-user of health IT to develop themselves. Value sets creation, and the appropriate encoding of clinical content with detailed specifications of controlled medical terminology and codes, and careful attention to coherence across value sets as they are defined requires a specialized skillset, and tooling that can help the authoring process at the value set level, and at the eMeasure and CDS logic specification level. As a knowledge engineering team considers how to utilize NQF eMeasure value sets and measurement goals to build CDS artifacts, several issues arise:

- 1) **Local Variation:** There might be local variation in how the knowledge engineering team's organization defines the terminology members of any given value set either because they don't agree with the NQF eMeasure or because the site has local terms that they wish to include
- 2) **Drug Classification Standards:** Drug classification approaches can be a challenge for an organization aligning their commercial (FDB, Multum, etc) or government sponsored (NDFRT) classes with the ones outlined in the eMeasures, for example the NDFRT value sets for drug classes don't neatly align with the RxNorm class lists in the eMeasures.
- 3) **Measure vs Manage:** The class definitions in an eMeasure might be narrower than desirable class definitions for how one creates a CDS artifact because the eMeasure is intended to be highly specific for how a care-giver is held accountable for providing an intervention. For example, the NQF list of clinical contraindications to an ACE or ARB is very long (NQF eMeasures 0066 and 0081). In a CDS context, rather than suppressing the recommendation for all of these considerations, a knowledge engineer must decide, with subject matter expert input, which are worth suppressing the recommendation for and which contraindications merit a "qualified recommendation" reminding the clinician to consider the possibility of these contraindications before prescribing the drug.
- 4) **Malaligned Standards:** The knowledge engineer might be required to tackle how to reconcile across recommended standards for cohorts of patients. For example, the Meaningful Use final rule requires that EHR vendors utilize CDC recodes to enable clinicians to document the tobacco use status of a patient. However, the eMeasures (NQF 0027 and 0028a) specify only SNOMED codes for smoking status, thus the CDS logic must be designed to reason over the CDC recodes while the Quality Data Management team must maintain a mapping between the CDC recodes and the SNOMED codes.

Many of the CDSC conversations with healthcare delivery organizations and EHR vendors have pointed to the strong need for ongoing curation and maintenance of these value sets, and creation of a readily available national library for their broad dissemination and use. Both the CDSC and the NQF have developed prototype authoring tools for CDS logic specifications, and eMeasures respectively. We offer to build a representative set of standard CDS artifacts leveraging the eMeasures to build case examples for recommended strategies and best practices for converting eMeasure content into CDS management artifacts targeting cardiovascular disease prevention measures for hypertension, anti-platelet therapy, beta-blockers, and lipid management.

Potential Deliverables

This project will result in both ready to implement knowledge specifications for clinical decision support and eMeasures made publicly available through the CDSC KM portal, and report documents describing the methods and specifications as described below.

CDSC Knowledge Artifacts for Meaningful Use Phase 2 Clinical Decision Support (or demonstration subset)

We propose to create a set of CDS intervention specifications related to achieving meaningful use phase 2 objectives utilizing eMeasures specifications relevant to cardiovascular disease management. We will leverage the Partners Healthcare System and Clinical Decision Support Consortium CDS libraries as a starting point and then work with the NQF collaborators and a

cardiovascular disease expert panel to develop an example set of reminders and alerts that leverage where appropriate the eMeasures logic and value sets. These artifacts will be rendered in a standard XML schema, encoded with standard terminologies where available, and published to the CDSC KMportal where they can be downloaded utilizing a range of style-sheet views. The interventions developed will address the following quality management targets:

- NQF Measure 0013 Hypertension: BP Measurement
- NQF Measure 0067 Coronary Artery Disease (CAD): Oral Antiplatelet Therapy Prescribed for Patients with CAD
- NQF Measure 0070 Coronary Artery Disease (CAD): Beta-Blocker Therapy for CAD Patients with Prior Myocardial Infarction (MI)
- NQF Measure 0074 Coronary Artery Disease (CAD): Drug Therapy for Lowering LDL-Cholesterol

The specific scope and focus area for this work will be determined by resource availability, and with guidance from the ONC.

Methodology for utilizing eMeasures content to build relevant CDS artifacts that facilitate achievement of eMeasure goals

We will describe a methodology for building CDS artifacts utilizing eMeasure content outlining the sequence of steps and necessary considerations and decisions to be made.

Gap Analysis and Recommendations for Reconciliation and Ongoing Maintenance: CDS Consortium CDS Specification and NQF eMeasure Specification

This effort would require collaboration between Aziz Boxwala/designee and Floyd Eisenberg designated resources to define gaps/reconciliation approaches-different resources than those building the artifacts and methodology described above

Timeline

The ultimate timeline will be determined by the final agreed upon scope and deliverables., and resource availability.

Estimated Budget

The final budget will be determined by the final agreed upon scope and deliverables, and resource availability (staff and contractors). The following key individuals will be involved:

Brigham and Women's Hospital/Partners Healthcare (Prime)

The final budget will be provided after the scope and deliverables are identified.

- Blackford Middleton 5%
- Tonya Hongsermeier, 20%
- Roberto Rocha 5%
- Saverio Maviglia 5%
- Research Assistant 30%

- Software Developer 50%
- Project Manager 40%
- Knowledge Engineer 50%
- SMEs (Subject Matter/Domain Experts) TBD
- Subject Matter Experts (net .8 FTE)

National Quality Forum (sub-contractor)

The National Quality Forum will be a partner in this research to examine how the QDM is being used in CDS development today, and to collaborate on the approach to a harmonized framework for value sets (at a minimum) that is supportive of the needs of both eMeasure and CDS development.

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NQF

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Appendices

CDS Consortium web site <http://www.partners.org/cird/cdsc/>

NQF QDM Overview

<http://www.qualityforum.org/WorkArea/linkit.aspx?LinkIdentifier=id&ItemID=60089>

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