

Health Level Seven International (HL7) Fast Healthcare Interoperability Resources (FHIR®)

September 26, 2019
Rob Samples, ESAC Inc.

Slides Updated February 28, 2020

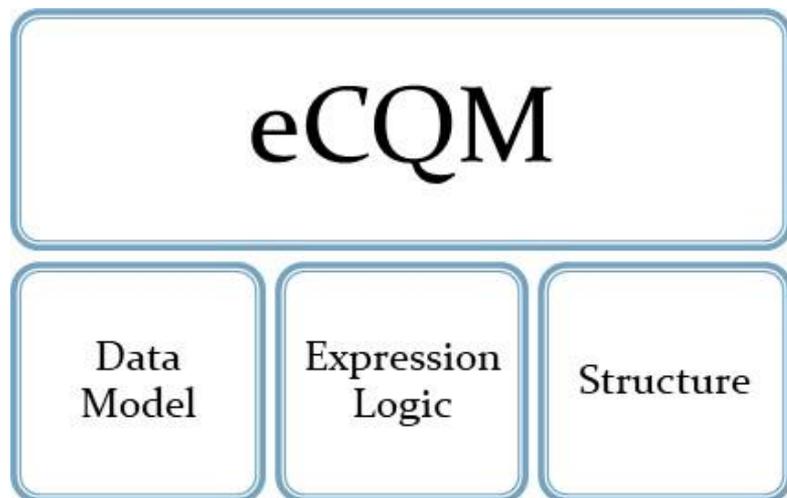


FHIR HL7
International

Agenda

- » Components of an electronic clinical quality measure (eCQM)
- » Introduction and walkthrough FHIR specification
- » Use of Profiles
- » Quality Data Model (QDM) and Quality Improvement Core (QI-Core) mappings
- » Introduction to Quality Improvement Clinical Knowledge (QUICK)
- » FHIR measure conversion
- » Tools to help with conversion
- » Using the FHIR eCQM Repository
- » Conversion examples

