NATIONAL QUALITY FORUM

Quality Data Model

National Quality Forum

(Draft October 2011)

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National Quality Forum: Overview and Goals

The National Quality Forum (NQF) is a nonprofit organization that operates under a three-part mission to improve the quality of American healthcare by:

- building consensus on national priorities and goals for performance improvement and working in partnership to achieve them;
- endorsing national consensus standards for measuring and publicly reporting on performance; and
- promoting the attainment of national goals through education and outreach programs.

NQF drives improvements in care by rigorously endorsing evidence-based measures of performance—focusing on measurement for accountability and quality improvement.

Measurement has the greatest impact on quality when it supports transparency and public reporting, but it also provides information to help clinicians and patients make improvements in care delivery. To date, quality measurement and public reporting have been thought of as secondary data uses rather than as drivers of care. By setting standardized performance measures and properly designing and building health IT, however, it will now be possible to capture performance data as part of the care process and provide immediate feedback and clinical decision support to clinicians and patients to improve care.

Designing and building health IT to support performance improvement requires close collaboration between the quality and health IT communities. NQF plays a key role in the quality community as the national standard-setting body for performance measures and as a neutral convener of multiple stakeholders to provide input to DHHS and others on national priorities and goals for improvement and the selection of performance measures for use in payment and public reporting programs.

Performance Measurement: Information Needs and the Quality Data Model

Collecting and reporting accurate, comparative healthcare performance data is a complex and largely time-consuming and manual process. Much of the information required to measure performance is collected in the process of routine clinical care and is available in electronic health records (EHRs) and other clinical data sources. It has not, however, been routinely available for export and use for reporting or performance measurement. Performance measures are most frequently developed based on routinely available sources of data and therefore are often based on claims and clinically enriched administrative data. Taking advantage of comprehensive clinical

data contained in EHRs and other clinical applications, including personal health records (PHRs) requires that measures are specified to account for the way data are expressed in such products.

NQF, through the Health Information Technology Expert Panel (HITEP), a committee of health IT industry experts, established the Quality Data Model (QDM) to enable such expression of data for measurement. QDM's development was based on a request by the American Health Information Community (AHIC) and the Office of the National Coordinator for Health Information Technology (ONC), with funding from the Agency for Healthcare Research and Quality (AHRQ).

The QDM (formerly referred to as the Quality Data Set or QDS) is an "information model" that clearly defines concepts used in quality measures and clinical care and is intended to enable automation of structured data capture in EHRs, PHRs, and other clinical applications. It provides a grammar to describe clinical concepts in a standardized format so individuals (i.e., providers, researchers, or measure developers) monitoring clinical performance and outcomes can concisely communicate necessary information. The QDM also describes information so EHR and other clinical electronic system vendors can consistently interpret and easily locate the data required.

Enhancements

Enhancements are incorporated into the QDM to enable expanding categories of measurement. This helps to ensure the QDM covers data required to evaluate care coordination across venues of care, patient, and family engagement in care and longitudinal outcomes. These QDM elements are used in different states (contexts), depending on the measure (see Figure 2, below). For example, one measure may assess if a lab test was ordered, while another may assess if it was performed, and a third may compare the actual lab result to a guideline threshold or the amount of change in the result over time.

Release Schedule for Future Versions

Future versions of QDM will be released annually: a draft of the next version, for comment, in the third quarter of the year and a final version in the first quarter of the year.

Introduction of QDM as the Grammar of eMeasure Development

Writing a sentence requires some basic understanding of structure:

"On the second try, he walked over it.
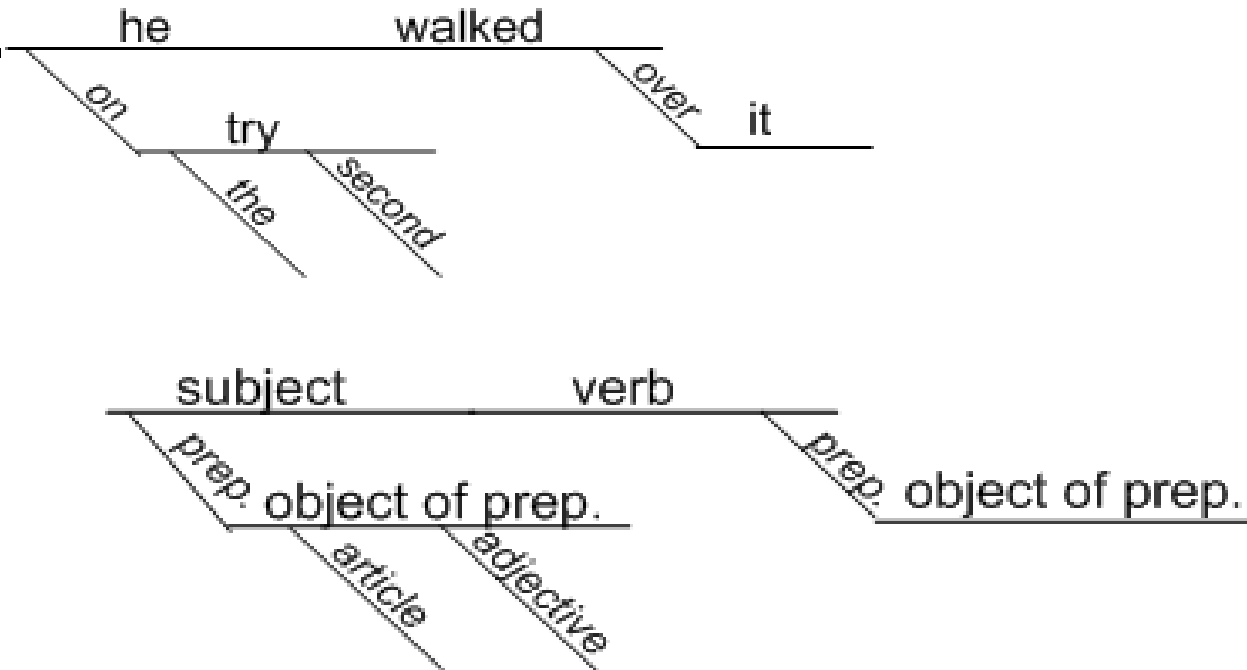
Basic sentence structure and gramma

QDM provides the structure to write a measure statement:

"All patients 65 years of age or older with at least two provider visits during the measurement period receiving influenza vaccine subcutaneously."

Basic measure structure and

QDM
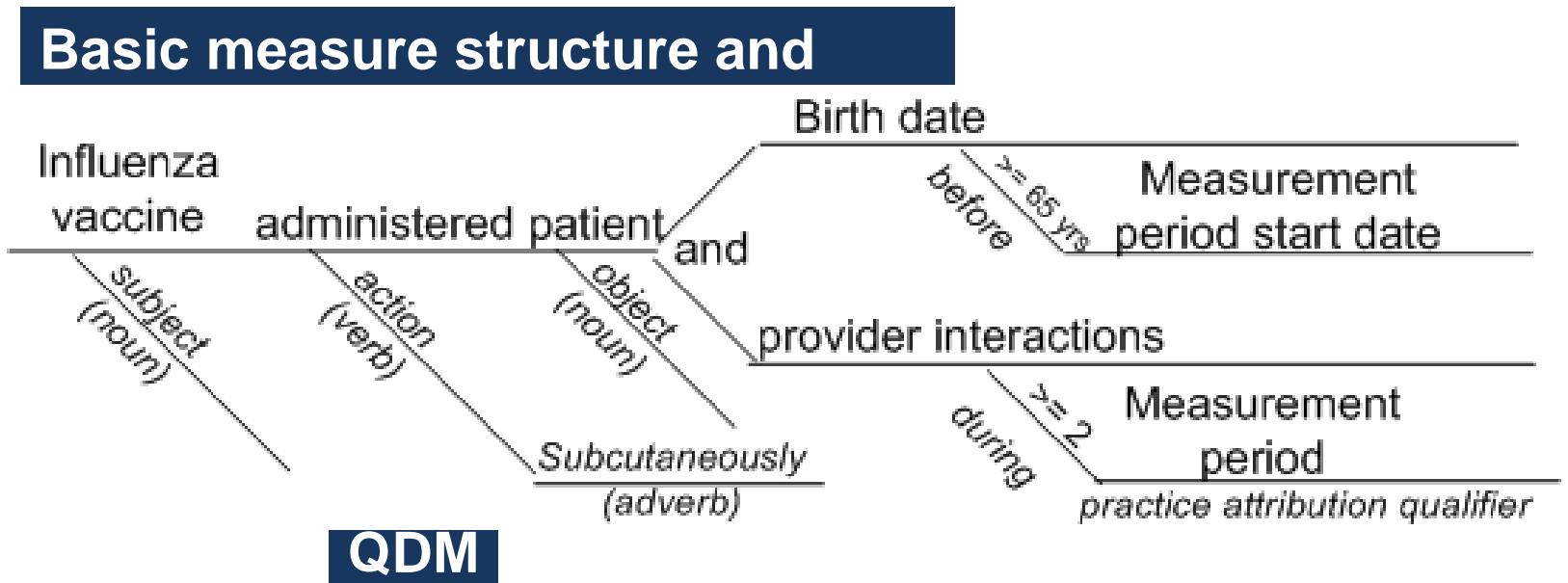
The QDM provides the potential for more precisely defined, universally adopted electronic quality measures to automate measurement and compare and improve quality using electronic health information. Use of the QDM will enable more standardized, less-burdensome quality measurement and reporting and more consistent use and communication of EHRs for direct patient care.

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The QDM is described in detail in the *Health Information Technology Expert Panel Report: Recommended Common Data Types and Prioritized Performance Measures for Electronic Healthcare Information Systems*. The model was further clarified and described in a second report, *Health Information Technology Automation of Quality Measurement: Quality Data Set and Data Flow*.

Electronic Measures (eMeasures) and QDM's Role

In 2010, NQF and 17 measure stewards participated in efforts to rapidly convert, or "retool," existing measures for use on an electronic platform. This project retooled an initial set of more than 100 performance measures. Many of these were used for the Health Information Technology for Economic and Clinical Health Act (HITECH) incentive payments linked to meaningful use of EHRs. The QDM provided the necessary grammar to enable that effort. The activity also highlighted some essential additions to the QDM model. Subsequent efforts continue to use the QDM to retool and to develop new measures *de novo*.

NQF has been laying the groundwork for the endorsement of eMeasures for some time. NQF's Testing Task Force Report released in 2011 specifies requirements for testing new and retooled e-measures. To enable retooling and creation of new eMeasures, NQF (with support from HHS) subcontracted with the Iowa Foundation for Medical Care (IFMC) to develop a Measure Authoring Tool that will help developers generate specifications for eMeasures in a consistent fashion. A basic version of the tool is now available for critical work that is part of HHS high priority projects and it is available for testing, evaluation and use by the general public as well. An enhanced version will be available in early 2012. The Measure Authoring Tool can be accessed from the NQF website at http://www.qualityforum.org/Topics/HIT/Measure_Authoring_Tool_(MAT)/Measure_Authoring_Tool_(MAT).aspx.

Quality Data Model: Status and the Public Comment Process

To ensure QDM's continued value and use, NQF will enhance and update it annually in response to evolving quality measurement needs. The QDM Version 3.0 was published for public comment in spring 2011. The current update is a draft developed with input from NQF's Health Information Technology Advisory Committee (HITAC) and HHS' HIT Standards Committee (HITSC) Clinical Quality Workgroup and Vocabulary Task Force. The draft is available for public comment and review. NQF will publish a final version in early 2012. NQF anticipates publishing updates annually as a draft followed by final versions at the beginning of each year. This QDM draft also contains updates based on feedback from the comment period as well as from information learned in applying the QDM to retooling more than 100 measures in 2010.

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This new draft has a number of modifications, including some specifically requested by the HITSC Clinical Quality Workgroup (indicated by an asterisk '*'):

1. Renaming of 'concept' to 'category' to maintain consistency between historical versions of the QDM and based on comments received
2. Consolidation of 'procedure' and 'intervention' into one category with a more expansive definition for procedure for measure consistency*
3. Consolidating the 'allergy' and 'intolerance' categories to 'Adverse effect: allergy' and 'Adverse effect: non-allergy' respectively.
4. Expanded definition of 'Encounter' category to more clearly include physical, electronic or verbal interactions between a patient and any individual involved in the provision of health related services regardless of setting*
5. More robust examples and definitions within the expression language section of the document
6. Updated assignments of 'states of action' and 'states of being' to categories based on member and public comments
7. Inclusion of a 'crosswalk' document in the appendix to help map categories and concepts from version 3.0 to this new draft.
8. Inclusion of code set (vocabulary) standards based on recommendations from the Health Information Technology Standards Committee Clinical Quality Workgroup and Vocabulary Task Force*

Quality Data Model: The Full Description, Specificity, and Technical Detail

The QDM provides a method, or grammar, to express patient, clinical, and community characteristics as well as the basic logic required to articulate quality measure criteria. The QDM provides a method to describe a specific data element by clarifying the category of information, the context in which is expected to exist (the state) and any additional information to precisely identify it (attributes) (see Figure 1). The QDM further coordinates with standards used by clinical information systems important to ensure the information is clear, unambiguous, consistent, and accurate. This document provides a general overview as well as QDM's technical details and specifications (e.g., expression language, relative timing).

