Evolving electronic Clinical Quality Measure (eCQM) Standards

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

**Beginning with CY 2019**
- HQMF (Metadata, Population Structure)
- CQL (Logic)
- QDM (Data Model)

**Future**
- FHIR Measure (Metadata, Population Structure)
- CQL (Logic)

- Measure Report Resource using Data Exchange for Quality Measures (DEQM)

---

QRDA Cat I - Quality Reporting – Patient Data

QRDA Cat III – Quality Reporting

---

#DQS2019
Goal is to align quality measurement standards for eCQM development and reporting using FHIR®
- QUICK replaces QDM
- FHIR® Measure replaces HQMF
- FHIR® Measure Report Replaces QRDA
FHIR® eCQMs and Reporting

» FHIR® Measure Resource- eCQM metadata and structure
  – Tooling will support structure
  – FHIR Measure Implementation Guide

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

» Implementation Guides for Quality Measurement
  QI-Core/QUICK - Data Model for eCQMs
  FHIR® Quality Measure - Structure of an eCQM
  Data Exchange for Quality Measures (DEQM)- How quality data is to be exchanged
Converting eCQMs to FHIR® Measures

Select Measure → Identify DQM Data Elements → Determine QI-Core equivalents based on mapping table → Name FHIR® measure EXM followed by CMS ID (CMS108 -> EXM108) → Translate Retrieves / Definitions from DQM version to FHIR®
Post Conversion to FHIR®

Post Conversion:

» Create Test Data and share final measure example with DEQM Implementation Guide developers to build reporting requirements and exchange scenarios

» Perform connection testing at Connectathon

1. Submit Data
2. Collect Data
3. Subscription

1. Individual
2. Summary
3. Patient-List
Tool to support eCQM Conversion

» Atom Text Editor
  – https://atom.io/
  – Additional Packages need to install
    • Language-cql
    • atom-ide-ui

**Before install Atom, please make sure the latest Java version is installed or updated to -
  https://www.java.com/en/
Tool 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
## Example of eCQM Conversion – VTE-1 (CMS108v7) Narratives

<table>
<thead>
<tr>
<th>eCQM Title</th>
<th>Venous Thromboembolism Prophylaxis</th>
</tr>
</thead>
<tbody>
<tr>
<td>eCQM Identifier</td>
<td>108</td>
</tr>
<tr>
<td>eCQM Version number</td>
<td>7.4.000</td>
</tr>
<tr>
<td>NQF Number</td>
<td>0371</td>
</tr>
<tr>
<td>Description</td>
<td>This measure assesses the number of patients who received VTE prophylaxis or have documentation why no VTE prophylaxis was given the day of or the day after hospital admission or surgery end date for surgeries that start the day of or the day after hospital admission</td>
</tr>
<tr>
<td><strong>Initial Population</strong></td>
<td>Patients age 18 and older discharged from hospital inpatient acute care without a diagnosis of venous thromboembolism (VTE) or obstetrics with a length of stay less than or equal to 120 days that ends during the measurement period</td>
</tr>
<tr>
<td><strong>Denominator</strong></td>
<td>All patients in the initial population</td>
</tr>
</tbody>
</table>
| **Denominator Exclusions** | * Patients who have a length of stay less than 2 days  
* Patients with comfort measures documented anytime between arrival and the day after hospital admission  
* Patients with comfort measures documented by the day after surgery end date for surgeries that start the day of or the day after hospital admission  
* Patients who are direct admits to intensive care unit (ICU), or transferred to ICU the day of or the day after hospital admission with ICU length of stay greater than or equal to one day  
* Patients with a principal diagnosis of mental disorders or stroke  
* Patients with a principal procedure of Surgical Care Improvement Project (SCIP) VTE selected surgeries |
| **Numerator**       | Patients who received VTE prophylaxis:  
- the day of or the day after hospital admission  
- the day of or the day after surgery end date for surgeries that end the day of or the day after hospital admission  
Patients who have documentation of a reason why no VTE prophylaxis was given:  
- between arrival and hospital admission  
- the day of or the day after hospital admission  
- the day of or the day after surgery end date (for surgeries that end the day of or the day after hospital admission) |

