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HL7 Domain Analysis Model: Health Quality Improvement, Release 1

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HL7 Informative Ballot

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Architecture Review Board

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QIDAM learns from and builds upon work done in several other projects and specifications including HL7 FHIR, vMR, QDM, QRDA, and CCDA. Many of the model elements and their documentation are drawn from these and other specifications.

Revision History

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# Introduction

Electronic clinical quality measures (eCQMs) and clinical decision support (CDS) artifacts are currently expressed using two different data models: eCQMs are expressed using the Quality Data Model (QDM) [1], while CDS artifacts are expressed using the Virtual Medical Record (vMR) [2]. This is unfortunate since clinical quality measurement and clinical quality improvement via clinical decision support are intimately related. While eCQMs measure the quality of care provided, CDS provides the interventions to improve the quality of care. They share common requirements in identifying patients to which a particular eCQM or CDS artifact applies.

<def name=*"Pregnancy"*>

<expression xsi:type=*"ClinicalRequest"* cardinality=*"Multiple"*

dataType=*"vmr:Problem"* codeProperty=*"problemCode"*

dateProperty=*"problemEffectiveTime.low"*

useValueSets=*"true"* subjectProperty=*"evaluatedPersonId"*>

<codes xsi:type=*"ValueSet"* id=*"2.16.840.1.113883.3.600.1622"*

authority=*"Quality Insights of Pennsylvania"*

version=*"20130614"* />

</expression>

</def>

Figure 1. Excerpt from a CDS artifact mapping the term “Pregnancy” to an element in the HL7 Virtual Medical Record schema

Figure 1 shows an excerpt from a CDS artifact in the HL7 Knowledge Artifact Schema. The excerpt illustrates the mapping of the term “Pregnancy” to problems having the codes from controlled terminologies specified in the value set. This example uses the Problem class from the vMR to define the data specification.

Figure 2. Excerpt from an eCQM artifact mapping the term “Pregnancy” to an element in the QualityData Model

Figure 2 shows an excerpt from an eCQM that maps the term “Diagnosis, Active: Pregnancy” to a QDM class of Diagnosis with the specified value set.

## Purpose

The Health Quality Improvement Domain Analysis Model (QIDAM) is a conceptual data model that can be used to create data mapping expressions, such as those illustrated above, consistently across eCQMs and CDS artifacts. It specifies the types of elements needed in the data model. More broadly, the primary purpose of the QIDAM is to serve as a model of clinical data within data mapping expressions, logical criteria, population criteria, formulae, and other expressions in health quality improvement artifacts.

The QIDAM harmonizes the existing eCQM and CDS data models into a single, unified conceptual model. This model can be mapped onto existing logical models while defining the structure and domain concepts required by eCQMs and CDS artifacts.

## Audience

The audience for this document includes knowledge workers in the health quality domains of measurement, management, and reporting as well as artifact authors and implementers, standards analysts and developers, tooling developers, and systems integrators. Readers must be familiar with object-oriented design principles and understand class diagrams in the Unified Modeling Language (UML).

## Background

Certification of electronic health record (EHR) systems to Meaningful Use Stage 2 (MU2) standards requires implementation of CDS artifacts that support improvement of approved eCQMs. The use of different data models for eCQM and CDS artifacts:

* Prevents sharing of patient data requirement specifications between eCQMs and CDS artifacts
* Requires EHR vendors to implement two different mappings from their source data
* Prevents development of shared modules that can be used for eCQM calculation and CDS artifact evaluation

Many of the current CDS standards in HL7 use the Virtual Medical Record (vMR) as the clinical data model, while eCQM standards currently use QDM as their clinical data model.

The vMR is an HL7 logical model; release 2 was published in early 2014. The logical model is defined in terms of UML class diagrams. The model draws concepts from the HL7 Clinical Statements model and uses a simplification of the HL7 version 3 datatypes release 2. Similar to the latter model, at the core of the vMR is a class known as ClinicalStatement. Concrete classes such as ProcedureEvent are derived from this abstract class. vMR also includes classes that model proposals for actions. These “proposal” classes support the output from CDS systems such as recommendations from a rule, or items in an order set.

