NCQA & HL7® PRESENT

DIGITAL QUALITY SUMMIT

16-18 July 2019

Sheraton Boston Hotel
Boston, Massachusetts
Who we are:

- Lisa Anderson
- Juliet Rubini
- Anne Marie Smith
Agenda

• Day 1:
  • History lesson: What has happened in past DQS events?
  • Rheumatoid arthritis measure review
• Day 2:
  • Current events: Misalignment of measure concepts
  • What’s to come?: QDM versus FHIR
• Day 3: Hands on with Track 1
Ice Breaker

- Take between 1-5 pieces of candy
  - Don't eat them yet
- Name
- Role
- Organization
• Red – favorite vacation
• Green – dream job
• Blue – favorite quality measure
• Yellow – white or chocolate milk
• Orange – hot or cold weather
Quality is kind of a big deal around here.
DQS 2018

• QDM, CQL and a bit of FHIR
• Let’s review the alphabet soup
QDM Data Model Structure

Category:
Examples:
- Laboratory Test
- Diagnostic Study
- Diagnosis
- Encounter
- Medication

Datatype (Context):
Examples:
- Performed
- Ordered
- Recommended
- Administered
- Dispensed

Value Set:
Examples:
- LOINC – Lab tests / observable entities
- SNOMED-CT – Conditions, Procedures
- RxNorm – Medications (administered or ingredient level)

Category:
Examples:
Detailed, fully specified data element, including attributes e.g.,
- Result thresholds
- Location arrival time

Category:
Value Set
Examples:

Datatype (Context)

Attribute
**QDM Data Model Use**

- **QDM Use with CQL – Laboratory Test Example**

  To identify all patients with borderline or elevated Antinuclear Antibody (ANA)

  - **HQMF**
    - Laboratory Test, Performed: Antinuclear Antibody (ANA)
    - Uses a LOINC value set for ANA
      [Attributes expressed via CQL]

  - **CQL**
    - Union of:
      - Component: Homogeneous Pattern (result $\geq 1:80$)
      - Component: Speckled Pattern (result $\geq 1:80$)
    - Uses LOINC value sets for “homogeneous pattern” and “speckled pattern”
Measure Harmonization Trajectory

Current (through CY2018)

- HQMF (Metadata, Population Structure)
- QDM (Logic)
- QDM (Data Model)

New (beginning CY2019)

- HQMF (Metadata, Population Structure)
- CQL (Logic)
- QDM (Data Model)

Definitions:

HQMF – Health Quality Measure Format
CQL – Clinical Quality Language
QDM – Quality Data Model
Measure Harmonization Trajectory

• Clinical Quality Language (CQL)
  - Improved expressivity
  - More precise/unambiguous
  - Can share logic between measures
  - Can share logic with decision support
  - Can be used with multiple information data models (e.g., QDM, Fast Healthcare Interoperability Resources [FHIR®])
  - Simplifies calculation engine implementation
Rheumatoid Arthritis measure

• Measure concept description
• Discussion of last year’s conceptual and technical work
• Steps for future measure development and testing opportunities
Measure Misalignment
Layers of Harmonization

- Measure Concept Domain
- Clauses
- Data Elements
- Codes/Value Sets
Measure Concept Domain Misalignment

CMS MU Measure

Initial Population
- Age 18-35
- 2 visits

Denominator
- At risk

Numerator
- HIV test
- Within 3 months

HRSA Ryan White Measure

Initial Population
- Age 18-34

Denominator
- At risk
- Other

Numerator
- HIV test
- Within 6 months
Data comes in different shapes and colors

Finding – Suspected Lung Cancer

Finding – Suspected Cancer
Location - Lung

Finding – Cancer
Location – Lung
Certainty – Suspected
(Let's say this is the preferred shape)

From Dr. Stan Huff
Example of Problem

"Suspected Lung Cancer"