GUID: 38b0b5ec-0f63-466f-8fe3-2cd20ddd1622
Example of eCQM Conversion – VTE-1 (EXM108v7) - Populations

<table>
<thead>
<tr>
<th>In QDM-CQL measure</th>
<th>In FHIR® Measure</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Initial Population</strong></td>
<td>define &quot;Initial Population&quot;:</td>
</tr>
<tr>
<td>&quot;Encounter With Age Range and Without VTE Diagnosis or Obstetrical Conditions&quot;</td>
<td>&quot;Encounter With Age Range and Without VTE Diagnosis or Obstetrical Conditions&quot;</td>
</tr>
<tr>
<td><strong>Denominator</strong></td>
<td>define &quot;Denominator&quot;:</td>
</tr>
<tr>
<td>&quot;Initial Population&quot;</td>
<td>&quot;Initial Population&quot;</td>
</tr>
<tr>
<td><strong>Denominator Exclusions</strong></td>
<td>define &quot;Denominator Exclusions&quot;:</td>
</tr>
<tr>
<td>&quot;Encounter Less Than 2 Days&quot;</td>
<td>&quot;Encounter Less Than 2 Days&quot;</td>
</tr>
<tr>
<td>union &quot;Encounter With ICU Location Stay 1 Day or More&quot;</td>
<td>union &quot;Encounter With ICU Location Stay 1 Day or More&quot;</td>
</tr>
<tr>
<td>union &quot;Encounter With Principal Diagnosis of Mental Disorder or Stroke&quot;</td>
<td>union &quot;Encounter With Principal Diagnosis of Mental Disorder or Stroke&quot;</td>
</tr>
<tr>
<td>union &quot;Encounter With Principal Procedure of SCIP VTE Selected Surgery&quot;</td>
<td>union &quot;Encounter With Principal Procedure of SCIP VTE Selected Surgery&quot;</td>
</tr>
<tr>
<td>union &quot;Intervention Comfort Measures on Day of or Day After Start of Hospitalization&quot;</td>
<td>union &quot;Intervention Comfort Measures on Day of or Day After Start of Hospitalization&quot;</td>
</tr>
<tr>
<td>union &quot;Intervention Comfort Measures on Day of or Day After Procedure&quot;</td>
<td>union &quot;Intervention Comfort Measures on Day of or Day After Procedure&quot;</td>
</tr>
<tr>
<td><strong>Numerator</strong></td>
<td>define &quot;Numerator&quot;:</td>
</tr>
<tr>
<td>&quot;VTE Prophylaxis Received on Day of or Day After Admission or Procedure&quot;</td>
<td>&quot;VTE Prophylaxis Received on Day of or Day After Admission or Procedure&quot;</td>
</tr>
<tr>
<td>union ( &quot;Medication Oral Factor Xa Inhibitor Administered on Day of or Day After Admission or Procedure&quot; intersect ( &quot;Encounter With Prior or Present Diagnosis of Atrial Fibrillation or VTE&quot; union &quot;Encounter With Prior or Present Procedure of Hip or Knee Replacement Surgery&quot; ) )</td>
<td>union ( &quot;Medication Oral Factor Xa Inhibitor Administered on Day of or Day After Admission or Procedure&quot; intersect ( &quot;Encounter With Prior or Present Diagnosis of Atrial Fibrillation or VTE&quot; union &quot;Encounter With Prior or Present Procedure of Hip or Knee Replacement Surgery&quot; ) )</td>
</tr>
<tr>
<td>union &quot;Low Risk for VTE or Anticoagulant Administered&quot;</td>
<td>union &quot;Low Risk for VTE or Anticoagulant Administered&quot;</td>
</tr>
<tr>
<td>union &quot;No VTE Prophylaxis Due to Medical Reason&quot;</td>
<td>union &quot;No VTE Prophylaxis Due to Medical Reason&quot;</td>
</tr>
<tr>
<td>union &quot;No VTE Prophylaxis Due to Patient Refusal&quot;</td>
<td>union &quot;No VTE Prophylaxis Due to Patient Refusal&quot;</td>
</tr>
</tbody>
</table>
Example of eCQM Conversion – VTE-1 (EXM108v7) Header Info

