NATIONAL QUALITY FORUM

Quality Data Model
June 2012 Update

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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. The goal is to provide input to DHHS and others on national priorities and goals for improvement and on 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 during 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. The 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. It is intended to enable automation of structured data capture in EHRs, PHRs, and other clinical applications. It provides a grammar to describe clinical concepts contained within quality measures 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 EHRs and other health electronic systems can consistently interpret and easily locate required data.

The QDM helps bring the goals of Meaningful Use and the National Quality Strategy (NQS) into attainable reach when used for electronic quality measure development and clinical decision support (CDS). By helping to facilitate quality and performance measurement directly from EHRs, the QDM has the potential to bring real-time information and feedback to the point of care. The incorporation of this quality measurement and feedback into a provider's daily routine will help to increase the pace of healthcare improvement and better outcomes while also showing positive Meaningful Use.

For more information about Meaningful Use, please visit: https://www.cms.gov/EHRIncentivePrograms/30_Meaningful_Use.asp.

The Quality Data Model Framework

NQF's Health Information Technology Advisory Committee (HITAC) developed a framework to describe the breadth of information needed to measure health. The framework was envisioned to help drive the data platform to provide the information required to improve health from the perspective of measurement. The framework provides the basis for a common information model to describe data reusable for different purposes (a model of meaning).[1] It sets requirements based on the need to help drive future development of mechanisms to capture and access such information. For the near term, the companion, QDM Style Guide June 2012 provides guidance to measure developers to create feasible measures for data that can be expected in EHRs.

[1] A model of meaning represents the underlying meaning in a way that is common to and reusable between different use cases. In contrast, a model of use represents the underlying meaning in a way that is determined by a limited set use cases. Excerpted from International Health Terminology Standards Development Organization (IHTSDO) Glossary, January 2012 International Release. Available at: http://www.ihtsdo.org/fileadmin/user_upload/doc/tig/glsct/glsct_ss_ModelOfUse.html#_c0cc3aca-4e72-40ba-af25-116e04a36fad, accessed 25 April 2012.

Figure 1: QDM Health Information Framework

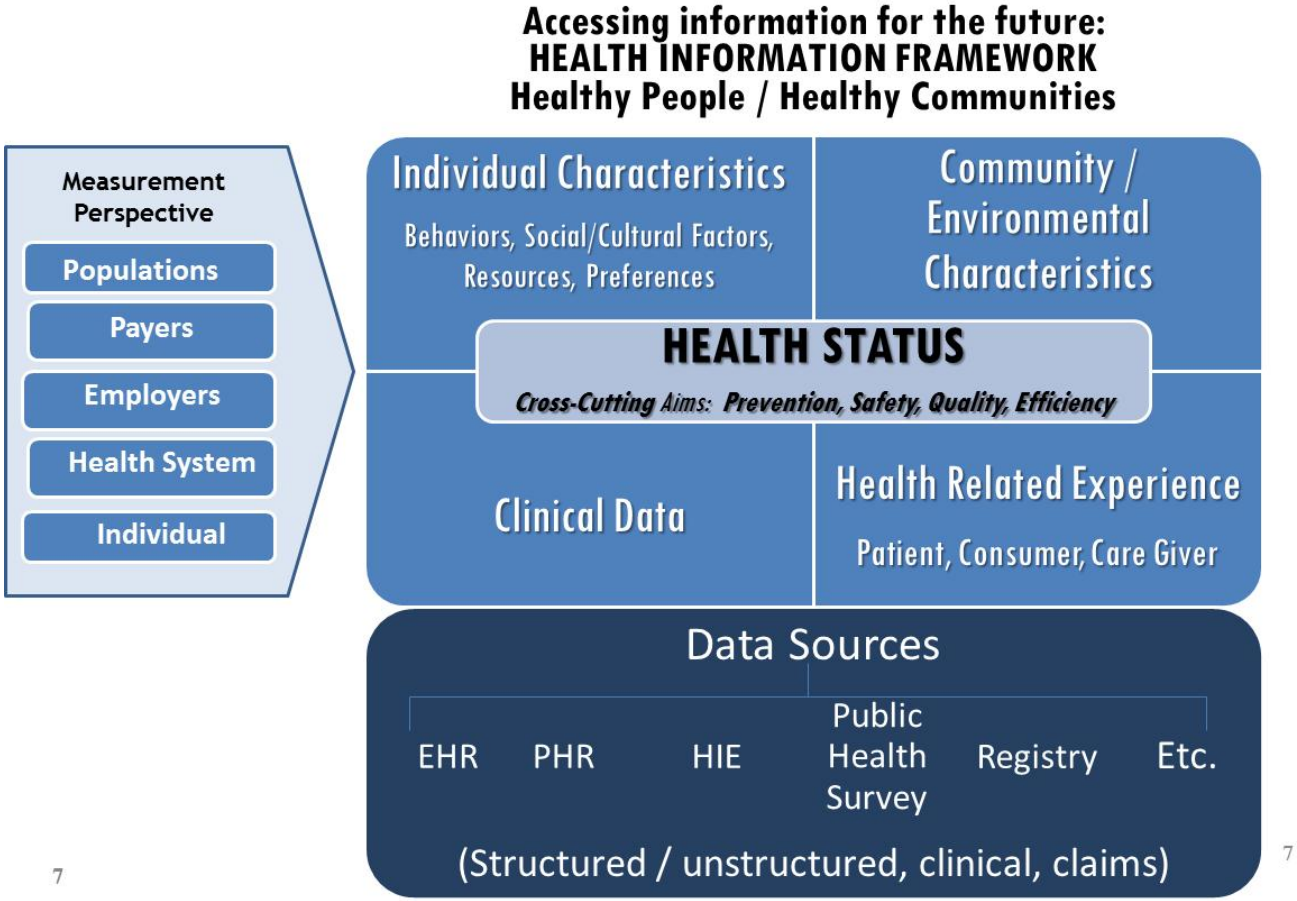


FIGURE 1. NQF HITAC Quality Data Model Health Information Framework. The Framework includes four major domains of information, Individual Characteristics (behaviors, social and cultural factors, personal resources and preferences), Clinical Data, Environmental Characteristics, and Health Related Experience (patient, consumer and care giver). Measures may address different perspectives of health – that of the population, a payer, employers, a health system and the individual. Additionally, the data platform to capture and manage the data required for each perspective includes multiple sources of information (EHRs, PHRs, health information exchanges (HIEs), surveys, registries and more.

The Framework incorporates four domains of information to enable a broader reach for data and encourage attention to the entire spectrum from the perspective of data infrastructure: Individual Characteristics (encompassing the Behaviors, Social / Cultural Factors, Preferences, and Personal Resources), Health Related Experience (with the perspectives of patient, consumer, and care giver), Clinical Care Process (including proteomic and genomic data), and Community / Environmental Characteristics. Each of these dimensions has an individual consumer, a population (previously, community), and health system dimension – factors that can be attributed to the individual and factors that are influenced by local community and population demographics. It is likely that any comprehensive measure of health should address each of the dimensions. The information requirements for each dimension are grounded in sources such as EHRs, PHRs, HIEs, Public Health surveys, and other sources.

Individual Characteristics

Many of the following individual characteristics are interrelated (e.g., behaviors are impacted by social, cultural and other factors):

- *Behaviors* - Responses or actions that impact (either positively or negatively) health or health care. 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* - 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/neglect.
- *Resources* - Means available to a patient or consumer to meet health and health care needs. This would include caregiver support, insurance coverage, financial resources, and community resources to which the patient is already connected and receiving benefit.
- *Preferences* - Choices made by patients or consumers 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.

Health Related Experience

- Information collected from a consumer, patient and/or family member about their perception of the care they received or from a care giver about the care provided. Information collected for a whole-person approach to care including the elements of care coordination, communication, access to care, timeliness of care and information sharing.