EHR #1

General Practice

Problem/Dx
- Prob/Dx: Cancer

Body Site: Lung

Status:
- Suspected
- Confirmed
- Not found

OK Cancel

EHR #2

Polyclinic

Problem/Diagnosis

Prob/Dx Name:
- Suspected cancer

Body Site: Lung

OK Cancel

EHR #3

Restructured Hospital

Diagnosis

Name:
- Suspected lung cancer

OK Cancel

(from Dr. Linda Bird)
Data Standardized in the Service

1. Application
   ➔ Application and User

2. Data in preferred shape and color

3. Shape and color translation

4. Shape and color of data in the local database
Partial Interoperability
Preferred Strategy: Full Interoperability

From Dr. Stan Huff
Misaligned Measure Concepts

• Workflow concerns: when should testing be triggered? After 1 or 2 visits, within 3 or 6 months?
• Should a retest be ordered if one measure is written so that it is not inclusive of the other?
• How can one capture misalignment?
• Free text "patient already tested under alternative protocol"?
• Should providers be shown both sets of metrics?
• Which metric should a QI initiative be performed on?
Clause and Data Element Misalignment

• Clause vs data element

• Data models identify the characteristics for a measure clause
  • Binding of a value set or Direct Reference Code (DRC) to a model element
    [characteristics and where to find them]
  • Models need to align data in systems
    • Procedures vs. Diagnosis, Ordered vs. Administered
    • Terminology differences follow
    • Use case-driven models can result in variations in model and terminology
      • Computers are rigid, humans adapt to technical misalignments

• Common combinations should be approached in similar ways
  • Among eCQMs, between CDS and eCQMs, across messages (C-CDA, V2)
Workflow Leading to Clause Misalignment

• Measure developers update measures on their own
  • No insight into changes of other developers
  • Developers code their own logic with reviews by multiple people in multiple organizations
  • Feedback may vary by person or by organization
• Existing libraries do not contain all logic that is reused by developers
• Developers make different choices
  • Some developers put all logic in definitions, some developers include logic calculations straight in the population of the measure
Misalignment Example

▲ Initial Population

exists { ["Patient Characteristic Sex": "Female"]
and exists ["Patient Characteristic Birthdate": "Birth date"] BirthDate
where Global."CalendarAgeInYearsAt"(BirthDate.birthDatet ime, start of "Measurement Period")in Interval(51, 74)
and exists AdultOutpatientEncounters."Qualifying Encounters"

▲ Denominator

"Initial Population"

▲ Denominator Exclusions

Hospice."Has Hospice"
or ( Count("Unilateral Mastectomy Procedure") = 2 )
or ( ( exists ( "Right Mastectomy Diagnosis" )
or exists ( "Right Mastectomy Procedure" )
and ( exists ( "Left Mastectomy Diagnosis" )
or exists ( "Left Mastectomy Procedure" )
)
or exists "Bilateral Mastectomy Diagnosis"
or exists "Bilateral Mastectomy Procedure"
or FrailtyTI."Advanced Illness and Frailty Exclusion Including Under Age 80"
or ( exists ["Patient Characteristic Birthdate": "Birth date"] BirthDate
where ( Global."CalendarAgeInYearsAt"(BirthDate.birthDatet ime, start of "Measurement Period")>= 65 )
and FrailtyTI."Has Spent More Than 90 Days in Long Term Care"
)

▲ Numerator

exists { ["Diagnostic Study, Performed": "Mammography"] Mammogram
where ( Mammogram.relevantPeriod ends 27 months or less before day of end "Measurement Period" )
}
Misalignment Example – Two Major Depression Measures

Measure 1:
- The percentage of adolescent patients 12 to 17 years of age and adult patients age 18 and older with the diagnosis of major depression or dysthymia who have a completed PHQ-9 during each applicable 4 month period in which there was a qualifying depression encounter.