Quality Data Model Information Structure
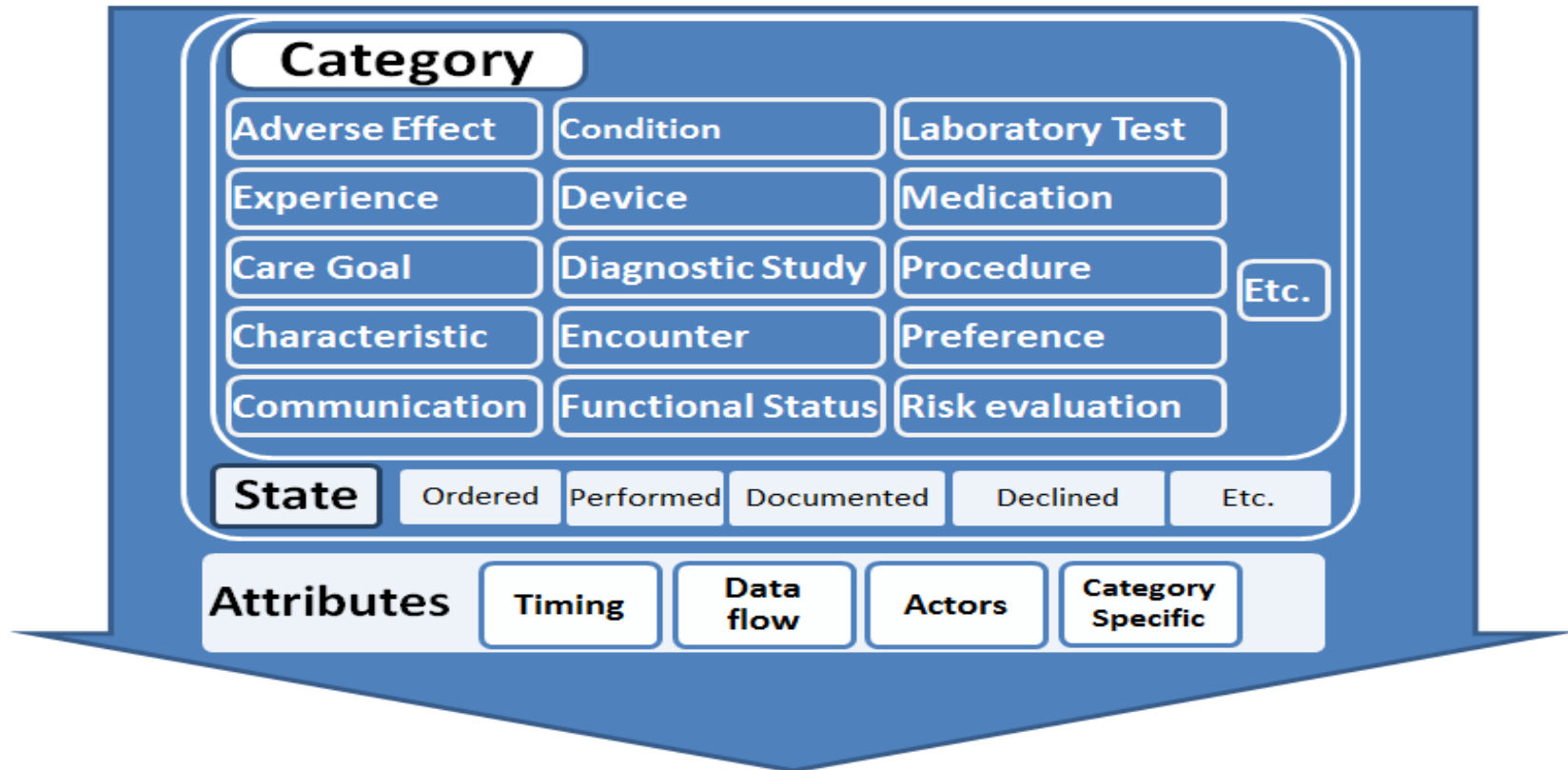
Figure 1. QDM Composition Diagram—the diagram depicts the definition of a QDM element beginning with defining a *category*, or the type of information desired (some examples shown in the center blue boxes). The clear boxes on the left hand side of the drawing shows the application of a *state,* or context of use that can be assigned to a category element. States may be actions (*states of action*) or indicate the existence of a specific concept instance (*states of being*). The category-state pair comprises the QDM element. The clear boxes on the bottom of the diagram provide the additional information, the *attributes* that can add precision to the definition of the data element. Attributes include four basic categories: *timing, actor, data flow, and category-specific.* Greater detail is provided in Figures 4, 5, 6, and 7.
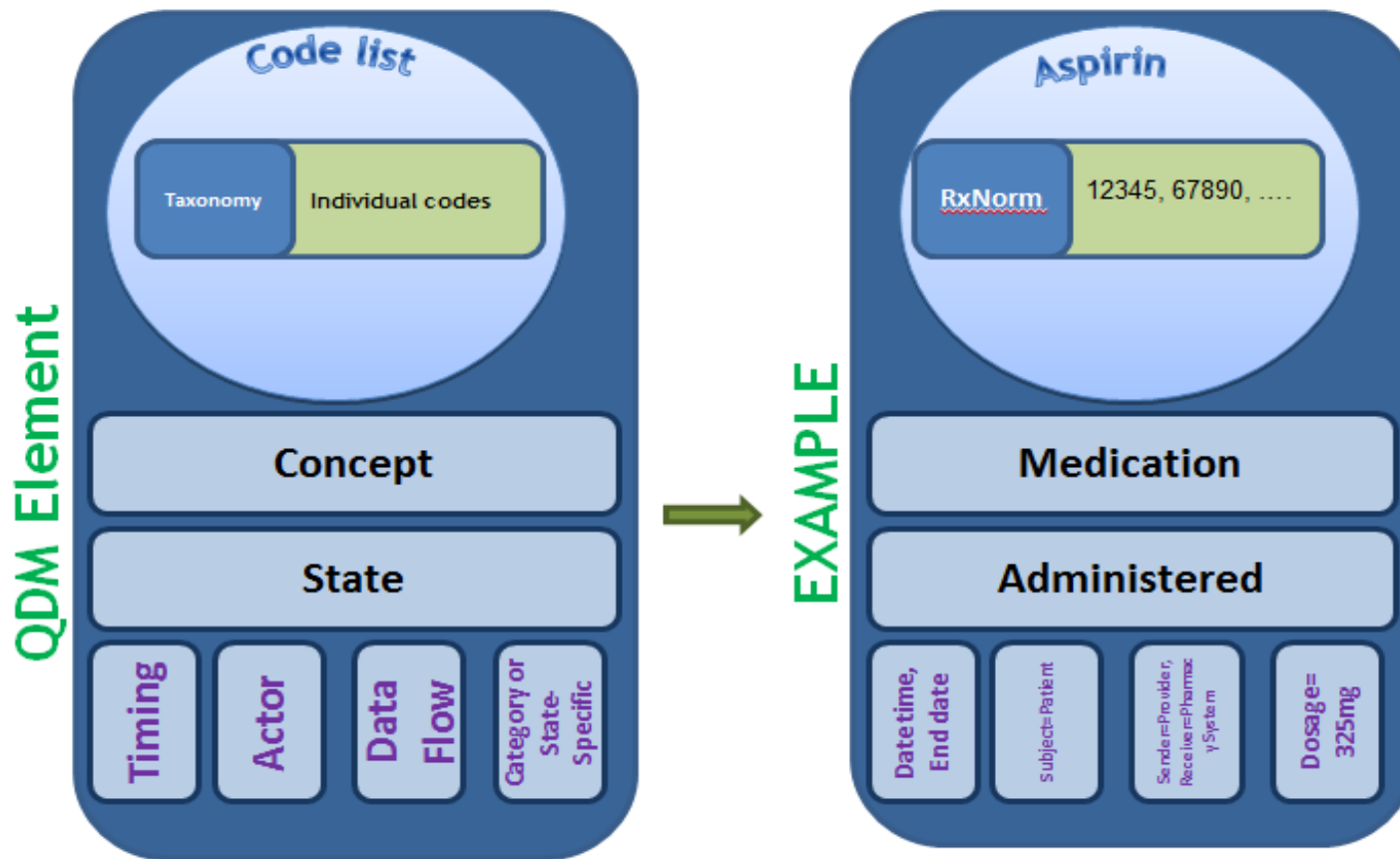
Figure 2. QDM Element Structure—The components of a QDM element are shown in the figure. The figure on the left identifies the terms used for each component of the QDM element. The figure on the right uses each of these components to describe a QDM element indicating "Medication, *administer* aspirin." Each QDM element is composed of a *category*, the *state* in which that category is expected to be used and a *value set* of codes in a defined code set (vocabulary) to specify which instance of the category is expected. The boxes in the lower section of the QDM element specify individual *attributes,* or additional data to describe the QDM element. Attributes include: *timing*, *actor*, *data flow*, and *category-specific*. More detail about each of these QDM components is provided in the text.

With a Value Set of a
Single Code Set (Vocabulary)

With a Value Set of
Multiple Code Sets
(Vocabulary)

With a Value Set of Multiple Child Value Sets
of the Same Code Set (Vocabulary)

Aspirin

| RxNorm | 97374, 198461,… 67890, …. |

Medication

Administered

Start date E d d t | Source, Subject, Recorder | Sender, Receiver | Category Specific

Diabetes

ICD-9	250.0, 250.00, 250 01 250 02
ICD-10	E10.36, E11.36, E11.9, E13.31,…
SNOMED	2751001,4627003, 5368009, …

Diagnosis/Condition

Active

Start date End date | Source, Subject, Recorder | Sender, Receiver | Category Specific

ACEI / ARB

RxNor	104370, 153750, 197436, 197437,..
RxNor	206313, 206763, 206277, 207780,..
RxNor	477130, 485471 577776, 636042,..

Medication

Dispensed

Start date End date | Source, Subject, Recorder | Sender, Receiver | Category Specific

Figure 3. QDM Use of Value Sets—This figure shows three QDM elements, each of which uses value sets. The figure on the left shows a value set for medication (aspirin) that includes a single set of codes using a single code set (vocabulary). The middle figure shows the instance *diabetes* of the category diagnosis. In the middle figure the value set provided is a *parent* value set composed of three *child* value sets, one each using the *code sets* SNOMED-CT, ICD-9-CM, and ICD-10-CM, respectively. In this case the parent value set indicates the same category instance but expressed in different code sets. The figure on the right provides a *parent* value set titled ACEI/ARB* comprised of two child value sets, each in the same code set (RxNorm). This example uses a parent value set for convenience, expressing a combination of two different category instances (both ACEI and ARB medications). *ACEI = angiotensin-converting enzyme inhibitor; ARB = angiotensin receptor blocker.

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Tables 1 and 2: QDM Categories and States: The following table lists all the QDM categories and states. The QDM element (category, state, value set, and attributes) comprise the atomic data expression that is used to specify data criteria required for the quality measure.

QDM Categories
1. Adverse Effect: allergy
2. Adverse Effect: non-allergy
3. Characteristics
4. Communication
5. Condition/Diagnosis/Problem
6. Device
7. Diagnostic Study
8. Encounter
9. Experience
10. Family History
11. Functional Status
12. Health Record Artifact
13. Laboratory Test
14. Medication
15. Physical Exam
16. Preference
17. Procedure
18. Risk Evaluation
19. Substance
20. Symptom
21. System Resources
22. Transfer

QDM States	
QDM State of Action	QDM State of Being
1. Accessed	1. Active
2. Acknowledged	2. Inactive
3. Administered	3. Resolved
4. Alerted	
5. Applied	
6. Assessed	
7. Calculated	
8. Created	
9. Declined	
10. Discontinued	
11. Dispensed	
12. Documented	
13. Implemented	
14. Notified	
15. Ordered	
16. Performed	
17. Planned	
18. Received	
19. Recommended	
20. Reconciled	
21. Reminded	
22. Reported	
23. Requested	
24. Reviewed	
25. Transmitted	
26. Updated	

Attributes

QDM Element attributes include four basic categories: *timing, actor, data flow, and category-specific.* Greater detail is provided in Figures 4, 5, 6, and 7.
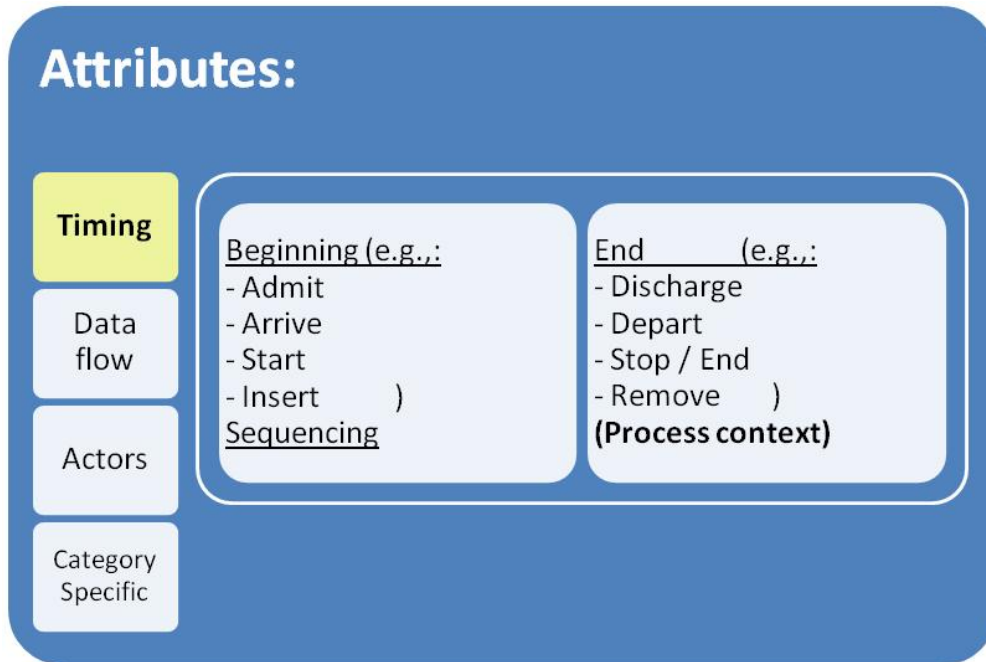
Figure 4. Timing Attribute: The timing attribute indicates the time of occurrence, including whether the beginning or end of a process is the time of interest. Timing provides the process context for the QDM element.
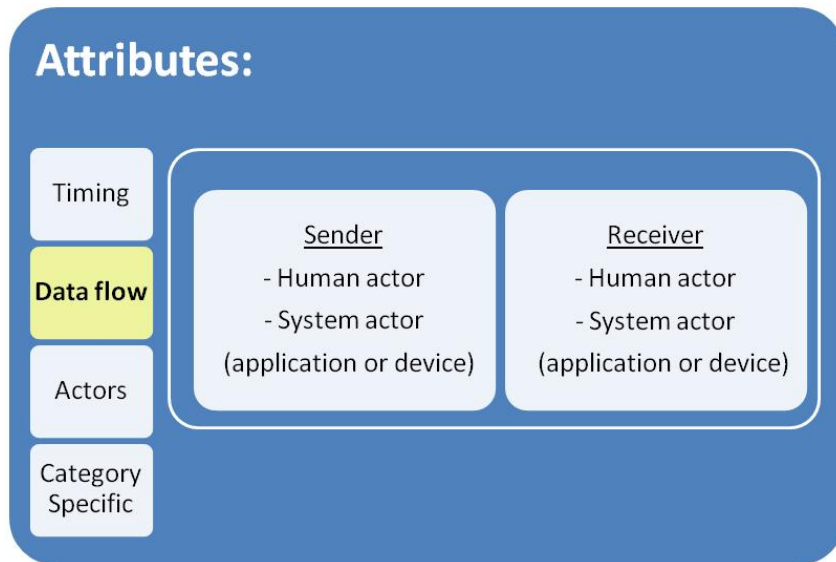
Figure 5. Data Flow Attribute: The data flow attribute allows specification of a specific sender or receiver of a transaction, enabling expression of criteria that a specific health care artifact is shared by a clinician (sender) with a patient (receiver).
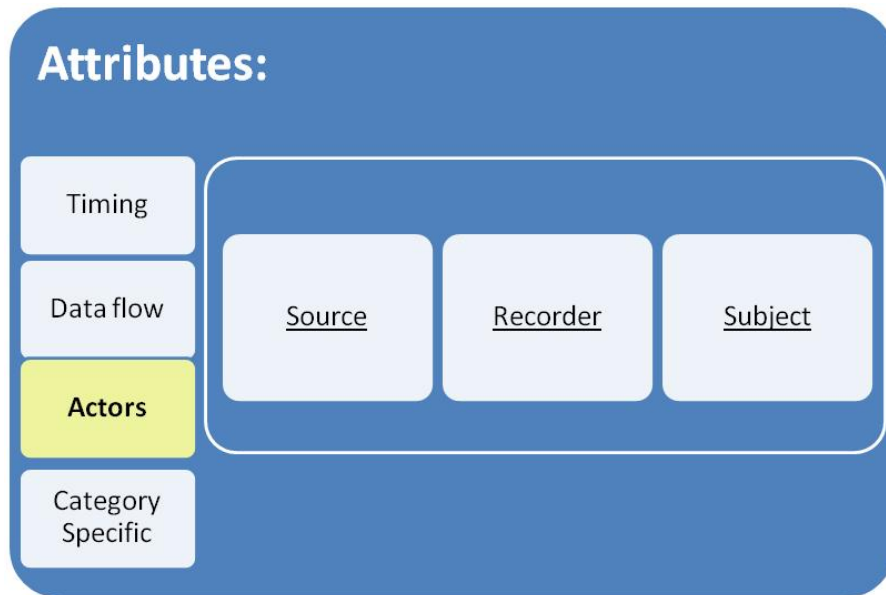
Figure 6. Actor Attribute: The actor attribute allows the measure developer to define the expected source, recorder, and subject for each QDM element; thus, it is possible to specify data only derived and recorded by devices, patients, or clinicians.
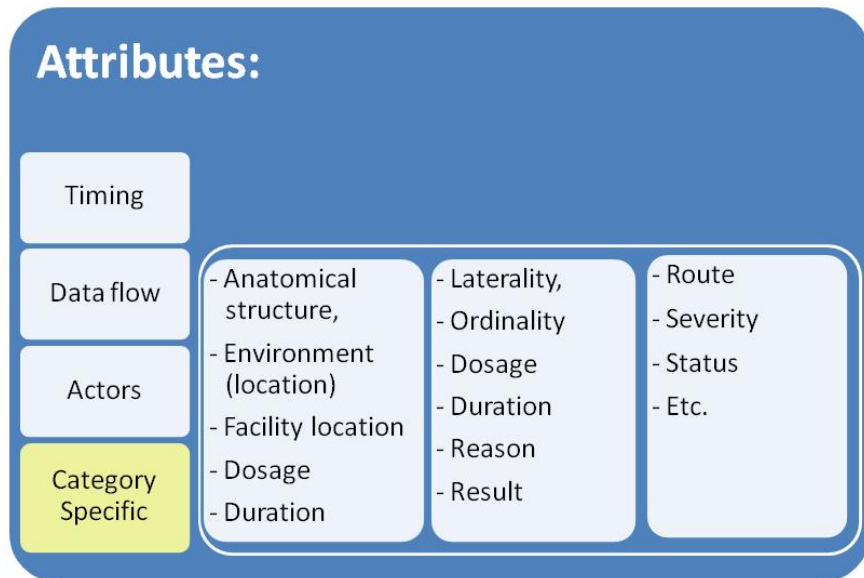
Figure 7. Category-Specific Attribute: *Category-specific* attributes are listed separately in Table 3 of this document.

