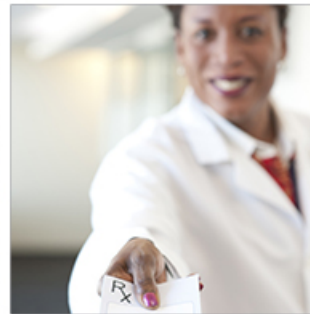


Quality Data Model Training

Covering QDM v4.0 and v4.1

July 15, 2014



Agenda [1 of 3]

- **Documentation Updates**

- **General Concepts**
 - Variables (4.0)
 - Inline Comments (4.0)

- **Functions and Subset Operators**
 - Age At (4.0)
 - Satisfies Any / Satisfies All (4.0)
 - Union / Intersection (4.1)
 - Fulfills (4.1)

Agenda [2 of 3]

■ Temporal Operators

- Overlaps (4.0)
- Or Concurrent With (4.0)
- Starts Concurrent With End / Ends Concurrent With Start (4.1)
- Starts Before End / Ends Before End (4.1)

■ Data Elements and Data Types

- Removal: Measurement Start Date / Measurement End Date (4.1)
- Restriction: One Attribute Per Data Element (4.1)
- Medication, Order Attributes: Signed Datetime / Active Datetime (4.1)
- Care Goal Attribute: Target Outcome (4.1)
- Datatype and Attribute Cleanup (4.1)
- Cumulative Medication Duration (4.1)

Agenda [3 of 3]

- **Bonus Round: Important QDM December 2013 Changes**
 - Result / Finding Datatypes
 - Anatomical Approach Site / Anatomical Location Site
 - Miscellaneous Attribute Changes

Documentation Updates

- **New Document Layout / Structure**
 - Improved readability and less redundancy
- **Incorporated Definitions of Functions and Operators**
 - Previously in MAT User Guide
- **Incorporated Timing Calculation Guidance**
 - Previously in Measure Logic Guidance

General Concepts

- **Variables (4.0)**
- **Inline Comments (4.0)**

Variables (QDM-8)

Use variables to allow re-use of data sets

Before:

```
AND: Union of:
    "Medication, Order: A" during "Encounter, Performed: X"
    "Medication, Order: B" during "Encounter, Performed: X"
    "Medication, Order: A" during "Encounter, Performed: Y"
    "Medication, Order: B" during "Encounter, Performed: Y"
```

After:

```
$TargetMedications = Union of:
    "Medication, Order: A"
    "Medication, Order: B"

$TargetEncounters = Union of:
    "Encounter, Performed: X"
    "Encounter, Performed: Y"

AND: $TargetMedications during $TargetEncounters
```

reduces redundancy • simplifies logic • improves readability
can be used like ad hoc value sets

Inline Comments (QDM-10)

Annotate logic with prose descriptions of intent

```
# Check if there were more than 4 inpatient encounters during the MP  
Count > 4 of: "Encounter, Performed: Inpatient" during "Measurement Period"
```

improves readability

improves accuracy of logic reviews

***not* intended for logic-affecting guidance**

Functions and Subset Operators

- **Age At (4.0)**
- **Satisfies Any / Satisfies All (4.0)**
- **Union / Intersection (4.1)**
- **Fulfills (4.1)**

Age At (QDM-12)

Provide native operator for specifying age conditions at start of event

Before:

```
AND: "Patient Characteristic Birthdate" >= 18 year(s)
      starts before start of "MeasurementPeriod"
AND: "Patient Characteristic Birthdate" < 85 year(s)
      starts before start of "MeasurementPeriod"
```

After:

```
AND: Age >= 18 year(s) at: "MeasurementPeriod"
AND: Age < 85 year(s) at: "MeasurementPeriod"
```

semantically equivalent, but more expressive

improves readability

very common use case

Satisfies Any / Satisfies All (QDM-4)

Specify that given events should satisfy multiple criteria

Before:

AND: Occurrence A of "Encounter, Performed: X" starts before start of FIRST:
"Procedure, Performed: Y"
AND: Occurrence A of "Encounter, Performed: X" starts after start of
"Diagnosis, Active: Z"
AND: Occurrence A of "Encounter, Performed: X (length of stay <= 3 day(s))"

After:

AND: "Encounter, Performed: X" **satisfies all**
starts before start of FIRST: "Procedure, Performed: Y"
starts after start of "Diagnosis, Active: Z"
(length of stay <= 3 day(s))

more expressive while less redundant

improves readability

reduces need for occurrences

Union / Intersection (QDM-9)