QDM defines the model in terms of components and specifies how the components can be assembled into a data mapping expression. The components include:

* Category (e.g., Procedure, Medication, Communication)
* State (e.g., Active, Administered)
* Attribute (e.g., Dosage, Frequency, Admission Date Time)
* Timing Operators (e.g., Starts Before or During)

Thus, while the two models have significant overlap in the concepts they aim to represent, they take very different approaches. The QIDAM unifies the modeling approach and the concepts represented in these models, as described later.

## Approach

QIDAM is a conceptual model that identifies the data needs of the health quality improvement applications. Since a conceptual model for this domain does not exist, we have created a new model. This new model harmonizes the functional capabilities of vMR and QDM (and the QDM-based HQMF Implementation Guide [3]). The QIDAM does not require direct mapping from these or other physical or logical models since it is not an implementable artifact. That is, data represented in other models will not need to be transformed to QIDAM since QIDAM is conceptual. However, mapping to QIDAM may be used to determine whether a given logical or physical model can represent all of the data and concepts required for health quality improvement. This will be done via mappings from QIDAM to the logical or physical model of interest. We expect that a logical or physical model manifestation of QIDAM will be based on an appropriate existing information model so as to support interoperability with other application domains.

As sources of input to the model, document templates used for healthcare quality applications were also reviewed. Specifically, templates contained in the following specifications were used to inform QIDAM on the concepts to be modeled and their structure:

* Quality Reporting Document Architecture (QRDA) Category 1 Templates [4]
* vMR Templates [5]
* Consolidated Clinical Document Architecture (CCDA) Templates [6]

Furthermore, the model was informed by and reuses elements from the other specifications when appropriate, including

* HL7 Fast Healthcare Interoperability Resources (FHIR) Specification [7]
* Federal Health Information Model (FHIM) Specification [8]

The supplemental worksheet (QDM-vMR-cross-map.xlsx) maps amongst QIDAM, QDM [1], and vMR [2] classes. The purpose of these mappings is to assess the coverage of concepts from QDM and vMR in QIDAM. The original mapping was against the Virtual Medical Record (vMR) for Clinical Decision Support [2]; changes in the current published version of vMR Release 2 (May 2013) have been annotated in the comments column of the worksheet as appropriate.

The summary worksheet shows the mappings of the QDM data types (with QRDA-I templates) (July 2012) and QIDAM and vMR classes, with each top-level QDM category (e.g., Medication) followed by a specific state (e.g., Medication, Administered, which is mapped to the SubstanceAdministrationEvent vMR class).

The other tabs in the worksheet are associated with the appropriate QDM category (e.g., Diagnosis, Encounter, Intervention, etc.) in which each category lists the QDM attributes which are mapped to the equivalent vMR classes and attributes. The Additional Notes column notes exceptions or limitations.

Scope

The primary scope of this model is limited to the clinical data elements needed to be represented in US Realm eCQMs and CDS artifacts. The working definition of the scope is the union of the existing clinical concepts represented in QDM [1] (and, by derivation, the QDM-based HQMF Implementation Guide) and vMR [2] that are further informed by the templates specifications previously listed.

The model currently addresses concepts related to:

* Encounters
* Medication
* Procedures
* Observation results
* Conditions including findings, diagnoses, symptoms
* Allergies, intolerances, and adverse events
* Immunizations
* Nutrition and Diet
* Communication
* Care Goals
* Care Plans and Protocols

# Use Cases

We describe three use cases for QIDAM in this section:

1. Development of artifacts
2. Implementation of artifacts
3. Evaluation of artifacts

This list is not exhaustive; we have describe the most common expected uses of QIDAM. Additional uses are possible including variations of the existing use cases, e.g., implementation of artifacts in a decision-support service.

## eCQM and CDS Artifact Development

|  |  |
| --- | --- |
| **Description** | eCQM or CDS artifact author creates data specifications or action specifications. |
| **Scenario identifier** | M1 |
| **Actors** | eCQM author or CDS artifact author (called author henceforth) |
| **Pre-conditions** | 1. A data specification exists in a descriptive (free text) form in a measure or guideline (e.g., discharge medication: aspirin with dose). 2. For CDS artifacts, a care recommendation or other an action specification exists in a descriptive (free text) form in a guideline (e.g., prescribe metformin, perform serum LDL test). |
| **Actions** | 1. Author identifies the appropriate clinical concept type from the QIDAM to represent the data specification (e.g., medication) or the action. 2. Author identifies the context of the data specification (e.g., discharge) or the action and uses that to select the appropriate clinical concept class from the QIDAM. 3. Author identifies attributes of interest (e.g., medication dose) and specifies the QIDAM identifier of the attributes. |
| **Post-conditions** | The QIDAM allows for an accurate and complete definition of the data specification (e.g., discharge medication dose) or the action. The QIDAM includes appropriate attributes such as dosage, timestamps, and attributes whose values are codes from controlled terminologies that indicate the data elements of interest (e.g., for diagnosis, medication, procedure). |
| **Comments** | While the QIDAM provides attributes whose values may be codes from controlled terminologies, constraints on the codes to be used (e.g., value sets, subsets, terminologies) are outside the scope of a conceptual model. |