Clinical Data

- All clinical information pertinent to a specific individual including aspects of care related to clinical capabilities, coordination, follow-up, access, timeliness, and thoroughness. Clinical data includes actions by any member of patient's care team, regardless of discipline, as well as factors impacting the degree of partnership demonstrated between the patient and the care team. Genetic and protein expression that have the potential to influence health status is also included as well as predisposition to disease, reaction to diagnostic testing or treatment, or adverse interaction with the environment due to genetic or proteomic expression factors. Examples include diseases associated with certain genes (e.g., Huntington's or cystic fibrosis) or variations in drug metabolism due to expressions of proteins in the Cytochrome P450 family.

Community / Environmental Characteristics –

- Any external circumstance impacting the efficacy and quality of health and health care. This would include specifics related to an individual's housing, the availability of community resources to which an individual is not already connected, or systemic issues such as provider availability or provider administrative and organizational issues.

The HITAC QDM Health Information Framework is the conceptual platform on which the QDM structure is built. It encompasses data from EHRs and other sources to manage measures of health for populations, health plan members, health system participants (or an individual provider's panel of patients), employers, or for measures of individual health for consumers. Examples of the many data sources are listed in Figure 2 (EHRs, PHRs, Health Information Exchanges (HIEs), public health surveys, and registries), but these are not intended to be exclusive. Information obtained from social media, hand-held and other devices will be increasingly significant for measuring health. The QDM is a model, or a grammar, to describe the information requirements (the model of meaning), based on the Framework, that can encourage innovation in data capture (multiple models of use) to enable easier access to data and analysis of health. It is based on a patient-centered approach to health with careful attention to outcomes and patient engagement. The Framework is intended to encourage a more data-driven approach to health information applications to allow greater data sharing and transparency of health outcomes through measurement.

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.

The QDM Update June 2012 now has an accompanying QDM Style Guide to address feasibility of QDM components with respect to EHRs certified for the 2014 EHR Certification Program proposed by the Office of the National Coordinator for Health IT (ONC). The QDM Style Guide provides guidance as to which information can be expected in structured form in referenced EHRs and which information may be important to measures but would likely require additional effort to modify data entry requirements for clinicians, or require post-documentation efforts (such as natural language processing or abstraction). The QDM Style Guide is intended to provide some direction to measure developers about the feasibility and availability of specific information. The style guide should help measure developers focus on available data in EHRs as they consider data elements to define measure content.

NQF's Health Information Technology Advisory Committee (HITAC) acts as an advisory body for QDM scope and enhancements. A subcommittee of HITAC members meet on a monthly basis to discuss current issues and planning for the QDM. The full HITAC provides the broad, multi-stakeholder input to the scope and content of the QDM. For more information about HITAC, please contact QDM@qualityforum.org.

Release Schedule for Future Versions

Future updates of QDM will be released annually or on an as-needed basis. In light of the new companion publication, the QDM Style Guide, an update is expected in Fall 2012 to address comments on the QDM Style Guide and the QDM.

Electronic Measures (eMeasures) and the Quality Data Model's Role

In 2010, NQF and 18 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*. The retooling effort highlighted some of the differences between data that could be expected using claims data, or clinically enriched claims data and those data available in structured form in EHRs. The QDM Style Guide companion document provides guidance as to which information can be expected in structured form in referenced EHRs and which information may be important to measures but would likely require additional effort to modify data entry requirements for clinicians, or require post-documentation efforts (such as natural language processing or abstraction).The QDM also allows expression of measures that can include data from other (non-EHR) electronic sources especially for measures addressing population health and some measures of patient-reported outcomes. The QDM Style Guide companion document is expected to evolve as EHR data capture and management abilities change over time.

With funding from HHS, NQF oversaw subcontractor development of a Measure Authoring Tool (MAT) prototype in September 2011 and its enhanced releases in January and March 2012. The MAT was developed to help measure developers apply the QDM to measure concepts to produce electronic specifications known as eMeasures. The Health Quality Measure Format (HQMF) was used as the standard in which the MAT constructed eMeasures.[2] Now that the concept of the tool has been established, NQF will transition the day-to-day development of the MAT to HHS with the intent of moving it to an open source option. NQF will retain both a strategic advisory role on future direction as well as an educational role to be sure NQF's members and other stakeholders can use the MAT successfully to develop eMeasures. The version of the MAT current as of the publication date of this document can be accessed from the NQF website at: http://www.qualityforum.org/Topics/HIT/Measure_Authoring_Tool_(MAT)/Measure_Authoring_Tool_(MAT).aspx.

With initial funding from AHRQ and subsequent funding through the current HHS contract, NQF developed the Quality Data Model (QDM) to provide standard data definitions, and a standard grammar and structure for electronic measurement. NQF will maintain its strategic convening role managing the QDM as the dynamic platform for eMeasure content and the MAT. 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*.

Quality Data Model: Status and the Public Comment Process

To ensure the QDM's continued value and usability, NQF will enhance and update it annually in response to evolving quality measurement needs. The QDM Draft October 2011 was published for public comment in fall 2011. The QDM Update June 2012 has been developed with input from NQF's Health Information Technology Advisory Committee. The QDM Update June 2012 is available for use; NQF is accepting public comments for the update for the Fall 2012. NQF anticipates publishing updates annually and as needed. The QDM Update June 2012 also contains changes based on feedback from the comment period as well as from information learned from HHS contractors applying the QDM to retool projects and new measure development.

This new version has a number of modifications:

1. Updated assignments of "states of action" and "states of being" to categories based on member and public comments
2. Reinstituted the Health Record Component category.
3. Reinstituted the Intervention category.

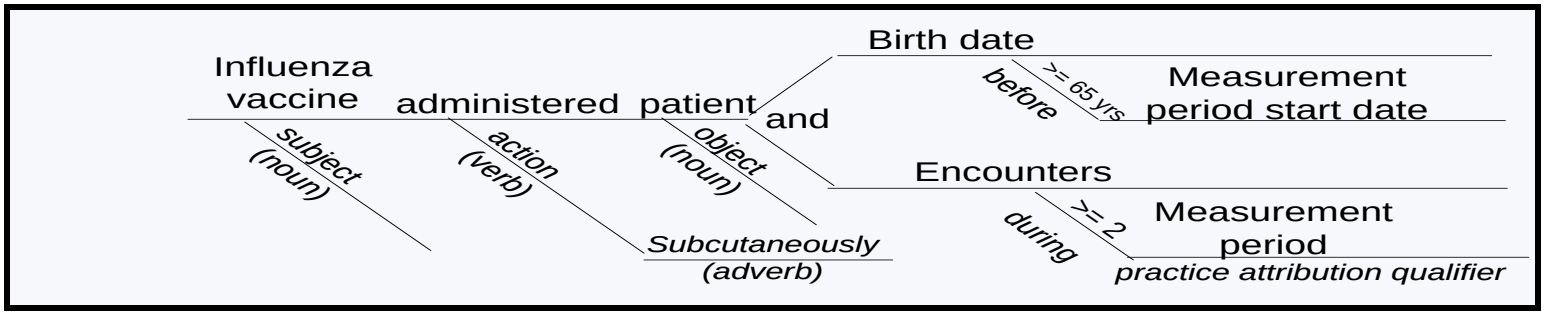
[2] The Health Quality Measure Format (HQMF) is an HL7 Draft Standard for Trial Use. Current work in the Standards and Interoperability Framework Query Health workgroup is expected to propose updates and simplifications for HQMF in HL7 future ballot cycles. Information regarding Query Health can be found at http://wiki.siframework.org/Query+Health.

4. Re-structured Functions, Operators and Relative Timings section into the *Measure Authoring Tool* user guide based on stakeholder feedback for more brevity and conciseness in this area of the document
5. Moved reference to more complete functions, operators and relative timings information in the MAT user guide.
6. Added a new companion document, the *QDM Style Guide June 2012* to provide a path for measure developers creating measures that exclusively use data expected in EHRs.
7. Suggested options for future development. The HITAC has looked beyond the new version and proposes options for future development. Enunciating these options is intended to stimulate and guide discussions and create a vision about the flexibility and scalability of the QDM.

