

Cooking with CQL Qs&As – Session 39

Thursday, October 24, 2019

Using Fast Healthcare Interoperability Resources (FHIR)

Q: From a performance perspective of a Quality Data Model (QDM) approach vs. a Fast Healthcare Interoperability Resource (FHIR) approach, you might be able to have a pretty efficient database access with QDM. With the FHIR measure doing one patient at a time, you're going to be making a lot of FHIR application programming interface (API) calls. One option might be to use a FHIR bulk export, which would return a large Newline-Delimited JavaScript Object Notation (ND JSON) file (the file format used for bulk data transfer in FHIR), that might be a way to get a lot of information at one time. Is there some thought to using a bulk concept to frontload the data?

A: The bulk export is certainly one option for retrieving all the data at one time. The way Clinical Quality Language (CQL) is built, all of the data access is expressed in terms of these retrieves so you can characterize the overall data requirements for this library by only looking at this set of retrieves and use that as parameters for an export operation to say "export all of the data required for this whole population given these data requirements." You can think of evaluating this patient at the time against a Fast Healthcare Interoperability Resources (FHIR) endpoint where these retrieves are converted into actual FHIR Uniform Resource Locators (URLs) is one approach to implementation. You can also imagine an implementation that went behind the scenes to access the same infrastructure that is supporting the FHIR application programming interface (API) and dig into that directly. With the reference implementation that is plugged into a HAPI FHIR server that reaches into the data access layer, you're hitting the underlying data access layer instead of going back out through the endpoint when you run the CQL in process in the HAPI FHIR server. It's still the case that in the reference implementation, the processing is happening a patient at a time, but you can imagine an implementation that does the same kind of thing but across the population rather than a patient at a time. The key aspect that's being communicated from the logic perspective is what the structure looks like and what the criteria are. It may be the case that you actually have a structured query language (SQL) database that has your FHIR resources in it and the way that you take the CQL and run it in that environment may be to translate it to an SQL query across patients. So there are a lot of potential approaches to evaluating the CQL and one of the primary goals of this approach is to make sure the logic can be shared and evaluated in all those different environments that makes the most sense for those environments.

Q: Once the Quality Improvement (QI)-Core QUICK model is fully mature and supported, will that be the expected mechanism to write a Fast Healthcare Interoperability Resources (FHIR)-based measure?

A: We're currently exploring that and making sure that the specifications can be expressed that way and making sure that it's a reasonable and feasible way of doing this. At this point, we're

still in the exploration phase. We are making sure the specification fully supports the specification of electronic clinical quality measure and quality reporting using this mechanism.

Q: In the draft of the Exclusive Breast Milk Feeding Measure - PC-05 (snippet from EXM9_FHIR4 version 8.1.000), there are some specific changes on how to represent some of the concepts used in this measure within Fast Healthcare Interoperability Resources (FHIR). Specifically, there are some changes around representation of total parenteral nutrition and nutrition intake resource that are planned for R5. When looking at a single newborn with no parenteral nutrition given, generally does status matter if it's a negation?

A: The example below states that "there is no evidence that parenteral nutrition was applied because there is no record that it happened." That's not a guarantee that it didn't happen since some occurrences may not be reflected in the database. The statement is merely saying that there is no evidence that parenteral nutrition was applied. We could take it one step further and say we are looking for positive evidence (for example, documentation) that it wasn't applied, but such documentation rarely, if ever, exists. Appropriate statuses are: in-progress, not-done, on-hold, completed, entered-in-error, stopped, and unknown. Other than entered-in-error and unknown, this set of responses are valid statuses in this context. However, when you get Fast Healthcare Interoperability Resources (FHIR) to indicate the Quality Data Model (QDM) concept of negation rationale, you have to add a status to say it didn't happen and there is no evidence of it. In the example below, the expression only evaluates that there is no evidence of MedicationAdministration: Parenteral Nutrition. A reason for absence of the activity is not requested. Note, the code below was tested and the updated measure was presented at the 11/4/2019 QDM Weekly Touchpoint meeting.

define "Single Live Birth Encounter Without Galactosemia and Parenteral Nutrition":

```
"Single Live Birth Encounter" SingleLiveBirthEncounter
  without ["MedicationAdministration": "Parenteral Nutrition"] ParenteralNutrition
  such that ParenteralNutrition.effective as Period starts during
SingleLiveBirthEncounter.period
  //where not (Global.EncounterDiagnosis(SingleLiveBirthEncounter).code in "Galactosemia")
    where not exists (
      (Global.EncounterDiagnosis(SingleLiveBirthEncounter))
        EncounterDiagnosis
          where EncounterDiagnosis.code in "Galactosemia"
    )
```

Q: With the Exclusive Breast Milk Feeding Measure - PC-05 (snippet from EXM9_FHIR4 version 8.1.001), currently Breast Milk is a value set with a substance code. In order to use the Procedure resource, can we create a new value set containing all the Procedure codes for Breast Milk? If we have that value set, can we just say procedure breast milk?

A: If you can find specific procedure codes that say "feeding breast milk" then that would be your procedure, but if you're looking for exclusive breast milk feeding and no other substances then you would have to find a procedure code for "exclusive breast milk feeding" or indicate without "procedure enteral feeding for any substance other than breast milk." It will be easier

to find a procedure code (or codes) more generic to enteral feeding, meaning feeding through the gastrointestinal track and then indicate a Procedure.usedCode of breast milk substances and indicate no feeding with anything else.

When the Quality Data Model says Substance Administered, empirically we know what that means, but the only substances that Fast Healthcare Interoperability Resources (FHIR) references as administered are those that can be classified as medications. We count total parenteral nutrition like a medication but breast milk isn't handled that way. Until such time as FHIR includes a way to represent intake and output of substances, the best approach is to use the Procedure resource to reference "feeding" as a procedure and Procedure.usedCode as the substance used to accomplish the feeding procedure. The implementation question and the terminology choice require consideration regarding how the data would be represented in the systems. A procedure that used Enteral Feeding as the code would capture more of the intent. Note, the code below was tested and the updated measure was presented at the 11/4/2019 QDM Weekly Touchpoint meeting.

define "Single Live Birth Encounter With Newborn Fed Breast Milk Only Since Birth":

"Single Live Birth Encounter With Gestational Age 37 Weeks or More" QualifyingEncounter
with ["Procedure": "Enteral Feeding"] BreastMilkFeeding

such that BreastMilkFeeding.status in { 'complete', 'in-progress' }

and BreastMilkFeeding.performed as Period starts during QualifyingEncounter.period

and BreastMilkFeeding.usedCode in "Breast Milk"

//with ["Procedure": usedCode in "Breast Milk"] BreastMilkFeeding

// such that BreastMilkFeeding.status = 'complete'

// and BreastMilkFeeding.performed as Period starts during QualifyingEncounter.period

without ["Procedure": "Enteral Feeding"] OtherFeeding

such that OtherFeeding.status in { 'complete', 'in progress' }

and OtherFeeding.performed as Period starts during QualifyingEncounter.period

and not (OtherFeeding.usedCode in "Breast Milk")

//without ["Procedure": usedCode in "Dietary Intake Other than Breast Milk"] OtherFeeding

// such that OtherFeeding.status in { 'complete', 'in progress' }

// and OtherFeeding.performed as Period starts during QualifyingEncounter.period