Measure 2:
- Percentage of patients 18 years of age and older who were treated with antidepressant medication, had a diagnosis of major depression, and who remained on an antidepressant medication treatment.
Example – Two Major Depression Measures

Measure Developer 1:

- Depression Diagnoses
  - ["Diagnosis": "Major Depression"] union ["Diagnosis": "Dysthymia"]

Measure Developer 2:

Has Initial Major Depression Diagnosis

exists ( ["Diagnosis": "Major Depression"] MajorDepression

let AntidepressantDispensed: "Antidepressant Dispensed 245 Days Before or 120 Days After Start of Measurement Period"

where start of MajorDepression.prevalencePeriod within 60 days of AntidepressantDispensed.authorDatetime

)
Bringing It All Together…

- eCQMs – Multiple components
  - Concept Domain, Clause components, Terminology subsets
- Additional requirements influence
  - May require measure-specific approach
  - Program requirements will influence
- Encoded documentation for clinical care is spotty so far
  - Workflow impacts, Drivers diverse: Data exchange, CDS, Quality, Analysis
- Tooling used has an impact
Harmonizing Measure Concept Domains

• **Some are easier**
  • **Example**: Race and Ethnicity (in the USA)
    • Reasons
      • Dictated by regulation – CDC publishes and aligned with Census
      • Use-specific changes are rare and built upon CDC base set
    • Harmonization focus: rollup to top levels
  • **Example**: Medications
    • Reasons
      • Already a common domain and approach
      • Acceptable terminology: RxNorm with links to NDC
    • Harmonization focus: Drugs for a particular use
    • Gotcha: Vaccines
Harmonizing Measure Concept Domains…

Others are harder

- **Example:** Encounters
  - Reasons
    - Scope can be use-case specific
    - Alignment with EHR data is unclear, particularly timing issues
  - Harmonization focus: What identifies an encounter and mapping to EHR data
  - Gotcha: Variance in populations based on code system selected

- **Example:** Importance of differences in Ordered, Performed, Planned
  - Reasons
    - Is ordered/attempted enough (intent) or are we interested in patient changes?
  - Gotchas: “Negation” or something that was not done
Harmonizing Clauses

• **Consistency based on requirements of the data, applied generally**

• **Example**: Vaccines: Immunizations or Procedures
  - ( ["Immunization, Administered": "DTaP Vaccine"] ) ➡ CVX value set
  union
  - ( ["Procedure, Performed": "DTaP Vaccine Administered"] DtApAdministration )
    ➡ CPT value set

• **Example**: Criteria Indicating Frailty: Many QDM datatypes
  - exists ( ["Device, Order": "Frailty Device"] ) ➡ Same value set
  - or exists ( ["Device, Applied": "Frailty Device"] ) ➡ Same value set
  - or exists ( ["Diagnosis": "Frailty Diagnosis"]
  - or exists ( ["Encounter, Performed": "Frailty Encounter"]
  - or exists ( ["Symptom": "Frailty Symptom"]

• END of DAY ONE
• Day Two:
  • Misalignment of measure concepts
  • Introduction to FHIR
Digital Quality Measurement Harmonization

- Measure Concept Domain
- Clauses
- Data Elements
- Codes/Value Sets
Terminology Misalignment

• Clinical Quality Assessments – Identify patient populations with specific characteristics and compare
• Patient population Queries require patient data that is consistently represented
• Queries need to represent the criteria using all the specific representations used in the patient records
• Practicality means use
  • Common terminology (code systems)
  • Consistent approaches for the same type of characteristic
Tools of the trade

• Code systems
  • Always bring a context of use that restricts applicability
    • Billing (ICD), Granular (SNOMED CT), Domain specific (LOINC)
    • Categorizations within (hierarchies and concept relationships) useful, but inconsistent
    • Are never perfect

• Value sets
  • Created by authors and implemented by users
  • Scope represents characteristics required
  • Delicate dance to align data model, ways clinicians think and capture clinical data

• Individual specific coded concepts – Direct Reference Codes (DRC)
Value Set Authority Center (VSAC)

- NLM Hosted
- Public repository and authoring tool
- All official versions of value sets specified by CMS eCQMs
- HL7 C-CDA Value Sets
- CMS Hybrid Value Sets
FHIR Terminology Services

The primary terminology-related structures and their relationships are shown below:

- Lowering implementation barrier with 80/20 rule
- Healthcare applications make use of codes and value sets without having to become experts in the underlying code systems and terminological principles
- Basic operations include
  - Code Lookup
  - Code Validation
  - Value Set Expansion
  - Translate
FHIR Terminology Services

• CQL Declaration and Value Set retrieval

```python
library BCS_FHIR version '1.0.0'

using FHIR version '3.0.0'

valueset "Absence of Left Breast Value Set": 'urn:oid:2.16.840.1.113883.3.464.1004.1329.1' // ICD10CM
valueset "Absence of Right Breast Value Set": 'urn:oid:2.16.840.1.113883.3.464.1004.1330.2' // ICD10CM
valueset "Bilateral Mastectomy Value Set": 'urn:oid:2.16.840.1.113883.3.464.1004.1042' // Grouping
valueset "Mammography Value Set": 'urn:oid:2.16.840.1.113883.3.464.1004.1168' // Grouping

....

parameter "Measurement Period" Interval<DateTime>

context Patient
```
FHIR Value Sets

Computable, Standardized Format

```xml
<?xml version="1.0" encoding="UTF-8" standalone="yes"?>
<ValueSet xmlns="http://hl7.org/fhir" xmlns:ns2="http://www.w3.org/1999/xhtml">
  <id value="11111"/>
  <meta>
    <lastUpdated value="2018-01-26T11:41:59.276-05:00"/>
  </meta>
  <url value="http://fhir.ext.apelon.com:7080/dtsserverws/fhir/ValueSet/2.16.840.1.113883.3.464.1004.1329.1"/>
  <identifier id="url">
    <value value="http://fhir.ext.apelon.com:7080/dtsserverws/fhir/ValueSet/2.16.840.1.113883.3.464.1004.1329.1"/>
  </identifier>
  <identifier value="2.16.840.1.113883.3.464.1004.1329.1">
    <status value="draft"/>
    <compose>
      <include>
        <system value="http://hl7.org/fhir/sid/icd-10-cm"/>
        <version value="2017.1.16AA"/>
        <filter>
          <property value="subset"/>
          <op value="="/>
          <value value="Codeable"/>
        </filter>
      </include>
    </compose>
    <expansion>
      <identifier value="http://fhir.ext.apelon.com:7080/dtsserverws/fhir/ValueSet/2.16.840.1.113883.3.464.1004.1329.1"/>
      <timestamp value="2018-05-07T11:27:35.904-04:00"/>
      <total value="1"/>
      <offset value="0"/>
      <contains>
        <system value="http://hl7.org/fhir/sid/icd-10-cm"/>
        <version value="2017.1.16AA"/>
        <code value="Z90.12"/>
        <display value="Acquired absence of left breast and nipple"/>
      </contains>
    </expansion>
  </ValueSet>
```
The Role of Value Sets in Quality Measures

Providing a set of codes, vetted by both clinicians and terminologists, for a particular quality measure use case

**Higher-Risk**

**Denominator 1:**
Women age 30 and older at increased risk for breast cancer (have any of the following):
- BRCA gene mutation
- History of chest radiation
- 20% or greater lifetime risk of breast cancer defined by models dependent on family history
- History of lobular carcinoma in situ
- History of atypical ductal hyperplasia
- Have Li-Fraumeni syndrome, Cowden syndrome, or Bannayan-Riley-Ruvalcaba syndrome

**Numerator 1:**
One mammogram and one MRI any time on or between October 1 of year prior to measurement year and December 31 of measurement year

**Average Risk**

**Denominator 2:**
Women age 50-74 at average risk of breast cancer (i.e., do not have any of the conditions listed in denominator 1)

**Numerator 2:**
One or more mammograms any time on or between October 1 two years prior to measurement year and December 31 of measurement year
Example – Two Major Depression Measures

• Measure 1:
  • Depression Diagnoses
    • ["Diagnosis": "Major Depression"] union ["Diagnosis": "Dysthymia"]

Measure 2:

