Clinical Quality eMeasure Logic and Implementation Guidance v1.2

This guidance document is for use with the 2014 electronic CQM measures released on December 21, 2012

Contents

1 Purpose

This document provides guidance for those interested in understanding, using, and/or implementing the clinical quality measure electronic specifications. These specifications are released for use for Clinical Quality Measures (CQM) reporting beginning in 2014 under the Meaningful Use EHR Incentive Program of the Centers for Medicare and Medicaid Services (CMS). We recommend that you review this document along with the electronic specifications for the CQMs, which include human readable descriptions and XML files to build a complete understanding of each measure's intent and operation prior to any implementation. Updates to the information in this document and additional help can be found on the CMS website

This document provides the following information:

1. Sections 2 through 5 provides general implementation guidance including defining how specific logic and data elements should be conceptualized and addressed during CQM implementation.
2. Section 5.1 provides detailed guidance for specific EH measures.
3. Section 5.2 provides detailed guidance for specific EP measures.
4. The appendices provide additional detail on versioning, time interval calculations, and documentation for a calculation in CMS179

For more information regarding measure titles, endorsement, and versioning, please see "Appendix A: Versioning and Endorsement" or refer to the CMS website.

For additional information that is directly relevant to implementing the 2014 CQMs, please refer to the following resources:

1. CMS 2014 Clinical Quality Measures on the CMS Website
2. CMS Measure Management System
3. NQF Quality Data Model 2.1.1.1
4. NQF Measure Authoring Tool
5. HL7 CDA Product Brief
6. HL7 HQMF Product Brief
7. HL7 QRDA-1 Product Brief
8. HL7 QRDA-3 Product Brief
9. Cypress Website

2 eMeasure Types

Measures can be classified based on the unit of scoring – patients or episodes – and how the score is computed – proportion or continuous variable. In this section we describe this classification. Below we will provide more detail on how these measures are computed.

2.1 Patient-Based Measures

Measures that evaluate the care of a patient, and assign the patient to membership in one or more populations are called patient-based measures. The vast majority (57 out of 64) of the EP CQMs are patient-based. All of the information in the patient record must be considered when computing a patient-based measure. The criteria for inclusion of a patient in a measure population may require that conditions be satisfied during multiple episodes of care; for example, a diagnosis occurring in one episode of care and treatment happening in a subsequent episode of care.

2.2 Episode-of-Care Measures

Measures that evaluate the care during a patient-provider encounter, sometimes called an episode of care, and assign the episode of care to one or more populations are called episode-of-care measures. All of the EH measures are episode of care measures, as are 7 of the 64 of the EP measures. In an episode of care measure, the episodes of care are identified in the Initial Patient Population, and are always designated by a specific occurrence. For example, in measure CMS55/NQF0495 the Initial Patient population identifies all inpatient encounters that are to be scored as 'Occurrence A of Encounter, Performed: Encounter Inpatient'. The Measure population identifies the associated ED visits that lead to inpatient encounters as 'Occurrence A of Encounter, Performed: Emergency Department Visit'. The measure observations average over these ED visits.

There is no clear indication within the HQMF XML file that specifies whether a measure is patient-based or episode of care (see Table1 and Table 2, below).

2.3 Proportion Measures

Most of the 2014 CQMs 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 a CQM, and the appropriate 'rates' computed. For example, if one of the MU2 EH CQMs, all of which are episode-of-care, is computed for a collection of 100 patients with a total of 132 episodes-of-care (as defined by the measure), each of the populations defined by the measure can contain between 0 and 132 episodes.

The populations defined by a proportion measure are:

- **Initial Patient Population** (IPP): The set of patients (or episodes of care) to be evaluated by the measure.
- **Denominator** (D): –A subset of the IPP.
- **Denominator Exclusions** (DExclusion): A subset of the Denominator that should not be considered for inclusion in the Numerator.

- **Denominator Exceptions** (DException): A subset of the Denominator. Only those members of the Denominator that are considered for Numerator membership and are not included are considered for membership in the Denominator Exceptions.
- **Numerator** (N): A subset of the Denominator. The numerator criteria are the processes or outcomes expected for each patient, procedure, or other unit of measurement defined in the denominator.

The computation of a proportion measure proceeds as follows:

1) Patients or episodes of care are classified using the IPP criteria, and those satisfying the criteria are included in the IPP.
2) The members of the IPP are classified using the Denominator criteria, and those satisfying the criteria are included in the Denominator.
3) The members of the Denominator are classified using the Denominator Exclusion criteria, and those satisfying the criteria are included in the Denominator Exclusions.
4) The members of the Denominator that are not in the Denominator Exclusion population are classified using the Numerator criteria, and those satisfying the criteria are included in the Numerator.
5) Those members of the Denominator that were considered for membership in the Numerator, but were rejected, are classified using the Denominator Exceptions criteria, and those satisfying the criteria are included in the Denominator Exceptions.

For CQMs with multiple numerators and/or strata, each patient/episode must be scored for inclusion/exclusion to *every* population. For example if a CQM has 3 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 criteria.

Specific programs may require reporting of performance rates, but these are not required for certification. The performance rate is defined as:

Rate = N/(D – DExclusion – DException)

2.4 Continuous Variable Measures

Continuous Variable Measures can be either episode or patient-based. They include the following elements:

- **Initial Patient Population** (of patients or episodes), roughly analogous to the Denominator in proportion measures
- **Measure Population** (subset of Initial Patient Population), roughly analogous to the Numerator in proportion measures
- **Measure Observations** describe the computation to be performed over the members of the Measure Population. For example, measure CMS55/NQF0495 computes the median for the difference between the Emergency Department arrival and departure, over all ED visits in the Measure population.

The computation of a continuous variable measure proceeds as follows:

1) Patients or episodes of care are classified using the IPP criteria, and those satisfying the criteria are included in the IPP.

2) The members of the IPP are classified using the Measure Population criteria, and those satisfying the criteria are included in the Measure Population.
3) Each member of the Measure Population is evaluated according to the criteria defined in the Measure Observations criteria, and all of these results are aggregated using the specified operator.

Results should be reported for each population without stratification, as well as for each defined stratum separately. For a continuous variable measure, for the IPP and Measure Population, results are required specifying the number of patients or episodes that fall into each of these populations without stratification, as well as stratified by any defined strata. The aggregated continuous variable computed defined by the Measure Observation should be reported for the unaggregated Measure Population, as well as for each stratum of the Measure Population.

Specific programs may require reporting of specific reporting and performance rates, but these are not required for certification.

Table 1 – EP eMeasure Types and Versions

eMeasure ID#	NQF #	Title	Type	Patient/Episode	Version
2	0418	Preventive Care and Screening: Screening for Clinical Depression and Follow-Up Plan	Proportion	Patient	2
22	XXXX	Preventive Care and Screening: Screening for High Blood Pressure and Follow-Up Documented	Proportion	Patient	1
50	XXXX	Closing the referral loop: receipt of specialist report	Proportion	Patient	1
52	0405	HIV/AIDS: Pneumocystis jiroveci pneumonia (PCP) Prophylaxis	Proportion	Patient	1
56	XXXX	Functional status assessment for hip replacement	Proportion	Patient	1
61	XXXX	Preventive Care and Screening: Cholesterol – Fasting Low Density Lipoprotein (LDL-C) Test Performed	Proportion	Patient	2
62	0403	HIV/AIDS: Medical Visits	Proportion	Patient	1
64	XXXX	Preventive Care and Screening: Risk-Stratified Cholesterol – Fasting Low Density Lipoprotein (LDL-C)	Proportion	Patient	2
65	XXXX	Hypertension: Improvement in blood pressure	Proportion	Patient	2
66	XXXX	Functional status assessment for knee replacement	Proportion	Patient	1
68	0419	Documentation of Current Medications in the Medical Record	Proportion	Episode	2

eMeasure ID#	NQF #	Title	Type	Patient/Episode	Version
69	0421	Preventive Care and Screening: Body Mass Index (BMI) Screening and Follow-Up	Proportion	Patient	1
74	XXXX	Primary Caries Prevention Intervention as Offered by Primary Care Providers, including Dentists	Proportion	Patient	2
75	XXXX	Children who have dental decay or cavities	Proportion	Patient	1
77	XXXX	HIV/AIDS: RNA Control for Patients with HIV	Proportion	Patient	1
82	1401	Maternal depression screening	Proportion	Patient	1
90	XXXX	Functional status assessment for complex chronic conditions	Proportion	Patient	2
117	0038	Childhood Immunization Status	Proportion	Patient	1
122	0059	Diabetes: Hemoglobin A1c Poor Control	Proportion	Patient	1
123	0056	Diabetes: Foot Exam	Proportion	Patient	1
124	0032	Cervical Cancer Screening	Proportion	Patient	1
125	0031	Breast Cancer Screening	Proportion	Patient	1
126	0036	Use of Appropriate Medications for Asthma	Proportion	Patient	1
127	0043	Pneumonia Vaccination Status for Older Adults	Proportion	Patient	1
128	0105	Anti-depressant Medication Management	Proportion	Patient	1
129	0389	Prostate Cancer: Avoidance of Overuse of Bone Scan for Staging Low Risk Prostate Cancer Patients	Proportion	Patient	2
130	0034	Colorectal Cancer Screening	Proportion	Patient	1
131	0055	Diabetes: Eye Exam	Proportion	Patient	1
132	0564	Cataracts: Complications within 30 Days Following Cataract Surgery Requiring Additional Surgical Procedures	Proportion	Episode	1
133	0565	Cataracts: 20/40 or Better Visual Acuity within 90 Days Following Cataract Surgery	Proportion	Episode	1
134	0062	Diabetes: Urine Protein Screening	Proportion	Patient	1

eMeasure ID#	NQF #	Title	Type	Patient/Episode	Version
135	0081	Heart Failure (HF): Angiotensin-Converting Enzyme (ACE) Inhibitor or Angiotensin Receptor Blocker (ARB) Therapy for Left Ventricular Systolic Dysfunction (LVSD)	Proportion	Patient	1
136	0108	ADHD: Follow-Up Care for Children Prescribed Attention-Deficit/Hyperactivity Disorder (ADHD) Medication	Proportion	Patient	2
137	0004	Initiation and Engagement of Alcohol and Other Drug Dependence Treatment	Proportion	Patient	1
138	0028	Preventive Care and Screening: Tobacco Use: Screening and Cessation Intervention	Proportion	Patient	1
139	0101	Falls: Screening for Future Fall Risk	Proportion	Patient	1
140	0387	Breast Cancer: Hormonal Therapy for Stage IC-IIIC Estrogen Receptor/Progesterone Receptor (ER/PR) Positive Breast Cancer	Proportion	Patient	1
141	0385	Colon Cancer: Chemotherapy for AJCC Stage III Colon Cancer Patients	Proportion	Patient	2
142	0089	Diabetic Retinopathy: Communication with the Physician Managing Ongoing Diabetes Care	Proportion	Patient	1
143	0086	Primary Open Angle Glaucoma (POAG): Optic Nerve Evaluation	Proportion	Patient	1
144	0083	Heart Failure (HF): Beta-Blocker Therapy for Left Ventricular Systolic Dysfunction (LVSD)	Proportion	Patient	1
145	0070	Coronary Artery Disease (CAD): Beta-Blocker Therapy- Prior Myocardial Infarction (MI) or Left Ventricular Systolic Dysfunction (LVEF <40%)	Proportion	Patient	1
146	0002	Appropriate Testing for Children with Pharyngitis	Proportion	Patient	1
147	0041	Preventative Care and Screening: Influenza Immunization	Proportion	Patient	1

eMeasure ID#	NQF #	Title	Type	Patient/Episode	Version
148	0060	Hemoglobin A1c Test for Pediatric Patients	Proportion	Patient	1
149	XXXX	Dementia: Cognitive Assessment	Proportion	Patient	1
153	0033	Chlamydia Screening for Women	Proportion	Patient	1
154	0069	Appropriate Treatment for Children with Upper Respiratory Infection (URI)	Proportion	Episode	1
155	0024	Weight Assessment and Counseling for Nutrition and Physical Activity for Children and Adolescents	Proportion	Patient	1
156	0022	Use of High-Risk Medications in the Elderly	Proportion	Patient	1
157	0384	Oncology: Medical and Radiation – Pain Intensity Quantified	Proportion	Episode	1
158	0608	Pregnant women that had HBsAg testing	Proportion	Patient	1
159	0710	Depression Remission at Twelve Months	Proportion	Patient	1
160	0712	Depression Utilization of the PHQ-9 Tool	Proportion	Patient	1
161	0104	Major Depressive Disorder (MDD): Suicide Risk Assessment	Proportion	Episode	1
163	0064	Diabetes: Low Density Lipoprotein (LDL) Management	Proportion	Patient	1
164	0068	Ischemic Vascular Disease (IVD): Use of Aspirin or Another Antithrombotic	Proportion	Patient	1
165	0018	Controlling High Blood Pressure	Proportion	Patient	1
166	0052	Use of Imaging Studies for Low Back Pain	Proportion	Patient	2
167	0088	Diabetic Retinopathy: Documentation of Presence or Absence of Macular Edema and Level of Severity of Retinopathy	Proportion	Patient	1
169	0110	Bipolar Disorder and Major Depression: Appraisal for alcohol or chemical substance use	Proportion	Patient	1

eMeasure ID#	NQF #	Title	Type	Patient/Episode	Version
177	1365	Child and Adolescent Major Depressive Disorder: Suicide Risk Assessment	Proportion	Episode	1
179	XXXX	ADE Prevention and Monitoring: Warfarin Time in Therapeutic Range.	Continuous Variable	Patient	1
182	0075	Ischemic Vascular Disease (IVD): Complete Lipid Panel and LDL Control	Proportion	Patient	1

Table 2 – EH eMeasure Types and Versions

eMeasureID	NQF #	Title	Type	Patient/Episode	Version
9	0480	Exclusive Breast Milk Feeding	Proportion	Episode	1
26	0338	Home Management Plan of Care (HMPC) Document Given to Patient/Caregiver	Proportion	Episode	1
30	0639	AMI-10: Statin Prescribed at Discharge	Proportion	Episode	2
31	1354	Hearing Screening Prior To Hospital Discharge (EHDI-1a)	Proportion	Episode	1
32	0496	ED-3: Median Time from ED Arrival to ED Departure for Discharged ED Patients	Continuous Variable	Episode	2
53	0163	AMI-8a: Primary PCI Received Within 90 Minutes of Hospital Arrival	Proportion	Episode	1
55	0495	ED-1: Median Time from ED Arrival to ED Departure for Admitted ED Patients	Continuous Variable	Episode	1
60	0164	AMI-7a: Fibrinolytic Therapy Received Within 30 Minutes of Hospital Arrival	Proportion	Episode	1
71	0436	STK-3: Anticoagulation Therapy for Atrial Fibrillation/Flutter	Proportion	Episode	2
72	0438	STK-5: Antithrombotic Therapy By End of Hospital Day 2	Proportion	Episode	1
73	0373	VTE-4: Venous Thromboembolism Patients with Anticoagulation Overlap Therapy	Proportion	Episode	1
91	0437	STK-4: Thrombolytic Therapy	Proportion	Episode	2

eMeasureID	NQF #	Title	Type	Patient/Episode	Version
100	0142	AMI-2- Aspirin Prescribed at Discharge	Proportion	Episode	1
102	0441	STK-10: Assessed for Rehabilitation	Proportion	Episode	1
104	0435	STK-2: Discharged on Antithrombotic Therapy	Proportion	Episode	1
105	0439	STK-6: Discharged on Statin Medication	Proportion	Episode	1
107	0440	STK-8: Stroke Education	Proportion	Episode	1
108	0371	VTE-1: Venous Thromboembolism Prophylaxis	Proportion	Episode	1
109	0374	VTE-4: Venous Thromboembolism Patients Receiving Unfractionated Heparin with Dosages/Platelet Count Monitoring by Protocol or Nomogram	Proportion	Episode	1
110	0375	VTE-5: Venous Thromboembolism Discharge Instructions	Proportion	Episode	1
111	0497	ED-2: Median Admit Decision Time to ED Departure Time for Admitted Patients	Continuous Variable	Episode	1
113	0469	Elective Delivery	Proportion	Episode	1
114	0376	VTE-6: Incidence of Potentially-Preventable Venous Thromboembolism	Proportion	Episode	1
171	0527	SCIP-INF-1: Prophylactic Antibiotic Received Within One Hour Prior to Surgical Incision	Proportion	Episode	2
172	0528	SCIP-INF-1: Prophylactic Antibiotic Selection for Surgical Patients	Proportion	Episode	2
178	0453	SCIP-INF-9: Urinary catheter removed on Postoperative Day 1 (POD 1) or Postoperative Day 2 (POD 2) with day of surgery being day zero	Proportion	Episode	2
185	0716	Healthy Term Newborn	Proportion	Episode	1
188	0147	PN-6: Initial Antibiotic Selection for Community-Acquired Pneumonia (CAP) in Immunocompetent Patients	Proportion	Episode	2

eMeasureID	NQF #	Title	Type	Patient/Episode	Version
190	0372	VTE-2: Intensive Care Unit Venous Thromboembolism Prophylaxis	Proportion	Episode	1

3 Measure Logic

The posted HQMF artifacts for the 2014 CQMs together with the documentation provided here and elsewhere have a single, correct interpretation that will be assessed as part of the certification process. This section provides clarification and guidance on the correct interpretation of the CQMs, and their implementation. The CQMs have been carefully reviewed so that the intent of the measure stewards has been respected when they are interpreted according to the guidance in this document. The logic and data elements for the CQMs are specified using the NQF Quality Data Model.