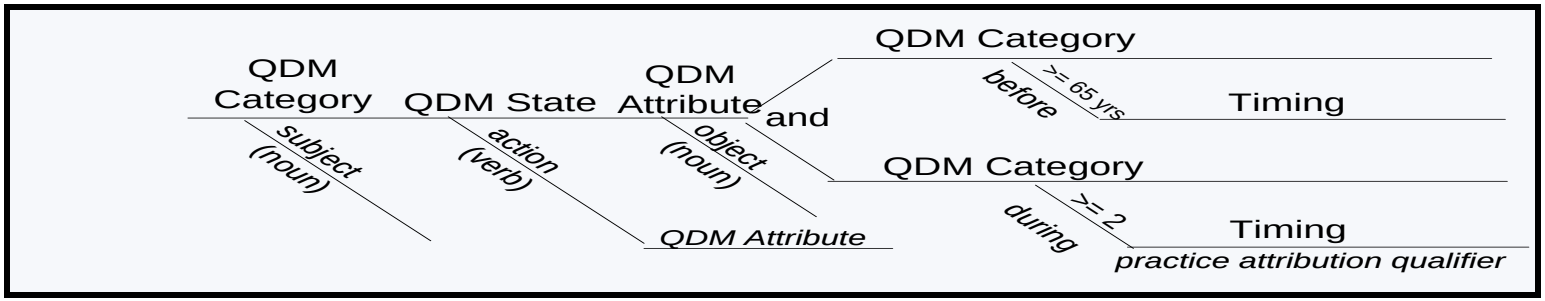
Introduction of QDM as the Grammar of eMeasure Development

The QDM provides a method, or grammar, to express patient, consumer, clinical, and community characteristics as well as the basic logic required to articulate quality measure criteria. 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 exchange of information with EHRs for direct patient care.

For example, the measure statement *"All patients 65 years of age or older with at least two provider visits during the measurement period receiving influenza vaccine subcutaneously"* can be represented as a diagrammed sentence:



This example begins to illustrate how the QDM becomes the grammar behind measure development. The QDM can further be broken down into a grammar structure when looking at the individual components of the model generically and comparing them to the measure diagrammed above:



Components of the QDM

A. QDM Element

A 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.[3][4]

B. Category

Category refers to a particular group 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. See Table 1 for a list of 23 categories and their definitions.

[3] A model of meaning represents the underlying meaning in a way that is common to and reusable between different use cases, excerpted from International Health Terminology Standards Development Organization (IHTSDO) Glossary, January 2012 International Release. Available at: http://www.ihtsdo.org/fileadmin/user_upload/doc/tig/glsct/glsct_ss_ModelOfUse.html#_c0cc3aca-4e72-40ba-af25-116e04a36fad, accessed 25 April 2012.

[4] 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.

C. 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.

D. 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[5]). Specific taxonomies are used in applying the QDM to quality measures based on the recommendations of the HIT Standards Committee of the Office of the National Coordinator for Health Information Technology (ONC) and established certification rules for meaningful use. ICD-9-CM, ICD-10, SNOMED-CT™, and CPT™ are examples of code systems. The concept of *diabetes* may be described in QDM with ICD-9-CM, ICD-10, and/or SNOMED-CT™.

E. Value Set

Value set, (previously 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)." [6] With respect to value sets, a *value* is a specific code defined by a given taxonomy. Values are included in value sets. 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 (numeric or alphanumeric).

[5] 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.
[6] Ibid

F. 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*, *performer, participant* 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 5.

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

The QDM provides a method to describe a specific data element by clarifying the category of information, the context in which it is expected to exist (the state), and any additional information to precisely identify it (attributes) (see Figure 2). The QDM further coordinates with standards used by clinical information systems, which is important in order 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).

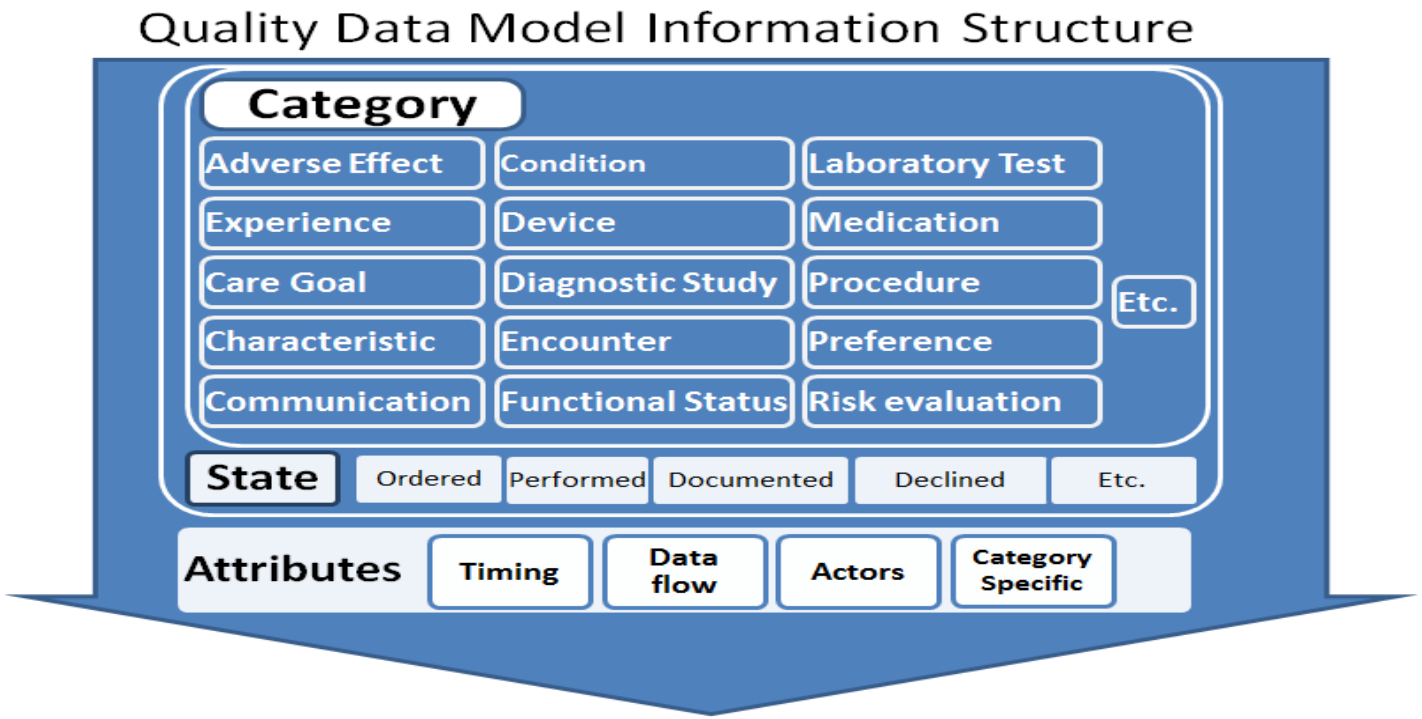


Figure 2. QDM Composition Diagram—The diagram depicts the definition of a QDM element beginning with defining a *category*, or the type of information desired (some examples shown in the center blue boxes). The clear boxes on the left hand side of the drawing show the application of a *state,* or context of use that can be assigned to a category element. States may be actions (states of action) or indicate the existence of a specific category instance (states of being). The category-state pair, along with the associated value set, 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.

