Centers for Medicare & Medicaid Services

Electronic Clinical Quality Measure Logic and Implementation Guidance

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1. Introduction

The Centers for Medicare & Medicaid Services (CMS) provides this guidance document for use with the updated Eligible Hospital (EH), Critical Access Hospital (CAH), and Eligible Professional (EP)/Eligible Clinician (EC) electronic clinical quality measure (eCQM) specifications. The eCQM specifications were released in May 2021 for people who are using or implementing the measures in calendar year 2022 performance/reporting under CMS's quality reporting and value-based purchasing programs.

eCQMs will not be eligible for 2022 reporting until they are proposed and finalized through notice, public comment, and rulemaking for each applicable program. CMS strongly recommends review of this document to understand the intent and operation of each eCQM before implementation. Additional information and guidance is available on the Electronic Clinical Quality Improvement (eCQI) Resource Center website. Appendix A in this document provides information on the standards and code systems used in conjunction with the updated eCQMs.

This document provides the following information:

- Sections 2 to 6 provide general implementation guidance, including defining how specific logic and data elements should be conceptualized and addressed during eCQM implementation.
- Section 7 provides information to stakeholders on how to use the ONC Project Tracking System (Jira), CMS' feedback system, to provide feedback; track issues; ask questions about measure intent, specifications, certification, and standards; and address issues uncovered during implementation associated with the eCQMs.

For additional information directly relevant to implementing the eCQM updates for 2022 reporting/performance, please refer to the eCQM Implementation Checklist and the tools, resources, and standards used by eCQMs provided on the eCQI Resource Center website.

2. eCQM Types

eCQMs are classified based on the unit of analysis—patients or episodes—and the way in which the score is computed, whether by proportion or continuous variable. This section describes these classifications and provides details on computing eCQMs. A statement has also been added to the Guidance section of measures to indicate whether the measure is patient- or episode-based.

2.1 Population Basis

2.1.1 Patient-Based Measures

Patient-based measures evaluate the care of a patient and assign the patient to membership in one or more measure segments or populations. Most EP and EC eCQMs are patient based.

Consider all information in the patient record referenced in the measure when computing a patient-based measure. The criteria for inclusion of a patient in a measure population might require satisfying conditions across multiple patient encounters, or episodes of care. For example, a patient can receive a diagnosis and initial treatment during one office visit, and then have ongoing treatment of that same diagnosis with several follow-up visits, or episodes of care.

To identify the patients who are counted in a patient-based measure, review the guidance section of the header and the context of the measure logic section. For example, for measure CMS124v9, *Cervical Cancer Screening*, the patients included in the measure are women 23-64 years of age with a visit during the measurement period, as defined in the measure's initial population:

Initial Population

```
exists ( ["Patient Characteristic Birthdate": "Birth date"] BirthDate
   where Global."CalendarAgeInYearsAt" ( BirthDate.birthDatetime, start of "Measurement
Period" ) in Interval[23, 64 )
)
  and exists ( ["Patient Characteristic Sex": "Female"] )
  and exists "Qualifying Encounters"
```

2.1.2 Episode-of-Care Measures

Episode-of-care measures evaluate the care during a patient-provider encounter and assign the episode of care to one or more measure population segments. All EH eCQMs and a few EP/EC eCQMs are episode-of-care measures.

In an episode-of-care measure, the episodes of care are identified in the measure's initial population. An episode is based on a specific event that will be referenced in other segments of the eCQM (such as the denominator or the numerator).

To identify the encounters or procedures that are counted in an episode-of-care-based measure, review the guidance section of the header and the context of the measure logic section. For example, for measure CMS133v9, *Cataracts: 20/40 or Better Visual Acuity within 90 Days Following Cataract Surgery*, the unit of analysis is the cataract surgery procedure, as defined in the initial population:

Initial Population

```
"Cataract Surgery Between January and September of Measurement Period" CataractSurgeryPerformed
    with ["Patient Characteristic Birthdate": "Birth date"] BirthDate
        such that Global."CalendarAgeInYearsAt"(BirthDate.birthDatetime, start of "Measurement Period")>= 18
```

In this example, the initial population includes all performed cataract surgery procedures in which the patient was age 18 or older at the start of the measurement period.

2.2 Measure Scoring

2.2.1 Proportion Measures

Most of the eCQMs in current CMS reporting programs are proportion measures. In a proportion measure, the scored entities (either patients or episodes) for a collection of patients are assigned to the populations and strata defined by an eCQM, and the appropriate rates are computed.

The populations defined by a proportion measure follow:[1]

- **Initial Population:** All events to be evaluated by a specific quality measure involving patients who share a common set of specified characteristics within a specific measurement set to which a given measure belongs. All patients counted (for example, as numerator, as denominator) are drawn from the initial population.
- **Denominator (DENOM):** The lower part of a fraction used to calculate a rate, proportion, or ratio. It can be the same as the initial population or a subset of the initial population to further constrain the population for the purpose of the measure. Continuous variable measures do not have a denominator but instead define a measure population.
- **Denominator Exclusion (DENEX):** A case that should be removed from the measure population and denominator before determining if numerator criteria are met. Denominator exclusions are used in proportion and ratio measures to help narrow the denominator. For example, patients with bilateral lower extremity amputations would be listed as a denominator exclusion for a measure requiring foot exams.
- **Denominator Exception (DEXCEP):** Any condition that should remove a patient, procedure, or unit of measurement from the denominator of the performance rate only if the numerator criteria are not met. A denominator exception allows for adjustment of the calculated score for those providers with higher risk populations. A denominator exception also provides for the exercise of clinical judgment and should be specifically defined where capturing the information in a structured manner fits the clinical workflow. A denominator exception is used only in proportion measures. Denominator exception cases are removed from the denominator. However, the number of patients with valid exceptions may still be reported. Allowable reasons fall into three general categories - medical reasons, patient reasons, or system reasons.

[1] Definitions available at the eCQI Resource Center website: https://ecqi.healthit.gov/glossary.

- **Numerator (NUMER):** The upper portion of a fraction used to calculate a rate, proportion, or ratio. Also called the measure focus, it is the target process, condition, event, or outcome. Numerator criteria are the processes or outcomes expected for each patient, procedure, or other unit of measurement defined in the denominator. A numerator statement describes the clinical action that satisfies the conditions of the performance measure.
- **Numerator Exclusion (NUMEX):** Defines an instance that should not be included in the numerator data. Numerator exclusions are only used in ratio and proportion measures.

The computation of a proportion measure proceeds as follows:

1. Identify patients or episodes of care in the initial population using the initial population criteria.
2. Refine the initial population by applying denominator criteria to identify the denominator cases (DENOM).
3. Review denominator cases against denominator exclusion criteria. If a case meets denominator exclusion criteria, label it as a denominator exclusion (DENEX) and remove it from consideration for the numerator.
4. Assess all remaining cases (all denominator cases that do not meet denominator exclusion criteria) against the numerator criteria. Label all cases that meet the numerator requirements as numerator (NUMER).
5. Identify cases that do not meet numerator requirements and assess them against denominator exception requirements. If a case meets denominator exception requirements, then label the case as a denominator exception (DEXCEP).
6. Identify cases that meet numerator requirements and evaluate them against the numerator exclusion requirements. If a case meets the numerator exclusions, then label the case as a numerator exclusion (NUMEX).

Specific programs might require reporting of performance rates. Using the labeling described previously, the performance rate for a single population is defined as follows:

Rate = (NUMER – NUMEX) / (DENOM – DENEX – DEXCEP)

There are a few measures with more than one population to support calculation of a single performance rate. In this instance, the header specifies the performance rate calculation. Figure 1 provides an example of a defined rate aggregation for CMS145, *Coronary Artery Disease (CAD): Beta-Blocker Therapy-Prior Myocardial Infarction (MI) or Left Ventricular Systolic Dysfunction (LVEF <40%).*

Figure 1. Performance Rate Calculation Defined in Header for Multiple Populations

Rate Aggregation	This measure is intended to have one reporting rate, which aggregates the following populations into a single performance rate for reporting purposes: - Population 1: Patients with left ventricular systolic dysfunction (LVEF <40%) - Population 2: Patients with a prior (within the past 3 years) myocardial infarction For the purposes of this measure, a single performance rate can be calculated as follows: Performance Rate = (Numerator 1 + Numerator 2)/ [(Denominator 1 – Denominator Exceptions 1) + (Denominator 2 – Denominator Exceptions 2)]

Proportion measures might also have reporting strata defined for a measure. Strata are variables that define a subdivision of the measure for reporting (for example, reporting separately by age group such as 14–19, 20–25). For eCQMs, the human-readable document includes the reporting stratification section. If a measure does not have reporting strata defined, it displays "None" as the default. If a measure contains reporting stratification, each stratum is listed separately under the population criteria section. For example, CMS159: *Depression Remission at Twelve Months* contains two strata, as stated in the header:

Figure 2. Stratification Example

Stratification	Ages 12 to 17 at the time of the index assessment Ages 18 and older at the time of the index assessment

In addition, the strata are defined in the logic section (for brevity, only one is shown below):

Stratification 1

```
exists ( ["Patient Characteristic Birthdate": "Birth date"] BirthDate
   with "Index Depression Assessment" IndexAssessment
     such that Global."CalendarAgeInYearsAt" (
BirthDate.birthDatetime, IndexAssessment.relevantDatetime ) >=
12
      and Global."CalendarAgeInYearsAt" (
BirthDate.birthDatetime, IndexAssessment.relevantDatetime ) <
18
  )
```

For eCQMs with multiple numerators and/or strata, each patient/episode must be scored for inclusion/exclusion to every population. For example, if an eCQM has three numerators and the patient is included in the first numerator, the patient should be scored for inclusion/exclusion from the populations related to the other numerators as well. When the measure definition includes stratification, each population in the measure definition should be reported both without stratification and stratified by each stratification criterion.