3.1 Evaluating QDM Logic

The eMeasure specifications are evaluated in a manner that differs from a typical procedural specification. A measure is composed of populations (e.g., Denominator, Numerator, etc), and each population is composed from "lines" of logic that comprise a single AND/OR statement. The order of the lines within a population does not determine the computed result. Within a line, logic is evaluated according to the order of operations described below. The only way to link the events described in one line of logic with those in another line of logic are through the use of specific occurrences, described below.

3.2 Operator Precedence

Within a single AND/OR statement the precedence of operators is as follows:

1. Event code matches value set code (Select procedures from patient based on matching code as defined by the value set)
2. Events filtered by status (active, ordered, resolved)
3. Events filtered by Negation (Negation Rationale, I.e. Not done)
4. Events filtered by fields (source, severity, facility location …)
5. Event filtered by temporal references (i.e. Starts After Start, During …)
6. Events filtered by value restriction (I.e. Ejection fraction > 40%)
7. Event filtered by subset operator (FIRST, SECOND, MOST RECENT)
8. "Assign" the Occurrence

The order of application of the subset operators is *critical*, since the order that subset operators are applied can change the results of execution. For instance, the result of selecting the first procedure and then restricting temporally to 'during the measurement period' could produce a different result than restricting procedures temporally to 'during the measurement period' and then selecting the first such procedure.

3.3 Specific Occurrences

Specific occurrences are the most challenging aspect of the QDM logic from an implementation perspective. In this section we will describe the use and computation of specific occurrences informally. Section 4 describes QDM idioms that incorporate specific occurrences. The document "Implementing Computation of Specific Occurrences" available via the Cypress website provides additional detail.

3.3.1 Simple Usage of Specific Occurrence

In the measure logic for 2014 CQMs, some occurrences will be labeled as specific occurrences (e.g. "`Occurrence A of Diagnosis, Active: Diabetes`"). When an occurrence is not specified (e.g., "`Diagnosis, Active: Diabetes`"), the measure refers to any instance of that event. When a specific occurrence of an

event is specified in multiple clauses linked by AND logic, the logic is only satisfied if the ANDed logical statements evaluate to true using a specific (single) instance of the event.

In the following example (from CMS169/NQF0110) there must be at least one instance of "BH Outpatient Encounter" that satisfies both clauses, falling between the measurement start date, and 42 days before the measurement end date.

```
AND: "Occurrence A of Encounter, Performed: BH Outpatient encounter" >=
42 day(s) starts before start of "Measurement End Date"
AND: "Occurrence A of Encounter, Performed: BH Outpatient encounter"
starts after start of "Measurement Start Date"
```

3.3.2 Multiple Specific Occurrences of the Same Event Type

A logical clause may reference other (distinct) specific occurrences of a particular type, or specific occurrences of a different type. The following example from NQF0405 references two specific occurrences of type "Encounter, Performed: HIV Visit".

```
AND: "Occurrence A of Encounter, Performed: HIV Visit" during
"Measurement Period"
AND: "Occurrence B of Encounter, Performed: HIV Visit" during
"Measurement Period"
AND: "Occurrence B of Encounter, Performed: HIV Visit" >= 90 day(s)
starts after end of "Occurrence A of Encounter, Performed: HIV Visit"
```

Specific Occurrences of the same type will be referenced with an alphabetically incrementing label (e.g, "Occurrence B"). The order of the labeling does not have *any* significance other than indicating that they represent different instances. Specifically, no temporal relationship is implied by the alphabetical ordering of the occurrences – Occurrence A does not necessarily occur prior to Occurrence B. When a measure references Occurrence A and Occurrence B of an event type (i.e., Encounter, Performed: HIV Visit) the logic of the measure will evaluate true when Occurrence A and Occurrence B reference *distinct* instances of an event type. In the example above, the logic is looking for two *different* HIV Visits. Both visits must occur during the measurement period as defined in the first two statements, and one visit ("Occurrence B") must start 90 days or more after an initial visit ("Occurrence A"), as defined in the last statement.

3.3.3 Multiple Specific Occurrences of the Different Event Types

Logic clauses can also reference occurrences of different types. The example below, also from NQF0405, has specific occurrences referencing two different medications and a laboratory test result.

```
AND: "Occurrence A of Medication, Order: Dapsone and pyrimethamine" <=
3 month(s) starts after end of "Occurrence A of Laboratory Test,
Result: CD4+ Count"
AND: "Occurrence A of Medication, Order: Leucovorin" <= 3 month(s)
starts after end of "Occurrence A of Laboratory Test, Result: CD4+
Count"
```

This logic will evaluate to true when a Laboratory Test, Result: CD4+ Count exists such that there are medication orders for "Dapsone and pyrimethamine" and "Leucovorin", and both start within 3 months of the end of the lab test.

3.3.4 Specific Occurrences in OR Clauses and Negations

When multiple logical statements referencing a specific occurrence are joined by an OR clause, the logic can evaluate to true if there is an event that satisfies the specific occurrence that satisfies the logic in *at least one* of the branches of the OR clause. When logical statements containing specific occurrences are used as part of a

negated clause (e.g, “AND NOT”) the specific occurrence of the event must either evaluate to false for the negated logic clause, or a viable specific occurrence for the event must not exist. In other words, in a negated clause, the specific occurrence must not evaluate to true, or the event must not exist. The case where an event does not exist is important where a specific occurrence is only referenced in negated clauses within a measure. If a specific occurrence is referenced by both negated and non-negated clauses then it must exist for the logic of the measure to hold, and it must evaluate to false for the negated logic.

3.4 Computing Time Intervals

Assessing the relative timing of events within a patient’s medical record is an essential part of computing CQMs. To enable unambiguous interpretation of the CQMs clear definition of the computation of time intervals is required. A simple expression such as “the treatment must occur within 3 days of the diagnosis” has a number of possible interpretations, including “the treatment must occur within 72hours of the diagnosis”, and “the treatment must happen within 3 business days of the diagnosis”. A mathematical definition of the computation of time durations in conjunction with the temporal operators used in the CQMs is required to support consistent interpretation. This definition is provided in Appendix A, and should be strictly implemented.

3.5 Subset Operators

Subset operators (e.g., FIRST) require a temporally sorted set of events. Timestamps are determined for each event by first looking for an event start time and then looking for an event end time. FIRST extracts the events with the earliest timestamp, MOST RECENT extracts the event with the latest timestamp. When a subset operator is applied to more than one data criteria, then all events are unioned regardless of the conjunction operator, i.e.:

```
FIRST:
     AND Diagnosis A
     AND Diagnosis B
```

Is equivalent to

```
FIRST:
     OR Diagnosis A
     OR Diagnosis B
```

Additionally, subset operators are non-associative operations with respect to other operations used within the QDM. Therefore, the order that subset operators are applied will impact the result of the calculation. Section 3.2 of this document outlines operator precedence in the QDM. Applying subset operators in a different order can change the results of the calculation.

3.5.1 Subset Operators and Specific Occurrences

Applying subset operators to specific occurrences is awkward. Specific occurrences represent a single instance of an event and all conditions logically bound to a specific occurrence must apply to that instance. The single instance nature of specific occurrences is at odds with subset operators such as FIRST, SECOND, MOST RECENT, etc. which act upon sets of events. Essentially this forces specific occurrences to be treated as both a single instance and a set of events as part of measure calculation.

However, subset operators are applied to specific occurrences almost exclusively within the context of a single logical statement. This allows the specific occurrence to be constrained to a single event before calculation progresses beyond the evaluation of a single statement, limiting the impact of having to treat specific occurrences as both a set of events and a single event. The following example shows a specific occurrence with a subset operator applied.

```
AND: FIRST: Occurrence A of X during “Measurement Period”
AND: Occurrence A of X starts after start of Encounter Performed Y
```

In this example, the defined order of operations restricts 'Occurrence A of X' to the first event X during the measurement period and that first event X must have an encounter of type Y that starts after the start of it.

3.6 COUNT operator usage

When the COUNT operator is applied to a disjunction of events, it will assess the size of the set of events reflecting the union of the ORed events. In this example, COUNT is used to assess whether there were more than two encounters of types A-D.

```
COUNT > 2
      OR:   Encounter performed: A
      OR:   Encounter performed: B
      OR:   Encounter performed: C
      OR:   Encounter performed: D
```

In some CQMs (e.g., the denominator of EP measure CMS64), COUNT will be applied to determine how many of the OR branches are true. In these cases, the logic has been constructed with a subset operator in each OR branch and assesses the number of encounter *types*, not the total number of encounters.

```
COUNT > 2
      OR:   FIRST: Encounter performed:A
      OR:   FIRST: Encounter performed:B
      OR:   FIRST: Encounter performed:C
      OR:   FIRST: Encounter performed:D
```

3.7 Temporal Logic Operators

Within the QDM, events (e.g., 'Diagnosis, Active') have start and end times. Some events have attributes that include start and end time (e.g., facility location). The QDM temporal operators are statements that relate the intervals defined by these start and end times to each other. Some intervals may only have start or end times specified. An interval with a 'null' start time is considered to have started at the beginning of time, whereas an interval with a 'null' end time is considered to end in the future.

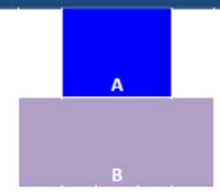
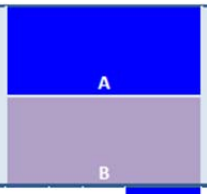
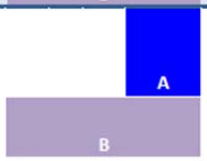
The temporal logic operators in the MU CQMs have strict definitions that differ from standard English usage. For the term "A during B", the definition of during requires that event A start after or concurrent with B, and end before or concurrent with B. In other words, the time interval of event A is *fully contained* within the time interval of B. If A starts before B and ends during or after B, it is not "during" B. To express that "A overlaps B", that is, the time intervals of events A and B intersect, multiple lines of logic are required (see section 4.1~~.4.1~~).

Note that for "A during B" to be true, A must have specified start and end times. Some data elements in medical records, for example diagnoses of chronic conditions, can be open-ended. Such an event can neither contain another event temporally, or be contained. In other words if a chronic condition, represented without a stop date is event A, there is no event B such that 'A During B', or 'B During A' is true.

Two events are considered "concurrent with" each other only if their start and end times are the same ignoring seconds~~.~~. This level of time resolution is too precise for most related events in the MU2 CQMs, and thus, the "concurrent with" operator is rarely used.

'During', and all other temporal relationships such as "starts before the start of" and "starts after the start of", are defined in the HL7 v3 Vocabulary Standard. The diagram below provides examples of some of these relationships.

Definitions for During and Concurrent With:

Time Relationships	Illustration	Time Relationships Corresponding to Timeline	Time Relationships Indicator Description
		DURING	A relationship in which the source act's effective time is wholly within the target act's effective time.
		STARTS DURING	A relationship in which the source act's effective time begins within the target act's effective time.
		ENDS DURING	A relationship in which the source act terminates within the target act's effective time.
		DURING	A relationship in which the source act's effective time is wholly within the target act's effective time.
		CONCURRENT WITH	A relationship in which the source act's effective time is the same as the target act's effective time.
		DURING	A relationship in which the source act's effective time is wholly within the target act's effective time.
		STARTS AFTER START OF	A relationship in which the source act starts after the start of the target Act
		ENDS CONCURRENT WITH	A relationship in which the source act's effective time ends with the end of the target act's effective time.

4 Common Logic Idioms and their Significance

4.1 A Overlaps B

The "During" operator is defined as a strict containment of the time interval of event A within the time interval of event B. Fairly frequently within the MU2 CQMs, the logic needs to specify that events A and B overlap temporally[1]. In the current collection of CQMs, this is accomplished as follows:

```
AND:      A starts before or during B
AND NOT:  A ends before start of B
```

Here is an example from CMS188/NQF0147:

- AND NOT: "Patient Characteristic: Clinical Trial Participant" ends before start of "Occurrence A of Encounter, Performed: Encounter Inpatient"
- AND: "Patient Characteristic: Clinical Trial Participant" starts before or during "Occurrence A of Encounter, Performed: Encounter Inpatient"

4.2 Any Past Diagnosis

The presence of a "Diagnosis, Active" at any time prior to an event can be used as an indication of "any past diagnosis". Measure developers used this idiom to detect the presence of some chronic conditions in the medical

[1] The overlap operator is an obvious candidate for future extension of the operators used within CQMs.

record prior to the beginning of the measurement period, or prior to an episode of care. Other developers looked for the presence of "Diagnosis, Active" at the start of the measurement period or episode-of-care (see section 4.3). If B is some event of interest, to specify that a Diagnosis of A that preceded B would be written:

```
AND: Diagnosis, Active: A starts before B
```

4.3 Diagnosis Active at a Particular Time

To detect that a Diagnosis D was active at the start of event E (e.g., the start of the measurement period), requires two QDM logic statements and a specific occurrence. The first statement specifies that the diagnosis started prior to T, and the second statement indicates that the diagnosis did not end prior to T. Similar logic could be used to detect that D started during E, and continued through the end of D.

- `AND: "Occurrence A of Diagnosis, Active: D" starts before E`
- `AND NOT: "Occurrence A of Diagnosis, Active: D" ends before start of E`

4.4 Use of Specific Occurrences to achieve filtering by value and subset

Operator precedence (see section **Error! Reference source not found.**~~0~~) specifies that value restriction filtering precedes the application of subset operators. This introduces some subtlety in interpreting the CQM logic. Let's compare these two pieces of logic:

```
A. MOST RECENT: Lab Result X (result: > 10)
B. AND:  Occurrence A of Lab Result X (result > 10)
   AND:  MOST RECENT: Occurrence A of Lab Result X
```

The statement A will find all Lab Result X's with result>10, and select the most recent instance, whereas statement B will find the most recent Lab Result X, and return true if it's result is > 10.

5 Data Elements and Value Sets

The data elements used in the 2014 CQMs are derived from the Quality Data Model (QDM), 2.1.1.1 October 2012, located on the National Quality Forum (NQF) website:

http://www.qualityforum.org/QualityDataModel.aspx#t=2&s=&p=2%7C.

Further explanation and description of the elements contained in the QDM can be found on that site.

Value Sets

The National Library of Medicine (NLM), in collaboration with ONC and CMS, maintains the NLM Value Set Authority Center (VSAC) (https://vsac.nlm.nih.gov) The VSAC provides downloadable access to all official versions of vocabulary value sets contained in the 2014 clinical quality measures. The value sets provide lists of the numerical value identifiers and individual names from standard vocabularies used to define the clinical concepts (e.g. diabetes, clinical visit) used in the quality eMeasures. NLM has an application programming interface (API) to the VSAC content in addition to a web interface. The VSAC also offers a Downloadable Resource Table (DRT). This table provides links to Excel and SVS-compliant XML for all Eligible Hospital (EH), Eligible Provider (EP), and EP+EH value sets.

Please note, currently, the VSAC contains some value sets with provisional codes. These provisional codes are preliminary to forthcoming versions of their respective code systems, and the provisional codes will have official

versions as the code systems are updated in the near future. In future versions of the measures, these codes will cease to be provisional codes when they are officially released in a version of their code system. The VSAC will be updated on a regular basis as the quality measures are updated.

Access to the Value Set Authority Center requires a free Unified Medical Language System® Metathesaurus License (available at https://uts.nlm.nih.gov/license.html). It is expected that any use of value sets is consistent with these licensing requirements and copyright protections.

United States Health Information Knowledgebase (USHIK)

The Agency for Healthcare Research and Quality (AHRQ), in collaboration with CMS, NLM, and ONC, maintains the Meaningful Use Portal in the United States Health Information Knowledgebase (USHIK) (http://ushik.ahrq.gov). USHIK presents the 2014 clinical quality measures, data elements, and the Value Sets. The 2014 CQM's may be downloaded in HL7's HQMF format (xml), Adobe (pdf), or Excel (xls). The value sets may be downloaded in several formats, including Excel (xls), Adobe (pdf), Integrating the Healthcare Enterprise's Sharing Value Sets format (xml), and comma separated values (csv). In USHIK, you may also obtain a single flat-file format containing all the 2014 CQM clinical concepts and their value sets organized by CQM name and ID and by vocabulary code system (such as ICD-9-CM, SNOMED CT, RxNORM). This flat file is available in both csv format and xml format (with schema).

5.1 QDM Category and Code System

Table 1 "QDM Category and Code System" of the current "Measure Authoring Tool 2012 Update User Guide (October 22, 2012)" document describes the recommended code system for each QDM category. For any measure clause where the category utilized is linked to a value set or grouping value set that does not provide the current recommended code system, a new value set with the recommended code system will be provided at the annual update. If the linked value set is a grouping value set, the new value set will be added to that grouping value set. If the linked value set is not a grouping value set, a grouping value set will be created for the clause and the existing value set, and a new value set with the missing code system will be grouped into the newly created grouping value set. The only exception to this will be when a measure developer split the clause into a number of "OR'd" sub-clauses with each sub-clause linked to a code system-specific value set, so the collection of all the sub-clauses does provide recommended code system coverage.

5.2 Brand and Generic Medications

In the 2014 CQMs, all value sets referring to medications use generic drug terms (i.e., semantic clinical drugs). It is expected that vendors/providers will record drug entities using generic terms or remap brand drugs to the same concepts. This is in accordance with guidance from CMS regarding the preferred use of generic drug concepts.

5.3 Discharge Medications

The use of "Medication, Discharge" has a very specific meaning in the 2014 EH measures. It refers to medications that are on the patient's Discharge Medication List. It should not be confused with medications that are 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 medication itself may not be started until after the episode ends. It is expected that, at the time of discharge, that discharge medications will be the same as the home medications but that this cannot be assumed at the time of admission as changes may have occurred since the prior episode of care.