## eCQM and CDS Artifact Implementation

|  |  |
| --- | --- |
| **Description** | eCQM or CDS artifact implementer at a clinical site maps data specifications and action specifications defined using the QIDAM to entries in an electronic health record system, order entry system, or a clinical data repository.  This scenario applies equally to an implementer at a vendor of a complete EHR system or EHR module. |
| **Scenario identifier** | M2 |
| **Actors** | eCQM implementer or CDS artifact implementer (called implementer henceforth) |
| **Pre-conditions** | 1. A data specification exists in an eCQM or CDS artifact. The data specification maps a symbol used in the artifact to its definition in the QIDAM. 2. A CDS artifact contains a specification of an action |
| **Actions** | 1. Implementer identifies the appropriate element (a table, a class) in the target system that is equivalent to the data specification or action specification in the QIDAM. 2. Implementer uses the definition (including attribute values) to construct the equivalent data or action definition in the target environment. 3. Implementer consults this document if the meaning or purpose of a QIDAM element or attribute is unclear. 4. Implementer repeats this task for all data specifications and action specifications. |
| **Post-conditions** | Implementer correctly maps all data specifications and action specifications from the eCQM or CDS artifact to the equivalent in the target environment. |
| **Comments** | Some data specifications and action specifications may not have equivalent elements in the target environment; those will not be mapped according to the above use case. |

## eCQM and CDS Artifact Evaluation

|  |  |
| --- | --- |
| **Description** | A measure calculation system or a CDS system evaluates an eCQM or CDS artifact. The data specifications and action specifications are specified using QIDAM. |
| **Scenario identifier** | M3 |
| **Actors** | A measure calculation system or a CDS system (referred to as system in this use case) |
| **Pre-conditions** | 1. A data specification exists in an eCQM or CDS artifact. The data specification maps a symbol used in the artifact to its definition in the QIDAM. 2. A CDS artifact contains a specification of an action. 3. All the specifications in the artifacts have been mapped previously to the data schema in the system or to actions that can be executed by the system or the user of the system. See the previous use case (Section 2.2), for example. |
| **Actions** | 1. The system evaluates the CDS artifact or the eCQM. 2. When the system encounters a data specification it is able to translate the specification unambiguously into a request or query to retrieve the data. 3. The system uses the retrieved data to calculate a performance or evaluate CDS logic. 4. The CDS system may determine an action specification must be applied as a result of evaluating the logic. The system translates that specification to an executable action unambiguously. 5. The action is presented as a proposal to a user or is executed autonomously by the system. 6. The system translates all needed data specifications and action specifications. |
| **Post-conditions** | The eCQM evaluation results in a computed performance of the quality metric.  The CDS artifact evaluation results in the determination of whether a set of actions must be applied and the execution of those actions. |
| **Comments** |  |

# Requirements

This chapter describes the requirements of a domain analysis model for quality improvement. The first subsection describes the extent of the domain, i.e., the concepts to be described by the model. Subsequent subsections describe requirements related to the use of the model. The next subsection discusses the need to extend the data model beyond what is included in the standard specification. The last subsection lists items explicitly identified as being out of scope of this specification.

## Coverage

The following requirements define the domain, focus, and content of the QIDAM:

* Represents data typically found in an electronic health record of a patient that are pertinent to health quality.
* Only includes data elements used in eCQMs and CDS artifacts; omits data elements that are not used in these domains. For example:
  + Omit details of an order transmittal data flow between an EHR and ancillary systems or within an EHR itself but captures that an order was placed, when, and its status.
* Includes clinical data concepts in vMR and QDM. The model also will include relevant concepts from templates defined in vMR, QRDA, and CCDA specification.
* Represents the canonical basis of clinical concepts
  + Concepts within the model should, if at all, minimally overlap with each other
* Is suitable for extension/refinement to create specialized concepts (e.g., SurgicalProcedure extends Procedure with data about anesthesia)

## Format

The QIDAM will be a UML class diagram that is thoroughly and clearly documented. The purpose, scope, and constraints of each element in the model are described within the specification.