Has Initial Major Depression Diagnosis

exists ( ["Diagnosis": "Major Depression"] MajorDepression
let AntidepressantDispensed: "Antidepressant Dispensed 245 Days Before or 120 Days After Start of Measurement Period"
  where start of MajorDepression.prevalencePeriod within 60 days of AntidepressantDispensed.authorDatetime)
Example – Two Major Depression Measures

<table>
<thead>
<tr>
<th>Major Depression</th>
<th>Value Set</th>
<th>Code System</th>
<th>Measure Developer</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>ICD9CM</td>
<td>Extensional</td>
<td>MNCM</td>
</tr>
<tr>
<td>Major Depression</td>
<td>ICD9CM</td>
<td>Extensional</td>
<td>NCQA</td>
</tr>
<tr>
<td>Major Depression</td>
<td>ICD10CM</td>
<td>Extensional</td>
<td>NCQA</td>
</tr>
<tr>
<td>Major Depression</td>
<td>ICD10CM</td>
<td>Grouping</td>
<td>NCQA</td>
</tr>
<tr>
<td>Major Depression</td>
<td>SNOMEDCT</td>
<td>Extensional</td>
<td>NCQA</td>
</tr>
</tbody>
</table>

- Value Sets from the two measure developers have the same name, same code system but different codes. Why?
  - NCQA was not including In Remission
  - MNCM was including In Remission
Harmonizing Terminology

**Target:** Use common value set (or DRC) across multiple use cases

- Across eCQMs within a program
  - Examples we seen already today
  - Primary area of success

- Across multiple programs and requirements/agencies
  - CMS programs such as those under MIPS (MACRA) – HVB, HRR, Physician VM, etc
  - Target: Ethnicity, Administrative Sex, General big value sets (All Problems), Opioids

- Across multiple models such as C-CDA, QDM/CQL, FHIR
  - Examples above but negation, unknown can complicate

- Variably including multiple code systems (ICD, SNOMED CT, other)

- Remember to look at value set expansions and definition
# Harmonizing Terminology...

<table>
<thead>
<tr>
<th>Name</th>
<th>Code System</th>
<th>Definition Type</th>
<th>St</th>
<th>OID</th>
<th>Code Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diabetes</td>
<td>ICD10CM</td>
<td>Extensional</td>
<td>Ch</td>
<td>2.16.840.1.113762.1.4</td>
<td>278</td>
</tr>
<tr>
<td>Diabetes</td>
<td>ICD9CM, SNOMEDCT</td>
<td>Grouping</td>
<td>NC</td>
<td>2.16.840.1.113883.3.4</td>
<td>424</td>
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<td>54</td>
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<tr>
<td>Diabetes</td>
<td>SNOMEDCT</td>
<td>Extensional</td>
<td>NC</td>
<td>2.16.840.1.113883.3.4</td>
<td>304</td>
</tr>
<tr>
<td>Diabetes Medical Supplies (insulin syringes only)</td>
<td>RXNORM</td>
<td>Extensional</td>
<td>VU</td>
<td>2.16.840.1.113762.1.4</td>
<td>8</td>
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<tr>
<td>Diabetes Mellitus</td>
<td>ICD10CM</td>
<td>Extensional</td>
<td>Le</td>
<td>2.16.840.1.113883.3.3</td>
<td>216</td>
</tr>
<tr>
<td>Diabetes Mellitus, poorly controlled</td>
<td>ICD10CM</td>
<td>Extensional</td>
<td>LU</td>
<td>2.16.840.1.113762.1.4</td>
<td>2</td>
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<tr>
<td>Diabetes Mellitus, poorly controlled</td>
<td>ICD10CM, SNOMEDCT</td>
<td>Grouping</td>
<td>LU</td>
<td>2.16.840.1.113762.1.4</td>
<td>3</td>
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<tr>
<td>Diabetes Visit</td>
<td>CPT, SNOMEDCT</td>
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<td>NC</td>
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<td>Diabetes mellitus</td>
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<td>Extensional</td>
<td>Le</td>
<td>2.16.840.1.113883.3.3</td>
<td>65</td>
</tr>
</tbody>
</table>
Harmonizing Terminology…

