### Authoring eCQMs Using the FHIR<sup>®</sup> Standard

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### Announcement - MAT and Bonnie User Group

- Purpose: Create an open forum to discuss the status of the tools and gather community and user feedback on planned enhancements and releases
- Users can submit questions or topics for User Group discussion using the MAT and Bonnie Issue Tracker
- Registration links for the monthly meetings are emailed to active MAT and Bonnie users, posted on the MAT Public Web site and on the eCQI Resource Center
- The User Group is scheduled to meet the third Thursday of every month, typically at 2 pm ET
- The April User Group will be held at 3 pm ET, April 15th
- Registration for April can be accessed <u>here</u>



# Agenda

- Welcome and Background
- Quality Improvement (QI-Core) for electronic clinical quality measures (eCQMs)
- Quality Data Model (QDM) vs QI-Core
- Specifying measures with QI-Core and Clinical Quality Language (CQL)
- QI-Core and CQL specification example
- Next Steps



## Evolution of eCQM Standards



CQL – Clinical Quality Language | HQMF- Health Quality Measure Format | QRDA- Quality Reporting Document Architecture

Authoring eCQMs Using the HL7<sup>®</sup> FHIR<sup>®</sup> Standard Goal is to align quality measurement standards for eCQM development and reporting using Fast Healthcare Interoperability Resources® (FHIR)

- QI-Core replaces QDM for clinical data element representation
- Quality Measure Implementation Guide (IG) replaces HQMF for eCQM structure
  - DEQM IG for Individual and Summary replaces QRDA I and III



### FHIR eCQM Implementation Guides for Developers

### • <u>QI-Core</u>

- QI-Core is a model IG using profiles based on US Core and base FHIR resources
- Used for quality applications including eCQMs and clinical decision support (CDS)
- Quality Measure (QM) IG
  - Specification IG detailing how eCQMs are structured
  - Based on FHIR Measure Resource



## QDM Category vs QI-Core Profile



Authoring eCQMs Using the HL7<sup>®</sup> FHIR<sup>®</sup> Standard

#### **QI-Core Profile (Encounter Example)**

Name	Flags	Card.	Туре	Description & Constraints ?
Encounter		0*	USCoreEncounterProfile	
- 💿 request-statusReason	S	01	CodeableConcept	Reason for current status URL: http://hl7.org/fhir/StructureDefinition/request-statusReason Binding: (unbound) (example)
	S	0*	(Complex)	Encounter Procedure Extension URL: http://hl7.org/fhir/us/qicore/StructureDefinition/qicore-encounter- procedure
🛅 status		11	code	
🛅 class	S	11	Coding	
- 🛅 type	S	1*	CodeableConcept	
🛅 priority		01	CodeableConcept	Binding: SNOMED CT Priorities Codes (preferred)
🖪 subject	S	11	Reference(QICorePatient)	
- 🗗 basedOn		0*	Reference(QICoreServiceRequest)	
📴 participant	S	0*	BackboneElement	
🗕 🗗 individual	S	01	Reference(QICorePractitioner)	
🛅 period	S	01	Period	
- 🛅 length	S	01	Duration	
🛅 reasonCode	S	0*	CodeableConcept	
🫅 diagnosis	S	0*	BackboneElement	
<ul> <li></li></ul>	S	11	CodeableConcept	onAdmission URL: http://hl7.org/fhir/us/qicore/StructureDefinition/qicore-encounter- diagnosisPresentOnAdmission Binding: ExampleDiagnosisOnAdmissionCodes (required)
– 🗗 condition	S	11	Reference(QICoreCondition	
- 🗃 use	S	01	CodeableConcept	OL-Core Profile Identifies
- 🛅 rank	S	01	positiveInt	
🫅 hospitalization	S	01	BackboneElement	• all attributes (called elements i
- 🗗 origin		01	Reference(QICoreLocation)	FHIR)
- 🛅 admitSource	S	01	CodeableConcept	
- 🛅 reAdmission	S	01	CodeableConcept	<ul> <li>that must be supported (red S</li> </ul>
- 🗗 destination		01	Reference(QICoreLocation)	flag) by implementars
- 🛅 dischargeDisposition	S	01	CodeableConcept	nay by implementers
- 📴 location	S	0*	BackboneElement	<ul> <li>required value sets specified in</li> </ul>
- 🗗 location	S	11	Reference(QICoreLocation)	Departmention 9 Constraints
L 🛅 period		01	Period	Description & Constraints
🗗 serviceProvider	S	01	Reference(QICoreOrganization)	column
- C partOf		01	Reference(QICoreEncounter)	

in

# Comparing QDM and QI-Core

### QDM

- Data model containing information needed for quality measurement
- Currently used to represent eCQM data elements
- Maintained by CMS for use in eCQMs
- Updated by QDM User Group

### QI-Core

- HL7 Implementation Guide defines FHIR profiles for quality improvement
- Informed by QDM
- Maintained by the HL7 Clinical Quality Information workgroup