**In QDM-CQL measure**

library VenousThromboembolismProphylaxis version '7.4.000'

using QDM version '5.3'

include MATGlobalCommonFunctions version '2.0.000' called Global

include VTEICU version '2.4.000' called VTEICU

**In FHIR® Measure**

```yaml
library VenousThromboembolismProphylaxis version '7.4.000'

using FHIR version '3.0.0'

include FHIRHelpers version '3.0.0' called FHIRHelpers

include MATGlobalCommonFunctions_FHIR version '2.0.000' called Global

include VTEICU_FHIR version '2.4.000' called VTEICU

include SupplementalDataElements_FHIR version '1.0.0' called SDE
```
Example of eCQM Conversion – VTE-1 (EXM108v7) Data Elements

**In QDM-CQL measure**

```
define "Inpatient Encounter":
    ["Encounter, Performed": "Encounter Inpatient"] EncounterInpatient
        where "LengthInDays"(EncounterInpatient.relevantPeriod) <= 120
        and EncounterInpatient.relevantPeriod ends during "Measurement Period"
```

**In FHIR® Measure**

```
define "Inpatient Encounter":
    ["Encounter": "Encounter Inpatient"] EncounterInpatient
        where EncounterInpatient.status = 'finished'
        and "LengthInDays"(EncounterInpatient.period) <= 120
        and EncounterInpatient.period ends during "Measurement Period"
```

**define "SCIP VTE Selected Surgery":**

```
define "SCIP VTE Selected Surgery":
    ["Procedure, Performed": "General Surgery"]
    union ["Procedure, Performed": "Gynecological Surgery"]
    union ["Procedure, Performed": "Hip Fracture Surgery"]
    union ["Procedure, Performed": "Hip Replacement Surgery"]
    union ["Procedure, Performed": "Intracranial Neurosurgery"]
    union ["Procedure, Performed": "Knee Replacement Surgery"]
    union ["Procedure, Performed": "Urological Surgery"]
```

```
define "SCIP VTE Selected Surgery":
    ["Procedure": "General Surgery"]
    union ["Procedure": "Gynecological Surgery"]
    union ["Procedure": "Hip Fracture Surgery"]
    union ["Procedure": "Hip Replacement Surgery"]
    union ["Procedure": "Intracranial Neurosurgery"]
    union ["Procedure": "Knee Replacement Surgery"]
    union ["Procedure": "Urological Surgery"]
    where P.status = 'completed'
```
Example of eCQM Conversion – VTE-1 (EXM108v7) Terminology