Table 3. QDM Categories and Specific Attributes: This table provides detail on the specific relationships between the attributes and categories. The individual category-specific attributes are provided as headers for each column. The categories define the rows. Category-specific attributes that apply to each category are depicted with an *x* in the applicable columns. Note that the attribute in prior versions "Health Record Field" is defined by the state (context) applied to each of the quality data elements; therefore it has been removed from the attribute section. It was not applied during any of the retooling efforts in 2010.

| Categories	Anatomical structure	Dosage	Environmental location	Facility location	Laterality	Ordinality	Reason	Result	Route	Severity	Status
1. Adverse effect: Allergy										X	X
2. Adverse effect: non-allergy										X	X
3. Care Goal								X		X	X
4. Characteristics											X
5. Communication							X				X
6. Condition/ Diagnosis/ Problem	X				X	X				X	X
7. Device	X				X	X	X				
8. Diagnostic study	X			X	X		X	X			
9. Encounter			X	X			X				
10. Experience											
11. Family History											X
12. Functional Status	X				X			X			
13. Health record artifact	X		X	X	X						
14. Laboratory test	X		X	X	X		X	X			
15. Medication		X							X		
16. Physical Exam	X		X	X	X		X	X			
17. Preference							X				
18. Procedure	X		X	X	X	X	X	X			X
19. Risk evaluation	X				X			X			

Categories	Anatomical structure	Dosage	Environmental location	Facility location	Laterality	Ordinality	Reason	Result	Route	Severity	Status
20. Substance		X							X		
21. Symptom	X		X	X	X	X				X	X
22. System resources			X	X			X				
23. Transfer			X	X			X				

Expression Language (Syntax)

The information provided in the QDM so far provides a clear method to articulate each data element used within a measure, a clinical decision support rule, or a request for information for other purposes. To communicate the information requirements fully, however, a measure developer must provide additional context regarding how each data element relates to other data elements.

The Health Quality Measures Format (HQMF) is a Health Level 7 (HL7) international standard that serves as a wrapper into which a health quality measure using the QDM can be placed. The HQMF serves as a means to share and distribute the measure as an electronic document. A quality measure is a quantitative tool that provides an indication of an individual or organization's performance with respect to a specified structure, process or outcome of clinical care.[1] The Quality Data Model provides the "grammar" to express the content of the measure to allow queries of existing data. The measure results can be used for quality improvement and public reporting, as appropriate. The following shows how to express a quality measure using the QDM. For example, a measure describing a measure related to asthma the measure first must identify asthma, using the *category* "Diagnosis/Condition/Problem" and a *state* "active," limiting the data element by using a specific *value set* of concepts that portray the meaning of the term 'asthma':

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[1] http://www.hl7.org/v3ballot/html/domains/uvqm/uvqm.html
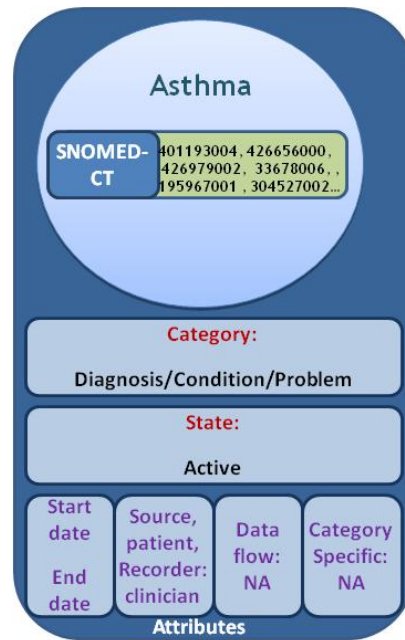
Figure 8. The data element will appear in a measure as, "Diagnosis active: asthma" using value set "asthma SNOMED-CT."

Diagnosis, Active: Asthma Diagnosis

Encounter: Office and Outpatient Consult

Patient Characteristic: birth date LOINC Code List

Risk Category Assessment: Asthma Symptom Tool SNOMED CT Code List

Symptom Active: Asthma Daytime Symptoms SNOMED CT Code List

Symptom Active: Asthma Night Time Symptoms SNOMED CT Code List

Relating QDM Elements as Grammar

Each measure must specify more detail than the data elements alone. In the example provided, the diagnosis of asthma, or related symptoms, must be present before a measure can expect that specific evaluation or treatment is recommended. Therefore, an expression language, or *syntax,* to apply QDM elements within a clause or a measure component must include the ability to relate each QDM data element to others in a statement. Such relationships include: 1) relative timings, 2) operators, or 3) functions. Relative timings allow a measure developer to describe timing relationships among individual QDM elements to create clauses that add meaning to the individual QDM elements. Operators allow measure developers to compare two or more QDM elements logically or mathematically (AND, OR, >=, etc.) and also allow description of acceptable ranges of results for laboratory tests, diagnostic studies, and other QDM categories Functions specify sequencing (ordinality) and provide the ability to specify a calculation (subtract, add, divide, multiply, etc.) with respect to QDM elements and clauses containing them. Specific details for each of the three relationships are provided in the following tables.

Relative Timings[2]

Relative Timings: Relative timings allow a measure developer to describe timing relationships among individual QDM elements to create clauses that add meaning to the individual QDM elements.		
Timing	**Description**	**Example**
Starts before or during	A relationship in which the source act's effective time starts before the start of the target or starts during the target's effective time. An Act is defined by HL7 as: A record of something that is being done, has	A pacemaker is present at any time *starts before or during* the measurement period: [*Diagnosis active: pacemaker in situ*] *starts before or during* [*measurement period*] A condition [diagnosis] that *starts before or during* [measurement

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[2] The relative timings are part of HL7's normative Reference Information Model (RIM), which is incorporated in the HL7 Draft Standard for Trial Use, eMeasure Representation of the Health Quality Measure Format (HQMF). The timings are temporal comparators, codes defined to define *act relationships* that connect two *acts*. They are part of the ActRelationshipType code system, available at: http://www.hl7.org/v3ballot/html/infrastructure/vocabulary/ActRelationshipType.html.

Relative Timings: Relative timings allow a measure developer to describe timing relationships among individual QDM elements to create clauses that add meaning to the individual QDM elements.

Timing	Description	Example
	been done, can be done, or is intended or requested to be done.[3]	end date], that means the diagnosis occurred any time before the measurement end date *including* the possibility that the diagnosis was established on the measurement end date itself
Starts before start of	A relationship in which the source act's effective time starts before the beginning of the effective start time of the target.	Patient age is >=17 before the beginning of the measurement period: [*Patient characteristic: birthdate*] (age) >=(17, "years") *starts before the start of* [*measurement period*]
Starts after end of	A relationship in which the target act takes place with a defined temporal relationship with respect to the time at which the source act terminates.	Medication reconciliation occurs within 30 days of a hospital discharge: [*Encounter: encounter medication reconciliation*] *starts after the end of* [*Encounter: encounter inpatient*] <= (30, "days")
During	A relationship in which the source act's effective time is wholly within the target act's effective time.	>= 2 outpatient encounters occur during the measurement year: [*Encounter: encounter outpatient*] DURING [*measurement year*]
Starts after start of	The source act starts after the start of the target Act (i.e., if we say "ActOne starts after start of ActTwo," ActOne is the source, and ActTwo is the target).	Medication reconciliation occurs within 24 hours of inpatient admission: [*Encounter: encounter medication reconciliation*] *starts after start of* [*Encounter: encounter inpatient*] <= (24, "hours")

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[3] http://www.hl7.org/v3ballot/html/infrastructure/rim/rim.html#Act-cls

Relative Timings: Relative timings allow a measure developer to describe timing relationships among individual QDM elements to create clauses that add meaning to the individual QDM elements.

Timing	Description	Example
Linked to	Typically used to connect two otherwise unrelated facts. In the 2010 retooling effort, *LINKED TO* was primarily used for *negation rationale* (reasons an action was not performed), using the term *not done.* With the new QDM applying *decline* as an action related to any given category, *LINKED TO* may have limited use.	To indicate the patient reason for why a medication was not given: [*Medication not done: patient reason*] *LINKEDTO* [beta blocker medication]
Ends before start of	A relationship in which the source act terminates before the target act's effective time.	To state that all aspirin products are discontinued at least 3 before the start of a surgical hospital admission: [*Medication active: aspirin products*] *ends before start of* [*Encounter: surgical hospital encounter*] >= (3 days)
Ends before or during	A relationship in which the source act terminates before the target act terminates.	To state that intravenous anticoagulant medication is stopped before inpatient hospital discharge: [Medication administered: *anticoagulant medication (route = IV)*] *ends before or during* [Encounter: *encounter inpatient*]
Ends after end of	A relationship in which the source act terminates after the target act terminates.	To state that antidepressant medication continues for at least 150 days of treatment after the end of an inpatient admission: [Medication dispensed: *anti-depressant medications*] *ends after end of* [*Encounter: encounter inpatient*] >= 150, days

Relative Timings: Relative timings allow a measure developer to describe timing relationships among individual QDM elements to create clauses that add meaning to the individual QDM elements.

Timing	Description	Example
Ends after start of	A relationship in which the source act terminates after the target act's effective time.	To state that intravenous anticoagulation administration ends within 3 days after the start of oral warfarin administration: [*Medication administered: intravenous anticoagulants (route = IV)*] *ends after start of* [*Medication administered: warfarin (route = oral)*] <=(3, "days")
Ends during	A relationship in which the source act terminates within the target act's effective time.	To describe all patients with inpatient admissions with discharge dates occurring during the measurement period: [*Encounter: inpatient*] *ends during* [*measurement period*]
Starts during	A relationship in which the source act's effective time begins within the target act's effective time.	To describe oral anticoagulation therapy that starts during a hospital admission: [*Medication administered: oral anticoagulants*] *starts during* [*Encounter: encounter inpatient*]
Ends concurrent with	A relationship in which the source act's effective time ends with the end of the target act's effective time.	To describe oral antibiotics that are stopped on the day of hospital admission: [Medication active: oral antibiotics] *ends concurrent with* [Encounter: acute hospital admission]
Starts concurrent with	A relationship in which the source act's effective time starts with the start of the target act's effective time.	To describe coronary artery bypass graft surgery (CABG) that is performed on the first day of an inpatient encounter: [*Procedure performed: CABG*] *starts concurrent with* [*encounter: inpatient*]

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Relative Timings: Relative timings allow a measure developer to describe timing relationships among individual QDM elements to create clauses that add meaning to the individual QDM elements.

Timing	Description	Example
Concurrent with	A relationship in which the source act's effective time is the same as the target act's effective time.	To describe systolic and diastolic blood pressure that are taken from the same blood pressure reading: [*Physical exam finding: systolic blood pressure*] *CONCURRENT WITH* [*Physical exam finding: diastolic blood pressure*]

Operators

Operators: Operators allow measure developers to compare two or more QDM elements logically or mathematically (AND, OR, >=, etc.) and also allow description of acceptable ranges of results for laboratory tests, diagnostic studies, and other QDM categories.		
Operator Name	**Description**	**Example**
Logical Operators		
AND	Used to conjoin two or more QDM elements or phrases through the use of 'AND'. ***Note: The addition of any measure phrase should always be preceded by an 'AND' or an 'OR'.***	*("Encounter perform: Hospital Inpatient" AND "Physical Exam, perform: Weight Measurement") DURING Measurement Period* The syntax provided above asserts that the following must have occurred during the measurement period: 1) A Hospital Inpatient Encounter **-AND-** 2) a Physical Exam Performed for Weight Measurement
OR	Used to conjoin two or more QDM elements or phrases through the use of 'OR'. ***Note: The addition of any measure phrase should always be preceded by an 'AND' or an 'OR'.***	*("Encounter perform: Hospital Inpatient" OR "Encounter perform: Hospital Outpatient") DURING Measurement Period* The syntax provided above asserts that one of the following must have occurred during the measurement period: 1) A Hospital Inpatient Encounter **-OR-** 2) A Hospital Outpatient Encounter
Math Operators		
SUBTRACTED FROM	Subtract operator. It is used to subtract a particular period of time to a QDM element.	*SUBDATE(Measurement End Date SUBTRACTED FROM 165 DAYS)* The syntax provided above asserts that 165 days should be subtracted from the measurement end date.

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Operators: Operators allow measure developers to compare two or more QDM elements logically or mathematically (AND, OR, >=, etc.) and also allow description of acceptable ranges of results for laboratory tests, diagnostic studies, and other QDM categories.

Operator Name	Description	Example
ADDED TO	Addition operator. It is used to add a particular period of time to a QDM element.	***ADDDATE(Measurement Start Date ADDED TO 165 DAYS)*** The syntax provided above asserts that 165 days should be added to the measurement start date.
MEAN	The average of a set of values. This operator is used mostly in continuous variable measures to compare a set of variables.	*MEAN:* *AND: "Diagnosis active: Diabetes"* *AND: FIRST "Laboratory test performed: HbA1c (result)"* *MINUS SECOND "Laboratory test performed: HbA1c (result)"* The statement evaluates the mean difference for all patients with diabetes.
MEDIAN	The middle value of a set of values. This operator is used mostly in continuous variable measures to compare a set of variables.	*MEDIAN:* *AND: "Diagnosis active: Diabetes"* *AND: FIRST "Laboratory test performed: HbA1c (result)"* *SECOND "Laboratory test performed: HbA1c (result)"* *THIRD "Laboratory test performed: HbA1c (result)"* *FOURTH "Laboratory test performed: HbA1c (result)"* The statement evaluates the median difference for all patients with diabetes.
DIVIDED BY	Division operator indicates the mathematical operation to occur between two elements in the measure (simple division)	1) Low-density lipoprotein can be described directly as a data element or can be calculated. The calculation uses a division operator: ("Laboratory test *documented*: high-density lipoprotein (HDL)(value)" minus "Laboratory test *performed*: triglycerides (value)") DIVIDED BY 5) < 100 mg/dL

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Operators: Operators allow measure developers to compare two or more QDM elements logically or mathematically (AND, OR, >=, etc.) and also allow description of acceptable ranges of results for laboratory tests, diagnostic studies, and other QDM categories.

Operator Name	Description	Example
MULTIPLIED BY	Times operator indicates the mathematical operation to occur between two elements in the measure (simple multiplication)	1) Absolute neutrophil count can be described directly as a data element or can be calculated. The calculation uses a multiplication operator: ("Laboratory test *document*: neutrophil count (percentage value)" TIMES "Laboratory test *document*: total white blood cell (absolute value)") <= 500 cells/hpf
Comparison Operators		
LESS THAN	Less than operator. In a mathematical expression, this comparison operator is used to denote that the value of the left-hand side is less than the value of the right-hand side (e.g., $x < y$). In clinical terms, the left-hand side might equate to the value of a data element specific attribute of a QDM or the timing associated between one or more QDM elements or phrases, while the right-hand side would equate to a specified quantity with/without an associated unit.	***"Encounter perform: Hospital Inpatient (duration < 120 DAYS)"*** The syntax above asserts that the Hospital Inpatient Encounter was less than 120 days in length.
EQUAL TO	Equal operator. In a mathematical expression, this comparison operator is used to denote that the value of the left-hand side is equal to the value of the right-hand side (e.g., $x = y$). In clinical terms, the left-hand side might equate to the value of a data element specific attribute of a QDM or the timing associated between one or more QDM elements or phrases, while the right-hand side would equate to a specified quantity with/without an associated unit.	***"Encounter performed: Hospital Inpatient (duration = 120 DAYS)"*** The syntax above asserts that the Hospital Inpatient Encounter must be equal to 120 days in length.

Operators: Operators allow measure developers to compare two or more QDM elements logically or mathematically (AND, OR, >=, etc.) and also allow description of acceptable ranges of results for laboratory tests, diagnostic studies, and other QDM categories.