## QI-Core Profiles and QDM Datatypes

- QI-Core Profiles are constrained by elements such as status and intent.
- One profile may address multiple QDM datatypes.
- MedicationRequest QI-Core Profile represents the QDM datatypes:
  - Immunization, Order
  - Medication, Active
  - Medication, Discharge
  - Refills on a Medication, Dispensed
  - Medication, Order



QI-Core Scope

QI-Core Profile	USCore Profile	Base Resource
QICoreAdverseEvent		AdverseEvent
QICoreAllergyIntolerance	USCoreAllergyIntolerance	AllergyIntolerance
QICoreBodyStructure		BodyStructure
QICoreCarePlan	USCoreCarePlan	CarePlan
QICoreCareTeam	USCoreCareTeam	CareTeam
QICoreClaim		Claim
QICoreCommunication		Communication
QICoreCommunicationNotDone		Communication
QICoreCommunicationRequest		CommunicationRequest
QICoreCondition	USCoreCondition	Condition
QICoreCoverage		Coverage
QICoreDevice		Device
QICoreDeviceNotRequested		DeviceRequest

Contents show derivation of QI-Core Profiles from USCore Profile and/or Base Resources



## QI-Core Profile compared to US Core Profile

#### **QICoreMedicationRequest**

Text Summary Differential Ta	ble	Snap	oshot Table All
Name	Flags	Card.	Туре
🛱 MedicationRequest		0*	USCoreMedicationRequestProfile
- 📷 id		01	string
🛅 status	S	11	code
- 🛅 intent		11	code
- 🛅 category	S	0*	CodeableConcept
💶 doNotPerform	S	01	boolean
-@ medication[x]	S	11	
- () medicationCodeableConcept			CodeableConcept
🗗 medicationReference			Reference(QICoreMedication)
- 🖻 subject	S	11	Reference(QICorePatient)
- 🗗 encounter	S	01	Reference(QICoreEncounter)
- 🛅 authoredOn	S	11	dateTime

#### **USCore MedicationRequest**

Text Summary	Differential Vie	w	Full View	A
Name	Flags	Card.	Туре	
HedicationRequest		0*	MedicationRequest	1
🗔 status	S	11	code	
- 🗃 intent	5	11	code	
- @ reported[x]	S	01		
reportedBoolean			boolean	
L. 🕑 reportedReferenc	e		Reference(US Core Patient Profile   US Core Practitioner Profile   US Core Organization Profile	e)
-@ medication[x]	S	11		
- () medicationCodea	bleConcept		CodeableConcept	
- C medicationRefere	nce		Reference(US Core Medication Profile)	

Differential view comparing QI-Core and USCore MedicationRequest. Adds 'Must Support' flags and binds to terminology.



## Reading the Profile Differential Table

- A red flag indicates whether an element must be supported if present.
- Cardinality indicates how many observations may or must be reported for the element.
- Type defines the type of data within the element, such as a code or a reference to another profile.

Text Summary Differential Ta	ble	Snap	oshot Table All
Name	Flags	Card.	Туре
MedicationRequest		0*	USCoreMedicationRequestProfile
🛅 id		01	string
- 🛅 status	S	11	code
- 🛅 intent		11	code
🛅 category	S	0*	CodeableConcept
🛄 doNotPerform	S	01	boolean
- @ medication[x]	S	11	
- () medicationCodeableConcept			CodeableConcept
- 🖸 medicationReference			Reference(QICoreMedication)
- 🗹 subject	S	11	Reference(QICorePatient)
🖪 encounter	S	01	Reference(QICoreEncounter)
- 🛅 authoredOn	S	11	dateTime



# QDM to QI-Core Mapping

- Use <u>QDM to QI-Core Mapping</u> to navigate similarities and differences, such as those with MedicationRequest
- Provides detailed mapping of all QDM datatypes and attributes to QI-Core R4 resources, profiles, and elements



### QDM to QI-Core Example: MedicationRequest

QDM Context	QI-Core R4	Comments
Medication, Discharge	MedicationRequest	
Medication, Discharge active	MedicationRequest.status	Constrain to active, completed, on-hold
	MedicationRequest.statusReason	
QDM Attributes		
code	MedicationRequest.medication[x]	RxNorm
id	MedicationRequest.id	
dosage	MedicationRequest.dosageInstruction.doseAndRate.dose[x]	Range, quantity
supply	MedicationRequest.dispenseRequest.quantity	Amount to be dispensed in one fill
days supplied	MedicationRequest.dispenseRequest.expectedSupplyDuration	Duration
frequency	MedicationRequest.dosageInstruction.timing	Timing schedule (e.g., every 8 hours)
refills	MedicationRequest.dispenseRequest.numberOfRepeatsAllowed	Integer
route	MedicationRequest.dosageInstruction.route	
setting	MedicationRequest.category	Constrain category to "Community"
reason	MedicationRequest.reasonCode	The reason for ordering or not ordering the medication
relevant dateTime	MedicationRequest.dosageInstruction.timing with Timing.event dateTime	
relevant Period	MedicationRequest.dosageInstruction.timing with Timing.repeat.bounds[x] Period	
author dateTime	MedicationRequest.authoredOn	
Negation Rationale	See Below	
Prescriber	MedicationRequest.requester	Note - MedicationRequest.performer indicates the performer expected to administer the medication

Shows QDM datatypes, mapping to QI-Core Profile, additional notes, and implementer guidance.