> Example logic:
> "Medication, Discharge: value set "during" Occurrence A of Encounter, Performed: value set"

Vendors/providers generating Quality Reporting Document Architecture (QRDA)-1 output will need to generate "Medication, Discharge" events for all medications on the discharge list with appropriate time stamps to enable the correct function of measure logic.
(See http://www.hl7.org/documentcenter/public/standards/dstu/CDAR2_QRDA_DSTUR2_2012JUL.zip.)

5.4 Medication Allergy

In the 2014 measures, medications are coded using generic terms for specific drug entities. There are a variety of ways to capture medications for allergies in the field. Vendor and implementer feedback has indicated that medication concepts used to represent allergy and intolerance data in EHR records is typically an Ingredient or equivalent type of concept and not the more detailed "prescribable" representations in the current value sets. Although they are currently often captured using drug ingredients; in the 2014 measures, specific medication entities, not ingredients, are linked to allergies. In addition, hospital inpatient medications may not be as specified as specific drug entities for reasons related to inpatient pharmacy substitutions.

In the 2014 v1 eMeasures, measure clauses used to identify patients with an allergy / intolerance to medication agents utilize the same value sets as clauses that identify medication orders and administration (i.e. specific drug entities). To support a change across the measures affected the allergy and intolerance measure clauses will need to have new value sets created that contain the ingredient-type RxNorm medication concepts appropriate for each measure.

In response, CMS/ONC will do the following:

1. No change in the published value sets until the annual update. For the annual update the affected measures will be updated to reference new value sets that contain appropriate medication codes from RxNorm that are aligned to ingredient-level concepts. Future expansion of RxNorm value sets will allow ingredients to be included with specific drug entities to link them to allergy references for ingredients. The reactions to substances are findings and should be expressed using diagnosis codes, usually SNOMED CT
2. Test cases developed by ONC to test vendor systems will have codes from the currently published value set, i.e., they will have detailed medications as a description of the "thing" the patient is allergic/intolerant to.
3. Vendors/implementers ***are not expected to map*** patient data to the original published value sets.

ONC acknowledges that since implementers are not expected to map patent allergy data to concepts in the value sets currently associated with allergy measure clauses, some patients remain in the measure populations rather than being excluded as they would after the changes published at the annual update. This may have a marginal effect on rates but will not impact certification as these exceptions will not be tested prior to the update.

5.5 Principal Diagnosis in Inpatient Encounters

The use of "Diagnosis, Active (ordinality: Principal)" has a specific meaning in the 2014 measures for hospitals and should be consistent with its definition in the Uniform Hospital Discharge Data Set (UHDDS) as "that condition established after study to be chiefly responsible for occasioning the admission of the patient to the hospital for care". It refers to the Principal Diagnosis of an episode of care, as defined above. This is typically determined at or after discharge time by a coder, and is used for the billing transaction. In EHRs, the Principal Diagnosis is typically chosen from among the diagnoses that were active during the encounter and if consistent with the UHDDS definition should be labeled as "Principal," starting from the time it was captured during the episode. The nature of the data element will require a retrospective look back to the beginning of the diagnosis to correctly compute several of the eMeasures.

Admission and discharge diagnoses cannot be expressed using current data elements and will be expressed using timing of active diagnoses at the start or end of the episode of care. The admission or discharge diagnoses recorded by the provider should not be used as a substitute for the principal diagnosis unless they are concordant with the principal diagnosis as defined by CMS.

Vendors and providers generating QRDA-1 output will need to label diagnoses appropriately to enable the measure logic to function correctly.

5.6 Principal Procedure in Inpatient Encounters

The use of "Procedure, Performed (ordinality: Principal)" has a very specific meaning in the 2014 EH measures. It refers to the Principal Procedure during an episode of care, as defined by CMS. This is typically determined at or after discharge time, and is used for the billing transaction. The Principal procedure is typically chosen from among the procedures performed during the encounter. The procedure that is chosen (post-discharge) as the principal procedure should be labeled as 'Principal', and the timing should reflect the timing of the actual procedure.

Vendors/providers generating QRDA-1 output will need to label procedures appropriate to enable the measure logic to function correctly.

5.7 Medical Reason, Patient Reason, System Reason

Because of limitations in EHRs and 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 (e.g., medication administration, physician order not done) from a measure. The use of negation to identify these exclusions is modeled using the concepts of medical reason, patient reason, and system reason and when deemed appropriate by providers, is selected to attest to the reason for the exclusion. 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 exclusion. It is intended that these concepts be used only when the record has a documented reason for exclusion; although it is not necessary to report that reason, it is expected that there is a legitimate reason for exclusion. A negation attribute may be used to identify situations where an action did not occur or was not observed for a documented reason. Modeling of negation uses AND NOT to identify NULL values when an action was not performed for a medical, patient or system reason.

Vendors/providers using these concepts are expected to have a documented reason for these exclusions and could be expected to demonstrate the relevant documentation if audited.

5.8 Clinical Trial Participation

Participation in a clinical trial may be a clinical reason to exclude a patient from an expected course of action in some 2014 measures; however, only participation in certain types of trials may be relevant. Due to limitations in data from EHRs, the specific nature of clinical trial participation cannot be captured in the 2014 CQMs. Therefore, in the 2014 CQMs, the code "clinical trial participant" refers to any participation in a clinical trial and therefore all trial participants of any type should be excluded when this term is present. An alternative method of expressing clinical trial participant exclusions via the terms "medical reason" or "patient reason" and should be used as exclusions only when providers deem that clinical trial participation is relevant to their exclusion from the measure.

Where the measure steward requested clinical trial participant remain in the electronic specifications, the eCQM guidance was updated to clarify this intent and additional direction offered to help facilitate implementation of the measure. The 2014 CQMs will not certify to clinical trial participation type.

5.9 Newborn/Gestational Age

Three of the 2014 measures are designed to be used in the encounter including birth or immediately after birth. In the 2014 specifications, a newborn at term indicates the gestational age is ≥ 37 weeks.

Vendors/providers generating QRDA-1 output are expected to capture gestational age for all neonates using the gestational age codes from SNOMED CT.

5.10 Source

Current attributes in the 2014 measures do not allow the electronic expression of the source of a diagnosis (e.g., a nurse versus a physician) and the measures have been structured so that this information is not required at this time for certification. Although the intent of some measures is to use information from a specific source, this is not captured in the 2014 stage of eMeasures. It is expected that the ability to electronically capture the source of a data element will be incorporated into future stages of eMeasures.

6 2014 Measure Guidance By CMS ID Measure Number

6.1 Eligible Hospital (EH) Measures

6.1.1 Measure 9v1: Exclusive Breast Milk Feeding, NQF 0480, BF_ExclusiveBreastFeed

For measure 9, the intent is to apply the measure only to single newborns born in the hospital and at term, defined as gestational age ≥ 37 weeks.

Maternal reasons for not exclusively breastfeeding are limited to the following situations:

- HIV infection
- Human t-lymphotrophic virus type I or II
- Substance abuse and/or alcohol abuse
- Active, untreated tuberculosis
- Taking certain medications, i.e., prescribed cancer chemotherapy, radioactive isotopes, antimetabolites, antiretroviral medications and other medications where the risk of morbidity outweighs the benefits of breast milk feeding
- Undergoing radiation therapy
- Active, untreated varicella
- Active herpes simplex virus with breast lesions
- Admission to Intensive Care Unit (ICU) post-partum

A discharge to a designated cancer center or children's hospital should be captured as a discharge to another hospital.

The unit of measurement for this measure is an inpatient episode of care. Each distinct hospitalization should be reported, regardless of whether the same patient is admitted for inpatient care more than once during the measurement period. In addition, the eMeasure logic intends to represent events within or surrounding a single occurrence of an inpatient hospitalization.

The logic phrase AND: "Occurrence A of Encounter, Performed: Inpatient Encounter (reason: 'Birth')" intends to capture admission type of newborn for the encounter. Where this information is available in existing EHR structured fields (e.g. data that is fed to UB-04, field location 14), it can be used to map the criterion specified in the logic.

The logic phrase AND: "Diagnosis, Active: Liveborn Born In Hospital" starts during "Occurrence A of Encounter, Performed: Inpatient Encounter" intends to capture the point of origin for the inpatient admission. Where this information is available in existing EHR structured fields (e.g. data that is fed to UB-04, field location 15), it can be used to map the criterion specified in the logic.

6.1.2 Measure 26v1: Home Management Plan of Care (HMPC) Document Given to Patient/Caregiver, NQF 0338, HMPC_HomeCareDoc

The home management plan of care document should be a separate and patient-specific written instruction. The document must be present in the form of an explicit and separate document specific to the patient rather than components or segments of the plan spread across discharge instruction sheets, discharge orders, education sheets, or other instruction sheets.

The home management plan of care is represented in the eMeasure logic by a LOINC code for an asthma action plan document. This form, or equivalent, contains most of the components required for the home management plan of care, including information on:

- Methods and timing of rescue actions: the home management plan of care addresses what to do if asthma symptoms worsen after discharge, including all of the following: 1) When to take action, i.e., assessment of severity (e.g., peak flow meter reading, signs and symptoms to watch for); 2) What specific steps to take, i.e., initial treatment instructions (e.g., inhaled relievers up to three treatments of 2-4 puffs by MDI at 20-minute intervals or single nebulizer treatment); 3) Contact information to be used, when an asthma attack occurs or is about to occur.
- Appropriate use of long-term asthma medications (controllers), including the medication name, dose, frequency, and method of administration.
- Appropriate use of rescue, quick-relief, or short acting medications of choice to quickly relieve asthma exacerbations (relievers), including the medication name, dose, frequency, and method of administration.
- Environmental control and control of other triggers: information on avoidance or mitigation of environmental and other triggers.

In addition to the information outlined in the asthma action plan form (or equivalent document), the home management plan of care is required to include information regarding arrangements for referral or follow-up care with a healthcare provider, namely:

- If an appointment for referral or follow-up care with a healthcare provider has been made, the home management plan of care is required to include the provider/clinic/office name, as well as the date and time of the appointment.
- If an appointment for referral of follow-up care with a healthcare provider has NOT been made, the home management plan of care is required to include information for the patient/caregiver to be able to make arrangements for follow-up care, i.e., provider/clinic/office name, telephone number and time frame for appointment for follow-up care (e.g., 7-10 days).

The home management plan of care can only be considered to comply with the criteria outlined in the measure logic if it meets the requirements outlined above and is appropriately filled-out with information specific to the patient. Although the components of the care plan do not need to be electronically reported, it is expected that the plan given to the patient would include the elements above if the record was to be audited.

6.1.3 Measure 30v2: Statin Prescribed at Discharge, NQF 0639, AMI10_StatinMed

The measurement period is one calendar year but the reporting period is 3 months as a calendar quarter; Q1 is Jan – Mar, Q2 is Apr – Jun, Q3 is Jul – Sep, Q4 is Oct – Dec.

The header incorrectly states, “Patients for whom there are missing or inaccurate data (e.g., arrival time, medication administration, etc.) are considered to have failed the measure; the total number of patients with missing or erroneous (e.g., a time of 03:69 or a date of 10/26/2035) data (i.e., measure failures) must be reported with the results of the measure.” This guidance will be removed during the next measure maintenance period.

Exclusion element guidance:

The intent of the exclusion for patients who are clinical trial participants was to limit the exclusion to patients participating in a clinical trial for acute myocardial infarction (AMI), ST elevation myocardial infarction (STEMI), non-ST elevation myocardial infarction (non-STEMI), heart attack, or acute coronary syndrome (ACS), the same conditions as covered by the measure. However, the data element used for clinical trial participation in the 2014 eMeasures cannot distinguish between different types of clinical trials; therefore, certification testing will not include clinical trial type.

Medical, patient, or system reasons for not performing a test or giving a medication are expressions for valid medical, patient, or system reasons that are not specifically listed in the exclusion section of the measure but would be considered relevant to the patient’s exclusion from the measure. Each is expected to be captured and made available for measurement or clinical decision support within the EHR workflow but the exact method or location of capture is a local or vendor decision.

As an eCQM, this measure does not use quarterly discharge datetime data sampling after claims are initiated. The eCQM measurement period may incorporate an admission datetime and will be further reviewed during the next measure maintenance period, with new specifications published in April 2013.

6.1.4 Measure 31v1: Hearing Screening Prior to Hospital Discharge (EHDI-1a), NQF 1354, EHDI_1a_HearScreen

This measure is designed to be used in hospital encounters involving newborns. It directs the inclusion of any neonate's first encounter after birth outside the hospital as well as neonates during an in-hospital birth encounter.

The measurement period is one calendar year but the reporting period is jurisdictionally defined.

6.1.5 Measure 32v2: Median Time from ED Arrival to ED Departure for Discharged ED Patients, NQF 0496, ED3_MedianTime

This measure uses a continuous variable. The specification provides elements from the clinical electronic record required to calculate for each ED encounter, i.e., the length of time the patient was in the Emergency Department, also stated as: the Emergency Department departure time minus the Emergency Department arrival time. The calculation requires the median of all ED encounter durations. This measure specification defines how to determine an individual Emergency Department stay. Reporting requires the median of all patient stays:

[Encounter: encounter ED]*arrivaldatetime -- [Encounter: encounter ED]*dischargedatetime)

The measure is stratified by (1) all patients discharged to a home setting, (2) all patients with mental disorders, (3) all patients transferred to an Acute care, critical access or federal health care facility, and (4) all patients transferred to observation status.

The measurement period is one calendar year but the reporting period is 3 months as a calendar quarter; Q1 = Jan – Mar, Q2 = Apr – Jun, Q3 = Jul – Sep, Q4 is Oct – Dec.

Additional guidance on ED Throughput is available on the CMS website at: http://www.cms.gov/Medicare/Quality-Initiatives-Patient-Assessment-Instruments/QualityMeasures/downloads/EH_EDThroughputStratificationTable.pdf

6.1.6 Measure 53v1: Primary PCI Received within 90 Minutes of Hospital Arrival, NQF 0163, AMI8a_PrimaryPCI

The measurement period is one calendar year but the reporting period is 3 months as a calendar quarter; Q1 = Jan – Mar, Q2 = Apr – Jun, Q3 = Jul – Sep, Q4 is Oct – Dec.

Denominator element guidance:

The denominator and numerator criteria indicate scenarios in which the patient is admitted to the hospital directly or the patient is admitted from the Emergency Department (ED). The calculation is to indicate the timing from arrival at the facility to the occurrence of an event.

For the denominator data element "Diagnostic Study, Result: Hospital Measures-ECG," EHR implementations will need to develop mechanisms to capture ECG findings to support denominator criteria for this measure. The measure specification indicates allowable findings. The source of the ECG results should be a physician/APN/PA (rather than the ECG machine's computerized results).

Numerator element guidance:

This measure expects a PCI procedure within 90 minutes of hospital arrival. Those patients receiving PCI procedures greater than 90 minutes after arrival may be excluded from the denominator only if there is a documented reason for a delay or documented occurrence of intubation, cardiopulmonary arrest or intraaortic balloon pump insertion within the first 90 minutes after arrival. Patients receiving PCI procedures greater than 90 minutes after arrival and with no reason provided are not compliant with the numerator criteria and will remain in the denominator.

Exclusion element guidance:

The intent of the exclusion for patients who are clinical trial participants was to limit the exclusion to patients participating in a clinical trial for acute myocardial infarction (AMI), ST elevation myocardial infarction (STEMI), non-ST elevation myocardial infarction (non-STEMI), heart attack, or acute coronary syndrome (ACS), the same conditions as covered by the measure. However, the data element used for clinical trial participation in the 2014 eMeasures cannot distinguish between different types of clinical trials; therefore, certification testing will not include clinical trial type.

Transfers from another hospital are excluded since care may have been delivered in the other setting. Transfers from those hospitals are considered exclusions regardless of whether the receiving hospital has the same or different hospital unique identifier as the transferring hospital. PCI procedures analyzed in this measure must be primary procedures. Primary includes emergent or urgent PCI procedures and not those described by the physician/APN/PA anywhere in the record as elective, not emergent, not immediate, not primary, not urgent, or secondary.

From a clinical standpoint, Primary PCI is loosely defined as percutaneous coronary intervention performed in the acute setting in patients with ST segment elevation MI which is intended to restore perfusion in the infarct-related artery. In randomized trials and observational studies, this therapy is associated with significant reductions in the risks of adverse events, including death, in selected patients with STEMI.

6.1.7 Measure 55v1: Median Time from ED Arrival to ED Departure for Admitted Patients, NQF 0495, ED1

This measure specification defines how to determine an individual Emergency Department stay. Reporting requires the median of all patient stays:

[Encounter: encounter ED]*arrivaldatetime – [Encounter: encounter ED]*EDdeparturedatetime

Calculate the ED time in minutes for each person in the measure population; report the median time for all calculations performed. The specification provides elements from the clinical electronic record required to calculate for each ED encounter, i.e., the length of time the patient was in the Emergency Department, also stated as: the TIMEDIFF for the Emergency Department departure time minus the Emergency Department arrival time. The calculation requires the median across all ED encounter durations.

Additional guidance on ED Throughput is available on the CMS website at: http://www.cms.gov/Medicare/Quality-Initiatives-Patient-Assessment-Instruments/QualityMeasures/downloads/EH_EDThroughputStratificationTable.pdf

6.1.8 Measure 60v1: Fibrinolytic Therapy Received Within 30 Minutes of Hospital Arrival, NQF 0164, AMI7a_FibrinolyticTher

The measurement period is one calendar year but the reporting period is 3 months as a calendar quarter; Q1 = Jan – Mar, Q2 = Apr – Jun, Q3 = Jul – Sep, Q4 is Oct – Dec.