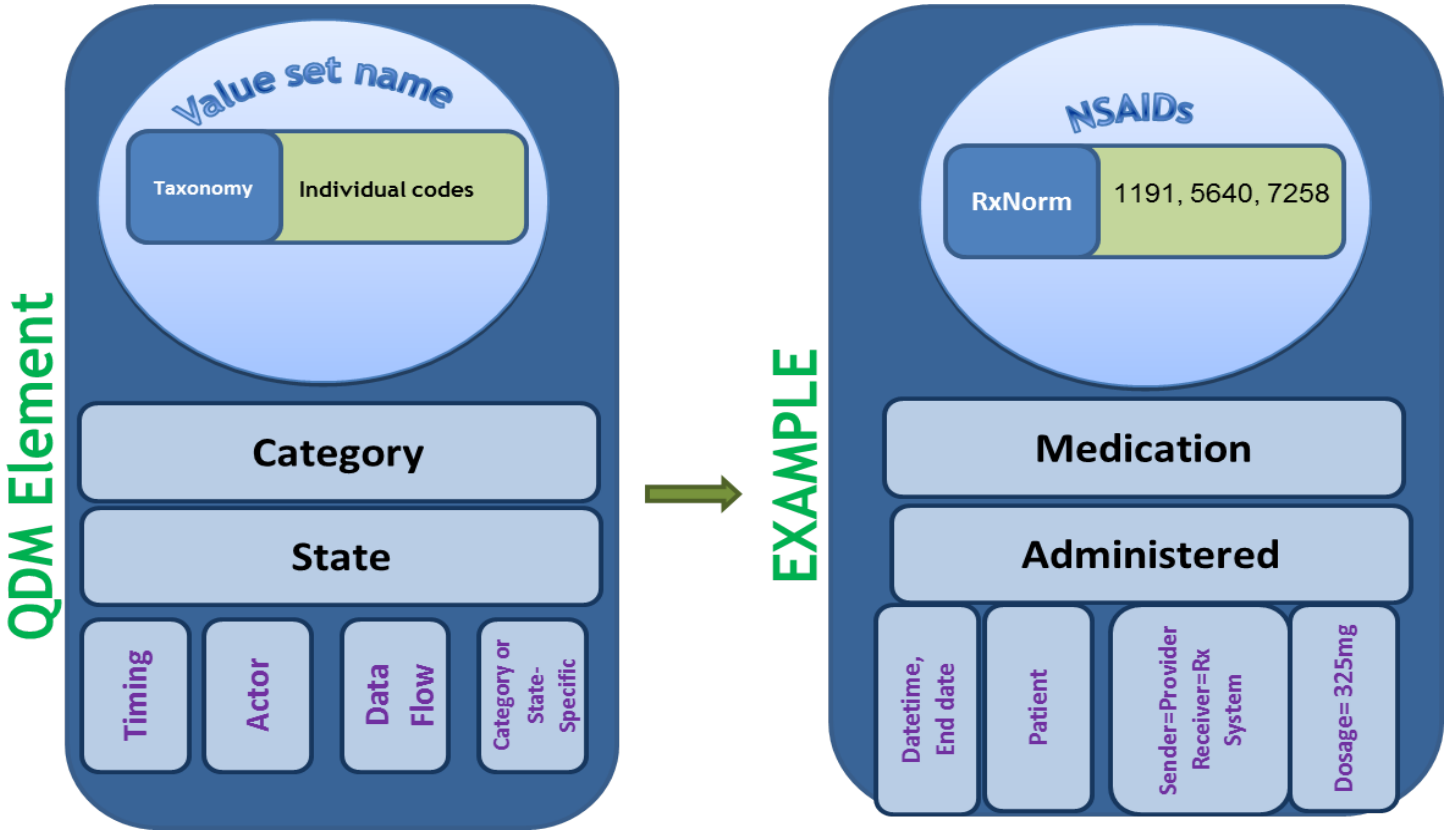


Figure 3. QDM Element Structure—The components of a QDM element are shown in the figure. The graphic on the left identifies the terms used for each component of the QDM element. The graphic on the right uses each of these components to describe a QDM element indicating "Medication, administered NSAIDs." 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.

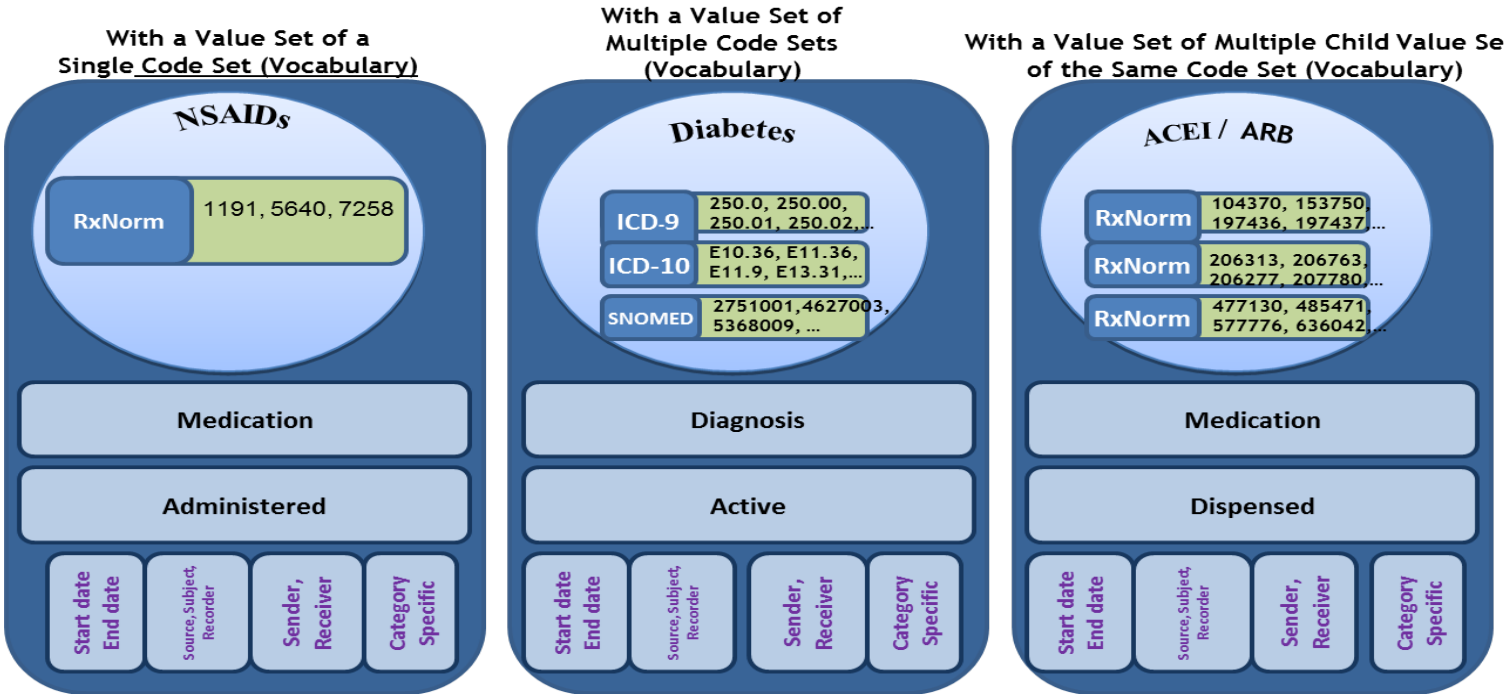


Figure 4. QDM Use of Value Sets—This figure shows three QDM elements, each of which uses value sets. The graphic on the left shows a value set for a class of medications (non-steroidal anti-inflammatory agents, or NSAIDs) that includes a single set of codes using a single code set (vocabulary). The middle graphic shows the instance diabetes of the category diagnosis. In the middle graphic 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 graphic 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 angiotensin-converting enzyme inhibitor (ACEI) and angiotensin receptor blocker (ARB) medications).

QDM Category Definitions

As referenced earlier, c*ategory* refers to a particular group of information that can be addressed in a quality measure. Definitions for each of the 23 categories currently available in the QDM can be found below:

Table 1: QDM Category Definitions	
Adverse effect: allergy	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*. The attribute of 'causative agent' with a relevant value set must be associated with this category.
Adverse effect: non-allergy	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 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 that is generally based on perception. Immunologic reactions are covered with the category *adverse effect: allergy*. The attribute of *causative agent* with a relevant value set must be associated with this category.

Table 1: QDM Category Definitions	
Care goal	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 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.] • *Goal, which* is what is expected to happen. • *Outcome, which* is what happened that can be shown by other QDM standard categories and their related data elements. Example: *Care Goal, Active: care goal value set (related to: diagnosis value set)*

Table 1: QDM Category Definitions	
Characteristics (patient or provider)	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	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.
Condition/Diagnosis/Problem	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.

Table 1: QDM Category Definitions	
Device	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.[7]
Diagnostic study	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, confirm that a person is free from disease).[8] 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 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.[9] A *patient encounter* represents interaction between a healthcare provider 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. Different levels of interaction can be specified in the value associated with the element while modes of interaction (e.g. telephone) may be modeled using the data flow attribute.

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

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

[9] 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.)

