eCQM 101 - Getting Started with Electronic Clinical Quality Measures for Quality Reporting Programs

Introduction

December 2023
eCQM 101 Overview

• What is an electronic clinical quality measure (eCQM)?
• Where do I find eCQMs?
• What is included in an eCQM specification?
What is an eCQM?
eCQMs

• eCQMs use data electronically extracted from electronic health records and/or health information technology systems to measure the quality of health care provided.
• CMS uses eCQMs in a variety of quality reporting and incentive programs.
• Eligible Clinicians, Eligible Hospitals (EHs), and Critical Access Hospitals (CAHs) report eCQMs to CMS.
Building an eCQM

• Data Model - What data to look for in the patient’s medical record to capture and report
• Expression Logic - How to calculate the results of the data captured to measure whether the ‘right’ care was provided
• Structure - metadata, numerator, denominator, exclusions, exceptions
The QDM is an information model that defines relationships between patients and clinical concepts in a standardized format to enable electronic quality performance measurement.

The QDM is the current structure for electronically representing quality measure concepts in eCQM development and reporting.

QDM Data Element structure

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

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

- **QDM Category** - Consists of a single clinical concept identified by a value set. A category is the highest level of definition for a QDM element. QDM versions 5.5 and 5.6 contain 22 categories.
  - Examples: Medication, Procedure, Condition/Diagnosis/Problem, and Encounter

- **QDM Datatype** - The context in which each category is used to describe a part of the clinical care process.
  - Examples: “Laboratory Test, Order”, “Laboratory Test, Performed”

- **QDM Attribute** - Provides specific details about a QDM datatype. QDM attributes represent metadata, or information about each QDM datatype that might be used in eCQM expressions to provide necessary details for calculation.
  - Example: “Laboratory Test, Performed: (result)”
The eCQM DERep provides all the data elements associated with published and tested eCQMs for use in CMS quality reporting programs including definitions and clinical focus for each data element.

Health Quality Measure Format (HQMF) and Expression Logic Clinical Quality Language (CQL)

• The HQMF is the basic electronic specification for the measure. It provides the metadata and population structure. The QDM provides the data model and CQL represents the logic used in the HQMF.

• The HQMF header includes descriptions of the measure populations, any stratifications, the measure steward, measure type, identifiers, rationale, scoring, and other details. The HQMF body includes the population criteria and the data criteria.

• CQL is a Health Level Seven International® (HL7®) human-readable authoring language standard. CQL is the expression logic used with HQMF for eCQMs.
Benefits of CQL

- Expresses measure in easily human-readable logic structured for processing a query electronically
- Provides for sharing measure logic between measures
- Harmonizes the standards used for eCQMs and Clinical Decision Support (CDS)
- Simplifies calculation engine implementation
- Can be used with multiple information data models, e.g., QDM, Fast Healthcare Interoperability Resources® (FHIR®)
Where do I find eCQMs?
eCQI Resource Center
https://ecqi.healthit.gov/

Electronic Clinical Quality Improvement (eCQI) Resource Center

Transforming eCQI through collaboration, education, and standards

- Eligible Clinician eCQMs
- Eligible Hospital / Critical Access Hospital eCQMs
- Outpatient Quality Reporting eCQMs

Featured News & Events
View All

- Nov 03, 2023
  CMS Publishes 2024 Policy Changes for the Quality Payment Program...

- Nov 14, 2023 @ 2:00pm EST
  CY 2023 eCQM Reporting and Data Submission Updates

Get Started with eCQMs
New to eCQMs? Learn the basics about eCQMs, development, certification, and resources to get started.

Educational Resources
Educational resources available for eCQMs and eCQI Tools, CQI, FHIR, QDM, and QRDA.

eCQI Standards
Key standards for the electronic transmission of health information used to support eCQMs.