<table>
<thead>
<tr>
<th>In QDM-CQL measure</th>
<th>In FHIR® Measure</th>
</tr>
</thead>
<tbody>
<tr>
<td>codesystem &quot;LOINC: 2.63&quot;: urn:oid:2.16.840.1.113883.6.1 version &quot;urn:hll:version:2.63&quot;</td>
<td>codesystem &quot;SNOMEDCT&quot;: &quot;<a href="http://snomed.info/sct/731000124108">http://snomed.info/sct/731000124108</a>&quot;</td>
</tr>
<tr>
<td>valueset &quot;ONC Administrative Sex&quot;: urn:oid:2.16.840.1.113762.1.4.1</td>
<td>valueset &quot;ONC Administrative Sex&quot;: <a href="https://cts.nlm.nih.gov/fhir/ValueSet/2.16.840.1.113762.1.4.1">https://cts.nlm.nih.gov/fhir/ValueSet/2.16.840.1.113762.1.4.1</a></td>
</tr>
<tr>
<td>valueset &quot;Race&quot;: urn:oid:2.16.840.1.114222.4.11.836</td>
<td>valueset &quot;Race&quot;: <a href="https://cts.nlm.nih.gov/fhir/ValueSet/2.16.840.1.114222.4.11.836">https://cts.nlm.nih.gov/fhir/ValueSet/2.16.840.1.114222.4.11.836</a></td>
</tr>
<tr>
<td>valueset &quot;Ethnicity&quot;: urn:oid:2.16.840.1.114222.4.11.837</td>
<td>valueset &quot;Ethnicity&quot;: <a href="https://cts.nlm.nih.gov/fhir/ValueSet/2.16.840.1.114222.4.11.837">https://cts.nlm.nih.gov/fhir/ValueSet/2.16.840.1.114222.4.11.837</a></td>
</tr>
<tr>
<td>valueset &quot;Comfort Measures&quot;: urn:oid:1.3.6.1.4.1.33895.1.3.0.45&quot;</td>
<td>valueset &quot;Comfort Measures&quot;: <a href="https://cts.nlm.nih.gov/fhir/ValueSet/1.3.6.1.4.1.33895.1.3.0.45">https://cts.nlm.nih.gov/fhir/ValueSet/1.3.6.1.4.1.33895.1.3.0.45</a></td>
</tr>
<tr>
<td>valueset &quot;Direct Thrombin Inhibitor&quot;: urn:oid:2.16.840.1.113883.3.117.1.7.1.205</td>
<td>valueset &quot;Direct Thrombin Inhibitor&quot;: <a href="https://cts.nlm.nih.gov/fhir/ValueSet/2.16.840.1.113883.3.117.1.7.1.205">https://cts.nlm.nih.gov/fhir/ValueSet/2.16.840.1.113883.3.117.1.7.1.205</a></td>
</tr>
<tr>
<td>valueset &quot;Emergency Department Visit&quot;: urn:oid:2.16.840.1.113883.3.117.1.7.1.292</td>
<td>valueset &quot;Emergency Department Visit&quot;: <a href="https://cts.nlm.nih.gov/fhir/ValueSet/2.16.840.1.113883.3.117.1.7.1.292">https://cts.nlm.nih.gov/fhir/ValueSet/2.16.840.1.113883.3.117.1.7.1.292</a></td>
</tr>
<tr>
<td>valueset &quot;General or Neuraxial Anesthesia&quot;: urn:oid:2.16.840.1.113883.3.666.5.1743</td>
<td>valueset &quot;General or Neuraxial Anesthesia&quot;: <a href="https://cts.nlm.nih.gov/fhir/ValueSet/2.16.840.1.113883.3.666.5.1743">https://cts.nlm.nih.gov/fhir/ValueSet/2.16.840.1.113883.3.666.5.1743</a></td>
