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

HL7 FHIR® 101 - Using Clinical Quality Language (CQL) and FHIR® for eCQMs
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Rob Samples, ESAC Inc.
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
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

HQMF – Health Quality Measure Format
QRDA – Quality Reporting Document Architecture
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
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

» FHIR® Measure Report
   – Supports Individual, List, and Summary
   – DEQM Implementation Guide

» 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/](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
    [http://build.FHIR.org/ig/cqframework/draft-measures/examples.html](http://build.FHIR.org/ig/cqframework/draft-measures/examples.html)
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

```cql
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"
```

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```cql
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

```plaintext
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"

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®

```plaintext
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"

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: http://build.FHIR.org/ig/cqframework/draft-measures/examples.html

» 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
More Resources

» CQL-to-Expression Logical Model (ELM) Translator

» 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/DBCG/cqf-ruler
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