Denominator element guidance:

The denominator and numerator criteria indicate scenarios in which the patient is admitted to the hospital directly or the patient is admitted from the Emergency Department (ED). The calculation is to indicate the timing from arrival at the facility to the occurrence of an event.

For the denominator data element "Diagnostic Study, Result: Hospital Measures-ECG," EHR implementations will need to develop mechanisms to capture ECG findings to support denominator criteria for this measure. The measure specification indicates allowable findings. The source of the ECG results should be a physician/APN/PA (rather than the ECG machine's computerized results).

Numerator element guidance:

This measure expects fibrinolytic therapy within 30 minutes of hospital arrival. Those patients receiving fibrinolysis greater than 30 minutes after arrival may be excluded from the denominator only if there is a documented reason for a delay or documented occurrence of intubation, cardiopulmonary arrest or intraaortic balloon pump insertion within the first 30 minutes after arrival. Patients receiving fibrinolysis greater than 30 minutes after arrival and with no reason provided are not compliant with the numerator criteria and will remain in the denominator.

Exclusion element guidance:

The intent of the exclusion for patients who are clinical trial participants was to limit the exclusion to patients participating in a clinical trial for acute myocardial infarction (AMI), ST elevation myocardial infarction (STEMI), non-ST elevation myocardial infarction (non-STEMI), heart attack, or acute coronary syndrome (ACS), the same conditions as covered by the measure. However, the data element used for clinical trial participation in the 2014 eMeasures cannot distinguish between different types of clinical trials; therefore, certification testing will not include clinical trial type.

Transfers from another hospital are excluded since care may have been delivered in the other setting. Transfers from those hospitals are considered exclusions regardless of whether the receiving hospital has the same or different hospital unique identifier as the transferring hospital.

6.1.9 Measure 71v2: Anticoagulation Therapy for Atrial Fibrillation/Flutter, NQF 0436, Stroke3

The unit of measurement for this measure is an inpatient episode of care. Each distinct hospitalization should be reported, regardless of whether the same patient is admitted for inpatient care more than once during the measurement period. In addition, the eMeasure logic intends to represent events within or surrounding a single occurrence of an inpatient hospitalization.

The facility location arrival date-time and facility location departure date-time are coupled with the emergency department visit value set. They intend to represent arrival date-time at the emergency department and the discharge date-time from the emergency department, respectively.

The Denominator Exceptions, “medication, order not done,” criteria is intended to refer to discharge medications.

6.1.10 Measure 72v1: Antithrombotic Therapy by End of Hospital Day 2, NQF 0438, Stroke5

The unit of measurement for this measure is an inpatient episode of care. Each distinct hospitalization should be reported, regardless of whether the same patient is admitted for inpatient care more than once during the measurement period. In addition, the eMeasure logic intends to represent events within or surrounding a single occurrence of an inpatient hospitalization.

The facility location arrival date-time and facility location departure date-time are coupled with the emergency department visit value set. They intend to represent arrival date-time at the emergency department and the discharge date-time from the emergency department, respectively.

6.1.11 Measure 73v1: Venous Thromboembolism Patients with Anticoagulation Overlap Therapy, NQF 0373, VTE3

The unit of measurement for this measure is an inpatient episode of care. Each distinct hospitalization should be reported, regardless of whether the same patient is admitted for inpatient care more than once during the measurement period. In addition, the eMeasure logic intends to represent events within or surrounding a single occurrence of an inpatient hospitalization.

The intent of this measure is to limit exclusions for clinical trial participation to cases in which the patient was enrolled in a clinical trial in which patients with Venous Thromboembolism were being studied during this hospital stay. However, the data element used for clinical trial participation in the 2014 eMeasures cannot distinguish between different types of clinical trials; therefore, certification testing will not include clinical trial type.

For date difference calculations, use the LAST (most recent) of the alternative dates as the end date and the EARLIEST of the alternative dates as the start date.

This measure uses the construct “medication, order not done” to represent both medications that were not ordered during the inpatient encounter AND medications intended as discharge medications. In the following example (there are more criteria in the logic with the same consideration), the first OR pertains to parental anticoagulants as discharge meds, while the second one addresses patients who did not receive a parenteral anticoagulant during the encounter (i.e., not ordered):

[Numerator]

OR:

- […]
- AND:
    - OR: "Medication, Discharge: Parenteral Anticoagulant" during "Occurrence A of Encounter, Performed: Inpatient Encounter"
    - OR:
        - OR: "Medication, order not done: Medical Reason" for "Parenteral Anticoagulant RxNorm Value Set"
        - OR: "Medication, order not done: Patient Refusal" for "Parenteral Anticoagulant RxNorm Value Set"

[…]

OR:

- AND NOT: "Medication, Order: Parenteral Anticoagulant" during "Occurrence A of Encounter, Performed: Inpatient Encounter"
- AND:
  […]
- AND:
    - OR:
        - OR: "Medication, Order not done: Medical Reason" for "Parenteral Anticoagulant RxNorm Value Set"
        - OR: "Medication, Order not done: Patient Refusal" for "Parenteral Anticoagulant RxNorm Value Set"
        - during "Occurrence A of Encounter, Performed: Inpatient Encounter"
    - OR:
        - OR: "Medication, Order not done: Medical Reason" for "Parenteral Anticoagulant RxNorm Value Set"
        - OR: "Medication, Order not done: Patient Refusal" for "Parenteral Anticoagulant RxNorm Value Set"
        - during "Occurrence A of Encounter, Performed: Emergency Department Visit

In addition, the measure does not address time-binding of medications intended as discharge medications, e.g., (*during vs. concurrent with: (encounter, performed: inpatient encounter (dischargedatetime*))).

The intent of the Denominator Inclusion criteria is to capture patients who were diagnosed with VTE in specific locations (as defined by the VTE confirmed value set) thru an allowable VTE diagnostic test (as defined by the VTE diagnostic test value set). The Diagnostic Study Test value set was modeled as "Diagnostic Study, Performed Separately" due to timing constraints on the actual occurrence of the test. The measure logic and value sets will be evaluate to determine if the timing constraints will permit removal of the "Diagnostic Study Performed" value set to reduce potential redundancy in the measure during the measure maintenance period. Any updates will be published in April 2013.

6.1.12 Measure 91v2: Thrombolytic Therapy NQF 0437, Stroke4

The unit of measurement for this measure is an inpatient episode of care. Each distinct hospitalization should be reported, regardless of whether the same patient is admitted for inpatient care more than once during the measurement period. In addition, the eMeasure logic intends to represent events within or surrounding a single occurrence of an inpatient hospitalization.

The facility location arrival date-time and facility location departure date-time are coupled with the emergency department visit value set. They intend to represent arrival date-time at the emergency department and the discharge date-time from the emergency department, respectively.

The baseline state data value set and its associated stop date-time intend to capture the date and time prior to hospital arrival at which it was witnessed or reported that the patient was last known to be without the signs and symptoms of the current stroke or at his or her baseline state of health

6.1.13 Measure 100v1: Aspirin Prescribed at Discharge, NQF 0142, AMI2_AspirinAtDisch

The measurement period is one calendar year but the reporting period is 3 months as a calendar quarter; Q1 = Jan – Mar, Q2 = Apr – Jun, Q3 = Jul – Sep, Q4 is Oct – Dec.

The header incorrectly states, "Patients for whom there are missing or inaccurate data (e.g., arrival time, medication administration, etc.) are considered to have failed the measure; the total number of patients with missing or erroneous (e.g., a time of 03:69 or a date of 10/26/2035) data (i.e., measure failures) must be reported with the results of the measure." This guidance will be removed during the next measure maintenance period.

Exclusion element guidance:

The intent of the exclusion for patients who are clinical trial participants was to limit the exclusion to patients participating in a clinical trial for acute myocardial infarction (AMI), ST elevation myocardial infarction (STEMI), non-ST elevation myocardial infarction (non-STEMI), heart attack, or acute coronary syndrome (ACS), the same conditions as covered by the measure. However, the data element used for clinical trial participation in the 2014 eMeasures cannot distinguish between different types of clinical trials; therefore, certification testing will not include clinical trial type.

6.1.14 Measure 102v1: Assessed for Rehabilitation, NQF 0441, Stroke10

The unit of measurement for this measure is an inpatient episode of care. Each distinct hospitalization should be reported, regardless of whether the same patient is admitted for inpatient care more than once during the measurement period. In addition, the eMeasure logic intends to represent events within or surrounding a single occurrence of an inpatient hospitalization.

6.1.15 Measure 104v1: Discharged on Antithrombotic Therapy, NQF 0435, Stroke2

The unit of measurement for this measure is an inpatient episode of care. Each distinct hospitalization should be reported, regardless of whether the same patient is admitted for inpatient care more than once during the measurement period. In addition, the eMeasure logic intends to represent events within or surrounding a single occurrence of an inpatient hospitalization.

The facility location arrival datetime and facility location departure datetime are coupled with the emergency department visit value set. They intend to represent arrival date-time at the emergency department and the discharge date-time from the emergency department, respectively.

The Denominator Exceptions, "medication, order not done" criteria is intended to refer to discharge medications.

The denominator Exclusion language currently states "patients admitted for elective carotid intervention." The logic and associated value set do not enable determination whether the intervention was elective or not. This issue is currently under review and guidance will be provided when a decision is made; therefore, certification testing will not include whether a procedure is elective or not.

6.1.16 Measure 105v1: Discharged on Statin Medication, NQF 0439, Stroke6

The unit of measurement for this measure is an inpatient episode of care. Each distinct hospitalization should be reported, regardless of whether the same patient is admitted for inpatient care more than once during the measurement period. In addition, the eMeasure logic intends to represent events within or surrounding a single occurrence of an inpatient hospitalization.

The facility location arrival date-time and facility location departure date-time are coupled with the emergency department visit value set. They intend to represent arrival date-time at the emergency department and the discharge date-time from the emergency department, respectively.

Lipid-lowering medications are intended as active home medications that the patient may or may not continue to take during hospitalization.

The Denominator Exceptions, "medication, order not done," criteria is intend to refer to discharge medications.

6.1.17 Measure 107v1: Stroke Education, NQF 0440, Stroke8

The unit of measurement for this measure is an inpatient episode of care. Each distinct hospitalization should be reported, regardless of whether the same patient is admitted for inpatient care more than once during the measurement period. In addition, the eMeasure logic intends to represent events within or surrounding a single occurrence of an inpatient hospitalization.

The facility location arrival date-time and facility location departure date-time are coupled with the emergency department visit value set. They intend to represent arrival date-time at the emergency department and the discharge date-time from the emergency department, respectively.

Communication from provider to patient regarding educational components (activation of emergency medical system, follow-up after discharge, medications prescribed at discharge, risk factors and signs and symptoms) are intended to be specific to stroke. In addition, written information given to the patient should be specific to stroke as well, and address each and every one of the educational components.

6.1.18 Measure 108v1: Venous Thromboembolism Prophylaxis, NQF 0371, VTE1

The unit of measurement for this measure is an inpatient episode of care. Each distinct hospitalization should be reported, regardless of whether the same patient is admitted for inpatient care more than once during the measurement period. In addition, the eMeasure logic intends to represent events within or surrounding a single occurrence of an inpatient hospitalization.

When unfractionated heparin is not administered due to medical reasons, the intended administration route is subcutaneous.

The facility location arrival datetime and facility location departure datetime are coupled with the emergency department visit value set. They intend to represent arrival date-time at the emergency department and the discharge date-time from the emergency department, respectively.

The value set used for "Medication Administered" is intended to examine actual medication administration, not medication orders. The measure criteria asks whether medication has been given to the patient or not, and, if not, is there a documented reason in the EHR. Since the measure looks for the evidence of medication administered ir or not administered, the measure does not use medication order data.

6.1.19 Measure 109v1: Venous Thromboembolism Patients Receiving Unfractionated Heparin with Dosages/Platelet Count Monitoring by Protocol or Nomogram, NQF 0374, VTE4

The unit of measurement for this measure is an inpatient episode of care. Each distinct hospitalization should be reported, regardless of whether the same patient is admitted for inpatient care more than once during the measurement period. In addition, the eMeasure logic intends to represent events within or surrounding a single occurrence of an inpatient hospitalization.

The facility location arrival date-time and facility location departure date-time are coupled with the emergency department visit value set. They intend to represent arrival date-time at the emergency department and the discharge date-time from the emergency department, respectively.

Treatment adjustment by protocol and/or use of a clinical pathway must be specific to unfractionated heparin therapy. Heparin protocols and clinical pathways may include use of a nomogram.

6.1.20 Measure 110v1: Venous Thromboembolism Discharge Instructions, NQF 0375, VTE5

The unit of measurement for this measure is an inpatient episode of care. Each distinct hospitalization should be reported, regardless of whether the same patient is admitted for inpatient care more than once during the measurement period. In addition, the eMeasure logic intends to represent events within or surrounding a single occurrence of an inpatient hospitalization.

Communication from provider to patient regarding educational components (medication compliance, adverse reactions and interactions, medication monitoring compliance, dietary advice and follow-up monitoring) are intended to be specific to discharge instructions related to warfarin therapy. In addition, written information given to the patient should be connected to the educational components for warfarin therapy as well.

6.1.21 Measure 111v1: Median Admit Decision Time to ED Departure Time for Admitted Patients, NQF 0497, ED2

This measure specification defines how to determine an individual Emergency Department stay. Reporting requires the median of all patient stays

> [Encounter: encounter ED]*decisiontoadmitdatetime -- [Encounter: encounter ED]* EDdeparturedatetime

Calculate the ED time in minutes for each person in the measure population; report the median time for all calculations performed. The specification provides elements from the clinical electronic record required to calculate for each ED encounter, i.e., the length of time the patient was in the Emergency Department from the time of decision to admit, also stated as: the TIMEDIFF for the Emergency Department departure time minus the Decision to Admit Time. The calculation requires the median across all ED encounter durations.

Additional guidance on ED Throughput is available on the CMS website at: http://www.cms.gov/Medicare/Quality-Initiatives-Patient-Assessment-Instruments/QualityMeasures/downloads/EH_EDThroughputStratificationTable.pdf

6.1.22 Measure 113v1: Elective Delivery, NQF 0469, PC01

The unit of measurement for this measure is an inpatient episode of care. Each distinct hospitalization should be reported, regardless of whether the same patient is admitted for inpatient care more than once during the measurement period. In addition, the eMeasure logic intends to represent events within or surrounding a single occurrence of an inpatient hospitalization.

Wherever the gestational age is mentioned with relative timing to delivery, the intent is to capture gestational age documented on the day of delivery but prior to delivery.

Gestational age should be rounded off to the nearest completed week, not the following week. For example, an infant born on the 5th day of the 36th week (35 weeks and 5/7 days) is at a gestational age of 35 weeks, not 36 weeks.

The denominator inclusion of patients with a gestational age of 37 or 38 weeks, or gestational age unknown, or gestational age not documented, is achieved implicitly by excluding patients with a gestational age of <37 weeks or >= 39 weeks.

The numerator inclusion for patients with gestational age unknown or not documented in the medical record is achieved by modeling patients who do not have a gestational age of 37 or 38 weeks.

6.1.23 Measure 114v1: Incidence of Potentially-Preventable Venous Thromboembolism, NQF 0376, VTE6

The unit of measurement for this measure is an inpatient episode of care. Each distinct hospitalization should be reported, regardless of whether the same patient is admitted for inpatient care more than once during the measurement period. In addition, the eMeasure logic intends to represent events within or surrounding a single occurrence of an inpatient hospitalization.

The facility location arrival date-time and facility location departure date-time are coupled with the emergency department visit value set. They intend to represent arrival date and time at the emergency department and the discharge date and time from the emergency department, respectively.

When unfractionated heparin is not administered due to medical reasons, the intended administration route is subcutaneous.

6.1.24 Measure 171v2: Prophylactic Antibiotic Received Within One Hour of Surgical Incision, NQF 0527, SCIPINF1_AntibioticPriorIncision

The measurement period is one calendar year but the reporting period is 3 months as a calendar quarter; Q1 = Jan – Mar, Q2 = Apr – Jun, Q3 = Jul – Sep, Q4 is Oct – Dec.

Denominator Exclusion guidance:

The intent of the exclusion for patients who are clinical trial participants was to limit the exclusion to patients participating in a clinical trial for the same conditions as covered by the measure. However, the data element used for clinical trial participation in the 2014 eMeasures cannot distinguish between different types of clinical trials; therefore, certification testing will not include clinical trial type.

6.1.25 Measure 172v2: Prophylactic Antibiotic Selection for Surgical Patients, NQF 0528, SCIPINF2_AntibioticForSurg

The measurement period is one calendar year but the reporting period is 3 months as a calendar quarter; Q1 = Jan – Mar, Q2 = Apr – Jun, Q3 = Jul – Sep, Q4 is Oct – Dec.

General guidance:

To precisely describe the required surgical procedure concepts, the measure steward elected to use ICD-9 or ICD-10 coding since SNOMED CT® currently does not provide the required specification for the granulated subset of the surgical procedures identified in the measure.

Denominator Exclusion guidance:

The intent of the exclusion for patients who are clinical trial participants was to limit the exclusion to patients participating in a clinical trial for the same conditions as covered by the measure. However, the data element used for clinical trial participation in the 2014 eMeasures cannot distinguish between different types of clinical trials; therefore, certification testing will not include clinical trial type.

Numerator element guidance:

Vancomycin is acceptable for CABG, other cardiac procedures, hip arthroplasty, knee arthroplasty and vascular surgery if there is an increased MRSA rate facility-wide or operation-specific. For the purpose of using vancomycin for prophylaxis, it is expected that vancomycin is given ONLY if one of the allowable conditions is TRUE. It is not necessary to report when the patient requires vancomycin, but it is expected that there would be a clinical reason to use vancomycin in the record if it were audited.