Group Criteria by unions or intersections

Before:

AND: FIRST:

OR: "Encounter, Performed: Office Visit"

OR: "Encounter, Performed: Face-to-Face Interaction"

After:

AND: FIRST:

Union of:

"Encounter, Performed: Office Visit"

"Encounter, Performed: Face-to-Face Interaction"

more expressive

reduces inconsistency in AND / OR definitions

Fulfills (QDM-49)

Add "fulfills" general relationship operator

"Communication: Provider to Provider: Consult Note" fulfills "Intervention, Order: Referral"

consistent w/ HL7 relationship from consult note to referral
directly applicable to "closing the referral loop" measures

Temporal Operators

- **Overlaps (4.0)**
- **Or Concurrent With (4.0)**
- **Starts Concurrent With End /
Ends Concurrent With Start (4.1)**
- **Starts Before End / Ends Before End (4.1)**

Overlaps (QDM-1)

Specify that one event "overlaps" another

Before:

AND: "Occurrence A of Diagnosis, Active: X" starts before or during
"Occurrence A of Encounter, Performed: Y"
AND NOT: "Occurrence A of Diagnosis, Active: X" ends before start
of "Occurrence A of Encounter, Performed: Y"

After:

AND: "Diagnosis, Active: X" **overlaps** "Encounter, Performed: Y"

improves readability

more expressive

more concise

reduces need for occurrences

Or Concurrent With (QDM-17)

Add "or Concurrent" Variants to Timing Operators

- starts before or concurrent with start of
- starts after or concurrent with start of
- starts before or concurrent with end of
- starts after or concurrent with end of
- ends before or concurrent with end of
- ends after or concurrent with end of
- ends before or concurrent with start of
- ends after or concurrent with start of

Before:

OR: "Encounter, Performed: X" starts after start of "Diagnosis, Active: Y"
 OR: "Encounter, Performed: X" starts concurrent with "Diagnosis, Active: Y"

After:

"Encounter, Performed: X" starts after or concurrent with start of "Diagnosis, Active: Y"

improves readability

more expressive

more concise

Starts Concurrent With End Ends Concurrent With Start (QDM-43)

Add new timing operators for adjacent events

Before: AND: "Medication, Active: X" starts concurrent with "Medication, Active: Y (stop datetime)"

After: AND: "Medication, Active: X" starts concurrent with end of "Medication, Active: Y"

Before: AND: "Medication, Active: X" ends concurrent with "Medication, Active: Y (start datetime)"

After: AND: "Medication, Active: X" ends concurrent with start of "Medication, Active: Y"

improves readability

reduces need for date attribute comparisons

Starts Before End / Ends Before End (QDM-42)

Replace SBOD / EBOD with more consistently named operators

Before: AND: "Encounter, Performed: X" starts before or during "Encounter, Performed: Y"

After: AND: "Encounter, Performed: X" starts before end of "Encounter, Performed: Y"

Before: AND: "Encounter, Performed: X" ends before or during "Encounter, Performed: Y"

After: AND: "Encounter, Performed: X" ends before end of "Encounter, Performed: Y"

eliminates confusion / discrepancy regarding "or during"
aligns with HL7 timing operators

Data Elements and Data Types

- **Removal: Measurement Start Date / Measurement End Date (4.1)**
- **Restriction: One Attribute Per Data Element (4.1)**
- **Medication, Order Attributes: Signed Datetime / Active Datetime (4.1)**
- **Care Goal Attribute: Target Outcome (4.1)**
- **Datatype and Attribute Cleanup (4.1)**
- **Cumulative Medication Duration (4.1)**

Removal: Measurement Start Date / Measurement End Date (QDM-57)

Improve consistency by always using "Measurement Period"

Existing Logic	Recommended Logic	Measures
starts before start of "Measurement Start Date"	starts before start of "Measurement Period"	160v2 169v2
starts before start of "Measurement End Date"	starts before end of "Measurement Period"	133v2
starts before or during "Measurement End Date"	starts before end of "Measurement Period"	138v2 141v3 160v2
starts after start of "Measurement Start Date"	starts after start of "Measurement Period"	160v2 169v2
ends before or during "Measurement End Date"	ends before end of "Measurement Period"	160v2
ends after start of "Measurement Start Date"	ends after start of "Measurement Period"	160v2

improves consistency

reduces potential for ambiguous statements

Restriction: One Attribute Per Data Element (QDM-45)

Only allow one attribute to be specified at a time in QDM elements

Before:

```
AND: "Encounter, Performed: Inpatient (facility location: 'ED', facility location arrival datetime)"
```