Parts of an eCQM

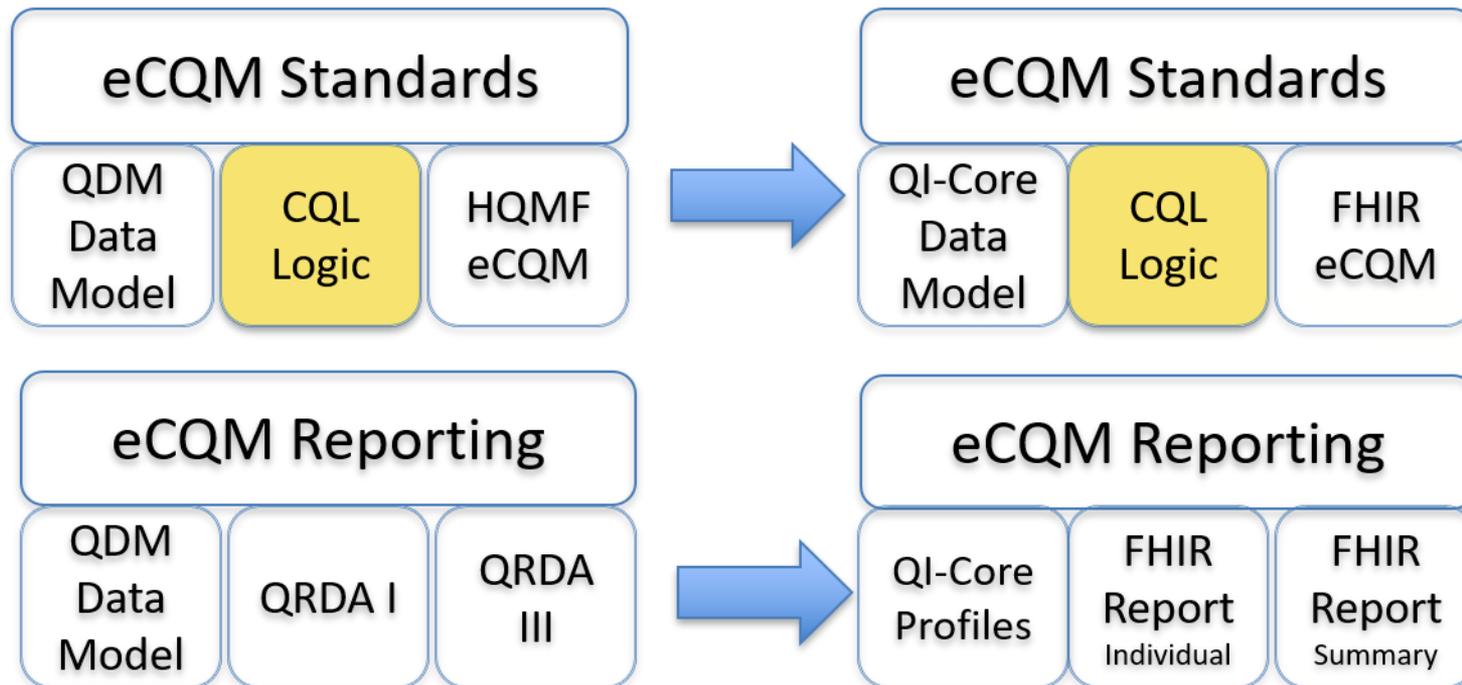


Data Model: What data to look for in the patient's medical record

Expression Logic: How to calculate the result, evaluate the right care was provided

Structure: Metadata, numerator, denominator, exclusions, exceptions

FHIR Standards for Quality Measurement



Goal is to align quality measurement standards for eCQM development and reporting using FHIR

- QI-Core/QUICK replaces QDM for clinical data
- FHIR Measure replaces HQMF for eCQM Structure
- FHIR Measure Report Individual and Summary replaces QRDA I and III

What Is FHIR?

- » Fast Healthcare Interoperability Resources (<http://hl7.org/FHIR>)
- » FHIR is a next-generation standards framework created by HL7
- » Provides an interoperable platform for healthcare
 - Defines a common way to structure health data known as Resources
 - Enables automated data exchange through Application Programming Interfaces (APIs)
- » FHIR uses latest technologies to be developer friendly

FHIR - A Brief History

FHIR DSTU 2*

- Balloted in early 2015
- Initial version of FHIR focused on core data set and exchange using APIs
- Focus of the Argonaut project and ONC Common Clinical Data Set

FHIR STU 3

- Released in 2017
- First version to contain Clinical Reasoning module
- Basis for initial eCQM conversion and Data Exchange for Quality Measures (DEQM) and Quality Measure Implementation Guides

FHIR R4

- Published 12/2018
- First version to contain Normative resources
- Target implementation for many EHR Vendors
- Current version used for converting test eCQMs

*Note HL7 no longer uses Draft for naming conventions

How is FHIR used?

- FHIR is organized into five levels for easy navigation
- Levels I and II give implementers a basis for exchanging data
- Levels III and IV are used to represent data in eCQMs
- Level V provides structure for eCQMs and Reporting

Foundation
Content
Management
Documents
Data Exchange

Implementation
Support, Security,
Terminology, Testing

Administration
Patient,
Practitioner,
Organization,
Location,
Healthcare Service

Record & Exchange:
Encounters,
Diagnostics,
Medications,
Workflow, Financial

Clinical Reasoning
Measure
Measure Report

Systems Development

Clinical Data Model

eCQMs & Reporting

Walkthrough of FHIR

- » <http://hl7.org/FHIR>
- » Basic navigation of the specification
- » Build vs. production sites
- » FHIR Maturity Model
- » Review a basic Resource - Encounter

