Using Quality Data Model (QDM)-Based Quality Reporting Document Architecture (QRDA) to Collect Both Electronic Clinical Quality Measure (eCQM) and non-eCQM Data for a National Registry

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BACKGROUND

The American Optometric Association’s (AOA) Measures and Outcomes Registry for Eyecare (MORE) is a web-based electronic clinical quality improvement registry available to over 35,000 US-based optometrists. MORE provides optometrists with weekly feedback on quality of care through electronic clinical quality measures (eCQMs) results and custom dashboards containing non-eCQM data. It also updates a clinical data warehouse containing de-identified patient and provider data for ad hoc querying by AOA.

Each week, multiple electronic health record (EHR) vendors submit patient data to MORE on behalf of their customers who participate in the registry. While this approach sharply reduces barriers to participation for busy providers, it puts greater responsibility for data quality and interoperability on EHR vendors and the registry operator.

PROBLEM

Define a standards-driven implementation guide (IG) for EHR vendors enabling them to submit both eCQM data for federal quality reporting and non-eCQM data for meeting customized reporting needs within the registry’s document-based data transmission architecture.

SOLUTION

We used QDM-based QRDA-I for eCQM data with QDM-based registry-specific extensions for non-eCQM data. This was feasible for the following reasons:

1. QRDA-I is an open template, which can contain new templates that satisfy its conformance rules.
2. QRDA-I supports QDM templates, which provide a common information model for quality calculation and reporting via Quality Data Elements (QDEs; Figs. 2a-c).
3. QDEs referenced by eCQM population criteria are bound to a single clinical concept (Fig. 2b); for non-eCQMs, QDEs can be bound to entire coding systems to support high-level data types (Fig. 2c).

This was a key insight that led to our solution.

4. Existing QDM templates (Fig. 3a) can be extended (Fig. 3b), streamlining template generation, validation, and parsing relative to using different standards.

RESULTS AND CONCLUSIONS

This solution has allowed MORE to receive, parse, and load eCQM and non-CQM data from over 200,000 QRDA-I files sent by EHR three vendors. HL7’s QDM-based QRDA-I can thus be extended to support both kinds of data for ad hoc secondary use within a single IG. This standards-compliant approach promotes efficient code and unifies all quality data under a single information model; however, architects should weigh these benefits against the costs of a) receiving redundant data and b) updating non-eCQM templates when federal standards referencing QRDA-I or eCQMs change.

ABSTRACT

Electronic clinical quality improvement registries often have electronic clinical quality measure (eCQM) and non-eCQM data requirements to satisfy diverse quality reporting goals. This case study demonstrates a novel method for satisfying these requirements for a nationwide quality registry with the Quality Data Model-based Quality Reporting Document Architecture standard.

INTRODUCTION

The American Optometric Association’s (AOA) Measure and Outcomes Registry for Eyecare (MORE) is a web-based electronic clinical quality improvement (eCQI) registry available to over 35,000 US-based optometrists. Launched in June 2015, AOA MORE provides optometrists with weekly feedback on quality of care through electronic clinical quality measures (eCQMs) results and custom dashboards containing non-eCQM data, such as practice-level demographics, medication, encounter, and procedure data and nationwide benchmarks. EHR vendors provide data to the registry for further processing. Our challenge was to develop an implementation guide that would enable EHR vendors to submit both eCQM data for specific measure calculation and non-eCQM data for meeting customized reporting needs within a document-based data transmission architecture. Thus, we considered two HL7 standards with the ability to emulate the needed data: Consolidated Clinical Document Architecture (C-CDA) Release 1.1.1 (R1.1.1) and Quality Reporting Document Architecture, Category 1 (QRDA-I) Release 2 (R2). [1, 2]

DESCRIPTION

We selected QRDA-I R2 over C-CDA because it supports the Quality Data Model (QDM), whereas C-CDA does not. QDM has rigorously defined data models and operations that support calculation of quality measures. QDM also enables consistent specification of quality data elements (QDEs) across EHR systems and care settings. For example, each QDE includes a well-defined clinical concept category (e.g., Medication), concept state (e.g., Ordered vs. Dispensed), attributes (e.g., dose, datetime), code systems (e.g., RxNorm), and value sets (e.g., codes corresponding to anti-inflammatory drugs). Further, QDEs can be expressed via pre-existing XML-based templates comprising the Healthcare Quality Measures Format (HQMF) QDM pattern library, which is used to specify eCQMs. These fully encapsulated, modular templates can also be expressed in a C-CDA-based document, in this case representing the response to an eCQM. In short, QDEs represent the question when expressed in HQMF, and the answer to that question when expressed in QRDA-I. Achieving the same capabilities with C-CDA would have required extensive custom specification development to achieve the same result as QDM-based QRDA-I R2. Although QDM has weaknesses, including limited capabilities for expressing certain complex temporal, and mathematical expressions and certain data element attributes with sufficient granularity, these did not affect the registry’s reporting requirements.

Two insights yielded a successful solution to the problem of representing eCQM and non-eCQM data within the same document specification. First, any collection of data and requirements that can be specified as a QDE will have both a QDM-based HQMF template and a corresponding QRDA-I-conformant representation. For example, the non-eCQM requirement to submit the RxNorm code and datetime for all instances of prescribed medications was expressed using the HQMF template for QDM data type “Medication Ordered” with the RxNorm attribute bound to a value set containing all prescribable medication formulation concepts in RxNorm. Although this value set has an unusually broad scope, it is consistent with all applicable standards and constraints. Second, eCQM and non-eCQM templates can be included within the same QRDA-I document as long as they have unique template IDs and clearly specified inclusion criteria. This is called an open template approach, where any templates not explicitly prohibited are allowed to be present in a QRDA-I document.

This case study demonstrates the feasibility of defining specifications for both eCQM and non-eCQM data within a single QRDA-I R2, provided that non-eCQM requirements can be expressed through a combination of QDEs and explicit inclusion criteria. A single interoperability standard can thus support the quality reporting and clinical data warehousing functions of a nationwide eCQI registry involving data from multiple proprietary EHR systems.