2.2.2 Continuous Variable Measures

Continuous variable measures can be either patient-based or episode-of-care measures. They include the following elements:

- **Initial Population:** All events to be evaluated by a specific performance measure involving patients who share a common set of specified characteristics within a specific measurement set to which a given measure belongs. All patients counted (for example, as numerator, as denominator) are drawn from the initial population.[2]
- **Measure Population (MSRPOPL):** The eCQM population—for example, all patients seen in the emergency department during the measurement period. This could be the same as, or contain a subset of, the initial population.
- **Measure Population Exclusions (MSRPOPLEX):** A subset of the measure population that measure observation calculations do not use.
- **Measure Observations:** The computation to be performed on the members of the measure population after removing the measure population exclusions. For example, measure CMS111, *Median Admit Decision Time to ED Departure Time for Admitted Patients*, computes the median duration from the decision to admit to the departure from the emergency department (ED).

The computation of a continuous variable measure proceeds as follows:

1. Identify the patients or episodes of care in the initial population using the initial population criteria.
2. Refine the initial population by applying measure population criteria to identify the measure population cases (MSRPOPL).
3. Review measure population cases against measure population exclusion criteria. If a case meets measure population exclusion criteria, label it as a measure population exclusion (MSRPOPLEX) and remove it from consideration for the measure observations.
4. Evaluate each remaining member of the measure population against the defined measure observations criteria and aggregate the results using the specified operator.

As with proportion measures, continuous variable measures might have stratification requirements. Performance results should be reported for each population without stratification and for each defined stratum separately. The initial population and measure population require specifying the number of patients or episodes that fall into each of these populations without stratification as well as those populations stratified by any defined strata. The aggregated continuous variable computed, defined by the measure observation, should be reported for the unaggregated measure population and for each stratum of the measure population.

CMS111v9, *Median Admit Decision Time to ED Departure Time for Admitted Patients*, is an example of a stratified continuous variable measure (Figure 3). The measure population includes all inpatient encounters preceded by an ED visit at the same facility. CMS111v9 defines two stratifications: patients with a diagnosis of psychiatric/mental health disorders and patients

[2] Definition available at the eCQI Resource Center website: https://ecqi.healthit.gov/glossary.

without a diagnosis of psychiatric/mental health disorders. This measure requires reporting the observations for all three instances—encounters for all patients, encounters for patients with the diagnosis of psychiatric/mental health disorders, and encounters for patients without a diagnosis of psychiatric/mental health disorders.

Figure 3. Example of a Stratified Continuous Variable Measure

Stratification	Report total score and the following strata: Stratification 1—all patients seen in the ED and admitted as an inpatient who do not have an inpatient encounter principal diagnosis (rank = 1) consistent with psychiatric/mental health disorders Stratification 2—all patients seen in the ED and admitted as an inpatient who have an inpatient encounter principal diagnosis (rank = 1) consistent with psychiatric/mental health disorders

2.3 Hybrid Measures

Hybrid measures are quality measures that merge data elements from electronic health records with claims data to calculate measure results. These measures require updates to both the electronic specifications and claims-based specifications, available on QualityNet. For more information on hybrid measures, please see the Hybrid Measures section of the eCQI Resource Center website.

2.4 Pre-Rulemaking eCQMs

Pre-rulemaking eCQMs are measures whose specifications are not finalized for use in a CMS quality reporting program. These measures are not eligible for CMS quality reporting until they are proposed and finalized through notice-and-comment rulemaking for each applicable program. Pre-rulemaking measures can be found on the eCQI Resource Center site in designated EP/EC and EH/CAH sub-sections.

3. eCQMs

A list of sortable and downloadable EP/EC, EH/CAH, Hybrid and applicable pre-rulemaking eCQMs can be found on the eCQI Resource Center website.

3.1 Use of Telehealth with eCQMs

CMS may provide supplemental information on whether telehealth encounters satisfy the criteria of EP/EC eCQMs for certain CMS programs in performance period 2022. Additional considerations for EP/EC eCQMs may be found on the eCQI Resource Center website.

4. Clinical Quality Language Measure Logic

Beginning with the eCQM Annual Update for 2019 reporting and performance years, eCQMs are represented using both Clinical Quality Language (CQL) logic and the Quality Data Model (QDM) in an effort to harmonize standards between clinical decision support and eCQM reporting. CQL is a clinically focused, high-level query language that can express more sophisticated eCQM logic than previously possible. It is a step beyond what was possible with just QDM logic, and it aims to tackle many of the issues encountered with previous eCQM specifications. A significant feature of CQL is its use of *libraries*, which are collections of CQL definitions or function statements that can be shared across measures and between measures and decision support rules. The use of shared functions and definitions results in greater consistency across measures and enables decision support to reuse the same statements. CQL, however, only replaced the QDM logic portions for measure specification. QDM continues to serve as the data model for describing data elements in eCQMs.

A Health Level Seven International (HL7) implementation guide provides direction on using CQL expressions and QDM data elements in the eCQM via the Health Quality Measures Format (HQMF) 2.1. The HL7 Version 3 Implementation Guide: Clinical Quality Language (CQL)-based Health Quality Measure Format (HQMF), Release 1, Standard for Trial Use 4—US Realm implementation guide; Clinical Quality Language Specification, Release 1, Standard for Trial Use 4; CQL Formatting and Usage Wiki; and QDM v5.5 Guidance Update should be used as primary sources for interpreting eCQM representation. The following subsections provide an overview of this material, including common logic expressions and proper usage.

4.1 Evaluating CQL Logic and QDM Elements

A measure consists of populations (such as denominator or numerator) in which each population is in turn composed of a combination of QDM data elements and CQL logic to form expressions. These expressions define the criteria for membership in each population based on the intent of the measure.

For example, the following definition statement establishes the global criteria for an inpatient encounter:

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

The first part of this definition statement, enclosed in brackets, references a QDM datatype ("Encounter, Performed") and a value set indicating the specific codes that meet encounter criteria for this measure ("Encounter Inpatient"). The combination of a QDM datatype and a value set defines a QDM data element, which describes clinical information. The QDM datatype is composed of a QDM category of clinical information, such as Encounter, Medication, or Procedure, with a context, such as "Encounter, Performed"; "Procedure, Performed"; "Medication, Order"; "Medication, Administered". Additional data (attributes) may be required to meet the needs of the measure. QDM specifies a set of attributes allowable for each QDM datatype. For example, *dosage* and *supply* are attributes available for "Medication, Order". All QDM datatypes include a *code* attribute that is typically used with a value set or direct reference

code. In the above example, the filter compares the *code* attribute to a list of codes from the "Encounter Inpatient" value set. For detailed descriptions of the QDM data model, including all QDM datatype and related attributes, please refer to the QDM v5.5 specification.

The CQL expression above also describes the timing elements to determine (1) whether the time difference between the start and end of the encounter is 120 days or less and (2) whether the end of the specified encounter occurred during the measurement period. By referencing this entire expression as a CQL definition (in this case called "Inpatient Encounter"), the measure can refer to that definition without repeating all of the details.

The CQL Formatting and Usage Wiki contains additional information regarding the use of CQL and QDM in Authoring Measures in CQL. What follows is a summary of that content, focused on interpreting measures written in CQL.

4.2 Understanding CQL Basics

CQL is a high-level query language, which means that it can serve to write expressions that determine *what* data to return rather than *how* to return them. *How* to return the data is part of the implementation of a quality measure and can be accomplished in various ways (for example, by queries in a database system or map-reduce processing on an Apache Hadoop® [software utility] cluster). CQL is intentionally silent on many of those details, enabling the logic expressed by CQL queries to be used in a broad variety of implementation environments to achieve the same result.

CQL expressions are made up of several basic elements:

- Values, such as the number `5`, or the quantity `5 'mm[Hg]'`
- Operators, such as `"+", "-", "and", "or", "intersect", and "union"`
- Functions, such as `CalculateAge() and First()`
- Identifiers, such as `"Inpatient Encounter"`

Measure developers can combine these basic elements to express criteria and then label them with identifiers so they can serve either to define additional criteria or as the definition of a top-level population.

When the members of an eCQM population are patients, the criteria are expressed as a simple yes or no test that determines whether the patient is in or out of that population segment. For example, the definition of "Initial Population" for CMS2v10, *Preventive Care and Screening: Screening for Depression and Follow-Up Plan*, is:

```
"Initial Population":
            "Patient Age 12 Years or Older at Start of Measurement
            Period"
      and exists ("Qualifying Encounter During Measurement Period")
```

For this example, patients are members of the initial population if they have a birthdate that indicates they were 12 years of age or older at the start of the measurement period, and the patient has a qualifying encounter.

In a patient-based measure, each population (such as the initial population, denominator, or numerator) is defined as a yes or no test; however, there could be other definitions in the measure that return lists. In the above example, "**`Qualifying Encounter During Measurement Period`**" is one such definition, which returns a list of encounter data. For this example, the relevant period indicates the difference between the start and end times for the qualifying encounter.

`Qualifying Encounter During Measurement Period`

```
( ["Encounter, Performed": "Encounter to Screen for Depression"]
  union ["Encounter, Performed": "Physical Therapy Evaluation"] )
ValidEncounter
  where ValidEncounter.relevantPeriod during "Measurement Period"
```

4.3 Libraries

CQL libraries are collections of CQL expression definitions, functions, and other declarations. Each eCQM program measure contains a *primary* library that defines the criteria used by the populations of the measure. The HQMF document references this library and defines the populations by identifying which expressions in the CQL library define each population.

Libraries can contain the following:

- Expression definitions, such as `"Inpatient Encounter"`
- Terminologies, such as references to code systems, value sets, and codes
- Functions, such as `"CalendarAgeInYearsAt"`

When a measure includes a reference to a *shared* library, components of that library can then be referenced throughout the measure. For example, the definition for **`Measure Population Exclusions`** in CMS111, *Median Admit Decision Time to ED Departure Time for Admitted Patients* is as follows.

`Measure Population Exclusions`

```
/*Exclude the most recent ED encounter (LastEDVisit) that occurred within an
hour of the inpatient admission with ED admission source in "Hospital
Setting" (any different facility- by location or CCN )*/
Global."Inpatient Encounter" EncounterInpatient
      where "LastEDEncounter"(EncounterInpatient).admissionSource in
      "Hospital Settings"
```

This example excludes ED encounters with an admission source in "Hospital Settings" resulting in an inpatient stay, referred in the logic as the `Global.Inpatient Encounter` definition. The `Global` in this definition refers to a shared library used by many of the measures that share definitions and functions such as `Inpatient Encounter`.