Operator Name	Description	Example
NOT EQUAL TO	Not Equal To operator. In a mathematical expression, this comparison operator is used to denote that the value of the left-hand side is not equal to the value of the right-hand side (e.g., x ≠ y). In clinical terms, the left-hand side might equate to the value of a data element specific attribute of a QDM or the timing associated between one or more QDM elements or phrases, while the right-hand side would equate to a specified quantity with/without an associated unit.	*"Encounter performed: Hospital Inpatient (duration ≠ 120 DAYS)"* The syntax above asserts that the Hospital Inpatient Encounter was not 120 days in length.
Comparison Operators		
GREATER THAN OR EQUAL TO	Greater Than Or Equal To operator. In a mathematical expression, this comparison operator is used to denote that the value of the left-hand side is greater than or equal to the value of the right-hand side (e.g., x ≥ y). In clinical terms, the left-hand side might equate to the value of a data element specific attribute of a QDM or the timing associated between one or more QDM elements or phrases, while the right-hand side would equate to a specified quantity with/without an associated unit.	*"Encounter performed: Hospital Inpatient (duration ≥ 120 DAYS)"* The syntax above asserts that the Hospital Inpatient Encounter was greater than or equal to 120 days in length.

Operators: Operators allow measure developers to compare two or more QDM elements logically or mathematically (AND, OR, >=, etc.) and also allow description of acceptable ranges of results for laboratory tests, diagnostic studies, and other QDM categories.

Operator Name	Description	Example
GREATER THAN	Greater Than operator. In a mathematical expression, this comparison operator is used to denote that the value of the left-hand side is greater than the value of the right-hand side (e.g., x > y). In clinical terms, the left-hand side might equate to the value of a data element specific attribute of a QDM or the timing associated between one or more QDM elements or phrases, while the right-hand side would equate to a specified quantity with/without an associated unit.	*"Encounter performed: Hospital Inpatient (duration > 120 DAYS)"* The syntax above asserts that the Hospital Inpatient Encounter was greater than 120 days in length.
LESS THAN OR EQUAL TO	Less Than Or Equal To operator. In a mathematical expression, this comparison operator is used to denote that the value of the left-hand side is less than or equal to the value of the right-hand side (e.g., x ≤ y). In clinical terms, the left-hand side might equate to the value of a data element specific attribute of a QDM or the timing associated between one or more QDM elements or phrases, while the right-hand side would equate to a specified quantity with/without an associated unit.	*"Encounter performed: Hospital Inpatient (duration ≤ 120 DAYS)"* The syntax above asserts that the Hospital Inpatient Encounter was less than or equal to 120 days in length.
Miscellaneous Operators		
IS NOT NULL	NOT NULL value indicates the attribute result must be have a value (i.e., *not null*); the exact value or set of values that should be expected are not specified. Example: "*Laboratory test* document*: LDL (result = NOT NULL)"* The syntax asserts that the LDL result is present.	1) (("Diagnostic study *documented*: chest X-ray (result = NOT NULL)) STARTS AFTER START OF (("Encounter *performed*: Hospital Inpatient) DURING Measurement Period) <= 24 hours

Operators: Operators allow measure developers to compare two or more QDM elements logically or mathematically (AND, OR, >=, etc.) and also allow description of acceptable ranges of results for laboratory tests, diagnostic studies, and other QDM categories.

Operator Name	Description	Example
IS NULL	NULL value indicates the attribute result is not valued. Example: "*Laboratory test* document: <u>*LDL (result = NULL)" The syntax asserts that the LDL may have been performed but no result is documented.*</u>	1) (("Diagnostic study *documented*: chest X-ray (result = NULL)") STARTS AFTER START OF (("Encounter *performed*: Hospital Inpatient) DURING Measurement Period) <= 24 hours
XOR	Logical XOR – 'exclusive *OR'* – only one of a series is true but not all	1) A patient should be included in the measure if he or she has allergy to only one of two medications required for the measure but not allergy to both medications (("Adverse effect: allergy *documented*: ACEI") XOR ("Adverse effect: allergy *documented*: ARB"))

Functions

Functions: Functions specify sequencing and provide the ability to specify a calculation (subtract, add, divide, multiply, etc.) with respect to QDM elements and clauses containing them.	
Function Name	**Description**
FIRST	Return the first occurrence of the associated QDM element or phrase. This is the first item in a list. Note, this does not represent ordinality which is handled as an attribute of the data element (see Attributes). Example: ***FIRST("Encounter performed: ambulatory encounter ")*** The syntax provided above would return the green item in the following list: 1. *"Encounter performed: ambulatory encounter" during "Measurement period"* 2. *"Encounter performed: ambulatory encounter" during "Measurement period"* 3. *"Encounter performed: ambulatory encounter" during "Measurement period"* 4. *"Encounter performed: ambulatory encounter" during "Measurement period"* 5. *"Encounter performed: ambulatory encounter" during "Measurement period"*
SECOND	Return the second occurrence of the associated QDM element or phrase. This is the second item in a list. Example: ***SECOND("Encounter performed: ambulatory encounter ")*** The syntax provided above would return the bolded item in the following list: 1. *"Encounter performed: ambulatory encounter" during "Measurement period"* 2. *"Encounter performed: ambulatory encounter" during "Measurement period"* 3. *"Encounter performed: ambulatory encounter" during "Measurement period"* 4. *"Encounter performed: ambulatory encounter" during "Measurement period"* 5. *"Encounter performed: ambulatory encounter" during "Measurement period"*

Functions: Functions specify sequencing and provide the ability to specify a calculation (subtract, add, divide, multiply, etc.) with respect to QDM elements and clauses containing them.	
Function Name	**Description**
THIRD	Return the third occurrence of the associated QDM element or phrase. This is the third item in a list. Example: ***THIRD("Encounter performed: ambulatory encounter ")*** The syntax provided above would return the green item in the following list: 1. *"Encounter performed: ambulatory encounter" during "Measurement period"* 2. *"Encounter performed: ambulatory encounter" during "Measurement period"* 3. *"Encounter performed: ambulatory encounter" during "Measurement period"* 4. *"Encounter performed: ambulatory encounter" during "Measurement period"* 5. *"Encounter performed: ambulatory encounter" during "Measurement period"*
FOURTH	Return the fourth occurrence of the associated QDM element or phrase. This is the fourth item in a list. Example: ***FOURTH("Encounter performed: ambulatory encounter ")***The syntax provided above would return the green item in the following list: 1. *"Encounter performed: ambulatory encounter" during "Measurement period"* 2. *"Encounter performed: ambulatory encounter" during "Measurement period"* 3. *"Encounter performed: ambulatory encounter" during "Measurement period"* 4. *"Encounter performed: ambulatory encounter" during "Measurement period"* 5. *"Encounter performed: ambulatory encounter" during "Measurement period"*

Functions: Functions specify sequencing and provide the ability to specify a calculation (subtract, add, divide, multiply, etc.) with respect to QDM elements and clauses containing them.

Function Name	Description
FIFTH	Return the fifth occurrence of the associated QDM element. This is the fifth item in a list or phrase. Example: *FIFTH("Encounter performed: ambulatory encounter ")* The syntax provided above would return the green item in the following list: 1. *"Encounter performed: ambulatory encounter" during "Measurement period"* 2. *"Encounter performed: ambulatory encounter" during "Measurement period"* 3. *"Encounter performed: ambulatory encounter" during "Measurement period"* 4. *"Encounter performed: ambulatory encounter" during "Measurement period"* 5. *"Encounter performed: ambulatory encounter" during "Measurement period"*
LAST	Return the last occurrence of the associated QDM element or phrase. This is the very last item in a list. For example, LAST*("Encounter performed: ambulatory encounter ")*would return the green item in the following list of eight diagnoses: 1. *"Encounter performed: ambulatory encounter" during "Measurement period"* 2. *"Encounter performed: ambulatory encounter" during "Measurement period"* 3. *"Encounter performed: ambulatory encounter" during "Measurement period"* 4. *"Encounter performed: ambulatory encounter" during "Measurement period"* 5. *"Encounter performed: ambulatory encounter" during "Measurement period"*
COUNT	Returns a True/False based on a count of a particular QDM element, with or without an attribute, or phrase and the result specified. The result must be specified as a positive integer. Example: *COUNT("Encounter performed: Hospital Inpatient" DURING Measurement Period) > 4* The syntax provided above would return "True" if and only if there were more than four hospital inpatient encounters during the measurement period.

Functions: Functions specify sequencing and provide the ability to specify a calculation (subtract, add, divide, multiply, etc.) with respect to QDM elements and clauses containing them.	
Function Name	**Description**
COUNTDISTINCT	Returns a True/False based on the distinct count of a QDM element with an assigned data element specific attribute(s) that equates to "is present." When using this function, an attribute must be added to define how the QDM element should be counted. The query is performed based on the given attribute(s) and filtered by the particular QDM data element to which it belongs (e.g., Encounter). The result must be specified as a positive integer. Example: ***COUNTDISTINCT("Encounter performed: Hospital Inpatient (start datetime is present)" DURING Measurement Period) > 4*** The syntax provided above would return "True" if and only if there were more than four hospital inpatient encounters during the measurement period that had a different start date/time.
MAX	Returns a True/False based on the maximum result value specified for a data element specific attribute of a QDM element. The result must be specified as a number. Example: ***MAX("Physical Exam performed: Systolic Blood Pressure (result value < 90 mm/Hg)" DURING Measurement Period)*** The syntax provided above would return "True" if and only if the maximum systolic blood pressure value recorded for a patient during the measurement period was less than 90 mm/Hg.
MIN	Returns a True/False based on the minimum result value specified for a data element specific attribute of a QDM element. The result must be specified as a number. Example: ***MIN("Physical Exam performed: Diastolic Blood Pressure (result value < 90 mm/Hg)" DURING Measurement Period)*** The syntax provided above would return "True" if and only if the minimum systolic blood pressure value recorded for a patient during the measurement period was less than 90 mm/Hg.

Functions: Functions specify sequencing and provide the ability to specify a calculation (subtract, add, divide, multiply, etc.) with respect to QDM elements and clauses containing them.

Function Name	Description
RELATIVEFIRST	Return the relative first item in a list (i.e., Immediate Prior). This function allows timing of a given list of clinical events to be compared, where each event must be considered in order of when it occurred in conjunction with the event that was immediately after it. As a result, this function should always be used in conjunction with the RELATIVESECOND function. Example: *NOT((RELATIVEFIRST("Diagnosis active: ADHD")) Starts Before Start Of (RELATIVESECOND("Diagnosis active: ADHD")) > 6 months)* The syntax provided above asserts that there was never an active diagnosis of ADHD that started before the start of any other active diagnosis of ADHD by greater than six months.
RELATIVESECOND	Return the relative second item in a list (i.e., Current). This function allows timing of a given list of clinical events to be compared, where each event must be considered in order of when it occurred in conjunction with the event that was immediately preceding it. As a result, this function should always be used in conjunction with the RELATIVEFIRST function. Example: *NOT((RELATIVEFIRST("Diagnosis active: ADHD")) Starts Before Start Of (RELATIVESECOND("Diagnosis active: ADHD")) > 6 months)* The syntax provided above asserts that there was never an active diagnosis of ADHD that started before the start of any other active diagnosis of ADHD by greater than six months.

Functions: Functions specify sequencing and provide the ability to specify a calculation (subtract, add, divide, multiply, etc.) with respect to QDM elements and clauses containing them.

Function Name	Description
NOT	Negates QDM element with associated attribute(s) or phrase. Please note that when an attribute is indicated for a QDM element at this level, what is being negated is the occurrence of a particular QDM element with that attribute. Example: **NOT("Lab Test documented: LDL (result)" SAS Measurement Period)** The above syntax indicates that there was **not** a LDL reading performed that: 1) started after the start of the measurement period -AND- 2) **had** a documented result However, there **could have been** an LDL reading that occurred that: 1) started after the start of the measurement period -AND- 2) **did not have** a documented result
ABS	Returns a True/False based on the absolute result value specified for a data element specific attribute value of a QDM element. The result must be specified as a positive number. Example: **ABS("Physical Exam performed: Diastolic Blood Pressure(result)" DURING Measurement Period) > 120** mmHg The syntax provided above would return "True" if and only if the absolute value for a diastolic blood pressure reading was greater than 120.
ROUND	Returns a True/False based on the result value specified for a rounded data element specific attribute value of a QDM element. The result must be specified as a positive number. Example: **ROUND("Physical Exam performed: Diastolic Blood Pressure (result)" DURING Measurement Period) > 140 mmHg** The syntax provided above would return "True" if and only if the rounded diastolic blood pressure value recorded for a patient during the measurement period was less than 90 mmHg.

Functions: Functions specify sequencing and provide the ability to specify a calculation (subtract, add, divide, multiply, etc.) with respect to QDM elements and clauses containing them.	
Function Name	**Description**
SUM	Returns a True/False based on the result value specified for a summed data element specific attribute value of a QDM element. The result must be specified as a positive number. Example: ***SUM("Procedure** performed**: Physical Restraint (duration)" DURING Measurement Period) > 5 HOURS*** The syntax provided above would return "True" if and only if the summed overall durations of physical restraint were greater than five hours.

Example Measures Using Expression Language (Syntax)

The following are examples of measure concepts that account for longitudinal, care coordination or patient centered measures. None of the following measures has been developed, reviewed or endorsed. The purpose of providing these examples is to show how the QDM and the expression language can be used to describe new areas of measurement.

A. **Hypertension**: These examples are provided to show how the QDM can be used to express required measure criteria. The examples do not explore all of the clinical permutations or appropriateness of measure design, which requires detailed clinical evaluation and may be managed using a composite measure approach (e.g., <a> proportion of patients with improvement, <b> mean or median time to improvement for those who improved, <c> mean or median of actual change in diastolic BP from intake or initial diagnosis until six months post intake, etc.).

   a. Initial Diagnosis to diastolic BP less than 90 using blood pressure taken by a device in the patient's home:
      - The QDM elements for the example are (elements in parentheses are attribute):
         o "Patient characteristic *documented*: birth date"

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- o "Diagnosis *active*: hypertension (time: onset time)"
- o "Physical exam finding *documented*: diastolic blood pressure (value >= 90 mmHg)
- Application of the expression language:
  - o Population:
    - AND: "Patient characteristic *documented*: birth date" >= 18 years starts before start of "measurement period"
  - o Denominator:
    - AND: FIRST "Diagnosis *active*: hypertension" starts before or during "measurement period"
    - AND: "Physical exam finding *documented*: diastolic blood pressure (value >= 90 mmHg; data flow source: blood pressure monitor, recorder: blood pressure monitor, subject: patient; environment: ambulatory office) starts concurrent with FIRST "Diagnosis *active*: hypertension"
  - o Numerator:
    - AND: FIRST "Physical exam finding *documented*: diastolic blood pressure (value < 90 mmHg; timing: start time; data flow source: blood pressure monitor, recorder: blood pressure monitor, subject: patient; environment: home) minus FIRST "Diagnosis *active*: hypertension (timing: onset time)"
- The general meaning of the description—Provide the time from the initial entry of hypertension active diagnosis that is associated with an elevated diastolic blood pressure result to the first diastolic blood pressure reading of < 90 mmHg that occurs after the initial entry of hypertension active diagnosis. The challenge with this measure is to determine when the diagnosis of hypertension was actually determined and whether it is recorded. That is a workflow and implementation issue. The denominator components of active hypertension diagnosis and elevated diastolic blood pressure may seem redundant; however, including both components ensures that there is an elevated value for which to expect improvement. A patient with controlled hypertension presenting to a new community with no prior electronic record information is therefore not included.

b. Time from initial (intake) visit to achievement of diastolic BP <90 based on blood pressure taken by a device in the patient'
- QDM elements
  - o "Patient characteristic *documented*: birth date"
  - o "Encounter *performed*: ambulatory or inpatient encounter (timing: start time)"

- o "Physical exam finding *documented*: diastolic blood pressure (value >= 90 mmHg)
- o "Diagnosis *active*: hypertension (timing: onset time)"
- Application of expression language:
  - o Population:
    - AND: "Patient characteristic *documented*: birth date" >= 18 years starts before start of "measurement period"
  - o Denominator:
    - AND: FIRST "Encounter *performed*: ambulatory or inpatient encounter (timing: start time)" during the "measurement period"
    - AND: "Diagnosis *active*: hypertension (timing: onset time)" starts before or during FIRST "Encounter *performed*: ambulatory or inpatient encounter"
    - AND: "Physical exam finding *documented*: diastolic blood pressure (value >= 90 mmHg; data flow source: blood pressure monitor, recorder: blood pressure monitor, subject: patient; environment: ambulatory office) during FIRST "Encounter *perform*: ambulatory or inpatient encounter"
  - o Numerator:
    - AND: FIRST "Physical exam finding *documented*: diastolic blood pressure (value < 90 mmHg; timing: start time) minus FIRST "Encounter *performed*: ambulatory or inpatient encounter (timing: start time; data flow source: blood pressure monitor, recorder: blood pressure monitor, subject: patient; environment: home)"
- The general meaning of the description—Provide the time from the initial patient visit (here listed as any encounter in any setting) with an entry diagnosis of hypertension and an elevated diastolic blood pressure at intake to the first diastolic blood pressure reading of < 90 mmHg that occurs after that visit. This is described as an individual patient measure with a unique value for each patient.