FHIR®
Fast Healthcare Interoperability Resources® is a standard for exchanging healthcare information electronically.
Different ways to get to eCQMs

https://ecqi.healthit.gov/
Example: Finding Eligible Hospital/Critical Access Hospital eCQM Resources

https://ecqi.healthit.gov/eh-cah?qt-tabs_eh=0
Example: Finding Eligible Hospital/Critical Access Hospital eCQMs

https://ecqi.healthit.gov/eh-cah?qt-tabs_eh=1
Anticoagulation Therapy for Atrial Fibrillation/Flutter

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<th>2024 Reporting Period</th>
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<tbody>
<tr>
<td>CMS eCQM ID</td>
<td>CMS071v13</td>
</tr>
<tr>
<td>Short Name</td>
<td>STK-3</td>
</tr>
<tr>
<td>NQF Number</td>
<td>Not Applicable</td>
</tr>
<tr>
<td>Description</td>
<td>Ischemic stroke patients with atrial fibrillation/flutter who are prescribed or continuing to take anticoagulation therapy at hospital discharge</td>
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https://ecqi.healthit.gov/ecqm/eh/2024/cms071v13

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Example: Finding Eligible Hospital/Critical Access Hospital Individual eCQM Specifications, Data Element Repository and Value Set Links

Anticoagulation Therapy for Atrial Fibrillation/Flutter

Receive updates on this topic

Specifications

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<th>Attachment</th>
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<tr>
<td>CMS7v13.html</td>
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<tr>
<td>CMS7v13.zip (ZIP)</td>
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<td>CMS7v13-TRN.xlsx (Excel)</td>
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<tr>
<td>CMS7v13-eCQMFlow.pdf (PDF)</td>
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Data Element Repository

Data Elements contained within CMS7v13

Value Sets

Value Sets to be used with CMS7v13

December 2023
Hybrid Measures In Use and Pre-Rulemaking

Eligible Hospital / Critical Access Hospital eCQMs

Select Period: 2024
Filter By: Hybrid Measures

<table>
<thead>
<tr>
<th>2024 Reporting Period Eligible Hospital / Critical Access Hospital eCQMs</th>
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<tr>
<td>Total number of EH/CAH eCQMs: 2</td>
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<table>
<thead>
<tr>
<th>Title</th>
<th>Short Name</th>
<th>CMS eCQM ID</th>
<th>NQF Number</th>
<th>Specifications</th>
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<tbody>
<tr>
<td>Core Clinical Data Elements for the Hybrid Hospital-Wide (All-Condition, All-Procedure) Risk-Standardized Mortality Measure (HWM)</td>
<td>Hybrid HWM</td>
<td>CMS844v4</td>
<td>3502</td>
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*2024 Mandatory reporting period for Hybrid Measures is July 1, 2024 - June 30, 2025

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https://ecqi.healthit.gov/eh-cah?global_measure_group=3721&globalyearfilter=2024&qt-tabs_eh=1
Finding Eligible Clinician eCQMs

https://ecqi.healthit.gov/ep-ec?qt-tabs_ep=1&globalyearfilter=2024&global_measure_group=3716
Finding Eligible Clinician eCQMs (cont.)

Eligible Clinician eCQMs

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Select Period: 2024  Filter By: eCQMs

Find older eCQM specifications in the eCQM Standards and Tools Version table.

2024 Performance Period Eligible Clinician Resources

Filter Resources by

- Any - Implementation Guidance Reporting References Standards References Technical Specifications

<table>
<thead>
<tr>
<th>eCQM Resources</th>
<th>Short Description</th>
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<tr>
<td>Implementation Checklist eCQM Annual Update</td>
<td>Implementation checklist</td>
<td>May 2023</td>
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<tr>
<td>Telehealth Guidance for eCQMs for Eligible Clinician 2024 Quality Reporting (PDF)</td>
<td>List of telehealth eligibility of eligible clinician eCQMs</td>
<td>May 2023</td>
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<tr>
<td>Guide for Reading eCQMs v9.0 (PDF)</td>
<td>Assists implementers and measured entities with information on how to read eCQM specifications</td>
<td>May 2023</td>
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Layout of tabs are the same for Eligible Clinicians, Eligible Hospitals/Critical Access Hospitals, and Outpatient Quality Reporting eCQMs

https://ecqi.healthit.gov/ep-ec?qt-tabs_ep=1&globalyearfilter=2024&global_measure_group=3716
Example: Individual eCQM - Data Element Repository

Appropriate Treatment for Upper Respiratory Infection (URI)

- CMS Measure ID: CMS154v12
- Performance/Reporting Period: 2024
- NQF Number: Applicable

**Description:**
Percentage of episodes for patients 3 months of age and older with a diagnosis of upper respiratory infection (URI) that did not result in an antibiotic order.