For more information on libraries, refer to the Using Libraries to Share Logic section (Chapter 2—Author's Guide) of the CQL Specification.

4.4 Queries

A central construct in CQL is the query, a specific type of expression that enables easy and precise expression of relationships between data. Queries in CQL are clause based, which means that they use different types of clauses depending on what operations are performed on the data.

The following is the general structure of a CQL query:

<source> <alias>
<with or without clauses>
<where clause>
<return clause>
<sort clause>

Because all the clauses are optional, the simplest query is just a source and an alias:

```
"Outpatient Encounters" Encounter
```

Here, the source is a reference to `"Outpatient Encounters,"` which is an expression that returns a list of encounters. This source is given the alias `Encounter`. The alias allows the elements of the source to be referenced anywhere within the query. Because this simple query does not have any clauses, it simply returns the same result as the source.

4.4.1 Where Clause

The where keyword introduces a where clause, which enables the user to filter the results of the source, as shown in this example from CMS122v9:

```
AdultOutpatientEncounters.Qualifying Encounters
      ( ["Encounter, Performed": "Office Visit"]
            union ["Encounter, Performed": "Annual Wellness Visit"]
            union ["Encounter, Performed": "Preventive Care Services -
            Established Office Visit, 18 and Up"]
            union ["Encounter, Performed": "Preventive Care Services-
            Initial Office Visit, 18 and Up"]
            union ["Encounter, Performed": "Home Healthcare Services"]
            ) ValidEncounter
            where ValidEncounter.relevantPeriod during "Measurement
            Period"
```

This query returns only those encounters from the source whose `relevantPeriod` is during the `Measurement Period`. The `where` clause enables you to specify any condition in terms of the aliases introduced in the query, such as `ValidEncounter` in this case. The condition in the `where` clause is evaluated for every encounter performed in the `union` query source, and the result then includes only those encounters for which the condition evaluates to true.

4.4.2 Relationships (With and Without Clauses)

Describing relationships between data is so common in quality measurement that CQL provides special constructs to make expressing these relationships simple by using `with` and `without` keywords. The `with` keyword can serve to describe cases that should be considered only if a related data item is present. The `without` keyword can express the converse: when a case should be considered only if a related data item is not present. The following example query from CMS146v9 limits the ED or ambulatory encounters returned to only those that start three days or less on or before the appropriate antibiotic was ordered. The `such that` clause describes the condition of the relationship, which is expressed in terms of the aliases `EDOrAmbulatoryVisit` (for the main source of the query) and `AntibioticOrdered`, which is only available in the `such that` clause.

Encounter With Antibiotic Ordered Within Three Days

```
"Qualifying Encounter" EDOrAmbulatoryVisit
  with ["Medication, Order": "Antibiotic Medications for Pharyngitis"]
AntibioticOrdered
    such that ( EDOrAmbulatoryVisit.relevantPeriod starts 3 days or
less on or before AntibioticOrdered.authorDatetime )
```

The `without` keyword can serve to describe cases that should be considered only if a particular data item is *not* present. For example, the definition of New or Recurrent Major Depressive Disorder Encounter in CMS161v9, *Adult Major Depressive Disorder (MDD): Suicide Risk Assessment*, is the following:

New or Recurrent Major Depressive Disorder Encounter

```
"Major Depressive Disorder Encounter" NewOrRecurrentMDDEncounter

      without "Major Depressive Disorder Encounter"
      PriorMDDEpisodeEncounter

            such that PriorMDDEpisodeEncounter !~
            NewOrRecurrentMDDEncounter

                  and PriorMDDEpisodeEncounter.relevantPeriod
                  ends 104 days or less before day of start of
                  NewOrRecurrentMDDEncounter.relevantPeriod

      where NewOrRecurrentMDDEncounter.relevantPeriod during
      "Measurement Period"
```

This query limits the outpatient encounters returned to only those that did *not* have a major depressive disorder encounter during the 104 days before the encounter. Similar to the `with` clause, the `without` clause uses `such that` to describe the condition of the relationship.

4.4.3 Specific Occurrences

QDM logic expression (versions 4.3 and earlier) was unable to differentiate specific instances of events and, therefore, created a concept of occurrences. Since using QDM version 5 and later, CQL is used for measure logic and expressions can be built up from other expressions so that occurrences are no longer required.

4.5 Timing Calculations

Assessing the relative timing of events within a patient's medical record is an essential part of computing eCQMs. To enable the unambiguous interpretation of the eCQMs, it is necessary to clearly define computation of time intervals. A simple expression such as "the treatment must occur within 3 days of the diagnosis" has many possible interpretations, including that the treatment must occur within 72 hours of the diagnosis or that the treatment must happen within three business days of the diagnosis.

The International Organization for Standardization 8601:2004 defines data elements and interchange formats for the representation of dates and times, including time intervals. A full list of definitions related to timing is part of the HL7 Cross-Paradigm Specification: Clinical Quality Language, Release 1, Standard for Trial Use (STU) 4 (1.4) (refer to section 4.1 Definitions within the Language Semantics chapter).

To determine the length of time between two dates, CQL provides two approaches: *duration*, the number of whole periods between two dates, and *difference*, the number of period boundaries crossed between two dates. The periods are expressed as a time unit, such as hours, days, or months. These approaches provide options to correctly express timing relationships for implementation of measures.

Appendix B of this document includes more information on time intervals and examples.

4.5.1 Duration

CQL provides for greater specificity when calculating duration. Conceptually, the calculation is performed by considering two dates on a timeline and counting the number of whole periods (for example, years, days, hours) that fit on that timeline between the two dates. CQL considers this calculation to be fine grained and is used as necessary to meet this intent of the measure. The precision of the calculation is limited only by the available data.

4.5.2 Difference

Difference calculations are performed by truncating the date or time values at the next level of precision and then performing the corresponding duration calculation on the truncated values.

To illustrate difference, consider the following example:

Date 1: 2012-12-31

Date 2: 2013-01-01

Duration In Years: years between Date 1 and Date 2

Difference In Years: difference in years between Date 1 and Date 2

The Duration In Years expression returns zero because a full year has not passed between the two dates, but the Difference In Years expression returns 1 because the one year boundary was crossed between the two truncated dates—2012 and 2013.

Appendix H of the CQL Specification provides additional examples.

4.5.3 Intervals

CQL supports intervals of numbers and date or time values and uses a standard mathematical notation to indicate open and closed. Brackets indicate a closed endpoint, and parentheses indicate an open endpoint. An open interval boundary excludes the endpoint and a closed interval boundary includes it. For example, `Interval[5, 10)` includes the point 5, but excludes the point 10. Intervals can be compared using a set of comparison operators such as `A during B`, `A overlaps B`, or `A includes B`. Precise relationships between intervals can be expressed using natural language timing phrases such as `A starts before start B` or `A starts 1 day or less after end B`.

The unit in which a time interval (or its duration) is expressed might depend on the necessary level of accuracy for the purposes of measurement, so select the time unit to use according to the level of granularity required to meet the intent of the measure. The Time Interval Calculations section of the CQL Formatting and Usage Wiki provides additional details related to timing, values, and calculations. In addition, Table 3 in Appendix B in this document provides time interval definitions and examples.

5. Data Elements and Value Sets

The data elements used in eCQMs are built from the datatypes and attributes in the QDM, located in the QDM—Quality Data Model section of the eCQI Resource Center website.

5.1 eCQM Data Element Repository (DERep)

The eCQM DERep provides additional clarification for all data elements associated with published and tested eCQMs used in CMS quality reporting programs, along with the definitions and clinical focus for each data element. An end user can filter information by data element, eCQM, QDM attribute, QDM category, or QDM datatype.

5.2 Value Set Location and Tools

Value Sets—Value Set Authority Center

The National Library of Medicine, in collaboration with CMS, maintains the Value Set Authority Center (VSAC). The VSAC provides downloadable access to all official versions of value set content contained in the eCQM specifications. The value sets are lists of unique coded identifiers with names (called descriptions) for groupings of clinical and administrative concepts selected from standard vocabularies. Value sets serve to define a set of concepts (for example, diabetes or clinical visit) that identify selected populations and satisfy measure criteria in eCQMs. Value sets used in eCQMs and available in the VSAC can either directly contain code system members or reference other value sets (a grouping value set). The VSAC also provides value set authoring capabilities for registered value set authors and updates value set content based on each new version of the underlying code systems, such as Current Procedural Terminology (CPT), International Classification of Diseases, Tenth Revision (ICD-10), Systematized Nomenclature of Medicine–Clinical Terms (SNOMED CT), or Logical Observation Identifiers Names and Codes (LOINC) used in value sets.

The National Library of Medicine has an application programming interface (API) to the VSAC content in addition to a web interface. The API documentation is available on the VSAC website in the Help section.

The VSAC website also links to downloadable value set content used in current and previous eCQM release sets. These downloads are provided in both Excel and sharing value sets–compliant XML for all EH/CAH value sets and EP/EC value sets.

The downloadable files include a column indicating the QDM category represented by each value set. For value sets used exclusively to express QDM attributes, the QDM category column is blank because an attribute might be used for more than one QDM category.

The value set spreadsheets do not include direct reference codes, which are used in the eCQMs. To obtain a separate listing of those codes, users must select the “Direct Reference Codes Specified with eCQM HQMF files, Publication Date: MM DD, YYYY.”

The VSAC also provides four additional resources:

- The binding parameter specification documents the information used to create the value set expansions made available for an annual release or addendum. The binding parameter

specification contains the code system version, the value set definition version, and the expansion profile information used to create each of the value set expansions included in the annual release, sorted by measure and QDM datatype.

- A list of retired and legacy codes in eCQM value sets published in the value set release.
- A list of the code system versions used in eCQM value sets published in the value set release.
- A list of direct reference codes, individual terminology codes specified within measure logic to describe QDM elements when a single code is appropriate rather than a value set.

Access to the VSAC requires a free Unified Medical Language System Metathesaurus License. Any use of value sets must be consistent with the licensing requirements and copyright protections covered by this license.