Table 1: QDM Category Definitions	
Experience	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. Experience also encompasses the patient's outcomes with respect to care provided in the past. For example, a patient receiving chemotherapy who has not responded to first line medication treatment or who no longer responds to such therapy may require second tier treatment. Such a patient's *experience* of care is an important factor in defining subsequent treatment which can be driven by patient preference.
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.
Functional Status	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. Comment is welcome.

Table 1: QDM Category Definitions	
Health Record Component	A *health record component* is a section of a clinical record that contains information about a patient and upon which actions can be performed (e.g., *reconcile, update*, etc.). A few examples of *health record components* include allergy lists, problem lists, medication lists, clinical summaries, and others.
Intervention	An *intervention* is a course of action intended to achieve a result in the care of persons with health *problems* that does not involve direct physical contact with a patient. This category is included to help differentiate care provided to patients that does not involve direct hands-on activity. Examples include patient education and therapeutic communication.
Laboratory Test	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.[10] 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	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	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.

[10] 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.)

Table 1: QDM Category Definitions	
Procedure	The definition of *procedure* is derived directly from HL7 and Canada Health Infoway: "An Act whose immediate and primary outcome (post-condition) is the alteration of the physical condition of the subject… procedure is but one among several types of clinical activities such as observation, substance-administrations, and communicative interactions…Procedure does not comprise all acts of whose intent is intervention or treatment."[11] 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. [12]
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.[13]
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.[14] 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).

[11] Definition of procedure from HL7 Reference Information Model (RIM) Version 02-19 (3/21/2007), available at: http://archive.hl7.org/v3ballotarchive/v3ballot2008may/html/infrastructure/rim/rim.htm#Procedure-cls

[12] Modified from Canada Health Infoway.

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

[14] 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.

Table 1: QDM Category Definitions	
Symptom	An indication that a person has a condition or disease. Some examples are headache, fever, fatigue, nausea, vomiting, and pain.[15] Also, symptoms are subjective of the disease perceived by the patient.[16] 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. Those resources can be evaluated with respect to a facility or a community.
Transfer	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.[17] This may include the setting from which a patient is received or released (e.g., home, acute-care hospital, skilled nursing facility) to the current location.

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

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

[17] (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, *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 of Action

As referenced earlier, 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. Definitions of the states currently available in the QDM can be found in the table below:

Table 2: 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 the appropriate clinical personnel and/or the patient aware of relevant information that may reduce the risk of harm or improve the quality of care. Examples include alerts of possible contraindications, preventative care reminders or recommended courses of action for a particular clinical scenario.
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 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.

Table 2: States of Action	
Declined	To indicate that a component of the workflow is not done, generally associated with a *reason* when used in quality measures. Example: *Medication, Declined: Antibiotic Value Set (reason: medical reason value set; source: provider)*
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.[18]
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* 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.[19]
Received	To get or be informed of, to accept.

[18] Adapted from Health Information Technology Standards Panel (HITSP) C154 Quality Data Dictionary. V1.01. 2010.
[19] Ibid

Table 2: States of Action	
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.

States of Being

Table 3: 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.

Attributes

QDM Element Attributes includes four attribute groupings: *timing, actor, data flow, and category-specific. Timing* (see Figure 5) 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. To look at it from another perspective, a QDM element could be a task that, when linked with other QDM elements, creates a workflow. 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 (see Figure 6) refers to the movement of information from one place or person to another. Data flow requires both a *sender* and a *receiver*. *Sender* can be the human or system entity (or application) that outputs the information content expressed by the QDM element to another system, individual, or location.

Receiver is defined as the human or system entity (or application) that was given the information content expressed by the QDM element from another system, individual, or location. For example, to express the 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).

The *actor* (see Figure 7) 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, performer, participant* 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 *performer* is the person (or device) that performed a task. This may be different than the source of the information. The *participant* is the person (or device) that assisted in performing the task. *The* same application or individual may be a source*,* recorder*,* and subject of the QDM element, but not necessarily. For example, 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 Figure 8), 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.

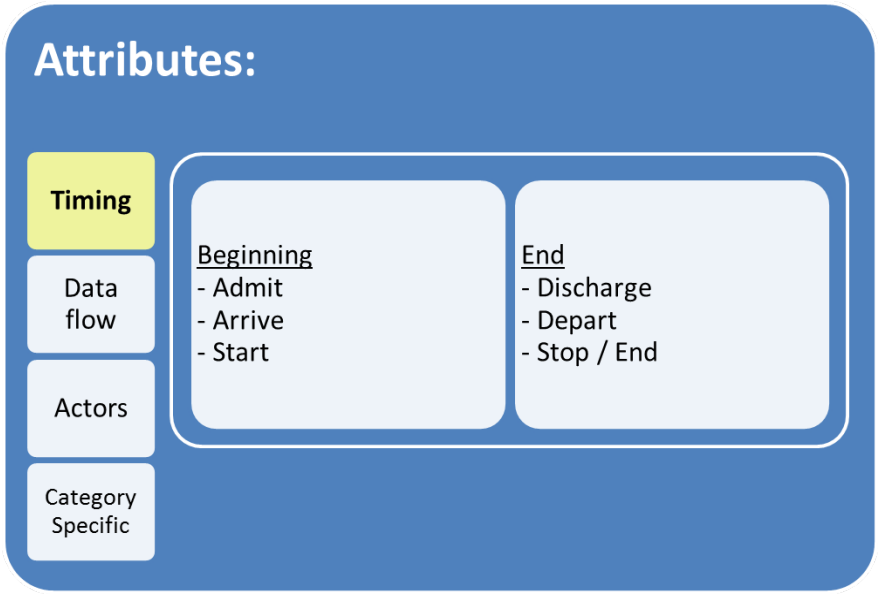


Figure 5. Timing Attribute The timing attribute indicates either the time frame or event that delineates when measurement should occur. Timing may be start and end dates and times or discrete clinical events like discharge or completion of treatment.

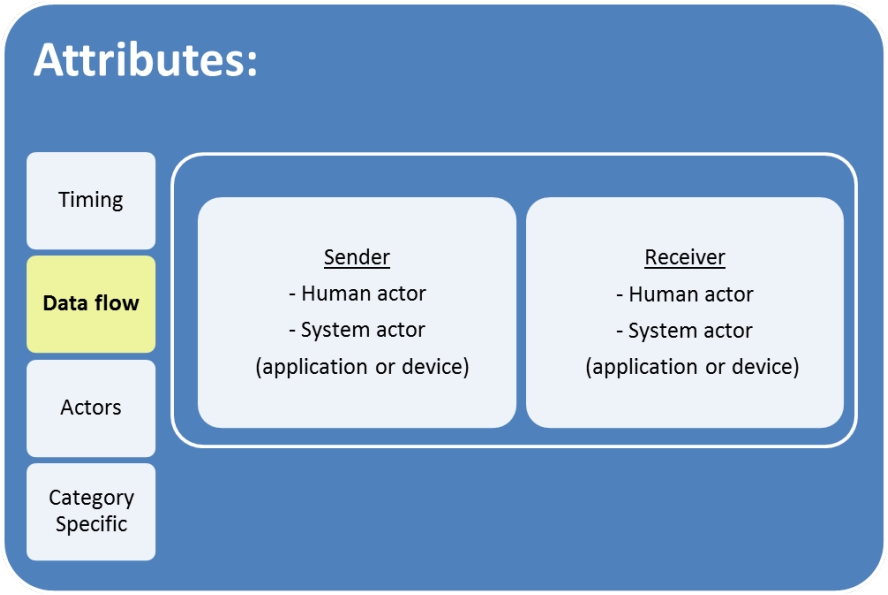


Figure 6. Data-Flow Attribute**:** The data-flow attribute allows specification of a specific sender or receiver of a transaction, enabling expression of criteria that a specific healthcare artifact is shared by a clinician (sender) with a patient (receiver).