## Usability

The QIDAM will provide a bridge between clinical and technical users by using intuitive or clinical names for classes and attributes. Technical jargon for names will be avoided. Classes should be unambiguous, well defined, and non-overlapping so that users of the model can distinguish when to use different model elements.

Data elements in the QIDAM need to relate in a way that is intuitive to authors of eCQMs and CDS artifacts, and to users of them. Categories or classes and the states associated with them will be clearly defined.

Additional established principles of usability to be met by the QIDAM include:

* **Effectiveness** – Ensure that the model allows all users to achieve their goals accurately by building the QIDAM based on how it will be used.
* **Efficiency** – Ensure that all users will be able to use the model to achieve their goals for their context of use in an efficient manner. Having unambiguous, non-overlapping concepts aids in this efficiency. Extensibility will also aid in efficiency.
* **Familiarity** – Name QIDAM concepts in a manner familiar to users. Avoid unfamiliar technical terms.

## Computability

The QIDAM will balance the needs for understandability by humans and computability. For instance, the use of more specific attribute names will be favored except in cases where computability requirements favor more general attribute names to support consistent and correct inferencing. The following are key areas that the QIDAM needs to address:

* **Semantic clarity** – The QIDAM must represent clinical concepts and attributes in an unambiguous manner. In cases where semantic clarity and understandability by humans compete (e.g., terms familiar to clinicians but with multiple meanings), semantic clarity will trump.
* **“Just enough” concept granularity** – The model will define concepts at a level of granularity that meet the needs of the clinical community and our use cases. Granularity must also be consistent across concepts (e.g., frequency or criticality should not be specified differently from one concept to another) unless there is a reason for such differences (e.g., frequency for chemotherapy regimen is much more complex than frequency for daily aspirin).
* **Inferencing**– The QIDAM will define concept relationships (e.g., IS-A and PART-OF relationships) that support the inferencing needs of CDS systems. This includes the definition of general (broader) concepts at higher levels in a concept hierarchy that may then be composed together to represent lower-level concepts more familiar to clinicians. CDS systems may operate on these broader concepts, while eCQM or CDS artifact authors may operate on lower-level concepts.

## Interoperability

Each concept and attribute of vMR and QDM must have an unambiguous mapping to a QIDAM equivalent unless there is a justification for not doing so.

## Extensibility

The QIDAM, initially, will only address existing concepts from vMR and QDM, and will therefore not include a representation for all types of clinical data. For example, the QIDAM may include a class for DiagnosticTestResult but not for GeneticTestResult that would require specific attributes for representing genes and their variations. The QIDAM (and logical or physical models derived from it) should have a flexible design. The design should allow incorporation of new classes and attributes in the future with little to no impact on existing classes.

It is expected that gaps in the models will be addressed through the standardization process, i.e., by proposing requirements and highlighting limitations of the model in appropriate working groups in HL7, collaboratively creating solutions by modifying the standard, and getting those solutions approved through ballots and other change management procedures at HL7. However, there often is a need to incorporate additional classes and attributes into a model even before the standardization is completed. Furthermore, such additions may be needed for local or regional business requirements, even though such requirements may not warrant modifications to the national or international standard. These needs for extension may arise during the use of the logical models and physical models derived from QIDAM. Those models must be extensible by the users and implementers of the specification. As an example, the vMR, uses relatedClinicalStatement, relatedEntity, and an attribute called “attribute” in the base ClinicalStatement and Entity classes, for purposes of extension, i.e., specifying attributes by implementers that do not exist in the standard vMR model. Similar approaches are used in FHIR and Clinical Statement specifications.

We expect that the logical and physical model specifications will elucidate the mechanisms for users to extend the respective models. We strongly recommend that the extension mechanism be designed for graceful degradation. i.e., classes will degrade gracefully to the core model class that they extend. For example, a GeneticTestResult extension of a DiagnosticTestResult will still be processable by a system as a DiagnosticTestResult.

The items noted in this section are considered out of scope of the QIDAM specification.

* The approach to extending the derivative models of the QIDAM (i.e., the logical and physical models) is not part of the conceptual model, the scope of this document. Therefore, this document does not specify an extension mechanism.