National Library of Medicine VSAC Collaboration Tool

The VSAC Collaboration Tool supports communication, knowledge management, and document management by value set authors and stewards. VSAC Collaboration provides a central website for value set authors to post value sets for collaborative discussion. Teams can share threaded discussions about the value sets, view recent value set expansions posted by site members, organize value sets by usage and the team's workflow needs, and receive activity and change notifications from VSAC.

The VSAC Collaboration Tool is accessible through the VSAC Collaboration tab. Training webinars and slides are available at the VSAC Users' Forum.

5.3 Direct Reference Codes

Beginning with QDM v5.3 Annotated, a *direct reference code* can serve to specify QDM elements in measure logic rather than creating single-code value sets. The use of direct reference codes prevents using an alternative identifier for a code system concept and eliminates additional implementation work to unpack the value set. These codes, such as birth date and death date, are included directly with the measure logic and in the terminology section of the HQMF. Some value sets that contain only one code, however, will continue to exist in the following circumstances:

- There is only one code available at the time the value set is created, but there is a reasonable expectation that additional codes will be created to represent the intent of the value set.
- A value set initially contained multiple codes, but all except one was retired by the code system or systems. Because the measure might have to allow look-back, the value set remains valid with only one active code.

An example of direct reference code use is CMS22v9, *Preventive Care and Screening: Screening for High Blood Pressure and Follow-Up Documented*, in which a single code within the CQL logic references diastolic blood pressure. This code is then listed in both the terminology and data criteria sections:

Encounter with High Blood Pressure Reading

```
      "Qualifying Encounter During Measurement Period" QualifyingEncounter
        let EncounterLastSystolicBP: Last(["Physical Exam, Performed":
      "Systolic blood pressure"] SystolicBP
            where SystolicBP.relevantDatetime during
      QualifyingEncounter.relevantPeriod
            sort by relevantDatetime
        ),
        EncounterLastDiastolicBP: Last(["Physical Exam, Performed":
      "Diastolic blood pressure"] DiastolicBP
            where DiastolicBP.relevantDatetime during
      QualifyingEncounter.relevantPeriod
            sort by relevantDatetime
        )
        where EncounterLastSystolicBP.result > 0 'mm[Hg]'
          and EncounterLastDiastolicBP.result > 0 'mm[Hg]'
          and ( EncounterLastSystolicBP.result >= 140 'mm[Hg]'
              or EncounterLastDiastolicBP.result >= 90 'mm[Hg]'
)
```

Terminology

- code "Diastolic blood pressure" ("LOINC Code (8462-4)")
- code "Systolic blood pressure" ("LOINC Code (8480-6)")

"Data Criteria (QDM Data Elements)

- "Physical Exam, Performed: Diastolic blood pressure" using "Diastolic blood pressure (LOINC Code 8462-4)"
- "Physical Exam, Performed: Systolic blood pressure" using "Systolic blood pressure (LOINC Code 8480-6)"

5.4 QDM Category and Code System

The CMS Measures Management System Blueprint includes QDM categories with recommended code systems for each category. Most data elements are linked to a value set, grouping value set, or a direct reference code that complies with these recommendations. Downloadable resources of value sets by QDM datatype are also available on the VSAC website at the download tab.

Some measures combine different options (definitions) to express instances of a single QDM datatype within the logic. An example for qualifying encounters can be found in the initial population for CMS131, *Diabetes: Eye Exam*:

Qualifying Encounters

```
      ( ["Encounter, Performed": "Office Visit"]

            union ["Encounter, Performed": "Annual Wellness Visit"]

            union ["Encounter, Performed": "Preventive Care Services -
            Established Office Visit, 18 and Up"]
```

```
union ["Encounter, Performed": "Preventive Care Services-Initial
Office Visit, 18 and Up"]

union ["Encounter, Performed": "Home Healthcare Services"]

union ["Encounter, Performed": "Ophthalmological Services"] )
ValidEncounter

where ValidEncounter.relevantPeriod during "Measurement Period"
```

In this example, the six encounters all use the same QDM datatype (`Encounter, Performed`) and each binds a grouped value set using a single code system and the logic (`union`) to express that any of these encounter types meet the measure criteria. Together, these six encounters provide codes that cover the recommended code system, SNOMED CT, as well as the transitional code systems, CPT and Healthcare Common Procedure Coding System (HCPCS).

CMS encourages users of the eCQMs updated for 2022 reporting or performance to suggest additions and deletions to data elements, both within value sets and between code systems. Users can submit their suggestions via the ONC Project Tracking System (Jira) Clinical Quality Measures Feedback System.

5.5 Drug Representations Used in Value Sets

Value sets referring to specific, non-vaccine, prescribable medications use generalized drug concepts (for example, RxNorm Semantic Clinical Drugs [SCDs]). It is expected that vendors or providers will report the drug entities in patient data using the generalized drug concepts included in the defined value sets. These accord with CMS's guidance about the preferred use of generalized drug concepts. Implementers should use the relationships found in RxNorm to support mapping between specific drug entities found in patient records to those found in the value sets provided. Administered vaccines are currently represented using Clinical Vaccine Formulation (CVX) codes.

5.6 Discharge Medications

The use of "Medication, Discharge" has a very specific meaning in the EH/CAH eCQMs. This designation refers to medications that have been reconciled and are listed on the patient's discharge medication list. **Do not confuse "Medication, Discharge" events with medications that happen to be active at the time of discharge.** "Medication, Discharge" events should start and end within the time duration of the episode of care, even though the patient might not start the medication itself until after the episode ends. It is expected that, at the time of discharge, discharge medications will be the same as the subsequent home medication lists for those medications that are germane to the quality measure, but do not assume this at the time of admission because changes might have occurred since the prior episode of care.

Example measure logic for `"Medication, Discharge"` is in CMS105, *Discharged on Statin Medication*, in which the numerator logic refers to a `"Statin at Discharge"` definition that contains `["Medication, Discharge": "Statin Grouper"]` and refers to the presence of a statin medication on the discharge medication list of the ischemic stroke encounter.

```
"Numerator"
      TJC."Ischemic Stroke Encounter" IschemicStrokeEncounter
            with "Statin at Discharge" DischargeStatin
                  such that DischargeStatin.authorDatetime during
                  IschemicStrokeEncounter.relevantPeriod
"Statin at Discharge"
      ["Medication, Discharge": "Statin Grouper"]
```

Vendors and providers generating Quality Reporting Document Architecture (QRDA) Category I output will have to generate `"Medication, Discharge"` events for all medications on the discharge list with appropriate timestamps to enable the correct function of measure logic.

5.7 Allergies to Medications and Other Substances

Allergy value sets referenced in measures contain appropriate codes from RxNorm that align to ingredient-level concepts. Users can use RxNorm relationships to link ingredients to the specific drug entities that could occur in patients' records. The reactions that occur, such as rash or wheezing, should be expressed using SNOMED CT codes that represent the appropriate condition.

This means that medication allergens included in "`Allergy/Intolerance`" value sets should be represented using RxNorm ingredient-type concepts. These concepts only identify the ingredient and not the form or strength, and they have the RxNorm term type consistent with ingredient-level identifiers. If patient allergy and intolerance data in the electronic health record (EHR) are not recorded using an RxNorm ingredient-type concept, reporting entities will have to use RxNorm relationships to identify the correct ingredient concept for the drug concept used in the EHR.

Beginning with the 2020 reporting year, in addition to the required approach for representing medication allergen (or ingredient) substances using RxNorm ingredient-type concepts noted previously, eCQMs can add SNOMED CT drug class concepts to represent medication allergens. If a drug class concept is appropriate for use in the measure, the following should occur:

- Measure developers will only include SNOMED CT drug class concepts when a general drug class concept is expected to be found in patient records as an indication that the patient is considered allergic *to all drugs in the class.*
- Implementers should keep in mind that when a drug class concept is used, this means the patient should receive *no drug in the class* for expected therapy.
- Measure authors will have reviewed all defined drugs included in the class when choosing to include the SNOMED CT drug class concept and will have defined an RxNorm allergy value set with the specific ingredient (IN) and precise ingredient (PIN) term types (TTY) drug ingredients that represent the drug class.
- A grouping value set, although not required, can be created, grouping both the RxNorm ingredient-type allergy value set and the SNOMED CT drug class allergy value set into one grouping value set that the measure then references.

The SNOMED CT substance hierarchy is expected to be used for coding nonmedication allergy-inducing entities.

5.8 Principal Diagnosis in Inpatient Encounters

From QDM v4.2 through QDM v5.4, QDM references `principal diagnosis` as an attribute of `Encounter, Performed`. The designation refers to the principal diagnosis of an episode of care. This is typically determined at or after discharge by a coder and is used for billing purposes. In EHRs, the principal diagnosis is typically chosen from diagnoses that were active during the encounter and, if consistent with the Uniform Hospital Discharge Data Set definition, should be labeled as principal. For purposes of measure computation, the principal diagnosis should be considered to start during the episode of care.

QDM v5.5 removed the `principal diagnosis` attribute. A new attribute of rank has been added that has an integer value. Rank defines the principal diagnosis as the encounter diagnosis with a rank of 1. See the example below from CMS111v9, *Median Admit Decision Time to ED Departure Time for Admitted Patients*:

```
/*Patient encounters with a principal diagnosis (rank=1) of
"Psychiatric/Mental Health Diagnosis*/
Global."Inpatient Encounter" EncounterInpatient
  where exists ( EncounterInpatient.diagnoses Diagnosis
      where Diagnosis.code in "Psychiatric/Mental Health Diagnosis"
        and Diagnosis.rank = 1
  )
```

Other diagnoses present within the encounter can be expressed with the `Encounter, Performed` attribute `diagnosis`; however, such other diagnoses may have started prior to, at the start of, or after the start of the encounter. The `Encounter, Performed` attribute `diagnosis` does not specify the exact timing relationship. Therefore, to express the timing relationship of a specific diagnosis with an encounter, the measure must use the QDM datatype `Diagnosis` to associate with the `Encounter, Performed` (that is, onset at the start or end of the episode of care). The admission or discharge diagnoses recorded by the provider should not substitute for the principal diagnosis unless they are concordant with the principal diagnosis as defined by CMS.

Vendors and providers generating QRDA Category I output must specify diagnoses appropriately to enable the measure logic to function correctly. Although the principal diagnosis is likely to commence before the episode of care, it should always be reported with a QRDA Category I entry that starts during the episode of care.