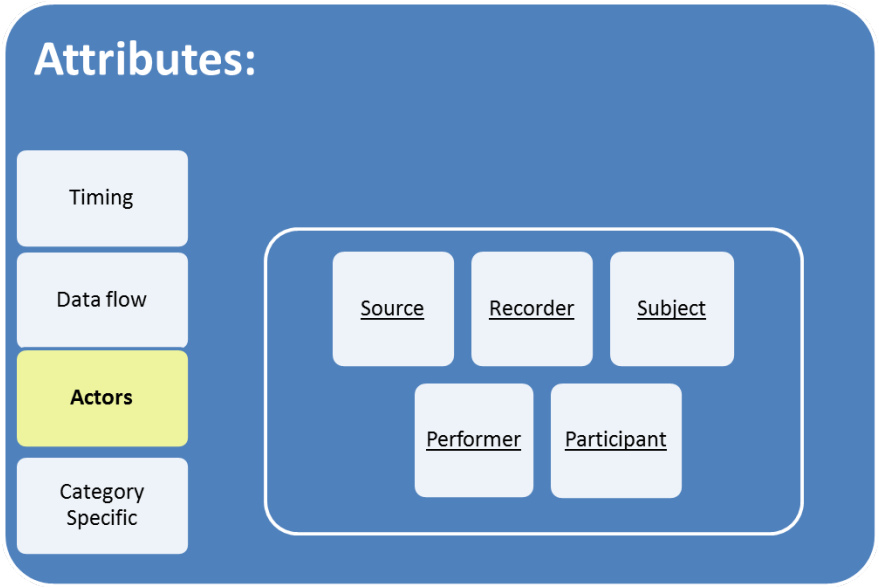


Figure 7. Actor Attribute**.** The actor attribute allows the measure developer to define the expected source, recorder, performer, participant and subject for each QDM element; thus, it is possible to specify data only derived and recorded by devices, patients, or clinicians.

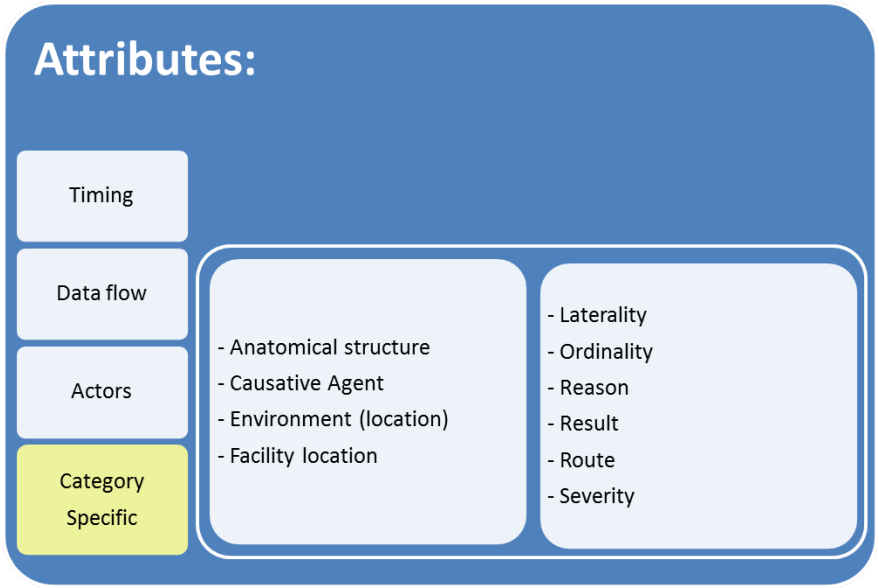


Figure 8. Category-Specific Attribute**:** *Category-specific* attributes provide specific detail about a QDM category/ state pairing.

Category-Specific Attributes

Category-specific attributes provide a finer level of detail to certain categories within the QDM. Definitions for these attributes can be found below:

Table 4: Category-Specific Attributes	
Admission DateTime	The start date and time for admissions.
Anatomical Structure	A particular, complex, anatomical part of a living thing.
Causative Agent	Agents that are identified as eliciting the adverse response in a patient.
Discharge DateTime	The end date and time for admissions.
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 units (ICUs), non-ICUs, burn critical-care unit, neonatal ICU, and respiratory-care unit.
Facility Location Arrival DateTime	The date and time the patient presents to the location.
Facility Location Departure DateTime	The date and time the patient departs the location.
Frequency	Relates to rate of occurrence of a medication or procedure; generally in hours.
Health Record Artifact	A snapshot, or set of data at a specific point in time derived directly from the clinical record that contains information about a patient and is communicated to another clinician or the patient. Health record artifacts are static snapshots of data. A few examples include clinical summaries, allergy lists, problem lists, and medication lists.
Infusion Duration	The total length of time for the infusion of a substance or medication. A derived attribute from the health records from infusion end time minus infusion start time.

Table 4: Category-Specific Attributes	
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, and 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.
Length of Stay	The difference of the admission date/time and the discharge date/time.
Method	A procedure, technique or way of doing something especially in accordance with a definite plan.
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*.
Patient Preference	Individual's expression of desirability or value of one course of action, outcome, or selection in contrast to others.[20] Example: *Procedure, ordered: gall bladder removal (patient preference: bloodless surgery)*
Provider Preference	Preference related to experience and education with treatment modalities in direct patient care.
Radiation Dosage	The total dosage of radiation received during a procedure or diagnostic test.
Radiation Duration	The elapsed time (duration) of radiation exposure during a procedure or diagnostic test.
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™) 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.

[20] MeSH Dictionary 2012; http://www.nlm.nih.gov/cgi/mesh/2012/MB_cgi?mode=&term=Patient+Preference&field=entry. Last accessed June 2012

Table 4: Category-Specific Attributes	
Related to	Pertaining to another subject or issue. Commonly used with the categories of *care goal and patient education*: Example: *Education, performed (related to: diabetic foot care, receiver: patient)*
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 *numerica*l, combined with a mathematical operator (e.g., LDL >= 100 mg/dL, or systolic blood pressure is **<** 140 mmHg), and 3) is one of a *specific set of elements* in a value set (e.g., chest X-ray result = <findings consistent with pneumonia>).
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.
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*.
Start DateTime	The time the related data element starts.
Stop DateTime	The time the related data element stops.

Table 5. 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. Please refer to the *QDM Style Guide June 2012* (click here) for information regarding feasibility of QDM elements within the parameters of current electronic systems.

Table 5 QDM Categories and Specific Attributes	Admission DateTime	Anatomical structure	Causative Agent	Discharge DateTime	Discharge Status	Dosage	Environmental location	Facility location	Facility Location Departure Date Time	Facility Location Arrival DateTime	Frequency	Infusion Duration	Health Record Artifact	Laterality	Length of Stay	Method	Ordinality	Patient Preference	Provider Preference	Radiation Dosage	Radiation Duration	Reason	Related to	Result	Route	Severity	Status
Adverse effect: Allergy			Yes																			Yes				Yes	Yes
Adverse effect: Non-allergy			Yes																			Yes				Yes	Yes
Care Goal																		Yes	Yes			Yes	Yes	Yes		Yes	Yes
Characteristics																						Yes					Yes
Communication													Yes					Yes	Yes			Yes					Yes

Table 5 QDM Categories and Specific Attributes	Admission DateTime	Anatomical structure	Causative Agent	Discharge DateTime	Discharge Status	Dosage	Environmental location	Facility location	Facility Location Departure Date Time	Facility Location Arrival DateTime	Frequency	Infusion Duration	Health Record Artifact	Laterality	Length of Stay	Method	Ordinality	Patient Preference	Provider Preference	Radiation Dosage	Radiation Duration	Reason	Related to	Result	Route	Severity	Status
Condition/ Diagnosis/ Problem		Yes												Yes			Yes	Yes	Yes			Yes				Yes	Yes
Device		Yes												Yes			Yes	Yes	Yes			Yes					
Diagnostic study		Yes						Yes						Yes		Yes		Yes	Yes	Yes	Yes	Yes		Yes			
Encounter	Yes			Yes	Yes		Yes	Yes	Yes	Yes			Yes		Yes			Yes	Yes			Yes					
Experience																		Yes	Yes			Yes					