**Approaches**

• Agree on more general value sets, push distinctions to subseted value sets
  • **Example:** Major Depression – create sub-domain value sets then use as needed
    • Major depression comprised of separate "current" and “in remission” sub-domain content
    • Different eCQMs use different combinations
  • Clinical society / domain expert input useful

• **Confirm what distinctions really matter**
  • What data is actually being collected/reported?
  • Mapping may blur any real differences
Addressing Measure Misalignment

• Attempt to understand and verify the misalignment
• Notify the measure owners and program owners—use public forums and if impact is critical consider reaching out directly
• Select umbrella criteria internally to perform to more stringent measure
• Create dummy variables and labels to represent multiple different but related concepts
• Create and track subset of metrics based on both measures
• Use shared logic and data elements wherever possible in common
Measure misalignment example

• Review value sets from Rheumatoid Arthritis measure
DQS RA Measure

Percentage of patients aged 18 years and older with rheumatoid arthritis (RA) who had a disease activity assessment performed during at least two encounters during the measurement period, at least 90 days apart, where there was an improved score from the first disease activity assessment to the last disease activity assessment

• Has Rheumatoid Arthritis
  • ["Diagnosis": "Rheumatoid Arthritis"] RA
  • where RA.prevalencePeriod overlaps "Measurement Period"
Appropriate Use of DXA Scans in Women Under 65 Years Who Do Not Meet the Risk Factor Profile for Osteoporotic Fracture

Percentage of female patients 50 to 64 years of age without select risk factors for osteoporotic fracture who received an order for a dual-energy x-ray absorptiometry (DXA) scan during the measurement period.

The following risk factors may occur at any time in the patient's history or during the measurement period: Rheumatoid arthritis, Hyperthyroidism, Malabsorption Syndromes, celiac disease, inflammatory bowel disease, ulcerative colitis, Crohn's disease, cystic fibrosis, Chronic liver disease, Chronic malnutrition,
Appropriate Use of DXA Scans in Women Under 65 Years Who Do Not Meet the Risk Factor Profile for Osteoporotic Fracture

• Combination Risk Factors Applicable Any Time
  
  • ( "Diagnosis": "Rheumatoid Arthritis"
  • union ["Diagnosis": "Hyperthyroidism"]
  • union ["Diagnosis": "Malabsorption Syndromes"]
  • union ["Diagnosis": "Chronic Liver Disease"]
  • union ["Diagnosis": "Chronic Malnutrition"] )

CombinationRiskDiagnosis

• where CombinationRiskDiagnosis.prevalencePeriod starts before end "Measurement Period"
• Lunch break
Ice Breaker

ROCK

SCISSORS

PAPER
Credit

• Credit for some of the following slides goes to Apelon, ESAC and Lantana – thank you!
FHIR® Standards for eCQMs

HQMF (Metadata, Population Structure)

QDM (Data Model)

CQL (Logic)

HQMF (Metadata, Population Structure)

CQL (Logic)

FHIR (Data Model)

FHIR Measure (Metadata, Population Structure)

FHIR (Data Model)

CQL (Logic)

MeasureReport Resource using Data Exchange for Quality Measures (DEQM)

QRDA Cat I - Quality Reporting (Patient Data)

QRDA Cat III – Quality Reporting (Summary)
What Is FHIR®?

• 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 APIs
• FHIR® uses latest technologies to be developer friendly
How is FHIR® Used?

• FHIR® is organized into 5 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](http://hl7.org/fhir)
- Basic Navigation
- FHIR Maturity Model
  - Draft – Wild West
  - Trial Use – Buyer Beware
  - Normative – Stability!
Walkthrough of FHIR®

• FHIR® Versions in the Wild
  • **FHIR DSTU2** - broad support among US-based vendors, basis for Argonaut profiles. Most major vendors today support some subset of this version of FHIR.
  • **FHIR STU3** - Version that QI Core and many other implementation guides are based on.
  • **FHIR R4** - First normative release of FHIR, Version that US Core is based on, includes several of the foundational, conformance, and administrative resources going normative.