B. **Care Coordination**: Stage 2 Recommended measure statement expecting composite measures assessing closing the "referral loop." Description: These composite measures would assess the success of critical information communicated in a bidirectional manner between specialists, primary care providers, and patients. Specifically, measures would assess information transfer between the providers requesting referral / consultation and the provider completing referral /

consultation. In addition, measures within this composite would assess communication of results by both specialist and primary care providers to patient and family members.

a. **Example measure:** Transmission and receipt of consultation and return of consultation report shared with referring providers and the patient. Note: This is only an example. Detailed specification can vary and the example is to show only how the QDM and the expression language can be used to describe the measure criteria.

- QDM elements:
    - o "Patient characteristic *document*: birth date"
    - o "Health record artifact *transmitted*: consultation referral"
    - o "Health record artifact *transmitted*: consultation report"
- Application of the expression language:
    - o Population:
        - AND: "Patient characteristic *documented*: birth date" >= 18 years starts before start of "measurement period"
    - o Denominator:
        - AND: "Health record artifact *transmitted*: consultation referral (data flow attribute: sender = *primary care* providers*; actor attributes: source = *primary care* providers, recorder = *primary care* providers, subject = *patient*)" DURING "measurement period"
    - o Numerator 1:
        - AND: "Health record artifact *received*: consultation referral (data flow attribute: receiver = *specialist provider;* actor attributes: source = *primary care provider*, recorder = *primary care provider*, subject = *patient*)
    - o Numerator 2:
        - AND: "Health record artifact *transmitted*: consultation report (data flow attribute: sender = *specialist provider;* actor attributes: source = *specialist provider*, recorder = *specialist provider*, subject = *patient*)

- AND: "Health record artifact *received*: consultation report (data flow attribute: receiver = *primary care provider;* actor attributes: source = *specialist provider*, recorder = *specialist provider*, subject = *patient*)
- AND: "Health record artifact *received*: consultation report (data flow attribute: receiver = *patient;* actor attributes: source = *specialist provider*, recorder = *specialist provider*, subject = *patient*)

Summary of Category Changes: QDM 3.0 to QDM Draft

NQF looks forward to comments regarding the following changes to categories within the QDM. Please refer to Appendix 1 for a table mapping the changes between this draft version of QDM and QDM 3.0.

Adverse Effect: Allergy and Non-Allergy

There is no significant difference between the "Adverse effect *allergy*: *type 1 hypersensitivity* (causative agent: *specific medication*)" and "Medication allergy: *specific medication* (severity: *type 1 hypersensitivity*) "OR "Adverse effect *non-allergic*: *value set of adverse effect related symptoms* (causative agent: *specific medication*)" Vs. "Medication adverse effect: *specific medication* (reaction: *value set of adverse effect related symptoms*)." It is recommended that the current QDM 'data elements' that use "intolerance" be ignored in the current round of measure retooling. The category of true allergy, adverse effect, adverse reaction and intolerance requires further discussion and public comment.

Experience

There is no significant difference between the "Experience, *reported*: (source: patient)" and "Patient care experience, reported. "

Care Goal

Care Goal had been removed from QDM in version 3.0. The rationale was that a care plan is a health record artifact and it can be communicated, updated or acted upon. However it has been reinstated in this draft version of the QDM. A goal is a defined target or measure to be achieved in the process of patient care. A typical goal is expressed as a change in status expected at a defined future

time. This change can be an observation represented by other QDM categories (diagnostic tests, laboratory tests, symptoms, etc.) scheduled for some time in the future with a particular value. A goal can be found in the plan of care (care plan). The care plan is the structure used by all stakeholders, including the patient, to define the management actions for the various conditions, problems, or issues identified for the target of the plan. This structure, through which the goals and care planning actions and processes can be organized, planned, communicated, and checked for completion is represented in the QDM categories as a Health Record Artifact. A time/date stamp is required. Specifically, a care plan is composed of the following elements:

- "Problem" which is managed by other QDM standard categories (condition/diagnosis/problem) and their related data elements.

- "Procedure" which is managed by other standard categories and their related data elements. Note that procedures are a continuum of interventions ranging from actions patients can do for themselves or those that can be performed by others (caregivers or clinical professionals) to and including detailed complex surgical procedures requiring highly trained physicians, nurses and state of the art facilities. [Note: based on feedback from the HIT Standards Committee Clinical Quality Workgroup, "Intervention" was retired in favor of a more comprehensive definition of procedure – and SNOMED-CT was the only code system recommended for use.]

- The "goal" is what is expected to happen.

- The "outcome" is what happened which can be shown by other QDM standard categories and their related data elements.

Communication

There is no significant difference between the "Communication, Documented: *content* (source: patient, receiver: provider)" and "Communication from patient to provider: *content*." The ability to determine acknowledgement is enhanced with the new proposed version but acknowledgement can be managed in a measure's logic by indicating another action (encounter/interaction, procedure/intervention) performed by the receiver.

Condition / Diagnosis / Problem

There is no significant difference between the "Diagnosis *active*: xxx" and "Diagnosis active: xxx "OR "Family history *reported*: xxx" Vs. "Diagnosis, family history: xxx"

Device

There is no significant difference between the QDM versions: "Device applied: *type of device*. " The missing element is "Device *planned*" which allows credit for a process step, but for measures looking for outcomes and results, *planned* or *ordered* may not be appropriate for Meaningful Use Stage 2.

Diagnostic study

There is no significant difference between the "Diagnostic study *perform*: *diagnostic study* (result: *appropriate result value set*)" and "Diagnostic study result: *diagnostic study* (result: *appropriate result value set*). " If the EHR is to understand that the diagnostic study was performed, a result must be present whether or not the measure identified a specific set of results that are acceptable. Conversely, if a result is present then a diagnostic study must have been performed. Therefore, there is no difference between perform and result and it is recommended that "Diagnostic study result: *diagnostic study*" is used in the current work, avoiding the "Diagnostic study perform." The missing element is "Diagnostic study *recommended*," which can be handled by "Communication provider to patient: *diagnostic study recommended*"

Encounter

Encounter should encompass any interaction between a clinician, healthcare associate, community-based volunteer, or others directly involved in managing the patient. It is not restricted to standard location-based physical visits.

A more comprehensive discussion is required regarding the category of *encounter vs. interaction.* That is the purpose of the planned public comment process for all of the QDM proposals, but especially for this modification. "Patient-professional interaction *performed*: *interaction type*" and "Encounter performed: *encounter type"* are basically the same if a broader definition for encounter is applied (and that is possible using different value sets). The missing element of "Encounter *recommended*" can be handled by "Communication provider to patient: *encounter recommended.*" More importantly, a method to handle all interactions is relatively new and not necessarily standardized.

Most providers would view the workflow of documenting a clinical interaction as entering a progress note, assessment, or filling in a template. How each type of interaction is categorized will likely require some pilot testing with real users before any real standardization of mapping to potential categories chosen from SNOMED-CT can be expected. For example, a provider may see an ambulatory patient purely by chance when the provider is rounding in the hospital and the patient is visiting a friend. During the

'interaction' there is a discussion about the effectiveness of the patient's treatment and the provider recommends a modification to the regimen. The provider accesses the patient's record on a mobile device and enters a progress note. There is a potential for numerous other modes of interaction between patient and provider: e-mail, text message, home visit. As technology expands and creates new dimensions in care delivery, the category of Encounter will need redefinition many times over. NQF invites active comment and debate on this issue so that a more suitable definition of Encounter can be achieved.

Functional Status

There is no significant difference between the "Functional status *perform*: *SF12*[4] (result = numerical value)" and "Functional status result: *SF12* (result: *numerical value*). " In addition, some of the states may be inappropriate. For example, can or should a functional status be ordered? Perhaps a health record artifact (functional status assessment) could be communicated from provider to patient, but 'ordered' may be unrealistic or at least too much of a process step to be included in a measure of meaningful use.

Health Record Artifact

Health record artifact is a new section and has not been used before. In review by the HIT Standards Committee Clinical Quality Workgroup and Vocabulary Task Force, there was some concern it may be overreaching and too granular for evaluation. This category may be better handled as applying the health record artifact as an attribute of other QDM categories. There is specifically overlap with the "communication" category. This section requires evaluation and study which will need comment to determine its value. As examples of applying these concepts in other QDM categories, medication reconciliation can be a procedure (or intervention in the version 3.0) and receipt is an output of communication based on the underlying XML structure. This category requires evaluation before it can be successfully implemented in measures.

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[4] The SF-12 contains 12 items from the SF-36 Health Survey. It was originally developed in 1994 as a shorter alternative to the SF-36, for studies in which a 36-item form was too long. The SF-12 contains one or two items that measure each of the eight concepts included in the SF-36. For more information visit: www.iqola.org/instruments

Characteristic

The 2010 version of the QDM used for retooling can express patient (or provider) characteristic directly by applying the appropriate value set to the 'data element' "Patient characteristic: *value set*" without loss of expressivity. Note that some characteristics will require clearer definition and some may actually be composites of other, weighted, characteristics (e.g., socioeconomic status as a function of education, income, etc.) that will require standardization.

Laboratory Test

The categories required can be stated using the 2010 version of QDM without loss of expressivity. There is no significant difference between the "Laboratory test *perform*: *diagnostic study* (result: *appropriate result value set*)" and "Laboratory test result: *laboratory test* (result: *appropriate result value set*)." If the EHR is to understand that the laboratory test was performed, a result must be present whether or not the measure identified a specific set of results that are acceptable. Therefore, there is no difference between perform and result and it is recommended that "Laboratory test result: *laboratory test*" is used in the current work, avoiding the "Laboratory test perform."

Example: How to express "proteinuria." There are two methods to express the same concept. First, the provider can indicate "proteinuria" as a condition and therefore the measure could address the category as a condition, "Diagnosis active: proteinuria" using SNOMED-CT to define the condition. The second option is to indicate "proteinuria" as a finding (result) of a laboratory test, "Laboratory test result: 24 hour urine protein (result >= 0.3 g)" or "Laboratory test result: spot urine protein (result >= +1)" (or whatever values are appropriate to the content of the measure. The first option allows provider judgment as to what defines proteinuria and expects that all instances of proteinuria will be identified in a problem list. The second option provides more detailed criteria and precision.

Medication

There is no significant difference between the "Medication *administer*: *medication*" and "Medication *administered*: *medication*." Note in the 2011 work that "Medication *active*" assumes there is activity in the medication list during the time period specified. Since most EHRs do not *deactivate* medication lists, medication active should not be used as the only element for a measure denominator in an ambulatory setting since patients who have left the practice may still have *active* medication lists. The relevance of this issue for other settings (e.g., inpatient) should be considered.

Physical Exam

There is no significant difference between the "Physical exam *performed*: *systolic blood pressure*" and "Physical exam performed: *systolic blood pressure* (result ≤ 140)" Note in the 2010 work, similar to laboratory tests and diagnostic tests, perform and result were two different data elements. To be consistent, the current work should use only "Physical exam performed: *type of exam* (result = *xxx*) for consistency.

Preference

The category "Patient Preference" was not used in 2010 but it is an available attribute for a number of other data elements. It can be included in measures using the Measure Authoring Tool by starting with the category for which preference is asserted (e.g., a type of procedure, a specific medication value set, etc.) and adding preference as an attribute.

Procedure

Procedures include a spectrum of activities that can include actions a patient can take and actions performed by a community-based volunteer to activities performed by clinicians up to and including complicated surgery. The final definition is pending. A *procedure* is a continuum of interventions ranging from actions patients can do for themselves or those that can be performed by others (caregivers or clinical professionals) and including detailed complex surgical procedures requiring highly trained physicians, nurses and state of the art facilities. A *procedure* is a course of action intended to achieve a result in the care of persons with health problems. A procedure may be a surgery or other type of physical manipulation of a person's body in whole or in part for purposes of making observations and diagnoses or providing treatment. [5] Many procedures are not reimbursed. NQF welcomes comment on this definition.

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[5] Modified from Canada Health Infoway.

Risk Evaluation

There is no significant difference between the "Risk evaluation *performed*: *PHQ9* (result = numerical value)" and "Risk category assessment: *PHQ9* (result: *numerical value*)." In addition, some of the states may be inappropriate. For example, can or should a risk evaluation be ordered? Perhaps a health record artifact (risk evaluation) could be communicated from provider to patient, but 'ordered' may be unrealistic or at least too much of a process step to be included in a measure of meaningful use.

Substance

Substance is defined as a chemical element and its compounds in the natural state or obtained by any manufacturing process other than pharmaceutical drugs. There is no significant difference between the "Substance *administer*: *substance*" and "Substance administered: *substance*." How substances are addressed in eMeasures will need to be evaluated to determine the assignment of appropriate states. NQF welcomes further comment in this area.

Symptom

There is no significant difference between the versions.

System Resources

There is no current use of system resources except as attributes of other QDM data elements for which the resource was used to indicate the location in which an action occurred. This category requires further exploration as measure requirements expand. Similar to Patient Characteristics, there are likely various attributes that could be added; each attribute may require a different code set (or terminology) to express it.

Transfer

The 2010 version can accommodate the need to express a sending and receiving organization. It is likely this category may be unnecessary in the future as transfer can be handled in logic by indicating subsequent encounters (or interactions) within very short time windows. The HITSC Clinical Quality Workgroup suggested this category may not be necessary as it can be handled in logic. Comment is welcome.

NATIONAL QUALITY FORUM

Code Set Recommendations from the HIT Standards Committee

Following is a table of QDM Categories. Each category and the proposed changes to it in this draft version are listed in the first two columns of the table. The third column includes the code set recommendations from the HIT Standards Committee (HITSC). Proposed transition recommendations are also presented in italics and in red to provide guidance to measure development occurring prior to the official decision.