</tr>
<tr>
<td>valueset &quot;General Surgery&quot;: urn:oid:2.16.840.1.113883.3.117.1.7.1.265</td>
<td>valueset &quot;General Surgery&quot;: <a href="https://cts.nlm.nih.gov/fhir/ValueSet/2.16.840.1.113883.3.117.1.7.1.265">https://cts.nlm.nih.gov/fhir/ValueSet/2.16.840.1.113883.3.117.1.7.1.265</a></td>
</tr>
<tr>
<td>valueset &quot;Glycoprotein Ilb/IIa Inhibitors&quot;: urn:oid:2.16.840.1.113762.1.4.1045.41</td>
<td>valueset &quot;Glycoprotein Ilb/IIa Inhibitors&quot;: <a href="https://cts.nlm.nih.gov/fhir/ValueSet/2.16.840.1.113762.1.4.1045.41">https://cts.nlm.nih.gov/fhir/ValueSet/2.16.840.1.113762.1.4.1045.41</a></td>
</tr>
<tr>
<td>valueset &quot;Graduated compression stockings (GCS)&quot;: urn:oid:2.16.840.1.113883.3.117.1.7.1.256</td>
<td>valueset &quot;Graduated compression stockings (GCS)&quot;: <a href="https://cts.nlm.nih.gov/fhir/ValueSet/2.16.840.1.113883.3.117.1.7.1.256">https://cts.nlm.nih.gov/fhir/ValueSet/2.16.840.1.113883.3.117.1.7.1.256</a></td>
</tr>
<tr>
<td>valueset &quot;Gynecological Surgery&quot;: urn:oid:2.16.840.1.113883.3.117.1.7.1.257</td>
<td>valueset &quot;Gynecological Surgery&quot;: <a href="https://cts.nlm.nih.gov/fhir/ValueSet/2.16.840.1.113883.3.117.1.7.1.257">https://cts.nlm.nih.gov/fhir/ValueSet/2.16.840.1.113883.3.117.1.7.1.257</a></td>
</tr>
<tr>
<td>valueset &quot;Hip Replacement Surgery&quot;: urn:oid:2.16.840.1.113883.3.117.1.7.1.259</td>
<td>valueset &quot;Hip Replacement Surgery&quot;: <a href="https://cts.nlm.nih.gov/fhir/ValueSet/2.16.840.1.113883.3.117.1.7.1.259">https://cts.nlm.nih.gov/fhir/ValueSet/2.16.840.1.113883.3.117.1.7.1.259</a></td>
</tr>
<tr>
<td>valueset &quot;Injectable Factor Xa Inhibitor for VTE Prophylaxis&quot;: urn:oid:2.16.840.1.113883.3.117.1.7.1.211</td>
<td>valueset &quot;Injectable Factor Xa Inhibitor for VTE Prophylaxis&quot;: <a href="https://cts.nlm.nih.gov/fhir/ValueSet/2.16.840.1.113883.3.117.1.7.1.211">https://cts.nlm.nih.gov/fhir/ValueSet/2.16.840.1.113883.3.117.1.7.1.211</a></td>
</tr>
<tr>
<td>valueset &quot;INR&quot;: urn:oid:2.16.840.1.113883.3.117.1.7.1.213</td>
<td>valueset &quot;INR&quot;: <a href="https://cts.nlm.nih.gov/fhir/ValueSet/2.16.840.1.113883.3.117.1.7.1.213">https://cts.nlm.nih.gov/fhir/ValueSet/2.16.840.1.113883.3.117.1.7.1.213</a></td>
</tr>
</tbody>
</table>
Mapping QDM to QI-Core