• Access to Current Build
FHIR® Clinical Reasoning Module

• Resources and operations to enable the representation, distribution, and evaluation of clinical knowledge.

• Describes how a common expression languages can be used throughout the specification to provide dynamic capabilities across domains.
FHIR® Clinical Reasoning Module

• Two primary use cases
  • Sharing – *represent* clinical knowledge consistently and share across organizations
  • Evaluation – *evaluate* clinical knowledge artifacts in the context of a specific patient or population

• How? Three components:
  • Expression Logic
  • Definitional Resources
  • Knowledge Artifacts
FHIR® Clinical Reasoning Module Resources

• FHIR® Measure
  • Structured, computable definition of a health-related measure
  • Tooling will support the structured approach

• FHIR® Measure Report
  • Contains the results of the calculation of a measure; and optionally a reference to the resources involved in that calculation
  • Supports Individual, List, and Summary
Quality Reporting in FHIR

• Measure Resource
  • Definition of a quality measure
    • Group
    • Top-level populations
    • References expressions for the actual criteria
  • Subject (e.g., Patient)
  • Library
    • Formal logic (e.g., CQL)

<table>
<thead>
<tr>
<th>Measure</th>
<th>Population Group</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Population Groups</td>
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<td>Initial Pop.</td>
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<td>Denominator</td>
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<td>Denominator Exclusions</td>
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<td>Gender</td>
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<td>Deceased</td>
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</tbody>
</table>
Quality Reporting in FHIR

• Measure Report
  • Response to a specific measure evaluation request
  • Various levels
    • Individual
    • Subject
    • Population
Resources vs. Profiles

- **Resources** are the basic building block of the FHIR® Specification
  - Defines how data is 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
What is Profiling?

- Adapts the FHIR standard for specific uses
- Can both constrain and extend APIs, Resources, Terminology
- Required elements and ‘Must Support’
- Specify a value set
- Extensions and Status
HL7 Data Model Standards Landscape

DEQM/HEDIS/etc

QI Core

US Core

FHIR

Quality Measurement focused

Quality Improvement focused

US Realm specific profiles

Universally applicable resources and guidance

Consensus-based Promotion

Constraint-based Definition

DEQM – Data Exchange for Quality Measures (HL7 Standard)

HEDIS – Healthcare Effectiveness Data and Information Set (National Committee for Quality Assurance)
Using QI-Core

• Walkthrough of QI-Core:
  http://hl7.org/fhir/us/qicore/

• Bi-Directional Mapping of QDM and QI-Core
  • QI-Core to QDM
  • QDM to QI-Core

• Example of Encounter QDM vs. QI Core
Introduction to QUICK

- Provides an authoring level view
- Ability to generate QI-Core profiles from QUICK model using tooling
- Targeting September ballot for QUICK

Converting eCQMs to FHIR®

- Select Measure for Conversion from Measure Tracker
- Review QDM based measure to identify data elements
- Determine QI-Core equivalents based on mappings
- Translate the retrieves in the QDM version to FHIR®
- Review the remaining definitions to update QDM elements to QI-Core
- Use comments in CQL for any questions or assumptions, enter into known issues page, discuss at Collaboration meeting, enter tracker items

Post Conversion:

- Create Test Data Share final measure example with DEQM Implementation Guide developers to build reporting requirements and exchange scenarios
- Perform connection testing at Connectathon
Tools to support eCQM Conversion

• Atom Text Editor
  • [https://atom.io/](https://atom.io/)
  • Provides a basic editor for authoring measures
  • CQL Highlighter to show correct expressions