# Model Overview

## Design

Approach

The core concept in the QIDAM is a class called ClinicalStatement. Patient data are represented as ClinicalStatements. The model divides clinical statements into three types:

* **StatementOfOccurrence**: This statement indicates the occurrence of an event (e.g., pneumonia) or an action (e.g., administration of digoxin) related to the patient’s health.
* **StatementOfNonOccurrence**: This statement indicates that a specified type of event or an action did not occur.
* **StatementOfUnknownOccurrence**: This statement indicates that it is unknown if a specified type of an event or action occurred.

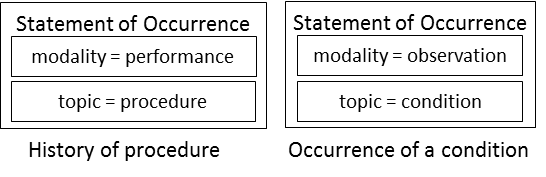
Each of these types of clinical statements, besides containing metadata about the statement, contains a topic and a modality (Figure 3). The topic is the subject matter of the statement such as a symptom, a test result, a procedure, or an immunization. The modality describes the way the topic exists, happens, or is experienced, e.g., an observation, an order, a plan. Thus, a patient’s diagnosis would be constructed as a statement of occurrence having as topic a condition and as modality an observation. Similarly, a history of a procedure would be a statement of occurrence having a procedure as the topic and performance as the modality. The figure below illustrates the examples.

Figure 3. Very high-level illustration of the structure of a Clinical Statement. The box on the left shows the design, the boxes in the middle and right illustrate examples respectively of a statement about a procedure that was performed and a statement about a condition that was observed.

The QIDAM currently defines two types of topics (Figure 4):

* **Act**: Acts are things done to a patient to assess or alter their health. Examples are treatment with a medication, measuring the blood pressure, performing a chest x-ray.
* **Observable**: Observables are elements that comprise the patient’s state of health. They typically are the result of medical examinations, investigations or diagnostics. Examples are past and present conditions (diagnoses, symptoms, findings), test results, vital sign results, allergies, prognoses.

Corresponding to the two types of topics, the QIDAM also defines two types of modalities:

* **Action**: Action describes the mode in which the act exists within a clinical statement. It defines subtypes including order and performance. Thus, statement of occurrence with a procedure act and a mode of order indicates this is an order for a procedure (to be performed). A statement of occurrence with a procedure act and a mode of peformance indicates the procedure has been or is being performed.
* **Observation**: An observation describes the mode in which an observable exists within a clinical statement. No subtypes of observation are defined, i.e., observables only exist as observations.

Figure 4. The figure illustrates schematically the relationship amongst clinical statement, its topic, and its modality.

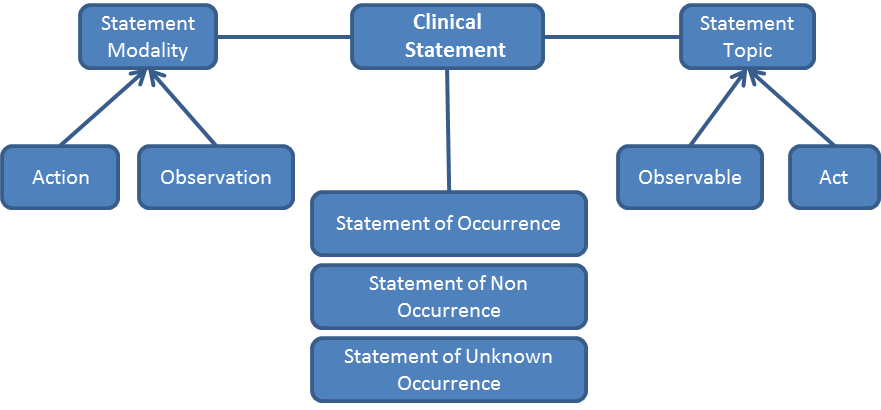
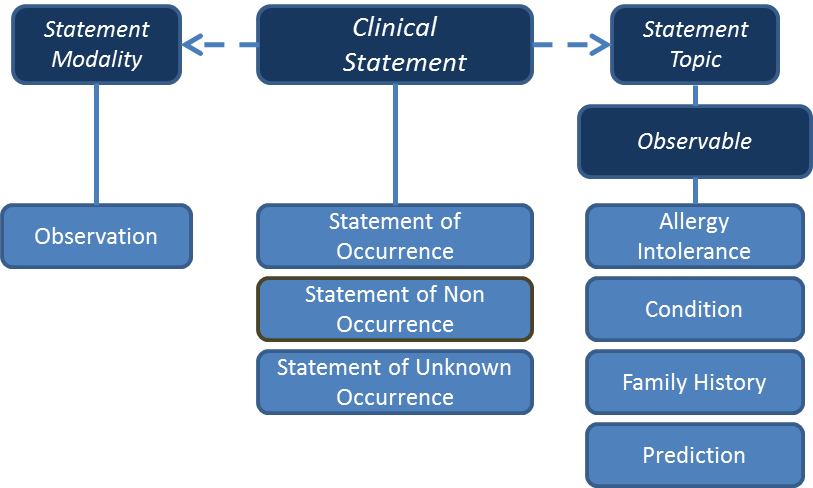
A clinical statement necessarily must match the topic to the corresponding type of modality. Thus, a statement with an observable must have an observation as a modality (Figure 5) and a statement with an act must have a subtype of an action as the modality (Figure 6).