» QDM to QI-Core Mapping
* QDM v5.3 to QI-Core v3.2 for VTE-1 CQF (EXM108 v7.4)

http://hl7.org/fhir/us/qicore/qdm-to-qicore.html

» Review mapping table
## FHIR Resources supported for VTE-1 (EXM108v7)

*Resources Used:*

<table>
<thead>
<tr>
<th>Resource Type</th>
<th>Profile Name</th>
<th>Link to STU3 Profile</th>
</tr>
</thead>
<tbody>
<tr>
<td>Condition</td>
<td>QI Core Condition Profile</td>
<td>QI Core Condition (STU3)</td>
</tr>
<tr>
<td>Coverage</td>
<td>QI Core Coverage Profile</td>
<td>QI Core Coverage (STU3)</td>
</tr>
<tr>
<td>DeviceRequest</td>
<td>DEQM DeviceRequest Profile</td>
<td>DEQM DeviceRequest (STU3)</td>
</tr>
<tr>
<td>DeviceUseStatement</td>
<td>DEQM DeviceUseStatement Profile</td>
<td>DEQM DeviceUseStatement (STU3)</td>
</tr>
<tr>
<td>Encounter</td>
<td>QI Core Encounter Profile</td>
<td>QI Core Encounter (STU3)</td>
</tr>
<tr>
<td>Library</td>
<td>CQFM Library Profile</td>
<td>CQFM Library (STU3)</td>
</tr>
<tr>
<td>Location</td>
<td>QI Core Location Profile</td>
<td>QI Core Location (STU3)</td>
</tr>
<tr>
<td>Measure</td>
<td>CQFM Measure Profile</td>
<td>CQFM Measure (STU3)</td>
</tr>
<tr>
<td>MeasureReport</td>
<td>DEQM Individual MeasureReport Profile</td>
<td>DEQM Individual MeasureReport Profile (STU3)</td>
</tr>
<tr>
<td>MedicationAdministration</td>
<td>DEQM MedicationAdministration Profile</td>
<td>DEQM MedicationAdministration (STU3)</td>
</tr>
<tr>
<td>MedicationRequest</td>
<td>DEQM MedicationRequest Profile</td>
<td>DEQM MedicationRequest (STU3)</td>
</tr>
<tr>
<td>Observation</td>
<td>QI Core Observation Profile</td>
<td>QI Core Observation (STU3)</td>
</tr>
<tr>
<td>Organization</td>
<td>DEQM Organization Profile</td>
<td>DEQM Organization (STU3)</td>
</tr>
<tr>
<td>Patient</td>
<td>QI Core Patient Profile</td>
<td>QI Core Patient (STU3)</td>
</tr>
<tr>
<td>Practitioner</td>
<td>DEQM Practitioner Profile</td>
<td>DEQM Practitioner (STU3)</td>
</tr>
<tr>
<td>Procedure</td>
<td>QI Core Procedure Profile</td>
<td>QI Core Procedure (STU3)</td>
</tr>
<tr>
<td>ProcedureRequest</td>
<td>QI Core ProcedureRequest Profile</td>
<td>QI Core ProcedureRequest (STU3)</td>
</tr>
</tbody>
</table>
FHIR Resources supported for VTE-1 (EXM108v7) - Encounter

**In QDM-CQL measure**

define "Inpatient Encounter":

["Encounter, Performed": "Encounter Inpatient"] EncounterInpatient
    where "LengthInDays"(EncounterInpatient.relevantPeriod) <= 120
    and EncounterInpatient.relevantPeriod ends during "Measurement Period"

**In FHIR® Measure**

define "Inpatient Encounter":

["Encounter": "Encounter Inpatient"] EncounterInpatient
    where EncounterInpatient.status = 'finished'
    and "LengthInDays"(EncounterInpatient.period) <= 120
    and EncounterInpatient.period ends during "Measurement Period"
**In QDM-CQL measure**

```cql
Define
  ( Global."Inpatient Encounter" InpatientEncounter
    where not ( exists ( InpatientEncounter.diagnoses EncounterDiagnoses
        where ( EncounterDiagnoses in "Obstetrics"
            or EncounterDiagnoses in "Venous Thromboembolism"
            or EncounterDiagnoses in "Obstetrics VTE"
        )
    ) )
  )
  intersect ( Global."Inpatient Encounter" InpatientEncounter
    without ( ["Diagnosis": "Obstetrics"]
        union ["Diagnosis": "Venous Thromboembolism"]
        union ["Diagnosis": "Obstetrics VTE"]
    ) Diagnosis
    such that Diagnosis.prevalencePeriod starts during Global."Hospitalization"(InpatientEncounter)
  )
```

**In FHIR® Measure**

```cql
define "Admission Without VTE or Obstetrical Conditions":
  (Global."Inpatient Encounter" InpatientEncounter
   where not (Global.EncounterDiagnosis(InpatientEncounter).code in "Obstetrics"
       or Global.EncounterDiagnosis(InpatientEncounter).code in "Venous Thromboembolism"
       or Global.EncounterDiagnosis(InpatientEncounter).code in "Obstetrics VTE"
   )
  )
  intersect (Global."Inpatient Encounter" InpatientEncounter
     without ( ["Condition": code in "Obstetrics"]
         union ["Condition": code in "Venous Thromboembolism"]
         union ["Condition": code in "Obstetrics VTE"]
     ) Diagnosis
     such that Diagnosis.clincialStatus = 'active'
     and Diagnosis.verificationStatus = 'confirmed'
     and Global."Normalize Onset"(Diagnosis.onset) during Global."Hospitalization"(InpatientEncounter)
  )
```
FHIR Resources supported for VTE-1 (EXM108v7) – DeviceUseStatement