5.9 Medical Reason, Patient Reason, System Reason

Because of limitations in EHRs and the use of free text in some record systems, it may be difficult to capture certain data elements that should exclude patients or components of care (for example, medication administration or physician order not done) from a measure. The use of negation to identify these exclusions is expressed in the logic using *exceptions* and *exclusions*. The concepts of medical reason, patient reason, and system reason, when deemed appropriate by providers, are explanations for why an activity was not done and are selected to identify the

reason for the exception. For example, a rare but relevant comorbidity would be a medical reason for exclusion, whereas a patient's religious preference would be a patient reason for exception. These concepts are intended to be used only when the record has a documented reason for exclusion. Although it is not necessary to report that reason electronically, it is expected that there is a legitimate medical, patient, or system reason for exclusion and that supporting evidence is noted in the record.

Health IT vendors and providers using these concepts are expected to have a documented reason for these exclusions and could be expected to demonstrate the relevant justification if audited.

5.10 Activities That Were "Not Done"

A negation attribute may be used to identify situations in which an expected action did not occur, an order was not placed or administered, or a finding was not observed for a documented reason. Before April 2014, the approach to an action being "not done" required providing a single code to indicate that a set of activities were "not done." However, based on implementers' feedback, a new approach has been specified in the HL7 QRDA I Category I Implementation Guide, starting from 2015. The new approach requires negation against the entire value set by providing a nullFlavor code and the value set object identifier (OID) in a QRDA Category I file to indicate "not done."

Thus, providers are not required to arbitrarily specify that they did not perform a specific member from the value set, but can instead indicate what they did not do on *any* of the items in the value set. This approach applies to all datatypes (1) that use negation to describe activities "not done" and (2) where the eCQM specification for "not done" references a value set instead of a direct reference code. It does not change the expression of negation in the HQMF; however, it does require using an HL7 nullFlavor code instead of a specific code from the value set associated with these activities in the QRDA Category I file.

The intent of the nullFlavor in this context is to specify that *all* the activities in the value set were intentionally not done, not that a single activity was not done or that it is not known why that activity was not completed. It is not appropriate for users to certify that an activity was not done using negation unless the provider intentionally did not order or perform the activity in question and documented a justification why that was the case.

Figure 4a shows an example of "not done" in CQL from CMS108, *Venous Thrombosis Prophylaxis*.

Figure 4a. Example of "Not Done" in CQL.

```
◢ No VTE Prophylaxis Medication or Device Due to Patient Refusal

    ( "No VTE Prophylaxis Medication Administered or Ordered"
        union "No VTE Prophylaxis Device Applied or Ordered" ) NoVTEProphylaxis
        where NoVTEProphylaxis.negationRationale in "Patient Refusal"

◢ No VTE Prophylaxis Medication Administered or Ordered

  ["Medication, Not Administered": "Low Dose Unfractionated Heparin for VTE Prophylaxis"]
      union ["Medication, Not Administered": "Low Molecular Weight Heparin for VTE Prophylaxis"]
      union ["Medication, Not Administered": "Injectable Factor Xa Inhibitor for VTE Prophylaxis"]
      union ["Medication, Not Administered": "Warfarin"]
      union ["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"]
```

Figure 4b shows a corresponding QRDA I negation instance example for "Medication, Not Administered: Low Molecular Weight Heparin for VTE Prophylaxis." due to patient refusal"

Figure 4b. Corresponding QRDA I Example of a Negation Instance "Not Done"

```
<!-- Medication, Note Administered": "Low Molecular Weight Heparin for VTE Prophylaxis" -->
<!-- negationRationale in "Patient Refusal" -->
<substanceAdministration classCode="SBADM" moodCode="EVN" negationInd="true">
  ...
  <consumable>
    <manufacturedProduct classCode="MANU">
      ...
      <manufacturedMaterial>
        <code nullFlavor="NA" sdtc:valueSet="2.16.840.1.113883.3.117.1.7.1.219">
          <originalText>None of value set: Low Molecular Weight Heparin for VTE Prophylaxis</originalText>
        </code>
      </manufacturedMaterial>
    </manufacturedProduct>
  </consumable>
  <author>
    <templateId root="2.16.840.1.113883.10.20.24.3.155" extension="2019-12-01"/>
    <time value='20201101060000'/>
    ...
  </author>
  <entryRelationship typeCode="RSON">
    <observation classCode="OBS" moodCode="EVN">
      ...
      <code code="77301-0" codeSystem="2.16.840.1.113883.6.1" displayName="reason" codeSystemName="LOINC"/>
      <value code="105480006" displayName="Refusal of treatment by patient (situation)"
        codeSystem="2.16.840.1.113883.6.96" codeSystemName="SNOMED-CT" xsi:type="CD"/>
    </observation>
  </entryRelationship>
</substanceAdministration>
```

Vendors and providers using these concepts are expected to have a documented reason for patient exceptions and could be expected to demonstrate the relevant justification if audited.

Beginning with QDM v5.3 Annotated, a direct reference code could serve to specify QDM elements in measure logic rather than creating value sets. For a "not done" measure logic specified using value sets, the approach described previously should be followed when the report is "not done." If "not done" measure logic is specified using a direct reference code, then the *direct reference code* itself should be negated directly and nullFlavor should not be used when submitted in a QRDA Category I file. For calendar year 2021 reporting, the 2021 CMS QRDA I Implementation Guide and its base standard, the HL7 QRDA I Category 1 Standard for Trial Use Release 5.2 with errata, provide additional guidance on how to use null values to describe activities that were "not done" using value sets, and how to report "not done" if a direct reference code is used.

5.11 Clinical Trial Participation

Participation in a clinical trial could be a reason to exclude a patient from an expected course of action in some eCQMs, but only participation in certain types of trials might be relevant based on the measure steward's intent. Because of limitations in data from EHRs, eCQMs might not

capture the specific nature of clinical trial participation. Measure developers have taken two approaches to address this issue. In some cases, particularly for hospital measures, developers removed clinical trial participant exclusions from the measure. In other cases, developers provided guidance for the type of clinical trial that should be considered to meet the measure's intent. It is recommended that implementers carefully review the guidance regarding clinical trial participation and developer intent for acceptable types of clinical trials.

5.12 Newborn/Gestational Age

eCQM CMS9 is designed for use in an encounter that includes delivery, birth, or the time immediately after birth and requires capture of gestational age. In the specifications, a newborn at term indicates the gestational age is greater than or equal to 37 weeks and 0 days using best estimated due date and rounded off to the nearest completed week. This represents a derived value calculated from existing data. This measure represents the gestational age calculation as an observation (that is, the result of an `Assessment, Performed`), ideally as a component of a standard labor and delivery assessment during delivery, or prenatal assessments before delivery.

5.13 Entities

QDM v5.5 introduces a new concept called entities. Entities are not QDM datatypes or attributes. Rather, they represent concepts that can serve to specify details about the actor (or performer) of any QDM datatype. An eCQM can use entities to provide further information required for an individual or organization actor to meet the measure's criteria.[3]

The new QDM entities are Patient, Related Person, Practitioner, and Organization.

Patient refers to an individual receiving health care services. Related Person is someone who is involved in the care of a patient but is not the direct target of care; this entity includes an identifier and a relationship (for example, mother to a newborn infant). Practitioner is a person with formal responsibility to provide healthcare with an ability to reference an identifier, role, qualification or specialty. Organization is a grouping of people or organizations with a common purpose and includes identifier and type attributes. Full definitions of the four entities and their attributes can be found in the QDM v5.5 documentation.

For complete technical details about the QDM, such as definitions of all its QDM datatypes and attributes, please refer to the QDM v5.5 specification. For information on versions to use in each reporting period, please visit the eCQI Resource Center.

5.14 Supplemental Value Sets Representing Race and Ethnicity

5.14.1 Race and Ethnicity

The eCQM specifications limit the reporting of patient race to the Centers for Disease Control and Prevention's (CDC's) value set "Race" 2.16.840.1.114222.4.11.836:

Code Description

[3] Please see https://ecqi.healthit.gov/sites/default/files/QDM-v5-5-errata-August2019-508.pdf.

1002-5 American Indian or Alaska Native

2028-9 Asian

2054-5 Black or African American

2076-8 Native Hawaiian or Other Pacific Islander

2106-3 White

2131-1 Other Race

To report an individual patient with a single race category in QRDA Category I, users enter one of the five U.S. Office of Management and Budget race category codes (1002-5, 2028-9, 2054-5, 2076-8, and 2106-3) in raceCode. To report an individual patient with more than one race category, the user reports one race in raceCode and additional races using sdtc:raceCode. In accordance with the standard, all the race codes placed here are equivalent in priority. Users should not use QRDA Category I, *Other Race* 2131-1, because missing patient race information should be described using null values (described in the paragraphs that follow).

For QRDA Category III files, users should identify a patient with multiple races using raceCode category 2131-1 Other Race. This enables patients with multiple races to be expressed in an aggregate document without creating multiple entries for a single patient with multiple races. Only QRDA Category III files should use the raceCode 2131-1 Other Race to express a raceCode category.

Similarly, the specifications limit the reporting of ethnicity to the CDC value set "Ethnicity" 2.16.840.1.114222.4.11.837:

2135-2 Hispanic or Latino

2186-5 Not Hispanic or Latino

In addition, the 2015 Cert Rule states the following:

§170.315 (a)(5) *Demographics*—

1. Enable a user to record, change, and access patient demographic data including race, ethnicity, preferred language, sex, sexual orientation, gender identity, and date of birth.
    1. *Race and ethnicity.*
        1. Enable each one of a patient's races to be recorded in accordance with, at a minimum, the standard specified in § 170.207(f)(2) and whether a patient declines to specify race.
        2. Enable each one of a patient's ethnicities to be recorded in accordance with, at a minimum, the standard specified in § 170.207(f)(2) and whether a patient declines to specify ethnicity.
        3. Aggregate each one of the patient's races and ethnicities recorded in accordance with paragraphs (a)(5)(i)(A)(*1*) and (*2*) of this section to the categories in the standard specified in § 170.207(f)(1).

Notably, the CDC value sets for race and ethnicity do not contain code(s) for "Patient Decline."