Table 5 QDM Categories and Specific Attributes	Admission DateTime	Anatomical structure	Causative Agent	Discharge DateTime	Discharge Status	Dosage	Environmental location	Facility location	Facility Location Departure Date Time	Facility Location Arrival DateTime	Frequency	Infusion Duration	Health Record Artifact	Laterality	Length of Stay	Method	Ordinality	Patient Preference	Provider Preference	Radiation Dosage	Radiation Duration	Reason	Related to	Result	Route	Severity	Status
Family History																	Yes					Yes				Yes	Yes
Functional Status		Yes												Yes		Yes		Yes	Yes			Yes		Yes			
Health record component																											Yes
Intervention								Yes								Yes	Yes	Yes	Yes			Yes		Yes	Yes	Yes	
Laboratory test		Yes					Yes	Yes						Yes		Yes		Yes	Yes			Yes		Yes			

Table 5 QDM Categories and Specific Attributes	Admission DateTime	Anatomical structure	Causative Agent	Discharge DateTime	Discharge Status	Dosage	Environmental location	Facility location	Facility Location Departure Date Time	Facility Location Arrival DateTime	Frequency	Infusion Duration	Health Record Artifact	Laterality	Length of Stay	Method	Ordinality	Patient Preference	Provider Preference	Radiation Dosage	Radiation Duration	Reason	Related to	Result	Route	Severity	Status
Medication						Yes					Yes	Yes						Yes	Yes			Yes			Yes		
Physical Exam		Yes					Yes	Yes						Yes		Yes		Yes	Yes			Yes		Yes			
Procedure		Yes					Yes	Yes						Yes		Yes	Yes	Yes	Yes			Yes		Yes			Yes
Risk evaluation		Yes												Yes		Yes		Yes	Yes			Yes		Yes			
Substance						Yes					Yes	Yes						Yes	Yes			Yes			Yes		

Table 5 QDM Categories and Specific Attributes	Admission DateTime	Anatomical structure	Causative Agent	Discharge DateTime	Discharge Status	Dosage	Environmental location	Facility location	Facility Location Departure Date Time	Facility Location Arrival DateTime	Frequency	Infusion Duration	Health Record Artifact	Laterality	Length of Stay	Method	Ordinality	Patient Preference	Provider Preference	Radiation Dosage	Radiation Duration	Reason	Related to	Result	Route	Severity	Status
Symptom		Yes					Yes	Yes						Yes			Yes					Yes				Yes	Yes
System resources							Yes	Yes														Yes					
Transfer							Yes	Yes										Yes	Yes			Yes					

Expression Language (Syntax)

The information provided in the QDM so far provides a clear basis to articulate each data element used within a measure, clinical decision support rule, or 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.[21] The QDM 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 related to asthma 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 (see Figure 9).

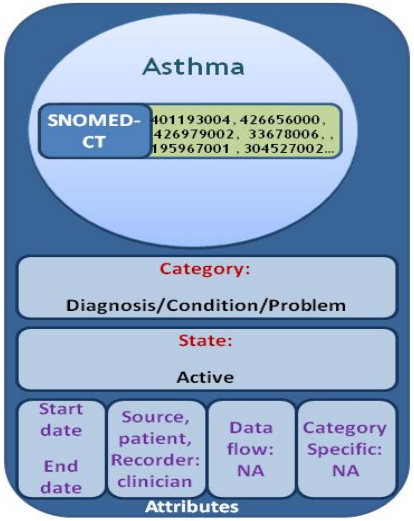


Figure 9. The data element will appear in a measure as *Diagnosis, Active: asthma* using value set "asthma SNOMED-CT."

[21] http://www.hl7.org/v3ballot/html/domains/uvqm/uvqm.html

Guidelines for Syntax with QDM Elements

Please refer to page 132 of the *Measure Authoring Tool User Guide* (click here) for more in-depth guidelines for syntax when authoring measures. The *Guide to Reading Retooled Measures* provides guidance for readers of eMeasures.

QDM o
Procedure, Performed: Cardiac Surgery

Function|QDM o FIRST|
Procedure, Performed: Cardiac Surgery

QDM|AND/OR|QDM
Procedure, Performed: Cardiac, Surgery |And| Encounter: Hospital Measures - Encounter Inpatient

QDM|AND/OR|QDM|AND/OR|QDM…
Procedure, Performed: Cardiac Surgery ||AND| Encounter: Hospital Measures - Encounter Inpatient |AND|Lab Test, Result: Hospital Measures – Glucose

Function|QDM|AND/OR|QDM... o COUNT|
Lab Test, Result: Hospital Measures - Glucose |AND| Lab Test, Performed: Hospital Measures – Glucose

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. Measurement period represents the time interval for the performance calculation.

Please refer to the *Measure Authoring Tool User Guide* (click here) Appendix F: Functions, Operators and Relative Timings (page 183) for descriptions of the available functions and operators. These items enable interaction between the QDM elements described in this document.

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.

Table 6: Relative Timings

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 been done, can be done, or is intended or requested to be done."	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 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*]

Table 6: Relative Timings		
Timing	**Description**	**Example**
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”)
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.*	To indicate the patient reason for why a medication was not given: [*Medication, Declined : 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
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*]

Table 6: Relative Timings		
Timing	**Description**	**Example**
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*]
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*]

Example Measure 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 bringing together several workflows in a hierarchical or sequential manner.

a. Initial Diagnosis of Diastolic BP greater than 90 mmHg using blood pressure taken by a device in the patient's home and the patient is 18 years of age or greater:

- The QDM elements for the example are (items in parentheses are attributes):
  - "Patient Characteristic, *Documented*: birth date"
  - "Diagnosis, *Active*: hypertension (time: start date/time)"
  - "Physical Exam, *Documented*: diastolic blood pressure (result>= 90 mmHg)
- Application of the expression language:
  - Population:
    - AND: "Patient Characteristic, *Documented*: birth date" >= 18 years starts before start of "measurement period"
  - Denominator:
    - AND: FIRST "Diagnosis, *Active*: hypertension" starts before or during "measurement period"
    - AND: "Physical Exam, Do*cumented*: diastolic blood pressure (result >= 90 mmHg; data flow source: blood pressure monitor, recorder: blood pressure monitor, subject: patient; environment: ambulatory office) starts concurrent with FIRST "Diagnosis, *Active*: hypertension"
  - Numerator:
    - AND: FIRST "Physical Exam, *Documented*: diastolic blood pressure (result < 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: start date/time)"

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 visit to achievement of diastolic BP less than 90 mmHg based on blood pressure taken by a device in the patient's home and the patient is 18 years of age or greater:
    - QDM elements
        - "Patient Characteristic, *Documented*: birth date"
        - "Encounter, *Performed*: ambulatory or inpatient encounter (timing: start date/time)"
        - "Physical Exam, *Documented*: diastolic blood pressure (result >= 90 mmHg)
        - "Diagnosis, *Active*: hypertension (timing: start date/time)"
    - Application of expression language:
        - Population:
            - AND: "Patient Characteristic, *Documented*: birth date" >= 18 years starts before start of "measurement period"
        - Denominator:
            - AND: FIRST "Encounter, *Performed*: ambulatory or inpatient encounter (timing: start date/time)" during the "measurement period"
            - AND: "Diagnosis, *Active*: hypertension (timing: start date/time)" starts before or during FIRST "Encounter, *Performed*: ambulatory or inpatient encounter"
            - AND: "Physical exam, *Documented*: diastolic blood pressure (result >= 90 mmHg; data flow source: blood pressure monitor, recorder: blood pressure monitor, subject: patient; environment: ambulatory office) during FIRST "Encounter, *Performed*: ambulatory or inpatient encounter"
        - Numerator:
    - DATEDIFF: FIRST "Physical exam, *Documented*: diastolic blood pressure (result < 90 mmHg; timing: start date/time) and FIRST " Physical exam, *Documented*: diastolic blood pressure (result > 90 mmHg; timing: start date/time)

    General meaning of the description

    Provide the time from the initial patient visit 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. Time takes on a new meaning when considered in the context of workflows. A start time equates to a trigger event while the end time equates to task completion and, if successful, attainment of a goal. This is described as an individual patient measure with a unique value for each patient.

Summary of Changes: QDM Draft 2011 to QDM JUNE 2012 UPDATE

NQF looks forward to comments regarding the following changes within the QDM.