6.1.26 Measure 178v2: Urinary Catheter Removed on Postoperative Day 1 (POD1) or Postoperative Day 2 (POD2) with Day of Surgery Being Zero, NQF 0453, SCIPINF9_UrinaryCathRemoved

The measurement period is one calendar year but the reporting period is 3 months as a calendar quarter; Q1 = Jan – Mar, Q2 = Apr – Jun, Q3 = Jul – Sep, Q4 is Oct – Dec.

The header incorrectly states, “Patients for whom there are missing or inaccurate data (e.g., arrival time, medication administration, etc.) are considered to have failed the measure; the total number of patients with missing or erroneous (e.g., a time of 03:69 or a date of 10/26/2035) data (i.e., measure failures) must be reported with the results of the measure.” This guidance will be removed during the next measure maintenance period.

General guidance:

To precisely describe the required surgical procedure concepts, the measure steward elected to use ICD-9 or ICD-10 coding since SNOMED CT® currently does not provide the required specification for the granulated subset of the surgical procedures identified in the measure.

Denominator element guidance:

The denominator in this measure specifically excludes surgical procedures that may be associated with post-operative indwelling urinary catheter usage and that occur in close time proximity to the index major surgical procedure. Previous CABG and 'other cardiac surgery' procedures allow exclusion if performed within 4 days before or after the index major surgical procedure. Other major surgical procedures allow exclusion if performed within 3 days before or after the index major surgical procedure.

The denominator in this measure captures catheter insertion during the inpatient encounter. The SCIP surgical procedure may end after the catheter was inserted OR the SCIP surgical procedure could end up to six hours before the catheter was inserted; i.e., SCIP procedure was performed; and a SCIP procedure performed before the end of the inpatient encounter.

Exclusion element guidance:

The intent of the exclusion for patients who are clinical trial participants wass to limit the exclusion to patients participating in a clinical trial for the same conditions as covered by the measure. However, the data element used for clinical trial participation in the 2014 eMeasures cannot distinguish between different types of clinical trials; therefore, certification testing will not include clinical trial type.

The original specification for this measure allowed an exclusion for patients with pacemaker or implantable defibrillator insertions within 4 days of CABG or other cardiac procedures or 3 days for other surgery.

By convention, discharge date post "Encounter inpatient" is used to describe the hospital discharge date. Where logic needs to indicate discharge (or transfer) from one inpatient location to another, the logic uses "Transfer From" or "Transfer To" as the QDS data type.

6.1.27 Measure 185v1: Healthy Term Newborn, NQF 0716, HealthyTermNewborn

This measure is designed to be used in hospital encounters involving newborns. For measure 185, the intent is to apply the measure only to single newborns born in the hospital and at term, defined as gestational age ≥ 37 weeks. The very first step for this measure, identifying all term singleton infants can be surprisingly challenging. Some hospitals do not do a good job of using the proper v-codes or DRGs so that clinical information such as birthweight and gestational age need to be used in the first step.

The logic phrase AND: “Occurrence A of Encounter, Performed: Inpatient Encounter (reason: 'Birth')” intends to capture admission type of newborn for the encounter. Where this information is available in existing EHR structured fields (e.g. data that is fed to UB-04, field location 14), it can be used to map the criterion specified in the logic.

The logic phrase AND: “Diagnosis, Active: Liveborn Born In Hospital” starts during “Occurrence A of Encounter, Performed: Inpatient Encounter” intends to capture the point of origin for the inpatient admission. Where this information is available in existing EHR structured fields (e.g. data that is fed to UB-04, field location 15), it can be used to map the criterion specified in the logic.

6.1.28 Measure 188v2: Initial Antibiotic Selection for Community-Acquired Pneumonia (CAP) for Immunocompetent Patients, NQF 0147, PN6_AntibioticForCAP

The measure criteria indicate scenarios in which the patient is admitted to the hospital directly (to ICU or Non-ICU locations) or the patient is admitted to one of these locations from the Emergency Department (ED).

The calculation is to indicate the timing from arrival at the facility to the occurrence of an event. The arrival can therefore be determined from the Emergency Department, the Non-ICU location, or the ICU location, whichever is the first location of contact between the patient and the facility.

The measure steward has approved removal of the following language. The guidance update will occur during the measure maintenance period. Patients for whom there are missing or inaccurate data (e.g., arrival time, medication administration, etc.) are considered to have failed the measure; the total number of patients with missing or erroneous (e.g., a time of 03:69 or a date of 10/26/2035) data (i.e., measure failures) must be reported with the results of the measure.

Denominator element guidance:

Abnormal findings on chest x-ray or CT scan of the chest are currently criteria to be included in the denominator.

In the majority of EHR systems integrated with or interfaced with imaging systems, the presence of abnormal findings on an x-ray or CT, let alone abnormal findings suggestive of pneumonia, are not recorded in a discrete fashion. Considerations for removing this data element from the denominator will require the measure steward to engage the measure Technical Expert Panel for approval. Guidance can only be provided based on the paper measure specifications. ONC remains sensitive to this issue moving forward and intends to address it in the future.

Denominator exclusion element guidance:

The intent of the exclusion for patients who are clinical trial participants was to limit the exclusion to patients participating in a clinical trial for the same conditions as covered by the measure. However, the data element used for clinical trial participation in the 2014 eMeasures cannot distinguish between different types of clinical trials; therefore, certification testing will not include clinical trial type.

Transfers from another hospital or an Emergency Department that is not part of the hospital's organization are excluded since care may have been delivered in the other setting. The measure as specified for abstraction allowed determination of other hospital or other hospital Emergency Departments by hospital billing number.

Transfers within 1 day from those hospitals or Emergency Departments using the same facility number are not considered transfers for the exclusion section of this measure, those using other facility numbers are considered exclusions.

The exclusion for absolute neutrophil count < 500 may require calculation. The absolute neutrophil count:
(ANC) = Total WBC x (% "Segs" + % "Bands") = WBC x ((Segs/100) + (Bands/100))

Respiratory Infection prior to admission: The logic indicates the patient is included if a respiratory infection is present but excluded for any other infection unless it ends <= 24 hours after the start of the encounter.

6.1.29 Measure 190v1: Intensive Care Unit Venous Thromboembolism Prophylaxis, NQF 0372, VTE2

The unit of measurement for this measure is an inpatient episode of care. Each distinct hospitalization should be reported, regardless of whether the same patient is admitted for inpatient care more than once during the measurement period. In addition, the eMeasure logic intends to represent events within or surrounding a single occurrence of an inpatient hospitalization.

The definition of an Intensive Care Unit (ICU) for the purpose of this measure is that used by the CDC in the NHSN Patient Safety Project. An intensive care unit can be defined as a nursing care area that provides intensive observation, diagnosis, and therapeutic procedures for adults and/or children who are critically ill. An ICU excludes nursing areas that provide step-down, intermediate care or telemetry only and specialty care areas.

6.2 Eligible Provider (EP) eMeasures

6.2.1 Measure 2v2: Preventive Care and Screening: Screening for Clinical Depression and Follow-Up Plan, NQF 0418, Depression_Screening

A clinical depression screen is complete on the date of the encounter using an age appropriate standardized depression screening tool AND if positive, a follow-up plan is documented on the date of the positive screen. The documented follow up plan must be related to positive depression screening, example: "Patient referred for psychiatric evaluation due to positive depression screening."

Standardized Depression Screening Tools should be normalized and validated for the age appropriate patient population in which they are used

6.2.2 Measure 22v1: Preventive Care and Screening: Screening for High Blood Pressure and Follow-Up Documented, NQF XXXX, BP_Screening_and_Follow_Up

Both the systolic and diastolic blood pressure measurements are required for inclusion. If there are multiple blood pressures on the same date of service, use the lowest systolic and lowest diastolic blood pressure on that date as the representative blood pressure.

Providers who report the measure must perform the blood pressure screening at the time of a qualifying visit by an eligible professional and may not obtain measurements from external sources.

The documented follow up plan must be related to the current BP reading as indicated, example: "Patient referred to primary care provider for BP management."

6.2.3 Measure 50v1: Closing the referral loop: receipt of specialist report, NQF XXXX, Closing_Referral_Loop

The provider to whom the patient was referred should be the same provider that sends the report.

If there are multiple referrals for a patient during the measurement period, use the first referral.

6.2.4 Measure 52v1: HIV/AIDS: Pneumocystis jiroveci pneumonia (PCP) Prophylaxis, NQF 0405, HIVAIDS_PCP_Prophylaxis

Denominator 1: The CD4 count below 200 cells/mm3 must occur during the first nine months of the year.

Denominator 2: The CD4 count below 500 cells/mm3 or the CD4 percentage below 15% must occur during the first nine months of the year.

Once all denominators and numerators are calculated, a total rate should be calculated using the sum of the three denominators and the sum of the three numerators.

6.2.5 Measure 56v1: Functional status assessment for hip replacement, NQF XXXX, FSA_Hip_Replacement

A Functional Status Assessment (FSA) is based on administration of a validated instrument to eligible patients that asks patients to answer questions related to various domains including: pain, physical function, emotional well-being, health-related quality of life, symptom acuity.

The use of patient-reported outcomes data in eMeasures - such as this measure of functional status - demonstrates the need for the Quality Reporting Data Architecture (QRDA) to support a data attribute that indicates that the patient provided the information.

6.2.6 Measure 61v2: Preventive Care and Screening: Cholesterol – Fasting Low Density Lipoprotein (LDL-C) Test Performed, NQF XXXX, Cholesterol_ScreeningA

6.2.7 Measure 64v2: Preventive Care and Screening: Risk-Stratified Cholesterol – Fasting Low Density Lipoprotein (LDL-C), NQF XXXX, Cholesterol_ScreeningB

These two eMeasure packages are part of a single eMeasure regarding cholesterol preventive care and screening. Because the measure is risk-stratified, it is presented in two separate packages, labeled “Cholesterol -- Fasting Low Density Lipoprotein (LDL-C) Test Performed” and “Risk-Stratified Cholesterol – Fasting Low Density Lipoprotein (LDL-C)”. If the fasting LDL-C test is performed by the provider or if the fasting LDL-C results are documented, both measures should be reported.

To successfully report on this measure, patients must have at least one face-to-face visit with the eligible professional during the measurement period and have one LDL-C performed during the same measurement period with the exception of patients with 0 or 1 risk factors who may have an LDL-C performed up to four (4) years prior to the current measurement period.

6.2.8 Measure 62v1: HIV/AIDS: Medical Visit, NQF 0403, HIVAIDS_Medical_Visit

A medical visit is any visit with a health care professional who provides routine primary care for the patient with HIV/AIDS (may be but is not limited to a primary care clinician, OB/GYN, pediatrician, infectious disease specialist).

6.2.9 Measure 65v2: Hypertension: Improvement in blood pressure, NQF XXXX, Hypertension_BP_Improve

Blood pressure readings must be taken while the patient is sitting. If multiple measurements occur on the same date, the last systolic and diastolic readings should be used.

6.2.10 Measure 66v1: Functional status assessment for knee replacement, NQF XXXX, FSA_Knee_Replacement

A Functional Status Assessment (FSA) is based on administration of a validated instrument to eligible patients that asks patients to answer questions related to various domains including: pain, physical function, emotional well-being, health-related quality of life, symptom acuity.

The use of patient-reported outcomes data in eMeasures - such as this measure of functional status - demonstrates the need for the Quality Reporting Data Architecture (QRDA) to support a data attribute that indicates that the patient provided the information.

6.2.11 Measure 68v1: Documentation of Current Medications in the Medical Record, NQF 0419, Current_Meds_Documented

This measure is to be reported for every encounter during the measurement period.

Eligible professionals reporting this measure may document medication information received from the patient, authorized representative(s), caregiver(s) or other available healthcare resources. This list must include all prescriptions, over-the-counter (OTC) products, herbs, vitamins, minerals, dietary (nutritional) supplements AND must contain the dosage, frequency and route.

This measure should also be reported if the provider documented the patient is not currently taking any medications.

6.2.12 Measure 69v2: Preventive Care and Screening: Body Mass Index (BMI) Screening and Follow-Up, NQF 0421, BMI_and_Follow_Up

BMI calculated and documented in the medical record may be reported if done in the provider's office/facility or if BMI calculation within the past six months is documented outside medical records obtained by the provider. If the most recent BMI is outside of normal parameters a follow-up plan is documented within the past six months of the calculated BMI. The documented follow up interventions must be related to the BMI outside of normal parameters, example: "Patient referred to nutrition counseling for BMI above normal parameters".

6.2.13 Measure 74v1: Primary Caries Prevention Intervention as Offered by Primary Care Providers, including Dentists, NQF XXXX, Primary_Caries_Prevention

No additional guidance provided.

6.2.14 Measure 75v1: Children who have dental decay or cavities, NQF XXXX, Children_Dental_Decay

This is an inverse measure which cumulatively tracks children with dental decay and cavities; therefore, an increasing rate indicates worse performance. For example, a rate of 100% would indicate failure whereas a rate of 0% indicates perfect performance.

6.2.15 Measure 77v1: HIV/AIDS: RNA Control for Patients with HIV, NQF XXXX, RNA_Control_HIV

No additional guidance provided.

6.2.16 Measure 82v1: Maternal depression screening, NQF 1401, Maternal_Dep_Screening

The endorsed measure relies on notes from the patient's and mother's charts. The eMeasure specifies only patient's record, looking for the newly allocated SNOMED codes that allow providers to record the screening and treatment of the mother.

6.2.17 Measure 90v2: Functional status assessment for complex chronic conditions, NQF XXXX, FSA_Complex_Chronic_Cond

Initial encounter: The first encounter during the first 185 days of the measurement year.

Follow-up encounter: The last encounter that is at least 30 days but no more than 180 after the initial encounter.

A Functional Status Assessment (FSA) is based on administration of a validated instrument to eligible patients that asks patients to answer questions related to various domains including: pain, physical function, emotional well-being, health-related quality of life, symptom acuity.

The use of patient-reported outcomes data in eMeasures - such as this measure of functional status - demonstrates the need for the Quality Reporting Data Architecture (QRDA) to support a data attribute that indicates that the patient provided the information.

6.2.18 Measure 117v1: Childhood Immunization Status, NQF 0038, Child_Imm_Status

For the MMR, hepatitis B, VZV and hepatitis A vaccines, numerator inclusion criteria include: evidence of the antigen; documented history of the illness; or, a seropositive test result for the antigen. For the DTaP, IPV, and influenza vaccines, numerator inclusion criteria include evidence of the antigen or previous anaphylactic reaction to the vaccine or its components. For the HiB, pneumococcal conjugate, and rotavirus vaccines, numerator inclusion criteria include only evidence of the antigen. For the MMR, VZV, and influenza vaccines, numerator inclusion criteria also include: a diagnosis of immunodeficiency, HIV, cancer of lymphoreticular or histiocytic tissue, multiple myeloma, or leukemia; or, previous anaphylactic reaction to neomycin. For the hepatitis B and hepatitis A vaccines, numerator inclusion criteria also include previous anaphylactic reaction to the vaccine or its components. For the DTaP vaccine, numerator inclusion criteria also include an active or resolved diagnosis of encephalopathy. For the IPV vaccine, numerator inclusion criteria also include previous anaphylactic reaction to streptomycin, polymyxin, or neomycin.

6.2.19 Measure 122v1: Diabetes: Hemoglobin A1c Poor Control, NQF 0059, Diab_HbA1c_Ctrl

Patient is numerator compliant if most recent HbA1c level >9%, if the result is missing, or if an HbA1c test was not done during the measurement year. This is an inverse measure which tracks patients with HbA1C >9%, missing results, and failure to perform the test; therefore, an increasing rate indicates worse performance. For example, a rate of 100% would indicate failure whereas a rate of 0% indicates perfect performance.

Only patients with a diagnosis of Type 1 or Type 2 diabetes should be included in the denominator of this measure; patients with a diagnosis of secondary diabetes due to another condition should not be included.

6.2.20 Measure 123v1: Diabetes: Foot Exam, NQF 0056, Diab_Foot

Only patients with a diagnosis of Type 1 or Type 2 diabetes should be included in the denominator of this measure; patients with a diagnosis of secondary diabetes due to another condition should not be included.

6.2.21 Measure 124v1: Cervical Cancer Screening, NQF 0032, Cervical_Cancer_Screen

By including women who are at least 24 years of age in the initial patient population, we are only including women in the measure who would have been at least 21 years old at the time of their pap screening, because there is a 3 year look back period for the pap test.

6.2.22 Measure 125v1: Breast Cancer Screening, NQF 0031, Breast_Cancer_Screen

By including women who are at least 42 years of age in the initial patient population, we are only including women in the measure who would have been at least 40 years old at the time of their mammogram, because there is a 2 year look back period for the mammogram.

6.2.23 Measure 126v1: Use of Appropriate Medications for Asthma, NQF 0036, Med_for_Asthma

No additional guidance provided.

6.2.24 Measure 127v1: Pneumonia Vaccination Status for Older Adults, NQF 0043, Pneu_Vacc_Status

Pneumococcal vaccination is expected once ever for patients 65 years of age or older.

6.2.25 Measure 128v1: Anti-depressant Medication Management, NQF 0105, Antidep_Med_Mgmt

To identify new treatment episodes for major depression, there must be a 90-day negative medication history (a period during which the patient was not taking antidepressant medication) prior to the first dispensing event associated with the Index Episode Start Date (Index Prescription Start Date).