Data Elements and coded QDM Attributes contained within the eCQM

- 
  - "Assessment, Performed": "Hospice care [Minimum Data Set]"
  - "Diagnosis": "Comorbid Conditions for Respiratory Conditions"
  - "Diagnosis": "Competing Conditions for Respiratory Conditions"

https://ecqi.healthit.gov/measure-data-elements/179611
Data Element and Details

["Diagnosis": "Upper Respiratory Infection"]

eCOM Data Element

Performance/Reporting Period: 2024

Value Set Description from VSAC

CLINICAL FOCUS: The purpose of this value set is to represent concepts for a diagnosis of an acute upper respiratory infection.

DATA ELEMENT SCOPE: This value set may use a model element related to Diagnosis.

INCLUSION CRITERIA: Includes concepts that represent a diagnosis of an acute upper respiratory infection.

EXCLUSION CRITERIA: No exclusions.

Constrained to codes in the Upper Respiratory Infection value set (2.16.840.1.113883.3.464.1003.102.12.1022)

QDM Datatype and Definition

"Diagnosis"

Data elements that meet criteria using this datatype should document the Condition/Diagnosis/Problem and its corresponding value set. The onset dateTime corresponds to the implicit start dateTime of the datatype and the abatement dateTime corresponds to the implicit stop dateTime of the datatype. If the abatement dateTime is not present, then the diagnosis is considered to still be active. When this datatype is used with timing relationships, the criterion is looking for an active diagnosis for the time frame indicated by the timing relationships.

Timing: The prevalencePeriod references the time from the onset date to the abatement date.

eCQMs using this data element:

CMS154v12 - Appropriate Treatment for Upper Respiratory Infection (URI)

Get to the same data element specifics including “eCQM using this data element” by going directly to the data element.

["Diagnosis": "Upper Respiratory Infection"]

eCQM Data Element
Performance/Reporting Period: 2024
Value Set Description from VSAC
CLINICAL FOCUS: The purpose of this value set is to represent concepts for a diagnosis of an acute upper respiratory infection.
DATA ELEMENT SCOPE: This value set may use a model element related to Diagnosis.
INCLUSION CRITERIA: Includes concepts that represent a diagnosis of an acute upper respiratory infection.
EXCLUSION CRITERIA: No exclusions.
Constrained to codes in the Upper Respiratory Infection value set: [2.16.840.1.113883.3.464.1083.102.12.1022]

QDM Datatype and Definition
"Diagnosis"
Data elements that meet criteria using this datatype should document the Condition/Diagnosis/Problem and its corresponding value set. The **onset date** corresponds to the implicit start date of the datatype and the **abatement date** corresponds to the implicit stop date of the datatype. If the **abatement date** is not present, then the diagnosis is considered to still be active. When this datatype is used with timing relationships, the criterion is looking for an active diagnosis for the time frame indicated by the timing relationships.

Timing: The **prevalence period** references the time from the **onset date** to the **abatement date**.

eCQMs using this data element:
CMS154v12 - Appropriate Treatment for Upper Respiratory Infection (URI)
What is included within an eCQM specification?
eCQM Components

- Human-readable HyperText Markup Language (HTML) file
- Machine readable
  - HQMF XML file
    - The header identifies and classifies the document and provides important metadata about the measure
    - The body contains eCQM sections (e.g., definitions, population criteria, supplemental data elements)
  - Shared CQL Libraries (.cql, .xml, .json)
    - CQL file provides the formal description of the computable content in the measure and organized into libraries for reusing or sharing between measures and other artifacts
    - Expression Logical Model (ELM) XML is the machine-readable representation of the eCQM’s logic in XML.
    - ELM JavaScript Object Notation (JSON) file is the ELM file in JavaScript Notation, as opposed to XML.