Figure 5. This diagram depicts the components that comprise a clinical statement about an observable. Only the elements shown in the lighter boxes with non-italic fonts can be used in actual clinical statements. The elements in boxes with italic fonts are abstract that define the hierarchical structure of the model. A partial list of the Observable classes are shown here.



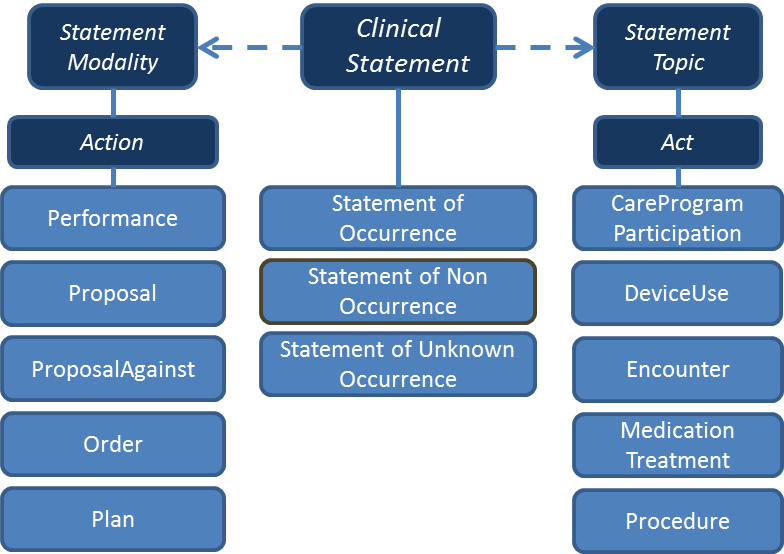


Figure 6. This diagram depicts the components that comprise a clinical statement about an act. Only the elements shown in the lighter boxes with non-italic fonts can be used in actual clinical statements. A partial list of the Act classes are shown here.

As is alluded to in the description above, the QIDAM uses a compositional design approach. That is, a clinical statement is composed or built by assembling together a clinical statement with a topic and a modality (i.e., picking one item from each column in the previous two figures). In the next two sections, we provide more details on the components of the statements about actions and observations and how they are assembled together

Statements about Actions

Clinical statements about actions are composed using a topic that is of type Act and a modality of type Action. The types of Acts within the QIDAM are