## QDM to QI-Core: Medications on Discharge

#### Excerpt from CMS104v9, Discharged on Antithrombotic Therapy

#### **4** Encounter With Pharmacological Contraindications for Antithrombotic Therapy at Discharge

TJC."Ischemic Stroke Encounter" IschemicStrokeEncounter with ["Medication, Discharge": "Pharmacological Contraindications For Antithrombotic Therapy"] Pharmacological such that Pharmacological.authorDatetime during IschemicStrokeEncounter.relevantPeriod

#### Translation of CMS104v9 to FHIR

#### A Pharmacological Contraindications for Antithrombotic Therapy at Discharge

["MedicationRequest": medication in "Pharmacological Contraindications For Antithrombotic Therapy"] Pharmacological where exists (Pharmacological.category C where FHIRHelpers.ToConcept(C) ~ Global."Community" or FHIRHelpers.ToConcept(C) ~ Global."Discharge") and Pharmacological.status in { 'active', 'completed' } and Pharmacological.intent = 'order'



## QDM to QI-Core: Laboratory Tests

#### Excerpt from CMS124v9, Cervical Cancer Screening

#### Cervical Cytology Within 3 Years

["Laboratory Test, Performed": "Pap Test"] CervicalCytology where CervicalCytology.relevantDatetime 3 years or less on or before end of "Measurement Period" and CervicalCytology.result is not null

#### Translation of CMS124v9 to FHIR

#### Cervical Cytology Within 3 Years

[Observation: "Pap Test"] CervicalCytology where CervicalCytology.value is not null and CervicalCytology.status in { 'final', 'amended', 'corrected', 'preliminary' } and Global."Normalize Interval"(CervicalCytology.effective) ends 3 years or less on or before end of "Measurement Period"



## QI-Core Extensions

<u>QI-Core Extensions</u> also enable identifying additional concepts:

- Actions "Not Performed"
- Procedures associated with encounters
- Elective procedures
- Conditions present on admission



## QI-Core and Reasons "Not Performed"

- Many quality measures ask for reasons specific actions were intentionally not performed.
- QI-Core adds profiles to simplify authoring, avoiding the need to write longer expressions.

define "Antithrombotic Not Given at Discharge": ["MedicationRequest": "Antithrombotic Therapy"] NoAntithromboticDischarge where NoAntithromboticDischarge.doNotPerform is true and (singleton from NoAntithromboticDischarge.reasonCode in "Medical Reason" or singleton from NoAntithromboticDischarge.reasonCode in "Patient Refusal")

• The "not performed" profiles specify the status (doNotPerform), the action not taken and the intentional reason.



## List of QI-Core Action Not Done Profiles

- <u>QICoreCommunicationNotDone</u>
- <u>QICoreDeviceNotRequested</u>
- <u>QICoreImmunizationNotDone</u>
- <u>QICoreMedicationNotDispensed</u>
- <u>QICoreMedicationAdministrationNotDone</u>
- <u>QICoreMedicationNotDispensed</u>
- <u>QICoreMedicationNotRequested</u>
- <u>QICoreObservationNotDone</u>
- <u>QICoreProcedureNotDone</u>
- <u>QICoreServiceNotRequested</u>



## QDM to QI-Core Example

- [Example measure, CMS124, Cervical Cancer Screening]
  - <u>GitHub link</u>
  - Human Readable



## Current Activities

- CMS began converting QDM-based eCQMs to use FHIR in spring of 2019
- CMS program measures continue to be tested at HL7
   Connectathons
- Measure Authoring Tool (MAT) and Bonnie have been updated with FHIR functionality
- Created a measure repository
  - See <u>GitHub</u> for work-in-progress eCQMs and example expressions



## Current HL7 Activities

- eCQM conversion of 2020 CMS program measures to FHIR is ongoing using MAT on FHIR
- Planning for ballots and updates
  - DEQM was balloted September 2020, applying updates
  - QM IG May 2021-ballot
  - QI-Core based on US Core Fall 2021-planned update
- HL7 convenes Connectathons three times per year
  - May
  - September



## Resources to Get You Started

- •Current FHIR Measures on GitHub
- •FHIR R4 Standards and IGs
  - •Current Version R4.0.1
  - •Current build- will change
  - US Core R4 version
  - •DEQM (Current version published Aug 2020)
  - •QM IG (Current version published Feb 2020)
- Electronic Clinical Quality Improvement (eCQI) Resource Center <u>FHIR Education page</u>



## Resources to Get Involved

- Collaborative learning
  - <u>Cooking with CQL, QDM, and FHIR® Webinars</u>
- Standards advancement
  - HL7 Clinical Quality Information workgroup
  - HL7 FHIR® Connectathons
- eCQI Resource Center FHIR Connect page



## Questions?