Note: Value sets and direct reference codes in the eCQM specifications are found in the Value Set Authority Center (VSAC) and require a free Unified Medical Language System (UMLS) license to access.
The measure header in the human readable file includes:

- Measure Developer
- Measure Steward
- Description of the Measure
- Rationale and Evidence for the Measure
- Relevant Clinical Guidelines
- Copyright Restrictions
- Measure Type
- How the Measure is Scored
- Who has Endorsed the Measure
- Any Additional Guidance
- Summary of the Different Fields/Criteria
Human Readable: Body- Population Criteria

Population Criteria

- **Initial Population**
  - "Encounter with Upper Respiratory Infection" EncounterWithURI
  - where AgeInMonthsAt(date from start of "Measurement Period") \( \geq 3 \)
  - return EncounterWithURI

- **Denominator**
  - "Initial Population"

- **Denominator Exclusions**
  - "Encounters and Assessments with Hospice Patient"
  - union "Encounter with Comorbid Condition for Upper Respiratory Infection"
  - union "Encounter with Upper Respiratory Infection and other Comorbid Conditions"
  - union "Encounter with Competing Diagnosis for Upper Respiratory Infection"

- **Numerator**
  - "Encounter with Upper Respiratory Infection" EncounterWithURI
  - without ["Medication, Order": "Antibiotic Medications for Upper Respiratory Infection"] OrderedAntibiotic
  - such that OrderedAntibiotic.authorDatetime \( \leq 3 \) days or less on or after start of EncounterWithURI.relevantPeriod
  - return EncounterWithURI

- **Numerator Exclusions**
  - None

- **Denominator Exceptions**
  - None

Think of the measure logic as an equation - it relates different pieces of information together and calculates a measure result.


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Definitions

- **Denominator**
  "Initial Population"

- **Denominator Exclusions**
  "Encounters and Assessments with Hospice Patient"
  union "Encounter with Comorbid Condition for Upper Respiratory Infection Prior"
  union "Encounter with Upper Respiratory Infection and Antibiotics Active In 30 Days Prior to the Episode Date"
  union "Encounter with Competing Diagnosis for Upper Respiratory Infection"

- **Encounter with Comorbid Condition for Upper Respiratory Infection Prior**
  ( "Encounter with Upper Respiratory Infection" EncounterWithURI
    with [{"Diagnosis": "Comorbid Conditions for Respiratory Conditions"}] ComorbidCondition
    s.t. start of ComorbidCondition.prevalencePeriod in day of Interval[start of EncounterWithURI.relevantPeriod - 1 year, start return EncounterWithURI
  )

- **Encounter with Competing Diagnosis for Upper Respiratory Infection**
  ( "Encounter with Upper Respiratory Infection" EncounterWithURI
    with [{"Diagnosis": "Competing Conditions for Respiratory Conditions"}] CompetingCondition
    s.t. CompetingCondition.prevalencePeriod starts 3 days or less on or after day of start of EncounterWithURI.relevantPeriod
    return EncounterWithURI
  )

- **Encounter with Upper Respiratory Infection**
  from
  "Qualifying Encounters" QualifyingEncounters,
  [{"Diagnosis": "Upper Respiratory Infection"}] URI
  where URI.prevalencePeriod starts during day of QualifyingEncounters.relevantPeriod
  or URI.prevalencePeriod overlaps before QualifyingEncounters.relevantPeriod
  return QualifyingEncounters
Human Readable: Body- Functions and Terminology

Functions

Global.NormalizeInterval(pointInTime DateTime, period Interval<DateTime>)

if pointInTime is not null then Interval(pointInTime, pointInTime)
else if period is not null then period
else null as Interval<DateTime>