CUMULATIVE MEDICATION DURATION is the total number of days of a medication for an individual. Days of medication can be derived from number of doses per day divided by the frequency. The cumulative duration can be calculated as the sum of the number of medication dispensed days x number of medication refills over a set period of time, excluding any gaps during which a medication was not dispensed. For example, if a medication was prescribed for 30 days with 3 refills, then a gap of 3 month, then prescribed again for 60 days with 2 refills, the cumulative medication duration for would be (30 x 3) + (60 x 2) = 210 days over the 10 month period.

6.2.26 Measure 129v2: Prostate Cancer: Avoidance of Overuse of Bone Cancer for Staging of Low Risk Prostate Cancer Patients, NQF 0389, PrCA_OveruseBoneScan

A higher score indicates appropriate treatment of patients with prostate cancer at low risk of recurrence.

Only patients with prostate cancer with low risk of recurrence will be counted in the performance denominator of this measure.

6.2.27 Measure 130v1: Colorectal Cancer Screening, NQF 0034, Colorectal_Cancer_Screen

By including patients who are at least 51 years of age in the initial patient population, we are only including patients in the measure who would have been at least 50 years old at the time of their colon cancer screening, because there is a 1 year look back period for the colon cancer screening.

6.2.28 Measure 131v1: Diabetes: Eye Exam, NQF 0055, Diab_Eye

Only patients with a diagnosis of Type 1 or Type 2 diabetes should be included in the denominator of this measure; patients with a diagnosis of secondary diabetes due to another condition should not be included.

The eye exam must be performed by an ophthalmologist or optometrist.

6.2.29 Measure 132v1: Cataracts: Complications within 30 Days Following Cataract Surgery Requiring Additional Surgical Procedures, NQF 0564, CATARACTS_30daycomp

The unit of analysis is cataract surgery. If a patient had more than one cataract surgery during the measurement period, each cataract surgery will be evaluated.

This is an inverse measure which tracks the total number complications for all cataract surgeries performed; therefore, an increasing rate indicates worse performance. For example, a rate of 100% would indicate failure whereas a rate of 0% indicates perfect performance.

6.2.30 Measure 133v1: Cataracts: 20/40 or Better Visual Acuity within 90 Days Following Cataract Surgery, NQF 0565, CATARACTS_2040

The unit of analysis for this measure is each cataract procedure, including instances where more than one cataract procedure was performed during the measurement performed. Only procedures performed during January 1-September 30 of the reporting period will be considered for this measure, in order to determine if 20/40 or better visual acuity has been achieved within the 90 days following the cataract procedure. Cataract procedures performed during October 1 – December 31 are excluded from the initial patient population.

6.2.31 Measure 134v2: Diabetes: Urine Protein Screening, NQF 0062, Diab_Urine

Only patients with a diagnosis of Type 1 or Type 2 diabetes should be included in the denominator of this measure; patients with a diagnosis of secondary diabetes due to another condition should not be included.

6.2.32 Measure 135v1: Heart Failure (HF): Angiotensin-Converting Enzyme (ACE) Inhibitor or Angiotensin Receptor Blocker (ARB) Therapy for Left Ventricular Systolic Dysfunction (LVSD), NQF 0081, HF_ACEARB

To meet this measure, it must be reported for all heart failure patients a minimum of once during the measurement period when seen in the outpatient setting AND reported at each hospital discharge during the measurement period.

6.2.33 Measure 136v2: ADHD: Follow-Up Care for Children Prescribed Attention-Deficit/ Hyperactivity Disorder (ADHD) Medication, NQF 0108, ADHD_FollowUp

CUMULATIVE MEDICATION DURATION is the total number of days of a medication for an individual. Days of medication can be derived from number of doses per day divided by the frequency. The cumulative duration can be calculated as the sum of the number of medication dispensed days x number of medication refills over a set period of time, excluding any gaps during which a medication was not dispensed. For example, if a medication was prescribed for 30 days with 3 refills, then a gap of 3 months, then prescribed again for 60 days with 2 refills, the cumulative medication duration for would be (30 x 3) + (60 x 2) = 210 days over the 10 month period.

The 30 day visit in Numerator 1 must be with a practitioner who has prescribing authority.

6.2.34 Measure 137v1: Initiation and Engagement of Alcohol and Other Drug Dependence Treatment, NQF 0004, Ini_Eng_Alc_Drug_Dep

The new episode of alcohol and other drug dependence should be the first episode of the measurement period that is not preceded in the 60 days prior by another episode of alcohol or other drug dependence and would be counted only if it occurs in the first 11 months of the measurement period.

6.2.35 Measure 138v1: Preventive Care and Screening: Tobacco Use: Screening and Cessation Intervention, NQF 0028, PREV_Tobacco

If tobacco use status of a patient is unknown, the patient cannot be counted in the numerator and should be considered a measure failure. Instances where tobacco use status of "unknown" is recorded include: 1) the patient was not screened; or 2) the patient was screened and the patient (or caregiver) was unable to provide a definitive answer. If tobacco use status of “unknown” is recorded but the patient has an allowable medical exception, then the patient should be removed from the denominator of the measure and reported as a valid exception, but otherwise patients coded as “unknown” would remain in the denominator.

6.2.36 Measure 139v1: Falls: Screening for Future Fall Risk, NQF 0101, Falls_Screening

No additional guidance provided.

6.2.37 Measure 140v1: Breast Cancer: Hormonal Therapy for Stage IC-IIIC Estrogen Receptor/Progesterone Receptor (ER/PR) Positive Breast Cancer, NQF 0387, BrCA_HormonalTherapy

The denominator for this measure has been limited to patients with a first recorded breast cancer diagnosis within the past 5 years. The numerator captures patients who are prescribed adjuvant tamoxifen or aromatase inhibitors (AI), or received adjuvant tamoxifen or AI during the 12 month period. Date of breast cancer diagnosis is defined as date of pathologic diagnosis.

6.2.38 Measure 141v2: Colon Cancer: Chemotherapy for AJCC Stage III Colon Cancer Patients, NQF 0385, ColonCA_ChemoStageIII

The measure logic includes the combination of 5-FU/LV/oxaliplatin which will capture either mFOLFOX6 or FLOX, category 1, as referenced in the definitions section.

The denominator for this measure has been limited to patients with a first recorded colon cancer diagnosis during the 12 month reporting period. The numerator captures patients who are prescribed adjuvant chemotherapy or received adjuvant chemotherapy during the 12 month period. "Referred for Chemotherapy" is not separately specified, as this option can be captured either through the Medication Order: Chemotherapy for Colon Cancer" numerator option or the patient reason exception: "Medication, Administered not done: Patient reason" for "Chemotherapy for Colon Cancer". Additional valid medical reason exceptions might include acute renal insufficiency, neutropenia, or leukopenia. Date of diagnosis is defined as the date of pathologic diagnosis.

6.2.39 Measure 142v1: Diabetic Retinopathy: Communication with the Physician Managing Ongoing Diabetes Care, NQF 0089, DR_Communication

No additional guidance provided.

6.2.40 Measure 143v1: Primary Open Angle Glaucoma (POAG): Optic Nerve Evaluation, NQF 0086, POAG_OpticNerve

Optic nerve head evaluation includes examination of the cup to disc ratio and identification of optic disc or retinal nerve abnormalities. Both of these components of the optic nerve head evaluation are examined using ophthalmoscopy.

6.2.41 Measure 144v1: Heart Failure (HF): Beta-Blocker Therapy for Left Ventricular Systolic Dysfunction (LVSD), NQF 0083, HF_BB

LVEF < 40% corresponds to qualitative documentation of moderate dysfunction or severe dysfunction

To meet this measure, it must be reported for all heart failure patients a minimum of once during the measurement period when seen in the outpatient setting AND reported at each hospital discharge during the measurement period.

Beta-blocker therapy:

- For patients with prior LVEF <40%, beta-blocker therapy should include bisoprolol, carvedilol, or sustained release metoprolol succinate.

6.2.42 Measure 145v1: Coronary Artery Disease (CAD): Beta-Blocker Therapy--Prior Myocardial Infarction (MI) or Left Ventricular Systolic Dysfunction (LVSD <40%), NQF 0070, CAD_BB

Beta-blocker therapy:

- For patients with prior MI, no recommendations or evidence cited in current chronic stable angina guidelines for preferential use of specific agents
- For patients with prior LVEF <40%, beta-blocker therapy should include bisoprolol, carvedilol, or sustained release metoprolol succinate

6.2.43 Measure 146v1: Appropriate Testing for Children with Pharyngitis, NQF 0002, Pharyngitis

No additional guidance provided.

6.2.44 Measure 147v1: Preventive Care and Screening: Influenza Immunization, NQF 0041, PREV_Influenza

The timeframe for the visit during the "Encounter, Performed: Encounter-Influenza" or “Procedure, Performed: Peritoneal Dialysis” or “Procedure, Performed: Hemodialysis” in the Population Criteria-Denominator, refers to the influenza season defined by the measure: October through March (October 1 for the year prior to the start of the reporting period through March 31 during the reporting period). The “Encounter-Influenza” Grouping OID detailed in the data criteria section below is comprised of several individual OIDs of different encounter types. The individual OIDs are included in the value set and should be reviewed to determine that an applicable visit occurred during the timeframe for "Encounter, Performed: Encounter-Influenza” as specified in the denominator.

To enable reporting of this measure at the close of the reporting period, this measure will only assess the influenza season that ends in March of the reporting period. The subsequent influenza season (ending March of the following year) will be measured and reported in the following year.

6.2.45 Measure 148v1: Hemoglobin A1c Test for Pediatric Patients, NQF 0060, HbA1c_Test_Ped

Only patients with a diagnosis of Type 1 or Type 2 diabetes should be included in the denominator of this measure; patients with a diagnosis of secondary diabetes due to another condition should not be included.

6.2.46 Measure 149v1: Dementia: Cognitive Assessment, NQF XXXX, DEMENTIA_Cognitive

Use of a standardized tool or instrument to assess cognition other than those listed will meet numerator performance. Standardized tools can be mapped to the concept “Intervention, Performed: Cognitive Assessment” included in the numerator logic below.

6.2.47 Measure 153v1: Chlamydia Screening for Women, NQF 0033, Chlamydia_Screen

Codes to identify sexually active women include codes for: pregnancy, sexually transmitted infections, contraceptives or contraceptive devices, and infertility treatments.

The denominator exclusion does not apply to patients who qualify for the initial patient population based on services other than the pregnancy test alone.

6.2.48 Measure 154v1: Appropriate Treatment for Children with Upper Respiratory Infection (URI), NQF 0069, URI

This measure examines all episodes per patient during the measurement period.

6.2.49 Measure 155v1: Weight Assessment and Counseling for Nutrition and Physical Activity for Children and Adolescents, NQF 0024, Weight_Assess_Counseling

The visit must be performed by a PCP or OB/GYN.

Because BMI norms for youth vary with age and gender, this measure evaluates whether BMI percentile is assessed rather than an absolute BMI value.

6.2.50 Measure 156v1: Use of High-Risk Medications in the Elderly, NQF 0022, HighRisk_Med_Elderly

The intent of Numerator 1 of the measure is to assess if the patient has been prescribed one high-risk medication. The intent of Numerator 2 of the measure is to assess if the patient has been prescribed at least two different high-risk medications.

This is an inverse measure which tracks the total number of high risk medications given to elderly patients; therefore, an increasing rate indicates worse performance. For example, a rate of 100% would indicate failure whereas a rate of 0% indicates perfect performance.

CUMULATIVE MEDICATION DURATION is the total number of days of a medication for an individual. Days of medication can be derived from number of doses per day divided by the frequency. The cumulative duration can be calculated as the sum of the number of medication dispensed days x number of medication refills over a set period of time, excluding any gaps during which a medication was not dispensed. For example, if a medication was prescribed for 30 days with 3 refills, then a gap of 3 month, then prescribed again for 60 days with 2 refills, the cumulative medication duration for would be (30 x 3) + (60 x 2) = 150 days over the 10 month period.

6.2.51 Measure 157v1: Oncology: Medical and Radiation—Pain Intensity Quantified, NQF 0384, ONC_PainQuantified

The level of analysis for this measure is every visit for patients with a diagnosis of cancer who are also receiving chemotherapy or radiation therapy during the measurement period. For patients receiving radiation therapy, pain intensity should be quantified at each radiation treatment management encounter. For patients receiving chemotherapy, pain intensity should be quantified at each face-to-face encounter with the physician while the patient is receiving treatment. For purposes of calculating this measure, eligible encounters for patients receiving chemotherapy will include those encounters where the patient has been administered chemotherapy at least 30 days prior to the encounter and also been administered chemotherapy within 30 days after the date of the encounter. For example, at every visit for patients with a diagnosis of cancer who are also receiving chemotherapy or radiation therapy, the patient should have pain intensity quantified.

Pain intensity should be quantified using a standard instrument, such as a 0-10 numeric rating scale, a categorical scale, or the pictorial scale.

6.2.52 Measure 158v1: Pregnant women that had HBsAg testing, NQF 0608, Preg_HBsAg

No additional guidance provided.

6.2.53 Measure 159v1: Depression Remission at Twelve Months, NQF 0710, Dep_Rem_12

No additional guidance provided.

6.2.54 Measure 160v1: Depression Utilization of the PHQ-9 Tool, NQF 0712, Dep_PHQ9

No additional guidance provided.

6.2.55 Measure 161v1: Major Depressive Disorder (MDD): Suicide Risk Assessment, NQF 0104, MMD_Suicide Risk

The level of analysis for this measure is every visit for major depressive disorder during the measurement period. A minimum of two encounters are required during the measurement year for a patient to be included in this measure; if the patient is only seen once by the eligible professional, the patient is not included in the measure. Once it has been established that the patient has been seen at least twice by the eligible professional, every visit for major depressive disorder should be counted as a measurable event for the measure calculation. For example, at every visit for MDD, the patient should have a suicide risk assessment.

Use of a standardized tool or instrument to assess suicide risk will meet numerator performance. Standardized tools can be mapped to the concept “Intervention, Performed: Suicide Risk Assessment” included in the numerator logic.

6.2.56 Measure 163v1: Diabetes: Low Density Lipoprotein (LDL) Management, NQF 0064, Diab_LDL

The patient is not numerator compliant if the result for the most recent LDL-C test during the measurement period is >= 100 mg/dL, or is missing, or if an LDL-C test was not performed during the measurement period.

Only patients with a diagnosis of Type 1 or Type 2 diabetes should be included in the denominator of this measure; patients with a diagnosis of secondary diabetes due to another condition should not be included.

6.2.57 Measure 164v1: Ischemic Vascular Disease (IVD): Use of Aspirin or Another Anti-thrombotic, NQF 0068, IVD_Aspirin

Only patients with an active diagnosis of ischemic vascular disease (IVD) during the measurement period, or who were discharged alive for acute myocardial infarction (AMI), coronary artery bypass graft (CABG) or percutaneous coronary interventions (PCI) within the 12 months prior to the measurement period should be included in the measure.

6.2.58 Measure 165v1: Controlling High Blood Pressure, NQF 0018, High_Blood_Pressure

In reference to the numerator element, only blood pressure readings performed by a clinician in the provider office are acceptable for numerator compliance with this measure. Blood pressure readings from the patient's home (including readings directly from monitoring devices) are not acceptable.

If no blood pressure is recorded during the measurement period, the patient’s blood pressure is assumed “not controlled.”

6.2.59 Measure 166v2: Use of Imaging Studies for Low Back Pain, NQF 0052, Low_Back_Pain

The outpatient or emergency department visit in the Initial Patient Population needs to occur during the first 337 days of the measurement period (337 days allows 28 days for the numerator event). This visit must be the first visit for low back pain during the measurement period.

6.2.60 Measure 167v1: Diabetic Retinopathy: Documentation of Presence or Absence of Macular Edema and Level of Severity of Retinopathy, NQF 0088, DR_MacularEdema

No additional guidance provided.

6.2.61 Measure 169v1: Bipolar Disorder and Major Depression: Appraisal for alcohol or chemical substance use, NQF 0110, Bipolar_Dep_Substance_Use

The intent of the measure is that the assessment be performed for a single episode for each patient. Due to current limitations of the eMeasure specification system, it is possible for there to be up to two treatment episodes per patient, identified through up to two index episodes. As a result, the numerator criteria of this measure can be satisfied if a substance use assessment is performed within either treatment episode. Future versions of the measure should address this issue.

6.2.62 Measure 177v1: Child and Adolescent Major Depressive Disorder: Suicide Risk Assessment, NQF 1365, CAMDD_SuicideRisk

A suicide risk assessment should be performed at every visit for major depressive disorder during the measurement period.

The level of analysis for this measure is every visit for major depressive disorder during the measurement period. A minimum of two encounters are required during the measurement year for a patient to be included in this measure; if the patient is only seen once by the eligible professional, the patient is not included in the measure. Once it has been established that the patient has been seen at least twice by the eligible professional, every visit for major depressive disorder should be counted as a measurable event for the measure calculation. For example, at every visit for MDD, the patient should have a suicide risk assessment.

Use of a standardized tool or instrument to assess suicide risk will meet numerator performance. Standardized tools can be mapped to the concept “Intervention, Performed: Suicide Risk Assessment” included in the numerator logic.

6.2.63 Measure 179v1: ADE Prevention and Monitoring: Warfarin Time in Therapeutic Range, NQF XXXX, ADE_TTR

INR values must be at least 0.8. Values less than 0.8 may represent aberrant results. INR values greater than 10 (i.e., outliers) must be replaced with a value of 10. An INR of 10 represents an abnormally high INR and would skew the results of the calculated TTR less than extreme values would (i.e., INR > 10).

Include the INR value closest to "2.5" when there are more than one INR result on a single date.

To be excluded from the denominator, patient must have an active diagnosis of valvular heart disease during the measurement period.