Category (From Version 3.0)	Proposed Category for QDM draft	Code Set
Allergy	Adverse Effect: Allergy	• SNOMED-CT for the actual effect (allergy) • RxNorm for medications as causative agents (note RxNorm will be incorporating more medication ingredients) • SNOMED-CT for non-medication substances as causative agents
Characteristics	Characteristics	• Preferred Language: ISO 639-2 constrained to elements in ISO 639-1 • Administrative Gender: CDC PHIN-VADS (HL7) • Race: CDC PHIN-VADS (HL7) • Ethnicity: CDC PHIN-VADS (HL7) • Assessment Instruments (smoking status, behaviors, cultural factors): LOINC • Responses (answers) to assessment instruments: SNOMED-CT • Payer: X12 Payer typology from Public Health Data Standards Consortium • Other: SNOMED-CT
Communication	Communication	• SNOMED-CT
Condition/ Diagnosis/Problem	Condition / Diagnosis / Problem	• SNOMED-CT • *Transition TBD – Add ICD-9, ICD-10*
Device	Device	• SNOMED-CT
Diagnostic study	Non-Laboratory Diagnostic Study	• Study name: LOINC • Appropriate findings: SNOMED-CT • Units of measure: UCUM (Constrained set)
Encounter	Encounter	• SNOMED-CT • *Transition TBD – Add CPT, ICD-9 Procedures, ICD-10 PCS*

Category (From Version 3.0)	Proposed Category for QDM draft	Code Set
Experience	Experience	• Assessment Instruments : LOINC • Responses (answers) to assessment instruments: SNOMED-CT
Family History	Family History	• Assessment Instruments : LOINC • Responses (answers) to assessment instruments: SNOMED-CT • *Transition TBD – Add ICD-9, ICD-10*
Functional Status	Functional Status	• Categories of Function: ICF (International Classification of Functioning, Disability, and Health) • Assessment Instruments : LOINC • Responses (answers) to assessment instruments: SNOMED-CT
Health record component	Health Record Artifact	• Naming of artifacts and their relationships: LOINC • Messaging among systems: HL7
Intervention	Procedure	• Interactions that produce an assessment or measurable results: LOINC • Appropriate results and interventions that do not produce measureable results: SNOMED-CT • *Transition TBD: Add CPT, ICD-9 Procedure, ICD-10 PCS*
Intolerance	Adverse Effect: non-allergic	• SNOMED-CT for the actual effect (non-allergic reaction) • RxNorm for medications as causative agents (note RxNorm will be incorporating more medication ingredients) • SNOMED-CT for non-medication substances as causative agents
Laboratory test	Laboratory Test	• Test name: LOINC • Appropriate results: SNOMED-CT
Medication	Medication	• Medications: RxNorm • Vaccines: CVX as standard vocabulary (In some contexts such as adverse effects, vaccines are treated as medications, in others they are treated separately)
Physical Exam	Physical Exam	• Assessment Instruments : LOINC • Responses (answers) to assessment instruments: SNOMED-CT
Preference	Preference	• Assessment Instruments : LOINC • Responses (answers) to assessment instruments: SNOMED-CT

Category (From Version 3.0)	Proposed Category for QDM draft	Code Set
Procedure	Procedure	• SNOMED-CT • *Transition TBD: Add CPT, ICD-9 Procedure, ICD-10 PCS*
Risk evaluation	Risk Evaluation	• Assessment Instruments : LOINC • Responses (answers) to assessment instruments: SNOMED-CT
Substance	Substance	• SNOMED-CT
Symptom	Symptom	• SNOMED-CT
System resources	System Resources	• Staffing resources: LOINC • EHR Functions: HL7 (i.e., for structural measures e.g., are EHR Functions present?) • Equipment: SNOMED-CT
Transfer	Transfer	• SNOMED-CT
Care Goal (Not present in Version 3.0 – Included in Measure Authoring Tool)	Care Goal	• SNOMED-CT (not discussed by Vocabulary Task Force)

QDM Mapping of Categories to States

Each of the categories described in the QDM has specific states in which it can be described. Most of the QDM categories are generally found in only a subset of the available states. The following table provides the states generally appropriate to each QDM category. A description of the category and state is available in the QDM Glossary. Recommendations for additional states or for additional mappings are encouraged as part of the QDM comment process. Each of the QDM categories and its associated state is depicted in the eMeasure computer readable version as a pattern based on HL7 Version 3.0 reference information model (RIM) concepts. Please note that items with an asterisk (*) are states newly assigned to the category based on public and member comments. NQF would appreciate feedback on the appropriateness of these assignments both on from a clinical perspective and measure development perspective.

QDM Mapping of Categories to States			
Category	**State**	**State of Action**	**State of Being**
Adverse Effect: Allergy	Acknowledged	x	
	Alerted	x	
	Documented	x	
	Updated	x	
Care Goal*	Acknowledged*	x	
	Documented*	x	
	Updated*	x	
	Active*		x
	Resolved*		x
Characteristics	Acknowledged	x	
	Documented	x	
	Ordered	x	
	Reported	x	
	Reconciled*	x	
Communication	Acknowledged	x	
	Declined	x	

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QDM Mapping of Categories to States			
Category	**State**	**State of Action**	**State of Being**
	Documented*	x	
	Transmitted	x	
Condition/Diagnosis/Problem	Active		x
	Inactive		x
	Resolved*		x
Device	Applied	x	
	Declined	x	
	Discontinued*	x	
	Ordered*	x	
	Planned	x	
Diagnostic Study	Declined	x	
	Ordered	x	
	Performed	x	
	Recommended	x	
Encounter	Documented*	x	
	Ordered	x	
	Performed	x	
	Recommended	x	
Experience	Acknowledged	x	
	Documented	x	
Family History	Declined	x	
	Documented	x	
	Updated	x	
Functional Status	Declined	x	
	Ordered	x	
	Performed	x	
	Reconciled*	x	

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QDM Mapping of Categories to States			
Category	**State**	**State of Action**	**State of Being**
Health Record Artifact	Accessed	x	
	Acknowledged	x	
	Alerted	x	
	Calculated	x	
	Created	x	
	Discontinued	x	
	Documented	x	
	Implemented	x	
	Notified	x	
	Ordered	x	
	Performed	x	
	Received	x	
	Recommended	x	
	Reconciled	x	
	Reminded	x	
	Reviewed	x	
	Transmitted	x	
	Updated	x	
Adverse Effect: Non-allergy	Acknowledged*	x	
	Alerted*	x	
	Documented*	x	
	Reconciled*	x	
	Updated*	x	
Laboratory Test	Alerted*	x	
	Declined	x	
	Performed	x	
	Ordered	x	

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QDM Mapping of Categories to States			
Category	**State**	**State of Action**	**State of Being**
Medication	Active		x
	Administered	x	
	Alerted*	x	
	Declined	x	
	Discontinued	x	
	Dispensed	x	
	Ordered	x	
	Reconciled*	x	
Physical Exam	Alerted*	x	
	Declined	x	
	Ordered	x	
	Performed	x	
Preference	Acknowledged	x	
	Documented	x	
	Reported	x	
	Requested	x	
	Updated*	x	
Procedure	Declined	x	
	Discontinued*	x	
	Ordered	x	
	Performed	x	
	Recommended	x	
Risk Evaluation	Documented*	x	
	Performed	x	
	Reviewed	x	
Substance	Administered	x	
	Discontinued*	x	

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QDM Mapping of Categories to States			
Category	**State**	**State of Action**	**State of Being**
	Dispensed*	x	
	Ordered	x	
	Recommended*	x	
	Reconciled*	x	
Symptom	Active		x
	Assessed	x	
	Inactive		x
	Documented*	x	
	Resolved		x
System resources	Acknowledged	x	
	Documented	x	
	Ordered*	x	
	Transmitted*	x	
	Updated*	x	
Transfer	Declined*	x	
	Documented*		
	Ordered	x	
	Performed	x	

Quality Data Model (QDM) Terminology Definitions (Glossary)

This glossary, which corresponds with the **Quality Data Model (QDM),** defines the major QDM components and then describes them in more detail with corresponding examples.

Quality data model (QDM) components	
QDM Element	*QDM element* is an atomic unit of information that has precise meaning to communicate the data required within a quality measure. A *QDM element* includes a *category*, the *state* in which the category is expected to be found with respect to electronic clinical data, and all required *metadata* (i.e., a *value set* of terms and all required *attributes*. The QDM element provides unambiguous definition and enables consistent capture and use of data for quality measurement. A QDM element may be defined for any given measure and reused when the same information is required for another measure. Reuse encourages standardization of quality measures and reduces computer programming requirements for new measures.[6]
Category	*Category* refers to a particular category of information that can be addressed in a quality measure. It is analogous to the HL7 Category Domain, a named category of like categories (semantic type) that will be bound to one or more *coded elements*.[1]The category is the highest level of definition for a QDM element. The QDM currently contains 23 categories. Some examples include medication, procedure, condition/diagnosis/problem, communication, and encounter.
Instance	*Instance* is a specific use or representation of the category. An instance of a category is created when a specific value set is applied to it. *Example: Diabetes* is an instance of the category *diagnosis* when a value set derived from ICD-9-CM or SNOMED-CT[TM] is applied. *Aspirin* is an instance of the category *medication* when a value set derived from RxNorm is applied.
Taxonomy	*Taxonomy* is a standard vocabulary or other classification system that can be used to define a QDM element's category. For the purpose of the QDM, taxonomy is synonymous with a code system (a collection of codes with associated designations and meanings[7]). Specific taxonomies are used in

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[6] NQF Health Information Technology Expert Panel II (HITEP II), *HIT Automation of Quality Measurement: Quality Data Set and Data Flow*. Washington DC: National Quality Forum; 2009.

[7] Value Set Consortium, Value set definition and binding document. Available at: http://valuesets.org/wiki/index.php?title=Value_Set_Definition_and_Binding_Document. Last accessed April 2011.

Quality data model (QDM) components	
	applying the QDM to quality measures based on the results of consensus-based standards harmonization efforts, such as the HIT Standards Committee of the Office of the National Coordinator for Health Information Technology (ONC) and established certification rules for meaningful use. *Examples:* ICD-9-CM, ICD-10, SNOMED-CT[TM], and CPT-[TM] are examples of taxonomies. The category of *diabetes* may be described in QDM with ICD-9-CM, ICD-10, and/or SNOMED-CT[TM].
Value Set	*Value set*, (also referred to as *code list*), is a set of values that contain specific codes derived from a particular taxonomy. Value sets are used to define an instance of a category used in a QDM element. A *parent* value set may also contain *child* (or nested) value sets that define the same category. The approach is consistent with the HL7 definition for a value set as "a uniquely identifiable set of valid concept representations, where any concept representation can be tested to determine whether or not it is a member of the value set…A sub-value set is a sub-set of a 'parent' value set…When a Value Set Entry references another Value Set, the child value set is referred to as a *Nested Value Set.* There is no preset limit to the level of nesting allowed within value sets. Value sets cannot contain themselves, or any of their ancestors (i.e. they cannot be defined recursively)." [8] *Examples:* *Value Set A:* The category diagnosis may be defined by a value set containing values using the taxonomy ICD-9-CM. [250, 250.0, 250.1, …] **or** *Value Set B:* The category diagnosis may be defined by a *parent* value set that contains more than one *child* value set each using a different taxonomy. For example, the category diagnosis with the instance *asthma* may be defined by a *parent* value set *asthma* that contains three *child* value sets using ICD-9CM, ICD-10, and SNOMED-CT[TM]. **or** *Value Set C:* Some value sets may contain more than one *child* value set that represent distinctly different instances but are grouped together for convenience. For example, the value set describing the category medication instance *ACEI*[9] may be combined with the value set describing the category

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[8] Value Set Consortium, Value set definition and binding document. Available at: http://valuesets.org/wiki/index.php?title=Value_Set_Definition_and_Binding_Document. Last accessed April 2011.

[9] ACEI—Angiotensin-converting enzyme inhibitors, a unique class of medications used for treating elevated blood pressure and heart failure, among other conditions.

Quality data model (QDM) components	
	medication instance *ARB*[10] into a parent value set *ACEI/ARB*. For consistency, applications of the QDM have used such "convenience" parent value sets only when the child value sets included in them all use the same taxonomy.
Value	With respect to value sets, a *value* is a specific code defined by a given taxonomy. Values are included in value sets. A value also may be used to express an attribute, or metadata, about a QDM element that specifies an expected result. In the context of QDM elements, some categories (e.g., laboratory test) have an *attribute* of "result." A result may be expressed as a value (numerical, alphanumeric, or words); see entry under *result*.
State	A *state* is a context or mode of existence or activity expected for any given QDM element. A state may indicate either that an instance of a category (*state of being*) or an activity expected for the instance of a category (*state of action*) exists. Examples of states of being include *active*, *inactive*, and *resolved* when applied to the category *diagnosis/condition/problem*, or *active* when applied to the category *medication*. Examples of states of action include *administer*, *decline*, *order*, and *dispense* when applied to the category *medication*. A full list of states of action and states of being is provided in the QDM Model.
Attribute	An *attribute* provides specific detail about a QDM element. QDM elements have required attributes related to actor, timing, and *data flow* or they may have optional attributes based on the category of a QDM element. Examples of actor attributes include *source*, *recorder*, and *subject*. Timing attributes refer to the beginning and end time of a QDM element, while the time span of a QDM element may be calculated from the timing attributes. Data flow attributes may include human or system *sender* and *receiver*. A list of optional category-specific attributes sorted by QDM category may be found in Table 3.

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[10] ARB—Angiotensin receptor blockers, a unique class of medications used for treating elevated blood pressure and heart failure, among other conditions

Category—Refers to a particular category of information in a quality measure. There are 23 categories in the current version of the QDM. Examples of categories include *medication*, *procedure*, *condition/diagnosis/problem*, *communication*, and *encounter*.

Adverse effect: Allergy	An adverse effect: allergy is an immunologically mediated reaction that is specific to exposure to a given agent and recurs on re-exposure to that agent. That agent may be a medication, a substance, or, in the case of a device, the materials used within that device. Non-allergic reactions are covered under *adverse effect: non-allergy*.
Adverse effect: non-allergy	*Adverse effect: non-allergy* refers to the inability to take a specific substance or medication, or endure a device, study, test, or procedure unrelated to a true allergic reaction.
	Adverse effect: non-allergy encompasses adverse events and adverse effects. In the instance of a quality measure, an adverse event is an unexpected or dangerous reaction to a device, diagnostic study, intervention, laboratory test, procedure, or substance. Serious adverse events are those that are fatal, life-threatening, permanently or significantly disabling, or require or prolonging hospitalization. *Medication adverse effects* refer to conditions that are due to drugs and medical and biological substances when the correct substance was administered as prescribed. These are generally clinician-identified effects. Medication adverse effects are distinct from medication allergy.
	Adverse effects include patient reported intolerance which is generally based on perception. Immunologic reactions are covered with the category *adverse effect: allergy*.
Care goal	A goal is a defined target or measure to be achieved in the process of patient care, an expected outcome. A typical goal is expressed as a change in status expected at a defined future time. That change can be an observation represented by other QDM categories (diagnostic tests, laboratory tests, symptoms, etc.) scheduled for some time in the future with a particular value. A goal can be found in the plan of care (care plan). The plan of care (care plan) is the structure used by all stakeholders, including the patient, to define the management actions for the various conditions, problems, or issues identified for the target of the plan. This structure, through which the goals and care planning actions and processes can be organized, planned, communicated, and checked for completion is represented in the QDM categories as a Record Artifact. A time/date stamp is required. Specifically, a care plan is composed of the following elements: - "Problem," which is managed by other QDM standard categories (condition/diagnosis/problem) and their related data elements. - "Procedure" which is managed by other standard categories and their related data elements. Note that procedures are a continuum of interventions ranging from actions patients can do for

Category—Refers to a particular category of information in a quality measure. There are 23 categories in the current version of the QDM. Examples of categories include *medication*, *procedure*, *condition*/*diagnosis*/*problem*, *communication*, and *encounter*.	
	themselves or those that can be performed by others (caregivers or clinical professionals) to and including detailed complex surgical procedures requiring highly trained physicians, nurses and state of the art facilities. [Note: based on feedback from the HIT Standards Committee Clinical Quality Workgroup, "Intervention" was retired in favor of a more comprehensive definition of procedure – and SNOMED-CT was the only code system recommended for use.] - The "goal" is what is expected to happen. - The "outcome" is what happened which can be shown by other QDM standard categories and their related data elements.
Characteristic (patient or provider)	*Characteristics* refer to specific factors about a patient, clinician, provider, or facility. Included are demographics, behavioral factors, social or cultural factors, available resources and preferences. *Behaviors* reference responses or actions that affect (either positively or negatively) health or healthcare. Included in this category are mental health issues, adherence issues unrelated to other factors or resources, coping ability, grief issues, and substance use/abuse. *Social/cultural factors* are characteristics of an individual related to family/caregiver support, education and literacy (including health literacy), primary language, cultural beliefs (including health beliefs), persistent life stressors, spiritual and religious beliefs, immigration status, and history of abuse or neglect. *Resources* are means available to a patient to meet health and healthcare needs, which would include caregiver support, insurance coverage, financial resources, and community resources to which the patient is already connected and receiving benefit. *Preferences* are choices made by patients and their caregivers relative to options for care or treatment (including scheduling, care experience, and meeting of personal health goals) and the sharing and disclosure of their health information. In the quality data element the attribute "source" is used to indicate whether it relates to the patient or the provider.
Communication	*Communication* is the transmission, receipt, or acknowledgement of information sent from a source to a recipient. This may include the provision of any communication from one clinician to another regarding findings, assessments, plans of care, consultative advice, instructions, educational resources, etc. It also may include the receipt of response from a patient with respect to any aspect of the care provided. Furthermore, it may include the provision of any communication from provider to patient. (e.g., results, findings, plans for care, medical advice, instructions, educational resources, appointments, result). A time and date stamp is required. The HITSC Clinical Quality Workgroup suggested removal of this category. Comment is welcome.