After:

```
AND: "Encounter, Performed: Inpatient" satisfies all  
(facility location: 'ED')  
(facility location arrival datetime)
```

more expressive

reduces ambiguity in timing relationships

existing measures may need minor rework

Medication, Order Attributes: Signed Datetime / Active Datetime (QDM-47)

Add specific attributes to reduce ambiguity with "start datetime"

- **Signed Datetime**
 - Date/time at which the order was signed
- **Active Datetime**
 - Date/time at which the order becomes active

AND: "Medication, Order (signed datetime)" during "MeasurementPeriod"

reduces ambiguity / improves specificity

"start datetime" may be removed in future versions

Care Goal Attribute: Target Outcome (QDM-50)

Add attribute to indicate a recorded target outcome for a goal

- **Target Outcome**

- The expected outcome representing when the goal is met

```
AND: "Care Goal: BMI Ratio (target outcome: 'Normal BMI Value Set')"
```

```
AND: "Care Goal: BMI Ratio (target outcome < 25 kg/m2)"
```

test for presence

test against a value set

test against a predefined value

Datatype and Attribute Cleanup [1 of 7] (QDM-46)

Clarify or remove TBD attributes from QDM

■ Criteria for Consideration

- Is there a clearly understood definition or meaning?
- Is the attribute used in MU-2 measures or planned for MU-3 measures?
- Is the data likely to be available in EHRs (today or in the future)?

Datatype and Attribute Cleanup [2 of 7]

- **Clarify or define the following datatypes**
 - Patient Characteristic
 - Patient Characteristic Birth Date
 - Patient Characteristic Expired
 - Patient Characteristic Race
 - Provider Characteristic

- **Remove the "System Characteristic" datatype**
 - Definition is too broad / ambiguous to map to HQMF
 - Not used or planned for MU-2 or MU-3 measures

Datatype and Attribute Cleanup [3 of 7]

- Clarify or define the following attributes

Attribute	Datatype
dose	Medication, Dispensed
route	Medication, Dispensed
removal datetime	Device, Applied

- Rename the following attribute to improve clarity

Attribute	New Attribute	Datatype
reason	cause	Patient Characteristic Expired

Datatype and Attribute Cleanup [4 of 7]

- **Remove the following attributes since they are redundant**
 - Status is defined by the datatype itself

Attribute	Datatype	
status	<ul style="list-style-type: none"> • Diagnosis, Active • Diagnosis, Inactive • Diagnosis, Resolved 	<ul style="list-style-type: none"> • Symptom, Active • Symptom, Assessed • Symptom, Inactive • Symptom, Resolved

- **Remove the following attributes since they are redundant**
 - Date and time are already reflected in "start datetime"

Attribute	Datatype	
date	<ul style="list-style-type: none"> • Medication, Administered 	<ul style="list-style-type: none"> • Substance, Administered
time	<ul style="list-style-type: none"> • Medication, Administered 	<ul style="list-style-type: none"> • Substance, Administered

Datatype and Attribute Cleanup [5 of 7]

- Remove the following attributes since they are too ambiguous or have no clear meaning

Attribute	Datatype	
environment	<ul style="list-style-type: none"> Symptom, Active 	
number	<ul style="list-style-type: none"> Medication, Active Medication, Administered Medication, Adverse Effects Medication, Allergy Medication, Discharge Medication, Dispensed Medication, Intolerance Medication, Order 	<ul style="list-style-type: none"> Substance, Administered Substance, Adverse Event Substance, Allergy Substance, Intolerance Substance, Order Substance, Recommended
reason	<ul style="list-style-type: none"> Patient Characteristic Sex 	

Datatype and Attribute Cleanup [6 of 7]

- Remove the following attributes since they do not make sense in the context of their datatype

Attribute	Datatype	
dose	<ul style="list-style-type: none"> Medication, Adverse Effects Medication, Allergy Medication, Intolerance 	<ul style="list-style-type: none"> Substance, Adverse Event Substance, Allergy Substance, Intolerance
frequency	<ul style="list-style-type: none"> Medication, Adverse Effects Medication, Allergy Medication, Intolerance 	<ul style="list-style-type: none"> Substance, Adverse Event Substance, Allergy Substance, Intolerance
refills	<ul style="list-style-type: none"> Medication, Active Medication, Administered Medication, Adverse Effects Medication, Allergy Medication, Intolerance 	<ul style="list-style-type: none"> Substance, Administered Substance, Adverse Event Substance, Allergy Substance, Intolerance
route	<ul style="list-style-type: none"> Medication, Adverse Effects Medication, Allergy Medication, Intolerance 	<ul style="list-style-type: none"> Substance, Adverse Event Substance, Allergy Substance, Intolerance