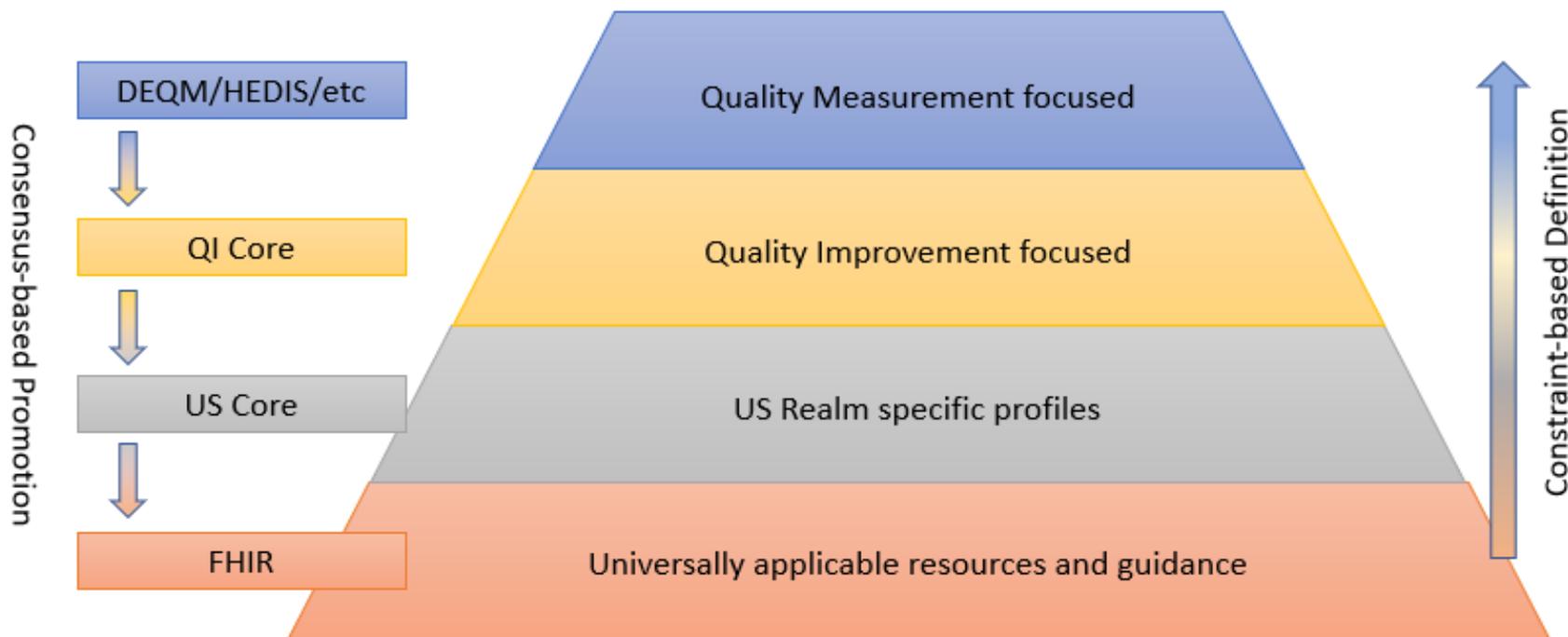
Resources vs. Profiles

- » **Resources** are the basic building block of the FHIR specification
 - Defines how data are to be structured and exchanged
 - Intended to be generic to fit a wide range of use cases
- » **Profiles** are Resources that have been changed for a specific use case
 - Profiles are published in an implementation guide
 - Conformance ensures both sender and receiver agree on the structure of data
- » Implementation guides for quality measurement
 - QI-Core/QUICK**- The data model for eCQMs
 - FHIR Quality Measure**- Structure of an eCQM
 - Data Exchange for Quality Measures (DEQM)**- How quality data are to be exchanged

What is Profiling?

- » Adapts the FHIR standard for specific uses
- » Can both restrict and extend APIs, Resources, Terminology
- » Required elements and Must Support
- » Specify a value set
- » Extensions and Statuses

HL7 FHIR Standards for Quality



HEDIS – National Committee for Quality Assurance’s (NCQA’s) Healthcare Effectiveness Data and Information Set

Using QI-Core

- » September 2019 ballot updates QI-Core to FHIR R4
- » Bi-directional mapping of QDM and QI-Core
 - QI-Core to QDM
 - QDM to QI-Core
- » QUICK- A conceptual view of QI-Core for authoring included in the [QI-Core Implementation Guide](#)

FHIR Clinical Reasoning

- » FHIR Measure Resource
 - eCQM metadata and structure
 - FHIR Quality Measure Implementation Guide

<http://hl7.org/fhir/us/cqfmeasures/>
- » FHIR Measure Report
 - Supports Individual, List, and Summary
 - DEQM Implementation Guide

<http://hl7.org/fhir/us/davinci-deqm/>
- » **Implementation Guides are currently based on FHIR STU 3**
 - Updates for R4 planned for Feb 2020 ballot cycle

Converting eCQMs to FHIR

- » CMS began converting QDM-based eCQMs to use FHIR in spring of 2019
- » Developed a prioritized list based on program needs
 - Initial conversions used FHIR STU 3
 - In July of 2019, began using FHIR R4
- » Intent of conversion is to
 - Identify gaps in emerging standards
 - Perform initial testing of FHIR eCQMs
 - Training for measure developers

Tools to support eCQM Conversion

» Atom Text Editor

- <https://atom.io/>
- Provides a basic editor for authoring measures
- Language-CQL package shows CQL highlighting and FHIR data model validation