To communicate that a demographic element is unknown or that the patient declined to provide the information for race and ethnicity, use the built-in nullFlavor feature of QRDA, which is designed for this purpose. The nullFlavor feature works for race, ethnicity, preferred language, and other cases in which the QRDA calls for a value from a value set and nullFlavor is allowed as specified by the standard.

Generally, race in a QRDA is presented as follows:

```
<raceCode code="2106-3"
displayName="White"codeSystem="2.16.840.1.113883.6.238"/>
```

When the value is unknown, use the nullFlavor UNK for “Unknown”:

```
<raceCode nullFlavor="UNK"/>
```

When the patient declined to answer, use the nullFlavor ASKU for “Asked but Unknown”:

```
<raceCode nullFlavor="ASKU"/>
```

5.14.2 ONC AdministrativeSex Value Set

Beginning with 2017 performance and reporting, any value set to identify a patient’s gender uses codes from the AdministrativeGender (not AdministrativeSex) code system when specifying birth sex. The actual codes (M and F) did not change. ONC has created a new definition version for all gender value sets in which the code system changed from AdministrativeSex to AdministrativeGender. The value set OIDs of the two affected value sets remain the same. The code system does not include the HL7 V2 code “Unknown,” which means the AdministrativeSex value set (unchanged OID 2.16.840.1.113762.1.4.1) now contains only the codes:

F	Female
M	Male

The code system to be used when representing the gender of the patient is the AdministrativeGender (OID: 2.16.840.1.113883.5.1) code system, which is currently used for the ONC AdministrativeSex value set required for recording the patient gender in a QRDA Category I. The value sets for 2017 performance and reporting use the gender-specific value sets within eCQM logic to identify gender-specific patient populations and the AdministrativeGender code system to define the included code in the value set. These value sets previously used the older AdministrativeSex code system. Because the actual codes (“M” and “F”) are the same in both code systems, the codes included in each gender-specific value set remain the same. With this change, however, the version of the value set will change. The following two value sets are affected:

1. “Female” (OID: 2.16.840.1.113883.3.560.100.2)
2. “Male” (OID: 2.16.840.1.113883.3.560.100.1)

The value set intent is to capture the biologic phenotypic sex as recorded on the patient’s birth certificate. If the data is missing, it is not possible to determine the patient sex, or if the patient’s

birth certificate sex is undetermined, then the nullFlavor "UNK" should be used, as described above in race and ethnicity section.

The CMS QRDA Implementation Guide provides additional guidance on how to use null values to describe race, ethnicity, and AdministrativeSex data when the response is declined by the patient or is unknown.

5.15 ICD-9 and ICD-10 Codes in Value Sets

5.15.1 Use of Non-Clinical or Administrative Code Systems

Specifications for eCQMs include terminologies in value sets derived from clinical vocabulary standards and those originally specified for administrative purposes, such as billing and payment or mortality data. As an example, diagnosis value sets contain terms in the standard vocabulary (SNOMED CT) and the transition vocabularies (ICD-9 and ICD-10). A complete list of value sets and direct reference codes used in eCQMs is available for download from the VSAC.

In October 2015, CMS formally retired the use of ICD-9 code systems for billing and reporting purposes. CMS designated a one-year period of transition to complete the phasing out of the ICD-9 content, which ended on October 1, 2016. The eCQMs, however, use ICD-9 codes in multiple ways, including look-back periods or to reference historical data. Therefore, CMS provided the following guidance to developers:

> For ICD-9 codes in the 2017 measure updates, measure developers were directed to review all ICD-9 codes in measure value sets as with any measure update. For ICD-9 value sets, the expectation is they will be removed if they only pull patients into the measure based on timing starting from the end of CMS's transition period to ICD-10. Therefore, it is expected that many ICD-9 value sets will remain to represent historical data and that is permitted per a consensus-based decision across the eCQM stakeholder federal agencies and partners. It is not expected that any new ICD-9 value sets will be added, however we are aware of one instance where ICD-9 was added to account for a data element requiring a look-back period. Moving forward, we expect the gradual phasing out of ICD-9 codes in the value sets.

Measure implementers should carefully review technical release notes and value sets to determine the areas in which value set changes might affect their ability to capture data for the 2022 reporting and performance period and adjust accordingly.

5.15.2 Value Set Addendum

Based on input from eCQM users requesting that eCQMs include current codes, CMS might release a value set addendum of new codes for use in performance and reporting *after* the initial eCQM annual specification updates are published. Value set addenda only include changes in value sets codes and do not make changes to eCQM logic or to value set OIDs. Value set addenda and updated supporting materials, such as the binding parameter specification document, are available through links on the EH/CAH measures and EP/EC measures pages on the eCQI Resource Center site. The complete set of addendum value sets (both changed and

unchanged) will be made available on the VSAC download page. Should CMS publish an addendum, links to previous versions of value sets and supporting materials will be made available on the "View Archive" section of the EP and CAH page as well as EP/EC pages of the eCQI Resource Center site.

5.16 Display of Human-Readable HQMF

The human-readable HTML file of an eCQM is contained in the measure specification package zip file. Users can also view the human-readable display directly on the measure page for a specific eCQM on the eCQI Resource Center site.

6. Measure Guidance—Measure Release Notes

CMS provides measure guidance to help users understand and implement eCQMs. Measure guidance is available in the human-readable HTML and the eCQM HQMF XML files within the measure specification package zip files located on the eCQI Resource Center website. The guidance is available in the measure header, in the inline comments in the measure logic itself, and in the release note section of each individual eCQM posted on the eCQI Resource Center site. Consider guidance to be critical to the correct implementation of the quality measure. Certification testing and measure reporting, however, will look only for the computable, coded elements present within the measure logic.

The technical release notes are available for EHs/CAHs and for EPs/ECs on the eCQI Resource Center site.

7. ONC Project Tracking System (Jira)—Clinical Quality Measure Feedback System

CMS contractors manage and respond to eCQM stakeholders through the Jira feedback system. The system supports feedback and questions in all phases of the eCQM life cycle, including development; approval; implementation; and updates regarding measure intent, specifications, certification, standards, and errors associated with the eCQMs. Users should report most issues related to eCQMs to the eCQM Issue Tracker; users can also ask questions or raise issues about other eCQM tools and standards to the eCQM Issue Tracker. Quality reporting issue trackers include the following:

- Bonnie/MAT Issue Tracker—Issues with eCQM development and testing tools
- CMS Hybrid Measures—Issues with CMS hybrid measures
- Comments on eCQMs under Development—Feedback on proposed U.S. Department of Health and Human Services eCQMs implementation feasibility
- CQL Issue Tracker—CQL development and implementation issues
- CYPRESS Issue Tracker—Certification testing tool test cases and implementation issues
- eCQM Known Issues Tracker—Implementation information on eCQMs with known technical issues for which a solution is under development but not yet available in a published eCQM specification
- QDM Issue Tracker—QDM development and implementation issues
- QDM Known Issues Tracker—Guidance for eCQM developers and implementers on interpreting QDM attributes
- QRDA Issue Tracker—QRDA implementation issues
- QRDA Known Issues Dashboard—Implementation information for QRDA Implementation Guides (IGs) or supporting documents with known technical issues for which a solution is under development but might not be published

The ONC Jira homepage provides information about creating a Jira account, searching for an issue, and creating an issue (ticket). An end user must create an account and sign in to create, watch, or comment on an issue. Before reporting a new issue, users should first search Jira to determine whether a similar question has already been reported and addressed. If the issue has been reported, users can watch an issue, which enables them to receive updates on the issue.

When reporting a new issue, users should fill out the ticket completely. Users should select a title that summarizes the issue, describe the issue in the description field, and include the measure name and version number. CMS encourages users to add attachments—without protected health information—whenever possible to facilitate a quick and accurate response. If users enter insufficient information, the issue is labeled “Pending for clarification” and will not include a response until the user or reporter updates the ticket. An issue in “Solution review” is a proposed solution and should not be considered final until the ticket is “Resolved.” Tickets will not be closed until final correction of the identified issue has been completed. There could be delays in responding to issues that require updates to standards or feedback from many stakeholders.

If a response is insufficient to answer an issue entered, the reporter can “Reopen” the issue. The reporter should explicitly state how the previous answer did not adequately address the issue. It is appropriate to comment or send an email regarding a missing resolution if there has not been any update or response in more than two weeks and there is no comment from the assignee explaining the delay or when the approximate resolution will be available.

8. CMS Quality Program Helpdesks

Direct questions on CMS quality and value-based purchasing program reporting requirements to the specific CMS quality reporting program as follows:

- Hospital Inpatient Quality Reporting program: Contact the Hospital Inpatient Value, Incentives, and Quality Reporting Outreach and Education Support Team at https://cmsqualitysupport.servicenowservices.com/qnet_qaor or (844) 472-4477.
- Medicare Promoting Interoperability Program (previously known as the Medicare Incentive Programs): Contact the Quality Net Help desk for assistance at qnetsupport@hcqis.org or 1-888-734-6433/TTY: 888-734-6563.
- QualityNet Secure Portal, Pre-Submission Validation Application tool and file-error messages: Contact the QualityNet Help Desk at qnetsupport@hcqis.org or (866) 288-8912.
- Quality Payment Program: Contact QPP@cms.hhs.gov or (866) 288-8292/TTY or 1-877-715-6222.