Datatype and Attribute Cleanup [7 of 7]

- **Remove attributes that are inconsistent with definition of “intervention”**
 - "Intervention represents a course of action intended to achieve a result in the care of persons with health problems *that does not involve direct physical contact with a patient*. Examples include patient education and therapeutic communication."
 - Method (if applicable) is better expressed in the intervention’s value set

Attribute	Datatype
anatomical location approach	<ul style="list-style-type: none"> • Intervention, Order • Intervention, Performed • Intervention, Recommended
anatomical location site	<ul style="list-style-type: none"> • Intervention, Order • Intervention, Performed • Intervention, Recommended
method	<ul style="list-style-type: none"> • Intervention, Order • Intervention, Performed • Intervention, Recommended

Cumulative Medication Duration Interim Solution (QDM-16)

- **Cumulative Medication Duration remains an attribute**
 - On Medication Order, Dispensed, Active, and Administered
 - QDM Specification will define how the attribute should be calculated
- **Sum defined to consider overlaps when operating on CMD**
- **Not forced: Only use it if it fits (guidance otherwise)**

`Sum > 180 day(s) of: "Medication, Dispensed: Warfarin (cumulative medication duration)"
during "Measurement Period"`

`Sum > 180 day(s) of: "Medication, Active: Warfarin (cumulative medication duration)"
during "Measurement Period"`

fixes QDM syntax error

retains original intent from prior QDM

no change to QDM datatypes or operators

Cumulative Medication Duration Interim Solution Limitations

Sum > 180 day(s) of: "Medication, Dispensed: Warfarin (cumulative medication duration)" during "Measurement Period"

- **No "prorating" medication events**
 - Every event captured by your timing logic contributes its *full* CMD calculation to the aggregate CMD result
 - No notion of a "calculation period"
- **EHRs may not have records of dispensed medications**
 - This affects measures calculating CMD on "Medication, Dispensed"
- **Restricted to a single QDM element with a single value set**
 - Create a grouping value set if needed

Bonus Round: Important QDM December 2013 Changes

- **Result / Finding Datatypes**
- **Anatomical Approach Site / Anatomical Location Site**
- **Miscellaneous Attribute Changes**

Result / Finding Datatypes [1 of 2]

Consolidate result datatypes with performance datatypes

- Remove the following result / finding datatypes

Datatype	
<ul style="list-style-type: none"> Diagnostic Study, Result Functional Status, Result Intervention, Result 	<ul style="list-style-type: none"> Laboratory Test, Result Physical Exam, Finding Procedure, Result

- Add result and status attributes to the following datatypes

Attribute	Datatype	
result	<ul style="list-style-type: none"> Diagnostic Study, Performed Functional Status, Performed Intervention, Performed 	<ul style="list-style-type: none"> Laboratory Test, Performed Physical Exam, Performed
status	<ul style="list-style-type: none"> Diagnostic Study, Performed Intervention, Performed 	<ul style="list-style-type: none"> Laboratory Test, Performed Procedure, Performed

Result / Finding Datatypes [2 of 2]

Consolidate result datatypes with performance datatypes

Before:

AND: Physical Exam, Finding: Heart Rate (result < 50 bpm)" during "Measurement Period"

After:

AND: Physical Exam, Performed: Heart Rate (result < 50 bpm)" during "Measurement Period"

simplifies data model

removes ambiguity and potential for confusion

existing measures will require rework

Anatomical Approach Site

Anatomical Location Site

Use more specific attributes for indicating anatomical sites

- **Replace anatomical structure in the following datatypes**
 - Use anatomical approach site and anatomical location site instead

Datatype	
<ul style="list-style-type: none"> • Device, Applied • Physical Exam, Order 	<ul style="list-style-type: none"> • Physical Exam, Performed • Physical Exam, Recommended

- **Add anatomical approach site and anatomical location site to**
 - Procedure (Order, Performed, Recommended)
- **Add anatomical location site to**
 - Diagnosis (Active, Inactive, Resolved)

Miscellaneous Attribute Changes

QDM December 2013 introduced a few other attribute changes

- **Add "admission datetime" and "discharge datetime" to**
 - Encounter (Active, Performed)

- **Add "method" and "ordinality" to**
 - Procedure, Intolerance

- **Add "cumulative medication duration" to**
 - Medication, Administered

- **Add "negation rationale" to**
 - Medication, Discharge

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