Category Changes:

Communication

In the QDM October 2011 Draft, HITSC had suggested the removal of Communication as a category within the QDM. Comments received from many stakeholders during the fall 2011 comment period revealed that removing this category would interfere with many quality- and performance-measurement opportunities. The QDM subcommittee of the HITAC discussed the suggestion at length and agreed with those stakeholders. At this time, the category of Communication will remain in the model pending further clarification from HITSC on their recommendation for removal. Communication is the category used by measure developers to indicate a specific *health record artifact* (e.g., a clinical summary) has been shared with a patient.

Diagnostic study

In response to stakeholder comments regarding an expanded definition to provide more clarity, the QDM subcommittee will continue discussion and suggestions in regards to this category to further refine the definition.

Encounter

In response to stakeholder comments regarding the inclusion of activities carried out by a patient or community volunteer in this category, the HITAC will continue discussion and suggestions in regards to this category combination to further refine the definition of this category. *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 or an 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.g., 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.

Health Record Component

Health Record Component has been added to the QDM categories to accommodate measurement of use of specific EHR sections. For example, to identify that a medication list, allergy list or problem list is reconciled, the health record components called medication list, allergy list and problem list need to be identified. The related states are limited to avoid excessive requirements for EHRs and to enable feasibility. A *health record component* 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 components* include allergy lists, problem lists, clinical summaries, medication lists, and others.

Intervention

Intervention was added back to the QDM as a category to be more consistent with the HL7 definition of procedure. An *intervention* is a course of action intended to achieve a result in the care of persons with health *problems* that does not involve direct physical contact with a patient. This category is included to help differentiate care provided to patients that does not involve direct hands-on activity. Examples include patient education and therapeutic communication. The QDM subcommittee and HITAC did not agree that concepts such as education were adequately covered by the term 'Procedure.' "Intervention" will remain. Review of HL7 definitions help to differentiate procedure from intervention. HL7 defines procedure as "*"A [physical] Act whose immediate and primary outcome (post-condition) is the alteration of the physical condition of the subject…procedure is but one among several types of clinical activities such as observation, substance-administrations, and communicative interactions…Procedure does not comprise all acts of whose intent is intervention or treatment."*[1]

[1] HL7 Reference Information Model 2008 (the most recent ANSI-approved glossary) – Procedure definition

Procedure

In response to stakeholder comments regarding the inclusion of activities carried out by a patient or community volunteer in this category, the QDM subcommittee and HITAC agreed that many such activities are better expressed as *interventions.* The definition of *procedure* is derived directly from HL7 and Canada Health Infoway: "An Act whose immediate and primary outcome (post-condition) is the alteration of the physical condition of the subject… procedure is but one among several types of clinical activities such as observation, substance-administrations, and communicative interactions…Procedure does not comprise all acts of whose intent is intervention or treatment."[22] 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. [23] NQF welcomes comment on this definition.

Symptom

In response to stakeholder comments regarding an expanded definition of this category to distinguish farther from Condition/ Diagnosis/ Problem category, the QDM subcommittee will continue discussion and suggestions to further refine the definition.

Changes to States:

It is proposed to limit the use of the 'Declined' state only for QDM categories that involve actions performed. 'Declined' is a state used to define actions that are not performed due to a clinician's intuitive knowledge about a patient; an individualized decision that cannot be detailed in advance in a measure description. It also is used for patient's decisions based on individual or cultural preferences. It is used mostly for exclusions or exceptions and represents a 'relative contraindication' that is patient specific. The categories for which 'declined' will remain include:

- *Device*
- *Diagnostic Study*
- *Encounter*
- *Functional Status*
- *Laboratory Test*
- *Medication*
- *Physical Exam*
- *Procedure*
- *Substance*

[22] Definition of procedure from HL7 Reference Information Model (RIM) Version 02-19 (3/21/2007), available at: http://archive.hl7.org/v3ballotarchive/v3ballot2008may/html/infrastructure/rim/rim.htm#Procedure-cls

[23] Modified from Canada Health Infoway.

- *Risk Evaluation*
- *Transfer*

Measure exclusions can include data that should be present in the record as part of routine care. Examples of such data are diagnoses on a Problem List and allergies on an Allergy List. Such exclusions can be considered *passive* as a query for them does not require any additional work on the part of the clinician. Data regarding relative contraindications, or 'declined,' require active documentation by the clinician and they can therefore be considered *active* data elements. *Active* exclusions raise more concerns for implementers of measures than *passive* ones.

Certain category/ state pairings have been highlighted in Table 5 for suggested removal: *discontinued (for medications and substances), inactive (for medications and substances), planned, and recommended.* Prior comments have suggested that these states do not fit the clinical workflow and thus should not be considered feasible for measure definitions. NQF welcomes comment on these suggested removals.

Changes to Attributes:

Readers will note the a*ddition of "performer" and "participant" to the Actor attributes with the following definitions:*

Performer – the person (or device) that performed the task. This may be different than the source of the information.

Participant – the person (or device) that assisted in performing the task (this may be different than the source of the information.

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. Table 7 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. NQF would appreciate feedback on the appropriateness of these assignments both on from a clinical perspective and measure-development perspective. Please refer to the *QDM Style Guide June 2012* (click here) for information regarding feasibility of QDM elements within the parameters of current electronic systems.

Table 7. Category and State Pairings

Category	State
Adverse Effect: Allergy	Acknowledged
	Alerted
	~~Declined~~ (removal suggested)
	Documented
	~~Reconciled~~ (removal suggested)
	Updated
Adverse Effect: Non-allergy	Acknowledged
	Alerted
	~~Declined~~ (removal suggested)
	Documented
	~~Reconciled~~ (removal suggested)
	Updated
Care Goal*	Acknowledged
	~~Declined~~ (removal suggested)
	Documented
	Updated
	Active
	Resolved
	Reviewed
Characteristics	Acknowledged
	~~Declined~~ (removal suggested)
	Documented
	Ordered
	~~Reported~~ (removal suggested)

	~~Reconciled~~ (removal suggested)
Communication	Acknowledged
	~~Declined~~ (removal suggested)
	Documented
	Transmitted
Condition/Diagnosis/Problem	Active
	~~Declined~~ (removal suggested)
	Inactive
	~~Reconciled~~ (removal suggested)
	Resolved
Device	Applied
	Declined
	~~Discontinued~~ (removal suggested)
	Ordered
	~~Planned~~ (removal suggested)
Diagnostic Study	Declined
	Ordered
	Performed
	Recommended
Encounter	~~Active~~ (removal suggested)
	Declined
	Documented
	Ordered

	Performed
	Recommended
Experience	Acknowledged
	~~Declined~~ (removal suggested)
	Documented
Family History	~~Declined~~ (removal suggested)
	Documented
	Updated
Functional Status	Declined
	Ordered
	Performed
	Reconciled
Health Record Component	Accessed
	Acknowledged
	Alerted
	Calculated
	Created
	~~Declined~~ (removal suggested)
	Discontinued
	Documented
	Reviewed
	Received
	Reconciled
	Transmitted
	Updated
Intervention	Acknowledged

	Declined
	Documented
	Performed
	Received
	Requested
Laboratory Test	Alerted
	Declined
	Performed
	Ordered
Medication	Active
	Administered
	Alerted
	Declined
	~~Discontinued~~ (removal suggested)
	Dispensed
	Inactive
	Ordered
	Reconciled
Physical Exam	Alerted
	Declined
	Ordered
	Performed
Procedure	Declined
	~~Discontinued~~ (removal suggested)
	Ordered

	Performed
	Recommended
Risk Evaluation	Declined
	Documented
	Performed
	Reviewed
Substance	Administered
	Declined
	~~Discontinued~~ (removal suggested)
	Dispensed
	Ordered
	Recommended
	~~Reconciled~~ (removal suggested)
Symptom	Active
	~~Assessed~~ (removal suggested)
	~~Declined~~ (removal suggested)
	Inactive
	Documented
	Resolved
System resources	Acknowledged
	Declined
	Documented
	Ordered
	Transmitted

	Updated
Transfer	Declined
	Documented
	Ordered
	Performed

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