To determine the proportion of patients with atrial fibrillation who are on chronic warfarin therapy and have sufficient INR monitoring to calculate a TTR, the reporting provider can divide the Measure Population by the Initial Patient Population.

The calculation for TTR is provided below in Appendix D.

The Measure Observation is the average of all patients' percent TTR, which can be calculated by dividing the sum of all patients' percent TTR by the number of patients in the Measure Population.

6.2.64 Measure 182v1: Ischemic Vascular Disease (IVD): Complete Lipid Panel and LDL Control, NQF 0075, IVD_Lipid_LDL

Only patients with an active diagnosis of ischemic vascular disease (IVD) during the measurement period, or who were discharged alive for acute myocardial infarction (AMI), coronary artery bypass graft (CABG) or percutaneous coronary interventions (PCI) within the 12 months prior to the measurement period should be included in the measure.

Appendices

Appendix A: Versioning and Endorsement

The 2014 eMeasures are labeled in a standard fashion. The names of the measure directories and Health Quality Measure Format (HQMF)[1] files are assigned automatically using the following conventions:

HQMF files are identified by the CMS eMeasure identifier. This is a unique number that refers only to eMeasures recommended by CMS. The eMeasures released with the 2014 Stage 2 Meaningful Use incentive Program are appended with the label "v1", or "v2". The measures labeled v2 were part of the December update. Subsequent versions will be labeled as v2, v3, and so on when updates are released.

File name structure: CMS eMeasure ID + extension

Example: CMS130v1.xml, CMS130v1.html

Names of measure directories contain additional information so that users can search measures by care setting, NQF ID (when applicable) and short description. Here is an illustration of the naming conventions for the measure directories and HQMF files, using measure CMS130v1 (EP measure, with NQF ID = 0034, and short description =Colorectal_Cancer_Screen) as an example:

For the Entire Collection of EP and EH measures

Directory name structure: <EP|EH>_<Hospital|Professional>_eMeasures_<date>
Example: EH_Hospital_eMeasures_2012_10_17 (assuming the release date for these EH measures is 10/17/2012)

Individual measure directories

Directory name structure: <EP|EH>_<CMSeMeasureID>_<NQFID>_<shortDescription>
Example: EP_CMS130v1_NQF0034_Colorectal_Cancer_Screen

Note: The NQFID reads NQFXXXX when it has not been endorsed by NQF.

All measures have been recommended by CMS but not all have yet been endorsed by the National Quality Forum (NQF). We recommend use of the CMS eMeasure ID to identify measures and their versions.

The Health Quality Measure Format (HQMF) is an HL7 standard for representing a health quality measure as an electronic document.

Appendix B: Time Unit and Time Interval Definitions

Time Unit and Time Interval Definitions

ISO 8601:2004 defines data elements and interchange formats for the representation of dates and times, including time intervals. Below is a summary of important terms defined in the standard that are of particular importance and can be drawn upon to be used in time interval calculations for eMeasures.

Term	ISO Definition	ISO Notes
Time interval	Part of the time axis limited by two instants.	• A time interval comprises all instants between the two limiting instants and, unless otherwise stated, the limiting instants themselves.
Duration	Non-negative quantity attributed to a time interval, the value of which is equal to the difference between the time points of the final instant and the initial instant of the time interval, when the time points are quantitative marks.	• In case of discontinuities in the time scale, such as a leap second or the change from winter time to summer time and back, the computation of the duration requires the subtraction or addition of the change of duration of the discontinuity. • The SI unit of duration is the second.
Nominal duration	Duration expressed amongst others in years, months, weeks or days.	• The duration of a calendar year, a calendar month, a calendar week or a calendar day depends on its position in the calendar. Therefore, the exact duration of a nominal duration can only be evaluated if the duration of the calendar years, calendar months, calendar weeks or calendar days used are known.
Second	Base unit of measurement of time in the International System of Units (SI) as defined by the International Committee of Weights and Measures	
Minute	Unit of time, equal to 60 seconds	
Hour	Unit of time, equal to 60 minutes	
Day <unit of time>	Unit of time, equal to 24 hours	
Calendar day	Time interval starting at midnight and ending at the next midnight, the latter being also the starting instant of the next calendar day	• A calendar day is often also referred to as a day. • **The duration of a calendar day is 24 hours**; except if modified by: o the insertion or deletion of leap seconds, by decision of the International Earth Rotation Service (IERS) or o the insertion or deletion of other time intervals, as may be prescribed by local authorities to alter the time scale of local time.
Day <duration>	Duration of a calendar day.	• The term “day” applies also to the duration of any time interval which starts at a certain time of day at a certain calendar day and ends at the same time of day at the next calendar day.
Calendar week	Time interval of seven calendar days starting with a Monday.	• A calendar week is also referred to as week.

Term	ISO Definition	ISO Notes
Week	Duration of a calendar week.	• The term "week" also applies to the duration of any time interval which starts at a certain time of day at a certain calendar day and ends at the same time of day at the same calendar day if the next calendar week.
Calendar month	Time interval resulting from the division of a calendar year in 12 time intervals, each with a specific name and containing a specific number of calendar days.	• A calendar month is often referred to as month. •
Month	Duration of 28, 29, 30 or 31 calendar days depending on the start and/or the end of the corresponding time interval within the specific calendar month.	• The term "month" applies also to the duration of any time interval which starts at a certain time of day at a certain calendar day of the calendar month and ends at the same time of day at the same calendar day of the next calendar month, if it exists. In other cases the ending calendar day has to be agreed on. • In certain applications a month is considered as a duration of 30 calendar days.
Calendar year	Cyclic time interval in a calendar which is required for one revolution of the Earth around the Sun and approximated to an integral number of calendar days.	• A calendar year is also referred to as year. • Unless otherwise specified the term designates in this International Standard a calendar year in the Gregorian calendar.
Year	Duration of 365 or 366 calendar days depending on the start and/or the end of the corresponding time interval within the specific calendar year.	• The term "year" applies also to the duration of any time interval which starts at a certain time of day at a certain calendar date of the calendar year and ends at the same time of day at the same calendar date of the next calendar year, if it exists. In other cases the ending calendar day has to be agreed on.
Common year	Calendar year in the Gregorian calendar that has 365 calendar days.	
Leap year	Calendar year in the Gregorian calendar that has 366 days.	

The standard also defines multiple formats for the representation of date and time as well as time intervals and durations. ISO 8601 postulates that duration can be expressed by a combination of components with accurate duration (hour, minute and second) and components with nominal duration (year, month, week and day). The standard allows for the omission of lower level components for "reduced accuracy" applications.

Appendix C: Time Interval Calculation Conventions

Time interval calculation conventions

The unit in which a time interval (or its duration) is expressed may be dependent upon the necessary level of accuracy for the purposes of measurement. As such, the selection of the time unit to be used should be made according to the level of granularity needed to meet the intent of the measure.

These conventions are intended to standardize the interpretation of time calculation units for durations, i.e., difference between two date/time elements, typically with time relationships defined in the QDM, such as "starts after start of" and "ends before start of".

Calculation Unit	Definition	Calculation[2,3,4]
Year	Duration of any time interval which starts at a certain time of day at a certain calendar date of the calendar year and ends at: • the same time of day at the same calendar date of the next calendar year, if it exists; • the same time of day at the immediately following calendar date of the ending calendar year, if the same calendar date of the ending calendar year does not exist **Notes:** 1. When in the next calendar year the same calendar date does not exist, the ISO states that the ending calendar day has to be agreed upon. The above convention is proposed as a resolution to this issue. 2. The ISO permits the representation of dates and times with "reduced accuracy", when necessary. For the purposes of quality measures, duration expressed in years ignores the time of day associated with the date/time stamps used in the calculation, i.e., the number of years will not change until the month and day of date 2 reach (or surpass) the month and day of date 1; time of day should be ignored or set to 00:00:00 for this calculation.	**1. 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** **2. 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** 08:01:59 Duration = year (date 2) – year (date 1) = 2013 – 2012 **= 1 year** **Note:** Time of day is ignored in this calculation. If time of day were to be considered for the calculation, the duration of the time interval would be 0 years according to the definition. 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 **= 1 year** **3. 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**

[2] For the purposes of this document, date 2 is assumed to be more recent than date 1.
[3] All dates are represented according to the extended formatted designated in ISO 8601: YYYY-MM-DD HH:MM:SS and a 24 hour timekeeping system.
[4] The result of the calculation is always an integer; if the result includes decimals, it should be truncated (rounded down) to the unit.

Calculation Unit	Definition	Calculation[2,3,4]
Year (continued)		**4. 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 is no February 29 in 2014, the number of years can only change when the date reaches March 1st, the first date in 2014 that surpasses the month and day of date 1 (February 29).
Month	Duration of any time interval which starts at a certain time of day at a certain calendar day of the calendar month and ends at: • 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 year does not exist **Notes:** 1. When in the next calendar year the same calendar date does not exist, the ISO states that the ending calendar day has to be agreed upon. The above convention is proposed as a resolution to this issue. 2. The ISO permits the representation of dates and times with "reduced accuracy", when necessary. For the purposes of quality measures, duration expressed in months ignores the time of day associated with the date/time stamps used in the calculation, i.e., the number of months will not change until the month and day of date 2 reach (or surpass) the month and day of date 1; time of day should be ignored or set to 00:00:00 for this calculation.	**1. 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** **2. Day (date 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: 2013-01-29 07:19:33 Duration = (year (date 2) – year (date 1))*12 + (month (date 2) – (month date 1)) – 1 = (2013 – 2012)*12 + (1 – 3) = 12 – 2 **= 10 months**

Calculation Unit	Definition	Calculation[2,3,4]
Week	Duration of any time interval which 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. **Notes:** 1. The ISO permits the representation of dates and times with "reduced accuracy", when necessary. For the purposes of quality measures, duration expressed in months ignores the time of day associated with the date/time stamps used in the calculation, i.e., a complete week is always seven days long: a week has passed when the same weekday in the following week is reached; time of day should be ignored or set to 00:00:00 for this calculation.	**1. Duration = [date 2 – date 1 (days[5])]/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** (result truncated to integer).
Day	Duration of any time interval which starts at a certain calendar day and ends at the next calendar day (1 second to 47 hours, 59 minutes and 59 seconds); the number of times midnight is crossed. **Notes:** 1. The ISO permits the representation of dates and times with "reduced accuracy", when necessary. For the purposes of quality measures, duration expressed in months ignores the time of day associated with the date/time stamps used in the calculation, i.e., the number of years will not change until the month and day of date 2 reach (or surpass) the month and day of date 1; time of day should be ignored or set to 00:00:00 for this calculation.	The duration in days between two dates, will be generally given by subtracting the start calendar date to the end calendar date, regardless of the time of day between the two dates. Example 1: Date 1: 2012-01-31 12:30:00 Date 2: 2012-02-01 09:00:00 Duration = 02-01 – 01-31 **= 1 day** 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**

[5] For information on how to calculate the duration, in days, of a time interval, please see "day".

Calculation Unit	Definition	Calculation[2,3,4]
Hours	The number of 60 minute cycles between two given dates. **Notes:** 1. Use the date, hour and minute of the date/time stamps to compute the interval. 2. Seconds are not used in the calculation.	The duration in hours between two dates is the number of minutes between the two dates, divided by sixty. The result is truncated to the unit. Example 1: Date/Time 1: 2012-03-01 03:10 Date/Time 2: 2012-03-01 05:09 Duration **= 1 hour** Example 2: Date/Time 1: 2012-02-29 23:10 Date/Time 2: 2012-03-01 00:10 Duration **= 1 hour** Example 3: Date/Time 1: 2012-03-01 03:10 Date/Time 2: 2012-03-01 04:00 Duration = **0 hours**
Minutes	The number of minutes between two given dates. **Notes:** 1. Seconds are **not** used in the calculation.	Example 1: Date/Time 1: 2012-03-01 03:10 Date/Time 2: 2012-03-01 05:20 Duration **= 130 minutes** Example 2: Date/Time 1: 2012-02-29 23:10 Date/Time 2: 2012-03-01 00:20 Duration **= 70 minutes**

Timing relationships with no calculation unit defined

When no threshold is defined in a measure phrase that compares timing between two elements, a common level of granularity needs to be established for comparisons within and across EHRs. For instance, the criterion:

A starts before start of B

Depending on the level of granularity of the data (e.g. HH:MM:SS vs. HH:MM), the result of the timing comparison may vary if no comparison unit is defined:

Example 1

A: 2012-01-01 11:00:01
B: 2012-01-01 11:00:02
A starts before B = TRUE

Example 2

A: 2012-01-01 11:00
B: 2012-01-01 11:00
A starts before B = FALSE

In order to resolve this type of issue, calculations should be performed with dates represented with reduced accuracy to the minute (date/time truncated to minute prior to calculation, i.e., seconds not used in calculation):

Example 3

A: 2012-01-01 11:00:01
B: 2012-01-01 11:00:02
A starts before B = FALSE

Note: Seconds are not used in the calculation.

Example 4

A: 2012-01-01 11:00
B: 2012-01-01 11:00
A starts before B = FALSE

By defining the unit of comparison as the minute if no unit is included in the logic, this convention effectively renders the following two criterions equivalent:

- A starts before start of B
- A > 1 minute(s) starts before start of B

If another unit is intended, it should be specified in the criterion, for instance:

- If the intended unit of comparison is the second:
  - A starts before start of B would "default" to comparison in minutes
  - A > 1 second(s) starts before start of B would explicitly refer the granularity intended for the calculation of duration between the two date/time stamps (criterion would be true if A started at least one second before B).
- If the intended unit of comparison is the day:
  - A > 1 day(s) starts before start of B (criterion would be true if A started at least one day before B).

The best practice is to always explicitly define the unit of calculation, as this shows intent on the part of the measure developer and provides a completely unambiguous interpretation of the level of granularity with which the computation should be performed. However, if no unit is defined, the above convention determines that the computation unit should be minutes.

Other date/time-related calculations using QDM functions

The above definitions are focused on the calculation of durations. However, forcertain applications it may be necessary to compare portions of the date/time elements directly, e.g., comparing years or months. This can be achieved by using existing QDM/MAT functions that allow the extraction of specific portions of date/time elements. A complete list of these functions is available on the Measure Authoring Tool User Guide (http://www.qualityforum.org/MAT/).

Appendix D: CMS179v1_Supplemental_SQL_Logic_Reference

Supplemental SQL Logic Reference

This document contains the logic provided by Veterans Affairs (VA) collaborators to calculate patients' percent time in therapeutic range (TTR). This is intended to support the implementation of the clinical quality measure "ADE Prevention and Monitoring: Warfarin Time in Therapeutic Range" by providing an example of the structured query language (SQL) currently in use at VA sites. The complete VA SQL logic has been provided to provide a full view of its content, but the specifications supplied by the Health Quality Measure Format (HQMF) of the clinical quality measure should be the primary basis for implementation of the measure. The HQMF files for this clinical quality measure contain instructions in the Definitions and Guidance sections that indicate which parts of the VA SQL logic should be used. Since the VA electronic health record (EHR) system has a different table structure and data definitions than other EHR systems, EHR system programmers and vendors should replace the fieldnames and tablenames as needed based on their knowledge of their EHR systems.

Parameters

The VA's SQL logic uses StudyStartDate and StudyFinalDate to set the date range of the data extracted. In the HQMF file for the eMeasure, the Measurement Period starts on January 1 and ends on December 31 of the measurement year.

Data	Domain	Description
StudyStartDate	DATETIME	Date of Study Start
StudyFinalDate	DATETIME	Date of Study Finish

```
DECLARE @StudyStartDate AS DATE = '10/1/2011'
;
DECLARE @StudyEndDate AS DATE = '10/1/2012'
;
```

Diagnosis Data

Step 1

Inclusion Criteria: Determine if a patient has Atrial Fibrillation or Atrial Flutter. The VA's SQL logic uses ICD-9 and ICD-10 codes. In the HQMF file for the clinical quality measure, the value set for the data element "Diagnosis, Active: Atrial Fibrillation/Flutter" contains the ICD-9, ICD-10, and SNOMED codes that should be used to identify patients with this condition.

VA Table: Diagnosis

Data	Domain	Description
PatientID	VARCHAR(255)	PatientID
ICD	VARCHAR(255)	ICD Code in either ICD-9-CM format or ICD-10-CM format
DiagnosisDate	DATETIME	Date of Diagnosis

ICD-9-CM Method

```
DECLARE @StudyStartDate AS DATE = '10/1/2011'
;
DECLARE @StudyEndDate AS DATE = '10/1/2012'
;

--ICD-9-CM
SELECT DISTINCT PatientID
INTO #Step1
FROM Diagnosis
WHERE ICD = '427.51' AND DiagnosisDate BETWEEN @StudyStartDate
AND @StudyEndDate
;
```

ICD-10-CM Method

```
DECLARE @StudyStartDate AS DATE = '10/1/2011'
;
DECLARE @StudyEndDate AS DATE = '10/1/2012'
;

--ICD-10-CM
SELECT DISTINCT PatientID
INTO #Step1
FROM Diagnosis
WHERE ICD = 'I48' AND DiagnosisDate BETWEEN @StudyStartDate
AND @StudyEndDate
;
```

Both methods

```
DECLARE @StudyStartDate AS DATE = '10/1/2011'
;
DECLARE @StudyEndDate AS DATE = '10/1/2012'
;

--Both
--The final DISTINCT is not required on SQL-Server or Oracle, but
--depending on UNION in other platforms, it is required.

SELECT PatientID
INTO #Step1
FROM
(
SELECT DISTINCT PatientID
FROM Diagnosis
WHERE ICD = '427.51' AND DiagnosisDate BETWEEN @StudyStartDate
AND @StudyEndDate

UNION

SELECT DISTINCT PatientID
FROM Diagnosis
WHERE ICD = 'I48' AND DiagnosisDate BETWEEN @StudyStartDate
AND @StudyEndDate
) AS A
;
```

Step 2

Exclusion Criteria: Determine if a patient has Valvular Heart Disease. In the VA's SQL logic, the Diagnosis codes used are ICD-9 and ICD-10. In the HQMF file for the clinical quality measure, the value set for the data element "Diagnosis, Active: Valvular Heart Disease" contains the ICD and SNOMED codes that should be used to identify patients with this condition.