Terminology

- code "Discharge to healthcare facility for hospice care (procedure)" ("SNOMEDCT Code (428371000124100)"")
- code "Discharge to home for hospice care (procedure)" ("SNOMEDCT Code (428361000124107)"")
- code "Hospice care [Minimum Data Set]" ("LOINC Code (45755-6)"")
- code "Unlisted preventive medicine service" ("CPT Code (99429)"")
- code "Yes (qualifier value)" ("SNOMEDCT Code (373066001)"")
- value set "Antibiotic Medications for Upper Respiratory Infection" (2.16.840.1.113883.3.464.1003.1190)
- value set "Common Conditions for Respiratory Infections" (2.16.840.1.113883.3.464.1003.102.12.1025)
- value set "Competing Conditions for Respiratory Conditions" (2.16.840.1.113883.3.464.1003.102.12.1017)
- value set "Emergency Department Evaluation and Management Visit" (2.16.840.1.113883.3.464.1003.101.12.1010)
- value set "Encounter Inpatient" (2.16.840.1.113883.3.666.5.307)
- value set "Ethnicity" (2.16.840.1.114222.4.11.837)
- value set "Home Healthcare Services" (2.16.840.1.113883.3.464.1003.101.12.1016)
- value set "Hospice Care Ambulatory" (2.16.840.1.113883.3.526.3.1584)
- value set "Hospice Diagnosis" (2.16.840.1.113883.3.464.1003.1165)
- value set "Hospice Encounter" (2.16.840.1.113883.3.464.1003.1003)
- value set "Initial Hospital Observation Care" (2.16.840.1.113883.3.464.1003.101.12.1002)
- value set "Medical Disability Exam" (2.16.840.1.113883.3.464.1003.101.12.1073)
- value set "Observation" (2.16.840.1.113883.3.464.1003.101.12.1086)
- value set "Office Visit" (2.16.840.1.113883.3.464.1003.101.12.1001)
- value set "ONC Administrative Sex" (2.16.840.1.113762.1.4.1)
- value set "Online Assessments" (2.16.840.1.113883.3.464.1003.101.12.1069)
- value set "Outpatient Consultation" (2.16.840.1.113883.3.464.1003.101.12.1008)
- value set "Payer" (2.16.840.1.114222.4.11.3591)
- value set "Preventive Care Services Established Office Visit, 18 and Up" (2.16.840.1.113883.3.464.1003.101.12.1025)
- value set "Preventive Care Services Group Counseling" (2.16.840.1.113883.3.464.1003.101.12.1027)
- value set "Preventive Care Services Individual Counseling" (2.16.840.1.113883.3.464.1003.101.12.1026)
- value set "Preventive Care Services Initial Office Visit, 18 and Up" (2.16.840.1.113883.3.464.1003.101.12.1023)
- value set "Preventive Care Services, Initial Office Visit, 0 to 17" (2.16.840.1.113883.3.464.1003.101.12.1022)
- value set "Preventive Care, Established Office Visit, 0 to 17" (2.16.840.1.113883.3.464.1003.101.12.1024)
- value set "Race" (2.16.840.1.114222.4.11.830)
- value set "Telephone Visits" (2.16.840.1.113883.3.464.1003.101.12.1080)
- value set "Upper Respiratory Infection" (2.16.840.1.113883.3.464.1003.102.12.1022)
Data Criteria (QDM Data Elements)

- "Diagnosis: Comorbid Conditions for Respiratory Conditions" using "Comorbid Conditions for Respiratory Conditions (2.16.840.1.113883.3.464.1003.102.12.1025)"
- "Diagnosis: Competing Conditions for Respiratory Conditions" using "Competing Conditions for Respiratory Conditions (2.16.840.1.113883.3.464.1003.102.12.1017)"
- "Diagnosis: Hospice Diagnosis" using "Hospice Diagnosis (2.16.840.1.113883.3.464.1003.1165)"
- "Diagnosis: Upper Respiratory Infection" using "Upper Respiratory Infection (2.16.840.1.113883.3.464.1003.102.12.1022)"
- "Encounter, Performed: Encounter Inpatient" using "Encounter Inpatient (2.16.840.1.113883.3.666.5.307)"
- "Encounter, Performed: Hospice Encounter" using "Hospice Encounter (2.16.840.1.113883.3.464.1003.1003)"
- "Encounter, Performed: Initial Hospital Observation Care" using "Initial Hospital Observation Care (2.16.840.1.113883.3.464.1003.101.12.1002)"
- "Encounter, Performed: Medical Disability Exam" using "Medical Disability Exam (2.16.840.1.113883.3.464.1003.101.12.1073)"
- "Encounter, Performed: Observation" using "Observation (2.16.840.1.113883.3.464.1003.101.12.1086)"
- "Encounter, Performed: Office Visit" using "Office Visit (2.16.840.1.113883.3.464.1003.101.12.1001)"
- "Encounter, Performed: Online Assessments" using "Online Assessments (2.16.840.1.113883.3.464.1003.101.12.1089)"
- "Encounter, Performed: Outpatient Consultation" using "Outpatient Consultation (2.16.840.1.113883.3.464.1003.101.12.1008)"
- "Encounter, Performed: Preventive Care Services Established Office Visit, 18 and Up" using "Preventive Care Services Established Office Visit, 18 and Up (2.16.840.1.113883.3.464.1003.101.12.1025)"
- "Encounter, Performed: Preventive Care Services Group Counseling" using "Preventive Care Services Group Counseling (2.16.840.1.113883.3.464.1003.101.12.1027)"
Supplemental Data Elements