Category—Refers to a particular category of information in a quality measure. There are 23 categories in the current version of the QDM. Examples of categories include *medication*, *procedure*, *condition/diagnosis/problem*, *communication*, and *encounter*.

Condition/Diagnosis/Problem	A *problem, diagnosis, or condition* is a scientific interpretation of result, assessment, and treatment response data that persists over time and tends to require intervention or management, or a clinical feature that includes but is not limited to those treated, monitored, evaluated, or impacts other treatment or venues of care (e.g., encounters or lengths of stay). It is used to guide planning, implementation, treatment, and evaluation. A problem or condition includes, but is not limited to, acute, intermittent, or chronic conditions; diagnoses; symptoms; functional limitations; or visit- or stay-specific conditions.
Device	*Device* is an instrument, apparatus, implement, machine, contrivance, implant, in vitro reagent, or other similar or related article, including a component part, or accessory, intended for use in the diagnosis, cure, mitigation, treatment or prevention of disease and that is not dependent on being metabolized to achieve any of its primary intended purposes.[11]
Diagnostic study	A *diagnostic study* is any kind of medical test performed as a specific test or series of steps to aid in diagnosing or detecting disease (e.g., to establish a diagnosis, measure the progress or recovery from disease, to confirm that a person is free from disease).[12] The QDM defines diagnostic studies as those that are not performed in organizations that perform testing on samples of human blood, tissue, or other substance from the body. Diagnostic studies may make use of digital images and textual reports. Such studies include but are not limited to imaging studies, cardiology studies (electrocardiogram, treadmill stress testing), pulmonary function testing, vascular laboratory testing, and others.
Encounter	An *encounter* is an identifiable grouping of healthcare-related activities characterized by the entity relationship between the subject of care and a healthcare provider; such grouping is determined by the healthcare provider.[13] A patient encounter represents interaction between a healthcare provider

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[11] Derived from the device definition of the US Food and Drug Administration (FDA), Department of Health and Human Services, Washington DC; 2010. Available at http://www.fda.gov/. Last accessed July 2010.

[12] Canada Health Infoway EHR Glossary (Note: No changes in the QDS Model Version 2 and 2.1 citations took place.)

[13] International Organization for Standardization (ISO), *Health Informatics—Requirements for an Electronic Health Record Architecture ISO/TS 18308*. Geneva, Switzerland: ISO; 2004. Available at www.iso.org/iso/home.htm. Last accessed May 2010. (Note: No changes in the QDS Model Version 2 and 2.1 citations took place.)

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	and a patient with a face-to-face patient visit to a clinician's office, or any electronically remote interaction with a clinician for any form of diagnostic treatment or therapeutic event. Encounters can be billable events but are not limited to billable interactions. Each encounter has an associated location or modality within which it occurred (such as an office, home, electronic methods, phone encounter, or telemedicine methods). The encounter location is the patient's location at the time of measurement.
Experience	Experience is defined as information collected from a consumer, patient, or family member about their perception of the care they received or from a care giver about the care provided. Information collected includes the elements of care coordination, communication, whole-person approach to care, access to care, timeliness of care, and information sharing.
Family History	Problems, conditions, and diagnoses experienced by a patient's family members whether existing currently or in the past. The *family history* represents a patient's pedigree information associated with clinical and genomic data. Older versions of the QDM had family history as a state of *Condition/Diagnosis/Problem.* It is separated here as it is generally a different concept for documentation in the clinical record. Comment is welcome.
Functional Status	*Functional status* assessment is specific to tools that evaluate an individual patient's actual physical or behavioral performance as an indicator of capabilities at a point in time. The functional status assessment can be used in measurement to determine change in physical or behavioral performance over time, or specific capabilities that cause a patient to be included or excluded from a measurement population. Examples include: Eastern Cooperative Oncology Group (ECOG) Performance Status, Edmonton Functional Assessment Tool (EFAT), Karnofsky Performance Scale, Katz Index of Independence in Activities of Daily Living, Palliative Performance Scale version 2, the Medical Outcomes Study (MOS) Short Form Survey Instrument (SF-12), and the Asthma Quality of Life Questionnaire. Alternately, *risk assessment* refers to appraisals of health and well-being, providing information as to the risk for conditions or increased severity of illness (e.g., Braden Skin Scale, Morse Fall Risk Scale, etc.), whereas *physical exam* includes psychiatric examinations. It has been proposed to divide functional status into two sections: general and disease specific.

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	Comment is welcome.
Health Record Artifact	A *health record artifact* is a section of a clinical record that contains information about a patient and upon which actions can be performed (e.g., transmit, acknowledge, document, etc.). A few examples of *health record artifacts* include allergy lists, problem lists, clinical summaries, medication lists, and others.
Laboratory Test	A *laboratory test* is a medical procedure that involves testing a sample of blood, urine, or other substance from the body. Tests can help determine a diagnosis, plan treatment, check to see if treatment is working, or monitor the disease over time.[14] Laboratory tests may be performed on specimens not derived from patients (electrolytes or contents of water or consumed fluids, cultures of environment, pets, other animals). The states will remain the same.
Medication	A *medication* refers to clinical drugs or chemical substances intended for use in the medical diagnosis, cure, treatment, or prevention of disease. A medication contains a value derived from taxonomies such as RxNorm.
Physical Examination	A *physical examination* is the evaluation of the patient's body to determine its state of health. The techniques of inspection include palpation (feeling with the hands or fingers), percussion (tapping with the fingers), auscultation (listening), visual inspection, and smell. Measurements may include vital signs (blood pressure, pulse, respirations) as well as other clinical measures (such as expiratory flow rate, size of lesion, etc.). Physical exam includes psychiatric examinations.
Preference	*Preference* refers to the healthcare treatment choices influenced, but not limited to, language, religious, or cultural preferences. Preference can be driven as well by utility measurement. A health utility index (HUI) is a family of generic health profiles and preference-based systems for measuring health status, reporting health-related quality of life (HRQL), and producing utility scores. HRQL, as defined by Patrick and Erickson, "is the value assigned to duration of life as modified by the impairments, functional states, perceptions, and social opportunities that are influenced by disease, injury, treatment, or policy." HUI questionnaires, designed to elicit responses from a wide variety of

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[14] National Cancer Institute (NCI). Bethesda, MD: NCI; 2010. Available at www.cancer.gov/. Last accessed May 2010. (Note: No changes in the QDS Model Version 2 and 2.1 citations took place.)

Category—Refers to a particular category of information in a quality measure. There are 23 categories in the current version of the QDM. Examples of categories include *medication*, *procedure*, *condition/diagnosis/problem*, *communication*, and *encounter*.	
	subjects, make it easy to incorporate such a patient-reported outcome (PRO) and utility instrument into a clinical study. HUI evolved in response to the need for a standardized system to measure health status and HRQL to describe: 1) the experience of patients undergoing therapy; 2) long-term outcomes associated with disease or therapy; 3) the efficacy, effectiveness, and efficiency of healthcare interventions; and 4) the health status of general populations. [15] Preference may be expressed in legal documents such as consent forms, living wills, and advance directives.
Procedure	A *procedure* is a continuum of interventions ranging from actions patients can do for themselves or those that can be performed by others (caregivers or clinical professionals) and including detailed complex surgical procedures requiring highly trained physicians, nurses and state of the art facilities. A *procedure* is a course of action intended to achieve a result in the care of persons with health problems. A procedure may be a surgery or other type of physical manipulation of a person's body in whole or in part for purposes of making observations and diagnoses or providing treatment. [16] Many procedures are not reimbursed.
Risk Evaluation	Risk category assessments include tools and calculators that suggest vulnerabilities for any given patient. Distinct from functional status, risk categorization uses findings, observations, results, and sometimes judgments and patient-generated information for use within clinical care algorithms, clinical decision support, and severity analysis. A time and date stamp is required. *Examples:* Braden Score for Predicting Pressure Score Risk, Morse Fall Risk Scale, Pneumonia Severity Index.[17]

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[15] Patrick DL, Erickson P, *Health Status and Health Policy: Quality of Life in Health Care Evaluation and Resource Allocation.* NewYork: Oxford University Press; 1993; and Horsman J, Furlong W, Feeny D, et al., The health utilities index (HUI): concepts, measurement properties and applications, *Health and Quality of Life Outcomes,* 2003;1-54. Abstract available at: http://www.ncbi.nlm.nih.gov/pmc/articles/PMC293474/.

[16] Modified from Canada Health Infoway.

[17] AHRQ, *Pneumonia Severity Index Calculator (PSI)*, Bethesda, MD: AHRQ. Available at: http://pda.ahrq.gov/clinic/psi/psicalc.asp. Last accessed May 2010.

Category—Refers to a particular category of information in a quality measure. There are 23 categories in the current version of the QDM. Examples of categories include *medication*, *procedure*, *condition*/*diagnosis*/*problem*, *communication*, and *encounter*.	
Substance	A chemical element and its compounds in the natural state or obtained by any manufacturing process (other than pharmaceutical drugs), including any additive necessary to preserve its stability and any impurity deriving from the process used, but excluding any solvent that may be separated without affecting the stability of the substance or changing its composition.[18] Substance may or may not have a code or be classified by a code system such RxNorm. Examples of a substance may include but are not limited to: environmental agents (e.g., pollen, dust) and food (e.g., vitamins).
Symptom	A *symptom* is an indication that a person has a condition or disease. Some examples are headache, fever, fatigue, nausea, vomiting, and pain.[19] Also, subjective of disease perceived by the patient.[20] As an example to differentiate symptom from finding, the patient's subjective symptom of fever is distinguished from the temperature (a finding). For a finding, there is a source of either a temperature-measuring device, and there is a recorder of the device (electronically) or an individual (healthcare provider, patient, etc.).
System Resources	The configuration of an organization (e.g., nursing staff ratios; availability of durable medical equipment; health information technology infrastructure and capabilities, such as e-prescribing; access to care systems; or invasive procedure capabilities.
Transfer	*Transfer* refers to the different locations or settings a patient is released to, or received from, to ensure the coordination and continuity of healthcare. Such transfers involve a handoff process, whereby patient information and permanent or temporary medical devices or equipment are exchanged, and accountability and responsibility for patient care are transferred.[21] This may

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[18] European Chemicals Agency, *REACH-Registration, Evaluation, and Authorisation of Chemicals*, France; 2005. Available at www.prc.cnrs-gif.fr/reach/en/home.html. Last accessed May 2010.

[19] UMLS Dictionary, 2010. http://www.nlm.nih.gov/research/umls/ Last accessed December. 2010.

[20] National Cancer Institute (NCI), Bethesda, MD; NCI, 2010. Available at www.cancer.gov/. Last accessed May 2010.

[21] (i) Coleman E, Falling through the cracks: challenges and opportunities for improving transitional care for persons with continuous complex care needs, *J Am Geriatr Soc*,2003;51(4):549-555. (ii); Alem L Joseph M, Kethers S et al. ,Information environments for supporting consistent registrar medical Handover, *Health Inform Manage J* , 2008;37(1): 9-23; Anderson C D, Mangino RR, Nurse shift report: who says you can't talk in front of the patient?, *Nurs Ad Q*, 2006;30(2):112-122; (iii) Benson E.Rippin-Sisler C, Jabusch K, et al., Improving nursing shift-to-shift report, *J Nurs Care Qual*, 2006; 22(1):80-84; (iv) Caruso EM, The evolution of nurse-to-nurse bedside report on a medical-surgical cardiology unit,

Category—Refers to a particular category of information in a quality measure. There are 23 categories in the current version of the QDM. Examples of categories include *medication*, *procedure*, *condition*/*diagnosis*/*problem*, *communication*, and *encounter*.	
	include the setting from which a patient is received or released (e.g., home, acute care hospital, skilled nursing) to the current location. A time and date stamp is required.

States of Action

States—A *state* is a mode of existence or activity of a *QDM element*. A *state* may be either a form of existence (*state of being*) including *active*, *inactive*, and *resolved*, or it may be an action (*state of action*), including but not limited to *administer*, *decline*, and *dispense*. *Examples:* The category *diagnosis* may have a state of being of *active,* and the category *medication* may have a state of action of *administered.*	
STATES OF ACTION	
Accessed	The act of retrieving data or a computer file.
Acknowledged	To officially recognize, admit, or accept receipt of an object or information.
Administered	To give or directly oversee by injection, inhalation, ingestion (or other means) the use of medicines, drugs, remedies, or other substances.
Alerted	To make someone aware of a possible danger or difficulty.
Applied	To utilize or put into operation equipment designed to treat, monitor, or diagnose a patient's status that is in use, or impacts or alters treatment, care plan, or encounter (e.g., an antithrombotic device is placed on the

Medsurg Nurs, 2007;16(1):17-22.; (v) Kerr MP, A qualitative study of shift handover practice and function from a socio-technical perspective, *JAdv Nurs*, 2002; 37(2):125-134; (vi) Lardner R, *Effective Shift Handover— A Literature Review*, Health and Safety Executive Report, Edinburgh, UK: Keil Centre; 1996, p. 17. Available at: http://www.npsf.org/download/Focus2004Vol7No2.pdf. Last accessed May 2010;
(vii) Manning ML, Improving clinical communication through structured conversation, *Nurs Econ*, 2006; 24(5): 268-271; (viii) Riesenberg LA, Leitzsch J, Little BW, Systematic review of handoff mnemonics literature, *Am J Med Qual, 2006;* 24(3):196-204; (ix) Strople, B, Ottani, P, Can technology improve intershift report? What the research reveals, *J Prof Nurs*, 2006;22(3):197-204.

States—A *state* is a mode of existence or activity of a *QDM element*. A *state* may be either a form of existence (*state of being*) including *active*, *inactive*, and *resolved*, or it may be an action (*state of action*), including but not limited to *administer*, *decline*, and *dispense*. *Examples:* The category *diagnosis* may have a state of being of *active,* and the category *medication* may have a state of action of *administered.*

STATES OF ACTION	
	patient's legs to prevent thromboembolism, or a cardiac pacemaker).
Assessed	To evaluate a situation or process.
Calculated	To compute mathematically.
Created	To produce something, as in a printed report or electronic copy.
Declined	To indicate that something is not done, generally associated with a *reason* when used in quality measures.
Discontinued	To stop or end an activity that is planned or is happening regularly; also to remove an element from existing patient information, such as an allergy from an allergy list.
Dispensed	To give medications to a patient or patient proxy based on a prescription. Typically, in the ambulatory setting, medications are primarily taken directly by patients and not directly observed. Hence, medications dispensed are the closest health provider documentation of medication compliance.[22]
Documented	To create a record of facts, events, symptoms, or findings.
Implemented	To put into effect or action.
Notified	To inform or warn officially to make something known. Typically, an indication from a patient, clinician, or system application to another patient, clinician, or system application that some fact or process must be addressed.
Ordered	An instruction to bring, supply, perform, or activate something. Typically, this refers to provider-generated instructions or requests for processes to be performed (e.g., *order* a medication, *order* a laboratory test, *order*

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[22] Adapted from HITSP C154 Quality Data Dictionary. V1.01. 2010.

States—A *state* is a mode of existence or activity of a *QDM element*. A *state* may be either a form of existence (*state of being*) including *active*, *inactive*, and *resolved*, or it may be an action (*state of action)*, including but not limited to *administer*, *decline*, and *dispense*. *Examples:* The category *diagnosis* may have a state of being of *active,* and the category *medication* may have a state of action of *administered.*

STATES OF ACTION	
	a diagnostic test).
Performed	To carry out an action or accomplish a task, especially one requiring care or skill.
Planned	To arrange or design a method or scheme for any prospective or intended orders, interventions, encounters, services, procedures, or any other proceedings.[23]
Recommended	To suggest something as worthy of being accepted, used or performed.
Reconciled	To make two or more potentially conflicting things consistent or compatible such that inconsistencies are resolved or explained. Often used in the context of *reconciliation* of medication lists, problem lists, or allergy lists.
Reminded	To cause an actor (individual, organization, or application) to remember or think of something, such as to take a specific action to maintain or improve health.
Reported	To give detailed information about results of aggregate research, analysis, or investigations.
Requested	To ask a person or system or application to do something.
Reviewed	To examine something critically to make sure it is adequate, accurate, and correct and to determine if new actions should be undertaken.
Transmitted	To communicate a message, information, or news.
Updated	To provide someone or something with the most recent information or with more recent information than was previously available.