» Measure Repository

- For work-in-progress eCQMs and example expressions
<https://github.com/cqframework/draft-measures/tree/master/pages/cql>

Example- ED Encounter

QDM

```
29 define "Initial Population" :↵↵↵
30   » "Inpatient Encounter" Encounter↵↵↵
31   » » with ["Encounter, Performed" : "Emergency Department Visit"] ED↵↵↵
32   » » ...such that ED.relevantPeriod ends 1 hour or less before start of Encounter.relevantPeriod↵↵↵
```

FHIR

```
26 define "Initial Population" :↵↵↵
27   .."Inpatient Encounter" Encounter↵↵↵
28   ...with ["Encounter" : "Emergency Department Visit"] ED↵↵↵
29   .....such that ED.status = 'finished'↵↵↵
30   .....and ED.period ends 1 hour or less before start of Encounter.period↵↵↵
```

Example- Lab Test Performed

QDM

```
48 define "Pap Test with Results":␣-
49   » ["Laboratory Test, Performed": "Pap Test"] PapTest␣-
50   » » where PapTest.result is not null␣-
51   ␣-
52 define "Pap Test Within 3 Years":␣-
53   » "Pap Test with Results" PapTest␣-
54   » » where PapTest.relevantPeriod 3 years or less before end of "Measurement Period"␣-
```

FHIR

```
58 define "Pap Test with Results":␣-
59   » [Observation: "Pap Test"] PapTest␣-
60   » » where PapTest.value is not null␣-
61   » » » and PapTest.status in { 'final', 'amended', 'corrected', 'preliminary' }␣-
62   ␣-
63 define "Pap Test Within 3 Years":␣-
64   » "Pap Test with Results" PapTest␣-
65   » » where PapTest.effective 3 years or less before end of "Measurement Period"␣-
```

Example- Procedure Performed

QDM

```
40 define "Flexible Sigmoidoscopy Performed":↵
41   » ["Procedure, Performed": "Flexible Sigmoidoscopy"] FlexibleSigmoidoscopy↵
42   » » where FlexibleSigmoidoscopy.relevantPeriod ends 5 years or less on or before end of "Measurement Period"↵
43   ↵
44 define "CT Colonography Performed":↵
45   » ["Procedure, Performed": "CT Colonography"] Colonography↵
46   » » where Colonography.relevantPeriod ends 5 years or less on or before end of "Measurement Period"↵
```

FHIR

```
49 define "Flexible Sigmoidoscopy Performed":↵
50   » [Procedure: "Flexible Sigmoidoscopy"] FlexibleSigmoidoscopy↵
51   » » where FlexibleSigmoidoscopy.status = 'completed'↵
52   » » » and FlexibleSigmoidoscopy.performed ends 5 years or less on or before end of "Measurement Period"↵
53   ↵
54 define "CT Colonography Performed":↵
55   » [Procedure: "CT Colonography"] Colonography↵
56   » » where Colonography.status = 'completed'↵
57   » » » and Colonography.performed ends 5 years or less on or before end of "Measurement Period"↵
```

Resources

- » More Examples: <https://github.com/cqframework/draft-measures/tree/master/pages/cql>
- » FHIR R4 Standards and Implementation Guides
 - <http://hl7.org/fhir/> (Current Version)
 - <http://build.fhir.org/> (Current build- will change)
 - <http://hl7.org/fhir/us/core/> (US Core R4 version)
 - Data Exchange for Quality Measures (Feb 2020)
 - Quality Measures Implementation Guide (Feb 2020)
- » FHIR STU 3 Standards and Implementation Guides
 - <http://hl7.org/fhir/STU3/>
 - <http://hl7.org/fhir/us/cqfmeasures/history.html>
 - <http://hl7.org/fhir/us/davinci-deqm/history.html>

More Resources

- » CQL-to-Expression Logical Model (ELM) Translator
 - https://github.com/cqframework/clinical_quality_language/blob/master/Src/java/cql-to-elm/OVERVIEW.md
- » Java Script (JS) CQL Execution Engine
 - <https://github.com/cqframework/cql-execution>
- » Java CQL Execution
 - https://github.com/dbcg/cql_engine
- » Clinical Quality Framework (CQF) Ruler
 - <https://github.com/DBCAG/cqf-ruler>

Questions?

Thank You!

- » Implementers should continue to use specifications and resources posted to: <https://ecqi.healthit.gov/>
- » Comments or questions can be directed to: fhir-esac@esacinc.com