ICD-9-CM

```
DECLARE @StudyStartDate AS DATE = '10/1/2011'
;
DECLARE @StudyStartDate AS DATE = '10/1/2012'
;
--ICD-9-CM
SELECT PatientID
INTO #Step2
FROM #Step1
EXCEPT
SELECT DISTINCT PatientID
FROM Diagnosis
WHERE (ICD = BETWEEN '394' AND '396.99' OR ICD LIKE '424%' OR ICD LIKE
'746%') AND DiagnosisDate BETWEEN @StudyStartDate
AND @StudyEndDate
;
```

ICD-10-CM

```
--ICD-10-CM
SELECT PatientID
INTO #Step2
FROM #Step1
EXCEPT
SELECT DISTINCT PatientID
FROM Diagnosis
WHERE ICD IN ('I05', 'I06', 'I07', 'I08', 'I34', 'I35', 'I36', 'I37','Q22',
'Q23')  AND DiagnosisDate BETWEEN @StudyStartDate
AND @StudyEndDate
;
```

Both methods

```
--Both
--The final DISTINCT is not required on SQL-Server or Oracle, but
--depending on UNION in other platforms, it is required.

SELECT PatientID
INTO #Step2
FROM
(
SELECT DISTINCT PatientID
FROM Diagnosis
WHERE (ICD = BETWEEN '394' AND '396.99' OR ICD LIKE '424%' OR ICD LIKE
'746%') AND DiagnosisDate BETWEEN @StudyStartDate
AND @StudyEndDate

UNION
```

```
SELECT DISTINCT PatientID
FROM Diagnosis
WHERE ICD IN ('I05', 'I06', 'I07', 'I08', 'I34', 'I35', 'I36', 'I37','Q22',
'Q23')  AND DiagnosisDate BETWEEN @StudyStartDate
AND @StudyEndDate
) AS A
;
```

Medication Data

Step 3A

Including the PatientIDs from the Inclusion Criteria above, choose the patients who have been on chronic Warfarin therapy for 180 days by start of the Measurement Period.

The VA's SQL logic below does not include the specific clause that filters for Warfarin prescriptions. In the HQMF file for the clinical quality measure, the value set for the data element Medication, Active "Warfarin" contains the RxNorm codes that should be used to identify patients on Warfarin therapy. The HQMF file for the clinical quality measure also defines cumulative medication duration >=180 days.

VA Table: Prescription

Data	Domain	Description
PatientID	VARCHAR(255)	PatientID
Warfarin	VARCHAR(255)	Warfarin Drug Name and Dose (NCPDP XML specification should be used)
PrescriptionDate	DATETIME	Date of Diagnosis
DispensedDate	DATETIME	Date of Dispense
DaysSupply	NUMERIC(9,2)	Day Supply of Prescription

```
SELECT DISTINCT PatientID, LongitudinalDaysSupply
INTO #Step3A
FROM
(
SELECT A.PatientID,SUM(DaysSupply) OVER(PARTITION BY B.PatientID) AS
LongitudinalDaysSupply
FROM #Step2 AS A INNER JOIN Prescription AS B
ON A.PatientID=B.PatientID
WHERE DispensedDate BETWEEN DATEADD(YEAR, -1, @StudyStartDate) AND
@StudyEndDate
) AS C
WHERE LongitudinalDaysSupply >= 180
```

Step 3B

The following code describes how the VA allows some flexibility in the actual number of days supply for Warfarin during the 180 day period. The VA's logic includes patients who have within 10% of their 180-day supply within the interval of time used the detect patients on chronic warfarin therapy.

```
SELECT DISTINCT PatientID, LongitudinalDaysSupply, TimeInterval, CrudeMPR
INTO #Step3B
FROM
(
```

```
SELECT PatientID, LongitudinalDaysSupply,
TimeInterval,LongitudinalDaysSupply/TimeInterval AS CrudeMPR
FROM
(
SELECT DISTINCT A.PatientID, CAST(A.LongitudinalDaysSupply AS NUMERIC(9,4))
AS LongitudinalDaysSupply,
DATEDIFF(DAY, MIN(DispensedDate) OVER(PARTITION BY
B.PatientID),MAX(DispensedDate) OVER(PARTITION BY B.PatientID) )
+ CAST(AVG(B.DaysSupply) OVER(PARTITION BY B.PatientID) AS NUMERIC(9,4))
AS TimeInterval
FROM #Step3A AS A
INNER JOIN
Prescription AS B
ON A.PatientID=B.PatientID
WHERE DispensedDate BETWEEN DATEADD(YEAR, -1, @StudyStartDate)AND
@StudyEndDate
) AS C
) AS D
WHERE CrudeMPR BETWEEN 0.9 AND 1.1
```

Step 3

The VA's logic below uses the difference between two dispense dates to identify patients who have been on at least 120 days of continuous Warfarin therapy. Please note that this is different than the logic used by the HQMF file for the clinical quality measure. The HQMF file for the clinical quality measure should be followed.

```
SELECT DISTINCT PatientID,TimeInterval
INTO #Step3
FROM
(
SELECT DISTINCT A.PatientID,DATEDIFF(DAY, MIN(B.DispensedDate) OVER(PARTITION
BY B.PatientID),MAX(B.DispensedDate) OVER(PARTITION BY B.PatientID))
AS TimeInterval
FROM #Step3B AS A
INNER JOIN Prescription AS B
ON A.PatientID=B.PatientID
WHERE B.DispensedDate BETWEEN  @StudyStartDate AND @StudyEndDate
) AS C
WHERE TimeInterval >= 120
```

INR Values

Step 4A

The VA's SQL logic collects INR values that are >=0.8 and not null. The LOINC code used in the logic below is "6301-6". In the HQMF file for the clinical quality measure, the value set for the data element Laboratory Test, Result: "INR" contains the LOINC codes that should be used to collect INR values.

```
SELECT A.PatientID, A.LOINC, convert(numeric(5,2),A.LabValue) as LabValue ,
A.LabDate , 0.0 AS DistanceFromIdeal
INTO #Step4A
FROM Lab AS A INNER JOIN #Step3 as B
ON A.PatientID=B.PatientID
```

```
WHERE LOINC = '6301-6' AND LabValue IS NOT NULL AND LabValue > 0.8 AND
LabDate BETWEEN  @StudyStartDate AND @StudyEndDate
```

Step 5

The VA's SQL logic collects INR values that are >10, and replaces them with LabValue equal to 10. This step is mentioned in the guidance section of the HQMF file for the clinical quality measure.

```
UPDATE #Step4A
SET LabValue = 10
WHERE LabValue > 10
```

Step 6

The Therapeutic Range for patients with Atrial Fibrillation or Atrial Flutter is a target INR result between 2.0 and 3.0. The VA's SQL logic describes how to identify the last or most recent INR result on a given day. The therapeutic range is mentioned in the Guidance section of the HQMF file for the clinical quality measure.

```
SELECT PatientID, LOINC, LabValue, LabDate, ROW_NUMBER() OVER(PARTITION BY
PatientID ORDER BY LabDate) AS MostRecentRank
INTO #Step6
FROM
(
SELECT PatientID, LOINC, LabValue, LabDate, DistanceFromIdeal,
MostRecentLabDate,
ROW_NUMBER() OVER(PARTITION BY PatientID, MostRecentLabDate ORDER BY
DistanceFromIdeal ASC) AS ClosestToIdealRank
FROM
(
SELECT PatientID, LOINC, LabValue,  LabDate, DistanceFromIdeal ,DENSE_RANK()
OVER(PARTITION BY PatientID ORDER BY LabDate) AS MostRecentLabDate
FROM #Step4A

) AS A
) AS B
WHERE ClosestToIdealRank = 1
```

Step 7

The following SQL is how the VA identifies a patient's valid INR intervals that occur during the measurement period. The HQMF file for the clinical quality measure requires that a patient have at least 2 valid INR intervals within the measurement period. Please refer to the HQMF for the definition of a valid INR interval. Note that you need to see both sides of a given INR result.

```
SELECT PatientID as BeneficiaryID, LOINC, LabValue as  INRValue, LabDate AS
INRDate, MostRecentRank, LastLabDate, NextLabDate,
PastInterval, NextInterval, IntervalScore
INTO #Step7
FROM
(
```

```
SELECT PatientID, LOINC, LabValue, LabDate, MostRecentRank, LastLabDate,
NextLabDate, PastInterval, NextInterval, IntervalScore,
SUM(IntervalScore) OVER(PARTITION BY PatientID) AS SummedIntervalScore
FROM
(
SELECT PatientID, LOINC, LabValue, LabDate, MostRecentRank, LastLabDate,
NextLabDate,PastInterval, NextInterval,
CASE WHEN PastInterval <= 56 THEN 1
WHEN NextInterval >= 56 THEN 1
WHEN PastInterval <= 56 AND NextInterval >= 56 THEN 2
ELSE 0 END AS IntervalScore
FROM
(
SELECT PatientID , LabValue , LOINC,LabDate , MostRecentRank, LastLabDate,
NextLabDate,DATEDIFF(DAY, LastLabDate, LabDate) AS PastInterval,
DATEDIFF(DAY, LabDate, NextLabDate) AS NextInterval
FROM
(
SELECT PatientID, LOINC, LabValue, LabDate, MostRecentRank,
(SELECT LabDate FROM #Step6 AS B WHERE A.PatientID=B.PatientID AND
A.MostRecentRank=B.MostRecentRank-1) AS LastLabDate,
(SELECT LabDate FROM #Step6 AS B WHERE A.PatientID=B.PatientID AND
A.MostRecentRank=B.MostRecentRank+1) AS NextLabDate
FROM #Step6 AS A
) AS C
) AS D
) AS E
) AS F
WHERE SummedIntervalScore >= 4
```

TTR Calculation

Step 8

This part of the VA's SQL logic calculates the TTR for each patient with the sufficient number of valid INR intervals. The VA SQL logic uses the field name "TherapeuticTTR" in the table "TTRFinalStep" to record each patient's calculated percent TTR. This value is represented in the HQMF file for the clinical quality measure by the data element Laboratory Test, Result: "Computed Value INR percent TTR" (LOINC code: 72281-9). The average of all patients' percent TTR (LOINC 72281-9) is the final result for the Continuous Variable measure specified by the HQMF.

```
SELECT  BeneficiaryID,  INRValue, INRDate,
ROW_NUMBER() OVER (PARTITION BY BeneficiaryID ORDER BY INRDate DESC) AS
MostRecentRank
INTO #INRHistorical
FROM
(
SELECT PatientID as BeneficiaryID,  CAST(LabValue AS NUMERIC(20,4)) AS
INRValue, LabDate  AS INRDate
FROM     dbo.Lab
WHERE   LOINC IN ('6301-6', '34714')AND LabDate >= DATEADD(YEAR, -1,
GETDATE()) AND LabValue IS NOT NULL
) AS A
```

```
SELECT BeneficiaryID, MAX(MostRecentRank) OVER(PARTITION BY BeneficiaryID) AS
NumberofINRs
INTO #INRLongitudinal
FROM #INRHistorical
WHERE INRDate >= DATEADD(DAY, -180, GETDATE())

SELECT DISTINCT  BeneficiaryID,  INRValue,  INRDate,MostRecentRank,
CASE
WHEN INRDate IS NULL THEN -1
WHEN INRDate < GETDATE() - 42 THEN 0
WHEN INRDate >= GETDATE() - 42 THEN 1
ELSE NULL
END INRKey,

CASE
WHEN INRValue > '3.0' THEN 2
WHEN INRValue>='2.0' and INRValue <='3.0' THEN 1
WHEN INRValue < '2.0' THEN 0
ELSE NULL
END INR_Therapeutic
INTO #TTRStep0
FROM #Step7


SELECT distinct A.BeneficiaryID, INRValue, INRDate, INRKey, INR_Therapeutic,
b.NumberofINRs,MostRecentRank,
CASE
WHEN NumberofINRs >= 4 THEN 1
ELSE 0
END AS INRLongitudinalKey
INTO #TTRStep1
FROM #TTRStep0 AS A
LEFT OUTER JOIN
#INRLongitudinal  AS B
ON A.BeneficiaryID=B.BeneficiaryID


SELECT DISTINCT  A.BeneficiaryID, A.INRDate,
B.INRLongitudinalKey,B.INRValue,B.INRkey,B.mostrecentRank
INTO #TTRStep2
FROM #INRHistorical  AS A INNER JOIN #TTRStep1 AS B ON
A.BeneficiaryID=B.BeneficiaryID
WHERE B.INRLongitudinalKey=1
AND A.INRDate > GETDATE()-185

SELECT *,
DATEDIFF(day, INRDate, NextINRDate) AS TimetoNextINR   --This calculates from
the current INR,  the number of days until the next INR
,
DATEDIFF(day, PreviousINRDate, INRDate) AS TimeFromLastINR --This calculates
from the current INR,  the number of days from the last INR
INTO #TTRStep3
FROM
(
SELECT distinct B.BeneficiaryID, B.INRDate, B.INRLongitudinalKey, B.INRValue,
B.INRKey, B.MostrecentRank,
CASE WHEN B.INRValue < 2.0 THEN 0
```

```
WHEN B.INRValue <= 3.0 AND B.INRValue >=2.0 THEN 1
WHEN B.INRValue >3.0 THEN 2
END as INRJudgment
,A.INRDate as NextINRDate
, C.INRDate as PreviousINRDate
FROM #TTRStep2 AS B
left JOIN #TTRStep2 AS A
ON A.BeneficiaryID=B.BeneficiaryID AND A.MostRecentRank = B.MostRecentRank+1
left JOIN #TTRStep2 AS C
ON C.BeneficiaryID=B.BeneficiaryID AND C.MostRecentRank = B.MostRecentRank -1
)AS X

/*Rollup Days for Therapeutic, Supra, and Subdays*/

SELECT *, 0 AS TherapeuticDays, 0 AS SupraDays, 0 AS SubDays, 0 AS
DenominatorDays
INTO #TTRStep4
FROM
(
SELECT distinct  B.BeneficiaryID, B.INRDate, B.INRLongitudinalKey,
B.INRValue, B.INRKey,
B.MostrecentRank,B.INRJudgment,B.NextINRDate,B.PreviousINRDate,
B.TimetoNextINR,B.TimeFromLastINR,
A.INRJudgment as NextINRJudgment,C.INRJudgment as PreviousINRJudgment ,
CAST(B.TimeFROMLastINR AS NUMERIC(9,4))/2 AS PastTime,
CAST(B.TimetoNextINR AS NUMERIC(9,4))/2 AS FutureTime
FROM #TTRStep3 AS B
left Join #TTRStep3 AS A
ON A.BeneficiaryID=B.BeneficiaryID AND A.MostRecentRank = B.MostRecentRank +1
left Join #TTRStep3 AS C
ON C.BeneficiaryID=B.BeneficiaryID AND C.MostRecentRank = B.MostRecentRank -1
)AS C


/*Setting NULLs to 0 */
UPDATE #TTRStep4
SET PastTime = 0
WHERE PastTime is null

UPDATE #TTRStep4
SET FutureTime = 0
WHERE FutureTime is null

/* Days spent in therapeutic range */

UPDATE #TTRStep4
SET TherapeuticDays = PastTime + FutureTime
WHERE INRJudgment = 1

/*Days spent in subtherapeutic range */

UPDATE #TTRStep4
SET SubDays = PastTime + FutureTime
WHERE INRJudgment = 0

/*Days spent in supratherapeutic range */
```

```
UPDATE #TTRStep4
SET SupraDays = PastTime + FutureTime
WHERE INRJudgment = 2

/* Denominator Days */

UPDATE #TTRStep4
SET DenominatorDays = PastTime + FutureTime

/*Calculate all TTRs*/
Insert into TTRFinalStep
SELECT *,
isnull(CAST(TherapeuticNumerator AS NUMERIC(9,4))/NULLIF(Denominator,0),0) AS
TherapeuticTTR,
isnull(CAST(SupraNumerator AS NUMERIC(9,4))/NULLIF(Denominator, 0),0) AS
SupraTTR,
isnull(CAST(SubNumerator AS numeric(9,4))/NULLIF(Denominator,0),0) AS SubTTR
FROM
(
SELECT distinct *,
(SELECT SUM(TherapeuticDays) FROM #TTRStep4 AS A
WHERE A.BeneficiaryID=B.BeneficiaryID AND A.MostRecentRank >=
B.MostRecentRank) AS TherapeuticNumerator ,
(SELECT SUM(SupraDays) FROM #TTRStep4 AS A
WHERE A.BeneficiaryID=B.BeneficiaryID AND A.MostRecentRank >=
B.MostRecentRank) AS SupraNumerator,
(SELECT SUM(SubDays) FROM #TTRStep4 AS A
WHERE A.BeneficiaryID=B.BeneficiaryID AND A.MostRecentRank >=
B.MostRecentRank) AS SubNumerator,
(SELECT SUM(DenominatorDays) FROM #TTRStep4 AS A
WHERE A.BeneficiaryID=B.BeneficiaryID AND A.MostRecentRank >=
B.MostRecentRank) AS Denominator
FROM #TTRStep4 AS B
) AS C

End
GO
```