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[23] Adapted from HITSP C154 Quality Data Dictionary. V1.01. 2010.

States of Being

States—A *state* is a mode of existence or activity of a QDM element. A state may be either a form of existence (*state of being*) including *active*, *inactive*, and *resolved*, or it may be an action (*state of action)*, including, but not limited to, *administer*, *decline*, and *dispense*. *Examples:* The category *diagnosis* may have a state of being of *active,* and the category *medication* may have a state of action of *administer*.
STATES OF BEING

Active	An *active* diagnosis is a problem, diagnosis, condition or allergy that is currently monitored, tracked, or a factor that must be considered as part of the treatment plan in progress. An active medication is a medication a patient currently is taking. An active symptom is a patient's reported perception of departure from normal functioning that is present at the time indicated. A time and date stamp is required.
Inactive	A problem, diagnosis, condition, symptom or allergy that has been present in the past and currently is not under active treatment or causing clinical manifestations but may require treatment or monitoring in the future. A time and date stamp is required.
Resolved	A resolved diagnosis is a problem, diagnosis, condition, or symptom that has been present in the past, no longer requires treatment, and is currently unlikely or unexpected to recur. A date and time stamp is required.

Attribute

ATTRIBUTE—An *attribute* provides specific detail about a QDM element. QDM elements *may* have attributes related to actor, timing, and data flow, or optional attributes based on the category of a QDM element.	
TIME	
Time	*Time* refers to the occurrence required for a specific QDM element. Each element has an initiation time and an ending time. In some cases, the initiation and the end are the same, and there is no intervening interval. Examples of paired beginning and end times (*beginning—end*) encountered during the 2010 measure retooling process include: *admission—discharge, arrival—departure, insertion—removal, incision—closure, start—stop*. Timing also applies a sequencing of QDM elements in a series, or *process context*. The occurrence of any given QDM element (beginning or end) may be one step in a sequence of process steps. Timing provides a mechanism to apply such sequencing in the logic of a measure. As one example of sequencing, duration is calculated from the difference between the beginning time and end time attributes. Cumulative duration may be expressed further by combining the durations of individual processes (e.g., cumulative medication duration over a defined period of time).
DATA FLOW	
Data Flow	*Data flow* refers to the movement of information from one place or person to another. Data flow requires both a *sender* and a *receiver*. *Sender*: the human or system entity (or application) that output the information content expressed by the QDM element to another system, individual, or location. *Receiver*: the human or system entity (or application) that was given the information content expressed by the QDM element from another system, individual, or location. *Example:* To express transmission of a clinical summary of an outpatient visit, the data flow sender may be the provider (or the EHR application), and the data flow receiver may be the patient (or a care giver.) To express acknowledgement of receipt of the clinical summary, the data flow sender may be the patient (or a care giver), and the data flow receiver may be the provider (or the EHR application).

ATTRIBUTE—An *attribute* provides specific detail about a QDM element. QDM elements *may* have required attributes related to actor, timing, and data flow, or optional attributes based on the *category* of a *QDM element.*

ACTOR

Actor	The *actor* is used to define the expected origin of the QDM element that, therefore, implies specific intended meaning. There are three actors of import to a QDM element that are involved in the origination, capture, and display of the data. These actors are the *source, recorder,* and *subject*.

The *source* is the originator of the QDM element. The source may be a human individual or an electronic application or system.

The *recorder* is the human individual or the electronic application or system that enters the data element into a health record field.

The *subject,* or focus of the information in the data element, is the human individual or the electronic application or system for which the data element is relevant.

The same application or individual may be a source*,* recorder*,* and subject of the QDM element, but not necessarily.

Examples:

1. A measure for depression could define a QDM element, PHQ-9 (Public Health Questionnaire 9: Depression screener), with the patient as a source (the person providing the information for the responses), a clinician as a recorder (the person who enters the responses into a computer interface screen), and the patient as the subject (the individual about whom the information is relevant). Alternatively, a different version of this measure for depression could define a QDM element, PHQ-9 (Public Health Questionnaire 9: Depression screener), with the patient as a source (the person providing the information for the responses), the patient as a recorder (the person who enters the responses into a computer interface screen), and the patient as the subject (the individual about whom the information is relevant). The very specific definition of the source, recorder, and subject allows a measure developer to incorporate clear direction to how information should be interpreted.

2. A measure for blood pressure control could define a QDM element, Physical examination finding: systolic blood pressure, with the electronic blood pressure monitor as a source (the application or device providing the information for the blood pressure value), a clinician as a recorder (the person who enters the blood pressure values into a computer interface screen), and the patient as the subject (the individual about whom the information is relevant). Alternatively, a different version of the measure for blood pressure control could define a QDM element, Physical examination finding: systolic blood pressure, with the electronic blood pressure monitor as a source (the application or device providing the information for the blood pressure value), the electronic blood pressure monitor as the recorder (the clinical application or device that enters the blood pressure values directly into the computer via electronic transmission), and the patient as the subject (the individual about whom the information is relevant). Each measure evaluates blood pressure, but the potential value of the data captured is different for each. Note, using the attribute of *environmental location* (see *category-specific attributes*), the measure developer could further specify whether the blood pressure was obtained in a home or office setting, thereby incorporating additional meaning to the information.

ATTRIBUTE—An *attribute* provides specific detail about a QDM element.	
Category Specific Attributes	
Anatomical Structure	The particular structure, location, or body part of a subject.
Discharge Status	The disposition of the patient at the time of discharge (generally used in the 2010 retooling project to express exclusions, e.g., left against medical advice, expired).
Dosage	The amount of therapeutic agent that was indicated to be given during a procedure, diagnostic test, or medication or substance administration.
Environmental Location	The setting in which an action or event takes place (e.g., home, school, work, etc.).
Facility Location	The particular location of a facility in which an encounter occurs. Examples include, but are not limited, to intensive care unit (ICU) locations, non-ICU locations, burn critical care unit, neonatal ICU, and respiratory care unit.
Laterality	The left or right side of the body or body part or object of interest to the measure developer describing the QDM element. This attribute also includes anterior/ posterior; superior/ inferior; medial/ distal as available criteria *Example*: A process measure to determine that a diabetic patient has had an examination of the skin integrity of the feet can use "Physical exam performed: dermatological exam" to apply two attributes—one for anatomical location (foot) and the other for laterality (right), and also indicate the same examination for the left foot.

ATTRIBUTE—An *attribute* provides specific detail about a QDM element.	
Category Specific Attributes	
Ordinality	The scale in which objects are ordered in terms of their qualitative value, as opposed to a ranking performed strictly numerically or quantitatively. For example, a clinical quality measure may only be interested in including patients with a principal diagnosis of congestive heart failure to evaluate care during a hospitalization. The measure developer can specify *Diagnosis active: congestive heart failure* with the attribute *ordinality: principal*.
Reason	The thought process or justification for an action or for not performing an action. In some measures, specific treatments are acceptable inclusion criteria only if a justified reason is present. Each of these measures uses a value set (often, but not exclusively, using SNOMED-CT^{TM}) to express acceptable justification reasons. Other measures specify reasons as justification for exclusions. Examples include patient, system, or medical-related reasons for declining to perform specific actions. Each of these measures also uses a value set to express acceptable justification reasons for declining to perform expected actions.
Result	The final consequences or data collected from a sequence of actions or events, or observable entities, including, but not limited to procedures, laboratory tests, physical examinations, or diagnostic tests. There are three sub-attributes that can be expressed for a result: (1) is valued, meaning that a result is present in the electronic record but any entry is acceptable; (2) is numerical, combined with a mathematical operator (e.g., LDL >= 100 mg/dL, or systolic blood pressure is < 140 mmHg), or (3) is one of a specific set of elements in a value set (e.g., chest X-ray result = <findings consistent with pneumonia>).
Route	*Route* refers to the path by which a therapeutic agent or substance is taken into the body systems, such as intradermally, intrathecally, intramuscularly, intranasally, intravenously, orally, rectally, subcutaneously, sublingually, topically, or vaginally.
Severity	A clinical qualifier that describes the intensity of illness required to be criteria for the QDM element; the severity attribute is always accompanied by a specific *value set* that defines allowable values (e.g., persistent, moderate, or severe).

ATTRIBUTE—An *attribute* provides specific detail about a QDM element.	
Category Specific Attributes	
Status	The particular stage of the subject within a defined process (e.g., whether a patient is *discharged*, a test is *completed*, a medication is *discontinued* or is *on hold*, or a report is *finalized*.

For more information on the QDM, visit www.qualityforum.org/Projects/h/QDS_Model/Quality_Data_Model.aspx.

General or specific questions related to the Quality Data Model and the Technical Specifications can be sent via e-mail to: QDM@qualityforum.org.

Appendix 1: Mapping of Categories from QDM 3.0 to QDM draft October 2011

Adverse Effect: Allergy and Non-Allergy

Latest Published Version of QDM (Version 3.0)			QDM Draft		
Category	State (managed by a value set)	Attribute	Category	State (managed by a value set)	Attribute (managed by a value set or numerical value)
Allergy	Document Update	Causative agent	Adverse effect: allergy	Acknowledged Alerted Documented Updated	Causative agent
Intolerance	Document Update	Causative agent	Adverse effect: non-allergy	Acknowledged Alerted Documented Updated	Causative agent

Care Goal

Latest Published Version of QDM (Version 3.0)			QDM 2013 version		
Category	State (managed by a value set)	Attribute	Category	State (managed by a value set)	Attribute (managed by a value set or numerical value)
Not present			Care Goal	Acknowledged Active Documented Updated Resolved	

Characteristics

Latest Published Version of QDM (Version 3.0)			QDM Draft		
Category	State (managed by a value set)	Attribute	Category	State (managed by a value set)	Attribute (managed by a value set or numerical value)
Characteristic	Acknowledge Document Order Report	(source = patient or provider)	Characteristic	Acknowledged Documented Ordered Reported Reconciled	(source = patient or provider)

Communication

Latest Published Version of QDM (Version 3.0)			QDM Draft		
Category	State (managed by a value set)	Attribute	Category	State (managed by a value set)	Attribute (managed by a value set or numerical value)
Communication	acknowledge decline record transmit	content (e.g., health record artifact)	Communication	acknowledged declined documented transmitted	Source: patient Receiver: provider

Condition / Diagnosis / Problem

Latest Published Version of QDM (Version 3.0)			QDM draft		
Category	State (managed by a value set)	Attribute	Category	State (managed by a value set)	Attribute (managed by a value set or numerical value)
Condition / Diagnosis / Problem	Active Inactive		Condition / Diagnosis / Problem	Active Inactive Resolved	

Device

Latest Published Version of QDM (Version 3.0)			QDM Draft		
Category	State (managed by a value set)	Attribute	Category	State (managed by a value set)	Attribute (managed by a value set or numerical value)
Device	Apply Order Plan Decline		Device	Applied Declined Discontinued Ordered Planned	Timing attribute addresses application (or insertion) date and time and removal date and time

Diagnostic study

Latest Published Version of QDM (Version 3.0)			QDM Draft		
Category	State (managed by a value set)	Attribute	Category	State (managed by a value set)	Attribute (managed by a value set or numerical value)
Diagnostic study	Decline Order Perform Recommend		Diagnostic study	Declined Ordered Performed Recommended	

Experience

Latest Published Version of QDM (Version 3.0)			QDM Draft		
Category	State (managed by a value set)	Attribute	Category	State (managed by a value set)	Attribute (managed by a value set[24] or numerical value)
experience	acknowledge document order report	Source: Patient or provider	experience	Acknowledged Documented	Source: Patient or provider

Encounter

Latest Published Version of QDM (Version 3.0)			QDM Draft		
Category	State (managed by a value set)	Attribute	Category	State (managed by a value set)	Attribute (managed by a value set or numerical value)
Encounter	Order Perform Recommend Decline		Encounter	Documented Ordered Performed Recommended	

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[24] A value set (also referenced as a code list) is a set of values that contain specific codes derived from a particular code set (or taxonomy). Value sets are used to define an instance of a category used as a QDM element.

Family History

Latest Published Version of QDM (Version 3.0)			QDM draft		
Category	State (managed by a value set)	Attribute	Category	State (managed by a value set)	Attribute (managed by a value set or numerical value)
Family history	Document Update Decline		Family history	Documented Updated Declined	

Functional Status

Latest Published Version of QDM (Version 3.0)			QDM Draft		
Category	State (managed by a value set)	Attribute	Category	State (managed by a value set)	Attribute (managed by a value set or numerical value)
Functional status	Order Perform Decline	result	Functional status	Declined Ordered Performed Reconciled	result

Health Record Artifact

Latest Published Version of QDM (Version 3.0)			QDM Draft		
Category	State (managed by a value set)	Attribute	Category	State (managed by a value set)	Attribute (managed by a value set or numerical value)
Health Record Component	access acknowledge alert calculate create discontinue document implement notify order perform receive recommend reconcile remind review transmit update		Health Record Artifact	Accessed Acknowledged Alerted Calculated Created Discontinued Documented Implemented Notified Ordered Performed Received Recommended Reconciled Reminded Reviewed Transmitted Updated	

Laboratory Test

Latest Published Version of QDM (Version 3.0)			QDM Draft		
Category	State (managed by a value set)	Attribute	Category	State (managed by a value set)	Attribute (managed by a value set or numerical value)
Laboratory test	Order Perform Decline		Laboratory test	Alerted Declined Ordered Performed	Result

Medication

Latest Published Version of QDM (Version 3.0)			QDM Draft		
Category	State (managed by a value set)	Attribute	Category	State (managed by a value set)	Attribute (managed by a value set or numerical value)
Medication	Active Administer Order Dispense Decline		Medication	Active Administered Alerted Declined Discontinued Dispensed Ordered Reconciled	

Physical Exam

Latest Published Version of QDM (Version 3.0)			QDM Draft		
Category	State (managed by a value set)	Attribute	Category	State (managed by a value set)	Attribute (managed by a value set or numerical value)
Physical exam	Perform Order Decline	result	Physical exam	Alerted Declined Ordered Performed	Result

Preference

Latest Published Version of QDM (Version 3.0)			QDM Draft		
Category	State (managed by a value set)	Attribute	Category	State (managed by a value set)	Attribute (managed by a value set or numerical value)
Preference	Acknowledge Document		Preference	Acknowledged Documented Reported Requested Updated	

Procedure

Latest Published Version of QDM (Version 3.0)			QDM Draft		
Category	State (managed by a value set)	Attribute	Category	State (managed by a value set)	Attribute (managed by a value set or numerical value)
Procedure	Order Perform Recommend		Procedure (intervention)	Declined Discontinued Ordered Performed Recommended	Result

Risk Evaluation

Latest Published Version of QDM (Version 3.0)			QDM Draft		
Category	State (managed by a value set)	Attribute	Category	State (managed by a value set)	Attribute (managed by a value set or numerical value)
Risk Evaluation	Perform Record Administer	Result	Risk Evaluation	Documented Performed Reviewed	Result

Substance

Latest Published Version of QDM (Version 3.0)			QDM Draft		
Category	State (managed by a value set)	Attribute	Category	State (managed by a value set)	Attribute (managed by a value set or numerical value)
Substance	Administer Order		Substance	Administered Discontinued Dispensed Ordered Recommended Reconciled	

Symptom

Latest Published Version of QDM (Version 3.0)			QDM Draft		
Category	State (managed by a value set)	Attribute	Category	State (managed by a value set)	Attribute (managed by a value set or numerical value)
Symptom	Active Assess Inactive Resolved		Symptom	Active Assessed Inactive Documented Resolved	

System Resources

Latest Published Version of QDM (Version 3.0)			QDM Draft		
Category	State (managed by a value set)	Attribute	Category	State (managed by a value set)	Attribute (managed by a value set or numerical value)
System Resources	Acknowledge Document Report Order		System Resources	Acknowledged Documented Ordered Transmitted Updated	

Transfer

Latest Published Version of QDM (Version 3.0)			QDM Draft		
Category	State (managed by a value set)	Attribute	Category	State (managed by a value set)	Attribute (managed by a value set or numerical value)
Transfer	Order	Sending and receiving organization	Transfer	Declined Documented Ordered Performed	Sending and receiving organization
	Perform	Sending and receiving organization			