• Measure Repository
  • For work-in-progress and converted draft measures

[http://build.fhir.org/ig/cqframework/draft-measures/examples.html](http://build.fhir.org/ig/cqframework/draft-measures/examples.html)
Example- ED Encounter (QDM)

```plaintext
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
```
Example – ED Encounter (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
```
Pain Points

• Stroke Measures
  • Medication at discharge

• Perinatal Care
  • Exclusive Breastfeeding
    • NutritionIntake Resource – earliest availability FHIR R5 (late 2020/early 2021)

• Negation Rationale
More Resources

• CQL-to-ELM Translator
  • https://github.com/cqframework/clinical_quality_language/blob/master/Src/java/cql-to-elm/OVERVIEW.md

• JS CQL Execution Engine
  • https://github.com/cqframework/cql-execution

• Java CQL Execution
  • https://github.com/cbcg/cql_engine

• CQF Ruler
  • https://github.com/DBCG/cqf-ruler
Live CQL and FHIR – Example
Client defined criteria to execute knowledge; ability to edit content for each defined population and use case.

Define clinical guidelines to support knowledge.

Drive intervention(s) for rule:
- Priority
- Participant and Role
- Activities: Appointment, CommunicationRequest, MedicationRequest, ProcedureRequest
How to visualize

Quickly go from outside content, producing outcomes, visualizing the data and creating a strategy for managing your population.
CQL Implementation Challenges

Variability in the modeling of Clinical Concepts

• Sources may send the same Clinical Concept on different clinical resources. Example, an "Outpatient Encounter" may be modeled against an Encounter, Procedure, or Claim as signified by various Code Systems. CQL must be written to cast a "wide net" for Clinical Concepts in order to not be brittle to variance in data modeling.

Variability in the Coding of Clinical Concepts

• Sources may code the same Clinical Concept differently. Example, abnormal HbA1c may be represented by a LOINC code, or be determined by way of a calculation against an Observation value. Sources may omit units given contextual assumptions e.g. an HbA1c Observation value is "assumed" to have a unit of '%'. CQL must be written to search for the presence of Concepts taking different coded forms, and also be robust to contextually omitted specifics. The value set must do the same.

Omitted Secondary Codes

• CQL may be written to too high a standard for secondary codes, especially Status codes, which sources may often omit with an assumption of 'Confirmed' or 'Verified'. Either CQL is written with contextual understandings of null secondary code values, or Sources need to provide values more rigorously.

Open Modeling Questions

• Some clinical concepts don't currently have clear data modeling in standards like FHIR. How should modifier codes be modeled against a Procedure? How should a Procedure be linked to the originating Service Line item of a Claim? The CQL authoring community should ask for 'Best Practices' from the modeling standards communities (e.g. FHIR) when it comes to modeling complex, inter-data relationships.
CQL-Runner – Ad-hoc CQL execution

- [http://cql-runner.dataphoria.org](http://cql-runner.dataphoria.org)
• Day three: Debrief and thinking forward
Break out in to groups

- Quality Measure Authors - ? Leads – Lisa/Ann?
- Providers – Viet Leads
- HIT/QM Vendors – Carol and Juliet leads
- Payers or other quality measure consumers – Linda Leads
Questions

• Brief review of the FHIR Track highlighting topics that Based on your experience, what you’ve learned over the past 2 days of the DQS, what topics were not discussed or need to be discussed further?

• The Da Vinci project following last year’s DQS, has begun exploring the parallels between quality measures and gaps in care.

• What can NCQA and others do to help advance the participant’s understanding and ability to work towards the future we’re describing?

• How can I participate in quality measure efforts?

• Can we create a high level timeline that accounts for Measure authorities and their requirements; Performance/reporting periods; Measures in transition to FHIR; FHIR STU 3,R4, R5; Measure, QI-Core, DEQM versioning updates

• What additional considerations/ questions does the group have?
Thank you!

• See you next year!
• Resource slides
Measure development resources

- eCQI Resource Center: https://ecqi.healthit.gov/
- Bonnie testing tool: https://bonnie.healthit.gov/users/sign_in
- Value Set Authority Center (VSAC): https://vsac.nlm.nih.gov/
Additional HL7 FHIR related resources

- HL7 FHIR R4 and related Implementation Guides – https://www.hl7.org/fhir/