In QDM-CQL measure

define “No VTE Prophylaxis Device Applied”:
    ["Device, Not Applied": "Intermittent pneumatic compression devices (IPC)"]
    union ["Device, Not Applied": "Venous foot pumps (VFP)"]
    union ["Device, Not Applied": "Graduated compression stockings (GCS)"]

In FHIR® Measure

define "No VTE Prophylaxis Device Applied":
    // NOTE: Should be using device.code, but that requires CQL 1.4
    (]]="DeviceUseStatement"; code in "Venous foot pumps (VFP)"
        union ["DeviceUseStatement"; code in "Intermittent pneumatic compression devices (IPC)"
        union ["DeviceUseStatement"; code in "Graduated compression stockings (GCS)"
    )
    where GetExtension(D.extension, 'http://example.org/fhir/extensions/notDone').value is true
    // where D.notDone is true // Needs a QI-Core extension to support
FHIR Resources supported for VTE-1 (EXM108v7) – DeviceRequest

In QDM-CQL measure

define “No VTE Prophylaxis Device Ordered”:
   ["Device, Not Ordered": "Intermittent pneumatic compression devices (IPC)"]
   union ["Device, Not Ordered": "Venous foot pumps (VFP)"]
   union ["Device, Not Ordered": "Graduated compression stockings (GCS)"]

In FHIR® Measure

define "No VTE Prophylaxis Device Ordered":
   // NOTE: Should be using device.code, but that requires CQL 1.4
   
   ["DeviceRequest": code in "Venous foot pumps (VFP)"
      union ["DeviceRequest": code in "Intermittent pneumatic compression devices (IPC)"
      union ["DeviceRequest": code in "Graduated compression stockings (GCS)"
   )
   where D.intent ~ ToConcept("Order")
   and GetExtension(D.extension, 'http://example.org/fhir/extensions/doNotPerform').value is true
   //where D.doNotPerform is true // Needs a QI-Core extension to support
FHIR Resources supported for VTE-1 (EXM108v7) – Procedure

In QDM-CQL measure
define “SCIP VTE Selected Surgery”:
["Procedure, Performed": "General Surgery"]
union ["Procedure, Performed": "Gynecological Surgery"]
union ["Procedure, Performed": "Hip Fracture Surgery"]
union ["Procedure, Performed": "Hip Replacement Surgery"]
union ["Procedure, Performed": "Intracranial Neurosurgery"]
union ["Procedure, Performed": "Knee Replacement Surgery"]
union ["Procedure, Performed": "Urological Surgery"]

In FHIR® Measure
```cql
define "SCIP VTE Selected Surgery":
( ["Procedure": "General Surgery"]
union ["Procedure": "Gynecological Surgery"]
union ["Procedure": "Hip Fracture Surgery"]
union ["Procedure": "Hip Replacement Surgery"]
union ["Procedure": "Intracranial Neurosurgery"]
union ["Procedure": "Knee Replacement Surgery"]
union ["Procedure": "Urological Surgery"] ) P
where P.status = 'completed'
```
FHIR Resources supported for VTE-1 (EXM108v7) – ProcedureRequest

In QDM-CQL measure

define “Intervention Comfort Measures”:
["Intervention, Order": "Comfort Measures"]
union ["Intervention, Performed": "Comfort Measures"]

In FHIR® Measure

```plaintext
define "Intervention Comfort Measures":
(["ProcedureRequest": "Comfort Measures"] P
 where P.intent = 'order')
union
(["Procedure": "Comfort Measures"] InterventionPerformed
 where InterventionPerformed.status = 'completed')```
FHIR Resources supported for VTE-1 (EXM108v7) – MedicationAdministration

**In QDM-CQL measure**

define “VTE Prophylaxis by Medication Administered”:

```
(SELECT ["Medication, Administered": "Low Dose Unfractionated Heparin for VTE Prophylaxis"] VTEMedication
 | VTEMedication.route in "Subcutaneous route"
 )
 union ["Medication, Administered": "Low Molecular Weight Heparin for VTE Prophylaxis"]
 union ["Medication, Administered": "Injectable Factor Xa Inhibitor for VTE Prophylaxis"]
 union ["Medication, Administered": "Warfarin"]
```

**In FHIR® Measure**

```cql
define "VTE Prophylaxis by Medication Administered":

(SELECT ["MedicationAdministration": medication in "Low Dose Unfractionated Heparin for VTE Prophylaxis"] VTEMedication
 | VTEMedication.status = 'completed'
 and VTEMedication.dosage.route in "Subcutaneous route"
 )
 union ["MedicationAdministration": medication in "Low Molecular Weight Heparin for VTE Prophylaxis"]
 union ["MedicationAdministration": medication in "Injectable Factor Xa Inhibitor for VTE Prophylaxis"]
 union ["MedicationAdministration": medication in "Warfarin"]
```
FHIR Resources supported for VTE-1 (EXM108v7) – MedicationRequest

**In QDM-CQL measure**

define “VTE Prophylaxis by Medication Ordered”:

- "Medication, Not Ordered": "Low Dose Unfractionated Heparin for VTE Prophylaxis"
- union "Medication, Not Ordered": "Low Molecular Weight Heparin for VTE Prophylaxis"
- union "Medication, Not Ordered": "Injectable Factor Xa Inhibitor for VTE Prophylaxis"
- union "Medication, Not Ordered": "Warfarin"

**In FHIR® Measure**

```plaintext
define "No VTE Prophylaxis Medication Ordered":
( ["MedicationRequest": medication in "Low Dose Unfractionated Heparin for VTE Prophylaxis"]
union
["MedicationRequest": medication in "Low Molecular Weight Heparin for VTE Prophylaxis"]
union
["MedicationRequest": medication in "Injectable Factor Xa Inhibitor for VTE Prophylaxis"]
union
["MedicationRequest": medication in "Warfarin"]
) MedicationOrder
where MedicationOrder.intent = 'order'
and GetExtension(MedicationOrder.extension, 'http://example.org/fhir/extensions/doNotPerform').value is true
// MedicationOrder.doNotPerform is true  // Needs a QI-Core extension to support
```
Gaps in FHIR Measure Conversion VTE-1 (EXM108v7) by FHIR STU3

- GForge [#22786/#22797]: To be able to identify a Principal / Elective procedure
- GForge [#20601]: need support “notDone/doNotPerform” for the following FHIR resources.
  - DeviceUseStatement
  - DeviceRequest
  - MedicationRequest
- Consider adding “recordedOn” to support the timings for “MedicationAdministration.notGiven” and “Procedure.notDone”.

<table>
<thead>
<tr>
<th>Profile</th>
<th>Timing used for Done</th>
<th>Timing used for doNotPerform</th>
</tr>
</thead>
<tbody>
<tr>
<td>DeviceUseStatement</td>
<td>whenUsed</td>
<td>recordedOn</td>
</tr>
<tr>
<td>DeveiceRequest</td>
<td>authoredOn</td>
<td>authoredOn</td>
</tr>
<tr>
<td>MedicationAdministration</td>
<td>effective</td>
<td></td>
</tr>
<tr>
<td>MedicaitonRequest</td>
<td>authoredOn</td>
<td>authoredOn</td>
</tr>
<tr>
<td>Procedure</td>
<td>performed</td>
<td></td>
</tr>
<tr>
<td>ProcedureRequest</td>
<td>authoredOn</td>
<td>authoredOn</td>
</tr>
</tbody>
</table>