* **CareProgramParticipation**: Participation of a patient in a recognized program of care such as a care plan, a chemotherapy protocol, or a clinical trial.
* **Communication**: A message sent from a sender to a recipient. The sender and recipients can be any entity including persons and devices. Examples are an alert from a CDS system to a provider about a critical lab result, a notification to a public health authority about a patient presenting with a communicable disease, or reminder to a patient to fill their prescription.
* **DeviceUse**: Use of equipment or device for or by the patient. Examples are use of a wheelchair, a Holter monitor, a pacemaker, or an intra-uterine contraceptive device. Implanting a device is modeled as a Procedure.
* **Diet**: Constraints and components for nutrition to be administered to a patient. Examples are low-carbohydrate diet, and enteral feeding.
* **Encounter**: An interaction between a patient, healthcare provider(s) or other healthcare professionals for the purpose of providing healthcare service(s) or assessing the health status of a patient. Examples are inpatient admission, visit to an anti-coagulation clinic.
* **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. Examples are an LDL cholesterol goal of less than 100 mg/dL or a blood pressure of less than 140/90 mm Hg.
* **Immunization**: Administration of vaccines to a patient. Examples are administration of influenze vaccine and polio vaccine. This does not include the administration of non-vaccine agents, even those that may have or claim immunological effects.
* **MedicationTreatment**: Administration of medication to a patient. Examples are prescribing lovastatin 10 mg oral, administering Interferon beta-1a intramuscularly. The model includes two additional specialized types of MedicationTreatment:
  + **CompositeIntravenousMedicationAdministration**: Parameters for intravenous fluid administration that may consist of one or more additives mixed into a diluent. Example is administration of
  + **PatientControlledAnalgesia**: Analgesics administered to the patient using delivery system with which patients self-administer predetermined doses. Examples are order for or administration of morphine.
* **Procedure**: An activity that is performed with or on a patient as part of the provision of care. A procedure can be a physical 'thing' like an operation, or less invasive like counseling or hypnotherapy. Examples include surgical procedures, diagnostic procedures, endoscopic procedures, biopsies. Procedures exclude activities for which there are specific types of acts defined, such as those for immunizations, medication administrations, diet, and use of devices. The model includes the following additional specialized types of Procedures:
  + **ImagingProcedure**: An examination of a person using an imaging procedure. Examples are Chest Radiograph - PA and Lateral and Head MRI.
  + **LaboratoryTestProcedure**: A procedure to test a tissue or fluid specimen from a patient. Examples are complete blood count and blood culture.
  + **RadiotherapyProcedure**: Procedure to administer treatment using high energy radiation. An example is brachytherapy of a prostate tumor.
  + **RespiratoryCareProcedure**: Procedures that encompass supplemental oxygen. Examples are CPAP and mechanical ventilation.

QIDAM defines the following types of modalities of actions:

* **Order**: An order is an instruction by a healthcare provider to another healthcare provider to perform some action. Examples are order for a laboratory test procedure and order for a medication treatment.
* **Performance**: The actual performance or execution of a healthcare-related action. Examples are 3rd dose of Hepatitis B vaccine administered on Dec 4th 2012, appendectomy performed today.
* **Plan**: An action that is planned to be performed. Typically, this would include a time at which the action is scheduled to be performed. Examples are an appointment (which is a planned encounter) or an scheduled surgery.
* **Proposal**: An offer or a suggestion for acceptance to perform a healthcare act. A recommendation to a provider is an example of proposal made by a CDS system. Proposals must be accepted by an entity in order for it to be performed.
* **ProposalAgainst**: A suggestion to not perform a healthcare act. An example may be a recommendation against prescribing a medication because the patient has a contraindication. Note that ProposalAgainst and Contraindication (a type of Observable) are very different concepts. The latter is one reason for proposing against an act. Other reasons can be cost-effectiveness and patient’s preferences.

The modalities have a sequence: a CDS system may offer a proposal for an MRI exam; the acceptance of a proposal can lead to an order for the exam; an appointment is scheduled; and finally the exam is performed at the scheduled time. However, this sequence does not necessarily have to get followed. In fact, providers write orders without a prompt by a CDS system, many orders are fulfilled without an explicit plan being created, and many acts do not require orders if it is within the scope of the responsibility of the person carrying out the action (e.g., a physician counseling the patient on smoking cessation will not write an order, even though a CDS system may propose doing so and a quality measurement system expects a statement reflecting that such counseling was performed).

Clinical statements about actions are composed, as mentioned previously, by selecting the act topic and the action modality with a subtype of clinical statement. We illustrate the combination of modality and topic in Table 1 below. Some combinations of statements, action modalities, and act topics either do not make sense clinically, are encountered rarely, or are usually not found in a structured format in an electronic health record. Thus, not all combinations may be realized in the logical model. Determination of the allowable combinations and how those will be formally specified will be done within the scope of a subsequent project for logical model for quality improvement.