- **SDE Ethnicity**
  - ["Patient Characteristic Ethnicity": "Ethnicity"]

- **SDE Payer**
  - ["Patient Characteristic Payer": "Payer"]

- **SDE Race**
  - ["Patient Characteristic Race": "Race"]

- **SDE Sex**
  - ["Patient Characteristic Sex": "ONC Administrative Sex"]
Machine Readable XML: Measure Header and Logic - Snippet

```xml
<?xml version="1.0" encoding="UTF-8"?>
<QualityMeasureDocument xmlns="urn:h17-org:v4" xmlns:cql-1-ext="urn:hhs-cql:hmf-n1-extensions:v1"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance">
  <!--
  Measure Details Section
  -->
  <typeId extension="POQM_MD00001UVW2" root="2.16.840.1.113883.1.3"/>
  <templateId>
    <item extension="2021-02-01" root="2.16.840.1.113883.10.20.28.1.2"/>
  </templateId>
  <id root="2c928084-8389-524e-0183-c8d7a6700f02"/>
  <code code="57024-2" codeSystem="2.16.840.1.113883.6.1"/>
  <displayName value="Health Quality Measure Document"/>
  <title value="Appropriate Treatment for Upper Respiratory Infection (URI)="/>
  <text value="Percentage of episodes for patients 3 months of age and older with URI that do not result in an antibiotic order"/>
  <statusCode code="COMPLETED"/>
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  <author>
    <representedResponsibleParty classCode="ASSIGNED">
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    </representedResponsibleParty>
  </author>
</QualityMeasureDocument>
```

The HQMF is an xml-based standard that shows the measure content, both machine-readable logic and header, in a way that a machine can parse the content into sections and perform calculations.

While it does take some investment to create a tool that "reads" the HQMF, it can be used to import the measure and generate the measure results automatically.

Snippet from the eCQM Specification on the eCQI Resource Center:
https://ecqi.healthit.gov/sites/default/files/ecqm/measures/CMS154v12.zip

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Companion eCQM 101 Presentations

• Find additional eCQM presentations on the eCQM Resources page of the eCQI Resource Center
• Email the eCQI Resource Center to ask questions or provide website feedback
## Acronyms

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<th>Acronym</th>
<th>Definition</th>
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<tr>
<td>CMS</td>
<td>Centers for Medicare &amp; Medicaid Services</td>
</tr>
<tr>
<td>CQL</td>
<td>Clinical Quality Language</td>
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<tr>
<td>CAH</td>
<td>Critical Access Hospital</td>
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<tr>
<td>DERep</td>
<td>Data Element Repository</td>
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<td>eCQI</td>
<td>Electronic Clinical Quality Improvement</td>
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<td>eCQM</td>
<td>Electronic Clinical Quality Measure</td>
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<td>EH</td>
<td>Eligible Hospital</td>
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<tr>
<td>ELM</td>
<td>Expression Logical Model</td>
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## Acronyms (Cont’d)

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<th>Acronym</th>
<th>Definition</th>
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<tr>
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<td>LOINC</td>
<td>Logical Observation Identifiers, Names, and Codes</td>
</tr>
<tr>
<td>QDM</td>
<td>Quality Data Model</td>
</tr>
<tr>
<td>UMLS</td>
<td>Unified Medical Language System</td>
</tr>
<tr>
<td>VSAC</td>
<td>Value Set Authority Center</td>
</tr>
<tr>
<td>XML</td>
<td>eXtensible Markup Language</td>
</tr>
</tbody>
</table>