Version History

Version	Date	Author / Owner	Description of Change
1.13	May 5, 2017	CMS / ONC (MITRE)	• Updated language in Introduction to include Merit-based Incentive Payment System Eligible Clinician and broadened from specific quality reporting programs to generic • Removed tools, resources, and standards references, now referencing the eCQI Resource Center for this information • Renumbered and updated Table 3, Example Inputs and Results for Overlap
			Section 2: • Updated language in subsections 2.1, 2.2, 2.3, 2.4 • Converted table graphic to image, Figure 1 (Sample Measure Item Count), in subsection 2.2
			Section 3: • Modified introductory paragraph in Section 3 • Removed Tables 1 and 2, Eligible Professional and Eligible Clinician eCQM Types and Versions and Eligible Hospital eCQM Types and Versions
			Section 4: • Updated language and logic sample in subsections 4.3.1, 4.3.3, 4.6, 5.2, 5.3 • Updated language in subsections 4.3.2, 4.3.4, 4.3.5
			Section 6: • Updated language in subsection 6.1—UHSIK • Updated language in subsection 6.2—QDM Category and Code System • Updated language in subsection 6.5—Allergies to Medications and Other Substances • Updated language in subsection 6.6—Principal Diagnosis in Inpatient Encounters • Updated language in subsection 6.9—Activities That Were “Not Done” • Updated language in subsection 6.10—Newborn/Gestational Age • Updated language in subsection 6.11—Source • Updated language in subsection 6.12—Patient Characteristic Birthdate and Patient Characteristic Expired • Added subsection 6.15.2—The 2016 Value Set Addendum

Version	Date	Author / Owner	Description of Change
			Appendix B • Updated table number for Table 3 Time Interval Definitions and Examples
			• Updated acronym list
2.0	May 4, 2018	CMS (MITRE)	• Updates and edits resulting in version 2.0 for release
3.0	May 3, 2019	CMS (Mathematica)	• Updated measure examples, figures, hyperlinks, and versions of standards referenced throughout • Revised text based on input from stakeholders and external reviewers • Updated acronym list
4.0	May 2020	CMS (Mathematica)	• Updated measure examples, figures, hyperlinks, and versions of standards referenced throughout • Revised text based on input from stakeholders and external reviewers • Updated acronym list
5.0	May 2021	CMS (Mathematica)	• Updated measure examples, figures, hyperlinks, and versions of standards referenced throughout • Removed measure tables • Revised text based on input from stakeholders and external reviewers • Added section on hybrid measures, pre-rulemaking section, and telehealth information • Added reference to eCQM and QRDA Known Issue trackers

Appendix A. Standards and Code Systems

Standards related to the updated eCQM specifications for 2022 reporting/performance:

- HQMF R1 Normative – HL7 Version 3 Standard: Representation of the Health Quality Measure Format (eMeasure) Release 1
- HL7 V3 CQL-based HQMF Implementation Guide R1 STU 4– HL7 Version 3 Implementation Guide: Clinical Quality Language (CQL)-based Health Quality Measure Format (HQMF), Release 1 - US Realm, Standard for Trial Use 4
- CQL R1 STU 4 – Clinical Quality Language Specification, Release 1 STU 4
- QRDA I R1 STU R5.2 – Quality Reporting Document Architecture - Category I Standard for Trial Use Release 5.2 (June 2020)
- QRDA III R1 STU R2.1 – Quality Reporting Document Architecture - Category III Standard for Trial Use Release 2.1 (June 2017)
- QDM v5.5 – Quality Data Model Version 5.5 Guidance Update

  CMS QRDA IGs – CMS Quality Reporting Document Architecture Implementation Guides (CMS QRDA I IG for Hospital Quality Reporting released in Spring 2021 for the 2022 reporting period, and CMS QRDA III IG v1 for Eligible Clinicians and Eligible Professionals

Code system versions used in the eCQM specifications for 2022 reporting/performance:

The binding parameter specification is a metadata file that provides a record of the value set metadata (binding and parameter) information that defines the value set code lists specified by published CMS eCQMs. Measure implementers can use the specification to track versions and other parameters that define the value set code lists for each eCQM release. The binding parameter specification is available from VSAC at https://vsac.nlm.nih.gov/download/ecqm.

- AdministrativeGender HL7V3.0_2020-11—Administrative Gender Value Set
- CDCREC 1.2—Centers for Disease Control and Prevention Race and Ethnicity Code Set
- CDT 2021—Current Dental Terminology
- CPT 2021—Current Procedural Terminology
- CVX 2020-12-22—Clinical Vaccine Formulation
- HCPCS 2021—Healthcare Common Procedure Coding System
- HSLOC 2020—NHSN Healthcare Service Location Codes
- ICD-9-CM 2013—International Classification of Diseases, Ninth Revision, Clinical Modification(in use because of look-back periods of some eCQMs)
- ICD-10-CM 2021—International Classification of Diseases, Tenth Revision, Clinical Modification,
- ICD-10-PCS 2021—International Classification of Diseases, Tenth Revision, Procedure Coding System,
- LOINC 2.69—Logical Observation Identifiers Names and Codes

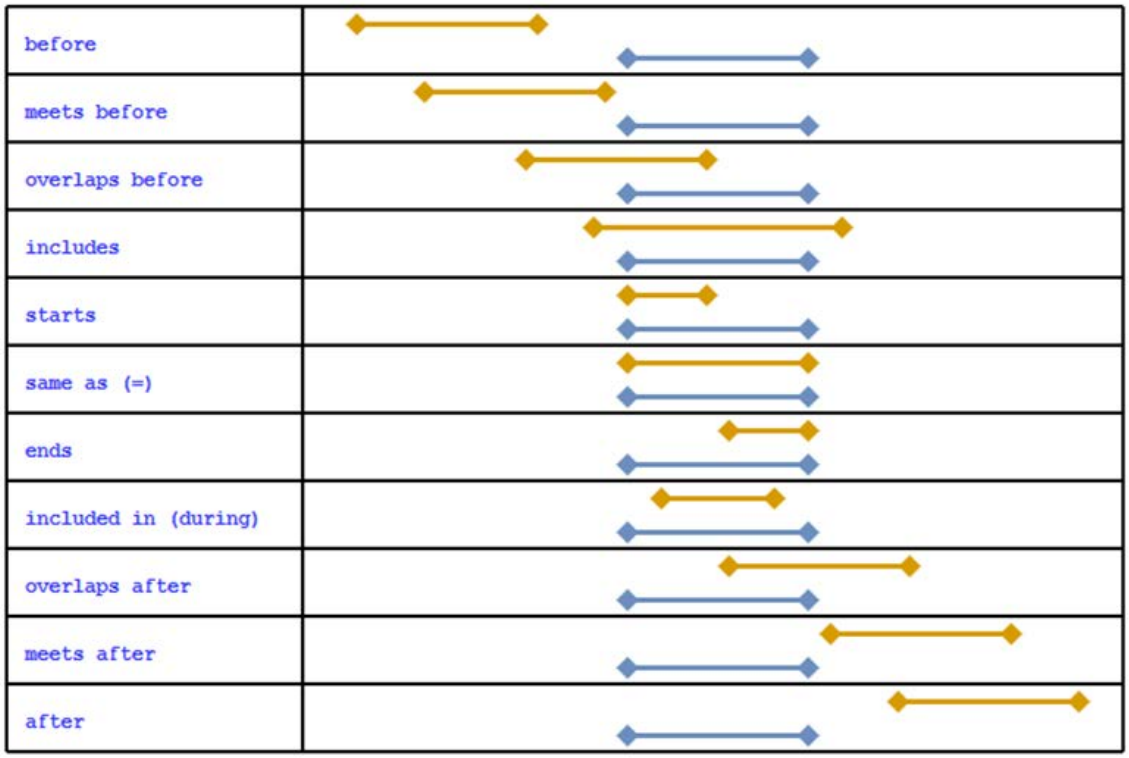
- RxNorm 2021-01—A normalized naming system for generic and branded drugs
- SNOMED CT US Edition 2020-09—A comprehensive and precise health terminology for electronic exchange of clinical health information
- SOP 9.2—Source of Payment

Appendix B. Time Interval Definitions and Examples

Interval Comparisons:

CQL provides a complete set of interval comparison operators (Figure 5):

Figure 5. Interval Comparison Operators



These are described more in sections 4.5.2 and 4.5.3.

Timing Phrases

CQL also supports timing phrases (Figure 6) that make it easier to express precise relationships between intervals using natural language. The before and after operators can have a prefix ofstartsorends, and a suffix ofstartorend. For example:

IntervalX starts before start IntervalY

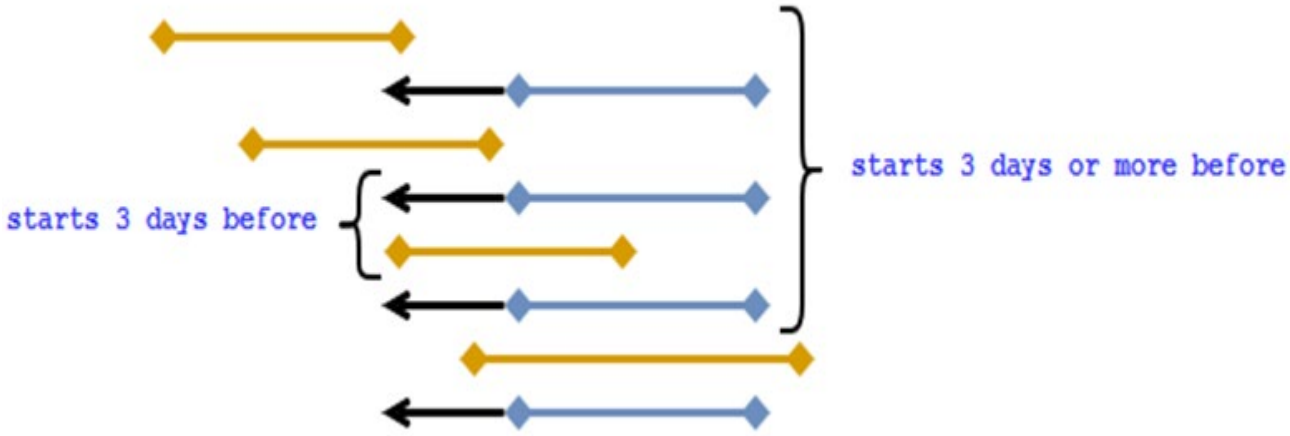
Figure 6. Interval Starts Before Start

The before and after operators can also take an offset that indicates how far away a given relationship should be. The offset can be absolute, indicating that the boundary of the interval must be on the offset, or it can be relative, indicating that the boundary must be at least on the offset (Figure 7):

IntervalX starts 3 days before start IntervalY

IntervalX starts 3 days or more before start IntervalY

Figure 7. Interval Starts Before Start with Offset



You can also specify a range for the boundary relationship using the within..of operator, as shown in Figure 8:

IntervalX starts within 3 days of start IntervalY

Figure 8. Interval Starts Within

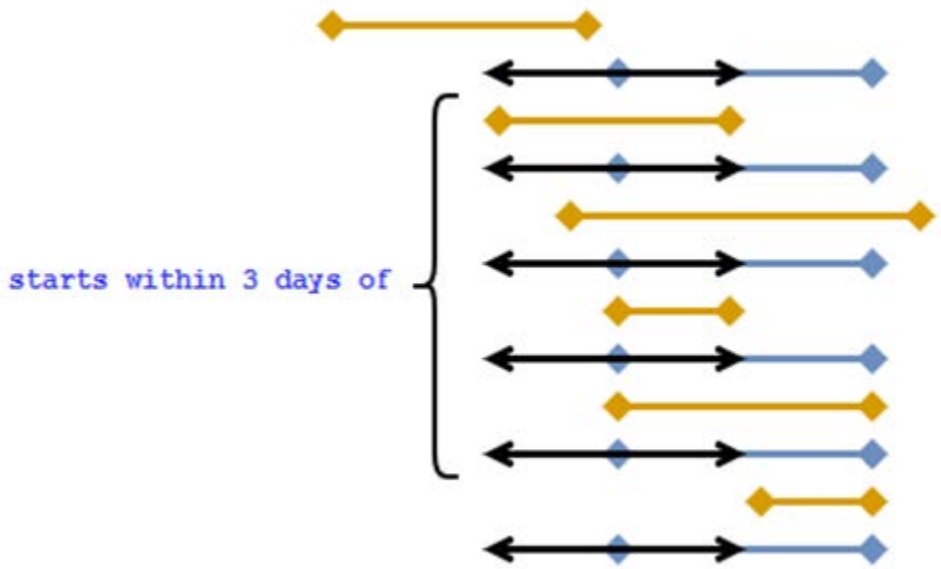


Table 1. Time Interval Definitions and Examples

Unit	CQL Definition	Examples
Year	Defined as the duration of any time interval that starts at a certain time of day, at a certain calendar date of the calendar year, and ends at one of the following: • The same time of day on the same calendar date of the next calendar year, if it exists • The same time of day on the immediately following calendar date of the next calendar year, if the same calendar date of the next calendar year does not exist **Note:** If, in the next calendar year, the same calendar date does not exist, the International Organization for Standardization states that the ending calendar day has to be agreed upon. The above convention is used in CQL as a resolution to this issue.	Month (date 2) < month (date 1): Duration (years) = year (date 2) - year (date 1) - 1 **Example 1:** Date 1: 2012-**03**-10 22:05:09 Date 2: 2013-**02**-18 19:10:03 Duration = year (date 2) - year (date 1) - 1 = 2013 - 2012 - 1 = **0 years** Month (date 2) = month (date 1) and day (date 2) >= day (date 1) Duration (years) = year (date 2) - year (date 1) **Example 2.a:** day (date 1) = day (date 2) Date 1: 2012-03-**10** 22:05:09 Date 2: 2013-03-**10** 22:05:09 Duration = year (date 2) - year (date 1) = 2013 - 2012 = **1 year** ***Note:*** *Time of day is important in this calculation. If the time of day of date 2 were less than the time of day for date 1, the duration of the time interval would be 0 years according to the definition.*

Unit	CQL Definition	Examples
		Example 2.b: day (date 2) > day (date 1) Date 1: 2012-03-10 22:05:09 Date 2: 2013-03-20 04:01:30 Duration = year (date 2) - year (date 1) = 2013 - 2012 = **year** Month (date 2) = month (date 1) and day (date 2) < day (date 1) Duration (years) = year (date 2) - year (date 1) - 1 **Example 3.a:** Date 1: 2012-02-29 Date 2: 2014-02-28 Duration = year (date 2) - year (date 1) - 1 = 2014 - 2012 - 1 = **1 year**
Year		Month (date 2) > month (date 1) Duration (years) = year (date 2) - year (date 1) **Example 4.a:** Date 1: 2012-*03*-10 11:16:02 Date 2: 2013-*08*-15 21:34:16 Duration = year (date 2) - year (date 1) = 2013 - 2012 - **1 year** **Example 4.b:** Date 1: 2012-*02*-29 10:18:56 Date 2: 2014-*03*-01 19:02:34 Duration = year (date 2) - year (date 1) = 2014 - 2012 = **2 years** ***Note:*** *Because there was no February 29 in 2014, the number of years can only change when the date reaches March 1, the first date in 2014 that surpasses the month and day of date 1 (February 29).*

Unit	CQL Definition	Examples
Month	Defined as the duration of any time interval that starts at a certain time of day at a certain calendar day of the calendar month and ends at one of the following: • The same time of day at the same calendar day of the ending calendar month, if it exists • The same time of day at the immediately following calendar date of the ending calendar month, if the same calendar date of the ending month in the ending year does not exist **Note:** If, in the next calendar year, the same calendar date does not exist, the International Organization for Standardization states that the ending calendar day has to be agreed upon. The above convention is used in CQL as a resolution to this issue.	Day (date 2) >= day (date 1) Duration (months) = (year (date 2) - year (date 1)) * 12 + (month (date 2) - month (date 1)) **Example 1.a:** Date 1: 2012-03-01 14:05:45 Date 2: 2012-03-31 23:01:49 Duration = (year (date 2) - year (date 1)) * 12 + (month (date 2) - (month (date 1)) = (2012 - 2012) * 12 + (3 - 3) = **0 months** **Example 1.b:** Date 1: 2012-03-10 22:05:09 Date 2: 2013-06-30 13:00:23 Duration = (year (date 2) - year (date 1)) * 12 + (month (date 2) - (month date 1)) = (2013 - 2012) * 12 + (6 - 3) = 12 + 3 = **15 months** Day (day 2) < day (date 1) Duration (months) = (year (date 2) - year (date 1)) * 12 + (month (date 2) - month (date 1)) - 1 **Example 2:** Date 1: 2012-03-10 22:05:09 Date 2: 2013-01-09 07:19:33 Duration = (year (date 2) - year (date 1)) * 12 + (month (date 2) - month (date 1)) - 1 = (2013 - 2012) * 12 + (1 - 3) - 1 = 12 - 2 - 1 = **9 months**
Weeks	Defined as a duration of any time interval that starts at a certain time of day at a certain calendar day at a certain calendar week and ends at the same time of day at the same calendar day of the ending calendar week. In other words, a complete week is always seven days long.	Duration = [date 2 - date 1 (days)] / 7 **Example 1:** Date 1: 2012-03-10 22:05:09 Date 2: 2012-03-20 07:19:33 Duration = [# days (month (date 1)) - day (date 1) + # days (month (date 1) + 1) + #days (month (date 1) + 2) + ... + # days (month (date 2) - 1) + day (date 2)] / 7 = (20 - 10) / 7 = 10 / 7 = **1 week**
Days	Defined as a duration of any time interval that starts at a certain calendar day and ends at the next calendar day (1 second to 23 hours, 59 minutes, and 59 seconds). The duration in days between two dates will generally be given by subtracting the start calendar date from the end calendar date, respecting the time of day between the two dates.	Time (date 2) < time (date 1) Duration = [date 2 - date 1 (days)] - 1 **Example 1:** Date 1: 2012-01-31 12:30:00 Date 2: 2012-02-01 09:00:00 Duration = 02-01 - 01-31 - 1 = **0 days** Time (date 2) >= time (date 1) Duration = date 2 - date 1 (days) **Example 2:** Date 1: 2012-01-31 12:30:00 Date 2: 2012-02-01 14:00:00 Duration = 02-01 - 01-31 = **1 day**
Hours	Defined as 60 minutes	**Example 1:** Date 1: 2012-03-01 03:10:00

Unit	CQL Definition	Examples
	The duration in hours between two dates is the number of minutes between the two dates, divided by 60. The result is truncated to the unit.	Date 2: 2012-03-01 05:09:00 Duration = **hour** **Example 2:** Date 1: 2012-02-29 23:10:00 Date 2: 2012-03-01 00:10:00 Duration = **1 hour** **Example 3:** Date 1: 2012-03-01 03:10 Date 2: 2012-03-01 04:00 Duration = **0 hours**
Minutes	Defined as 60 seconds The duration in minutes between two dates is the number of seconds between the two dates, divided by 60. The result is truncated to the unit.	**Example 1:** Date 1: 2012-03-01 03:10:00 Date 2: 2012-03-01 05:20:00 Duration = **130 minutes** **Example 2:** Date 1: 2012-02-29 23:10:00 Date 2: 2012-03-01 00:20:00 Duration = **70 minutes**

Acronyms

ACE	angiotensin-converting enzyme
API	application programming interface
ARB	angiotensin receptor blocker
CAH	critical access hospital
CDC	Centers for Disease Control and Prevention
CMS	Centers for Medicare & Medicaid Services
CPT	Current Procedural Terminology
CQL	Clinical Quality Language
CVX	Clinical Vaccine Formulation
DENEX	denominator exclusion
DENOM	denominator
DEXCEP	denominator exception
EC	eligible clinician
eCQI	Electronic Clinical Quality Improvement
eCQM	electronic clinical quality measure
ED	emergency department
EH	eligible hospital
EHR	electronic health record
EP/EC	eligible professional/eligible clinician
HCPCS	Healthcare Common Procedure Coding System
HL7	Health Level Seven International
HQMF	Health Quality Measures Format
HTML	Hypertext Markup Language
HSLOC	Healthcare Service Location Codes
ICD	International Classification of Diseases
IG	implementation guide
IN	ingredient (RxNorm term type)
IQR	Inpatient Quality Reporting
ISO	International Organization for Standardization
LOINC	Logical Observation Identifiers Names and Codes

MAT	Measure Authoring Tool
MIPS	Merit-based Incentive Payment System
NHSN	National Healthcare Safety Network (CDC)
NLM	National Library of Medicine
NUMER	numerator
NUMEX	numerator exclusion
OID	object identifier
ONC	Office of the National Coordinator for Health Information Technology
PIN	precise ingredient (RxNorm term type)
QDM	Quality Data Model
QPP	Quality Payment Program
QRDA	Quality Reporting Document Architecture
SNOMED	Systematized Nomenclature of Medicine
TTY	term type
VSAC	Value Set Authority Center
XML	eXtensible Markup Language