Table 1. Possible combinations of topic and modality for clinical statements about actions. The first row shows the modalities, the first column shows the different topics. cells show the possible combinations. A third dimension of this table, not shown here is the three subtypes of ClinicalStatement. Not all combinations of clinical statement subtypes, modality and topic will be realized for practical reasons as explained in the text. Due to formatting constraints, the ProposalAgainst modality is not shown and the subtopics of MedicationTreatment and Procedure are not shown in this table.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Modality →**  **Topic ↓** | **Performance** | **Order** | **Proposal** | **Plan** |
| **CareProgram Participation** | CareProgram Participation Performance | CareProgram Participation Order | CareProgram Participation Proposal | CareProgram Participation Planned |
| **Communication** | Communication Performance | Communication Order | Communication Proposal | Communication Planned |
| **Diet** | Diet Performance | Diet Order | Diet Proposal | Diet Planned |
| **DeviceUse** | DeviceUse Performance | DeviceUse Order | DeviceUse Proposal | DeviceUse Planned |
| **Encounter** | Encounter Performance | Encounter Order | Encounter Proposal | Encounter Planned |
| **Goal** | Goal Performance | Goal Order | Goal Proposal | Goal Planned |
| **Immunization** | Immunization Performance | Immunization Order | Immunization Proposal | Immunization Planned |
| **Medication Treatment** | Medication  Treatment Performance | Medication  Treatment Order | Medication  Treatment Proposal | Medication  Treatment Planned |
| **Procedure** | Procedure Performance | Procedure Order | Procedure Proposal | Procedure Planned |

Statements about Observations

Clinical statements about observations are composed using a topic of type Observable and modality of type Observation. The QIDAM contains these Observables:

* **AdverseReaction**: An unexpected reaction suspected to be related to the exposure of the subject to a substance. The substance may be a medication, immunization, food, or environmental agent. An adverse reaction can range from a mild reaction, such as a harmless rash to a severe and life-threatening condition. They can occur immediately or develop over time. For example, a patient may develop a rash after taking a sulpha medication. AdverseReactions model an actual instance of a reactions, i.e., an event, whereas AllergyIntolerance models a known susceptibility.
* **AllergyIntolerance**: Indicates that the patient has a susceptibility to an undesirable physiologic or other reaction upon exposure to a specified stimulus. This stimulus may be a substance or an activity. The reaction is not seen in most individuals who are exposed to the type and magnitude of the stimulus (e.g., the quantity of substance). Examples of AllergyIntolerance are a known allergy to penicillin, and intolerance to MRI.
* **CareExperience**: 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.
* **Condition**: Use to record detailed information about conditions, problems or diagnoses recognized by a clinician. The Condition class specifically excludes AdverseReactions and AllergyIntolerances as those are modeled in their own classes.There are many uses including: recording a Diagnosis during an Encounter; populating a Problem List or a Summary Statement, such as a Discharge Summary.
* **Contraindication**: A concern about the performance of (proposed, ongoing, or past) action, e.g., medication intake, procedure, due to a health reason. A contraindication is a specific situation in which a drug, procedure, or surgery should not be used because it may be harmful to the patient. Contraindications should not be used when the concern is administrative, e.g., lack of consent, insurance coverage. Contraindications are different from the action modality ProposalAgainst (though a contraindication may be the basis for proposing against an action). Contraindications also are different than the underlying conditions, such as pregnancy or a bleeding ulcer which may contraindicate certain medications. An example of a contraindication is for a Category X medication. The rationale is that the patient is pregnant (a condition). The contraindication might lead to a proposal against prescribing a statin.
* **FamilyHistory**: Significant health event or condition in people related to the patient, relevant in the context of care for the patient. This information can be known to different levels of accuracy. Sometimes the person can be identified ('my aunt agatha') and sometimes all that is known is that the person was an uncle. Examples of family history are “father has heart disease”, “maternal aunt had breast cancer at the age of 38 years”.
* **ObservationResult**: Assertions and measurements made about a patient. ObservationResults are a central element in healthcare, used to support diagnosis, monitor progress, determine baselines and patterns and even capture demographic characteristics. Fundamentally, observations are name/value pair assertions. ObservationResult is an abstract class. In clinical statements, one of the following subtypes must be used:
  + **SimpleObservationResult**: Measurements and simple assertions having a single value made about a patient. Examples of simple observation results are:
    - Vital signs: temperature, blood pressure, respiration rate
    - Measurements emitted by Devices
    - Personal characteristics: height, weight, eye-color
    - Social history: tobacco use, family supports, cognitive status
    - Core characteristics: blood type
    - Computed scores, Glasgow coma scale
  + **ResultGroup**: A group of related observations values bound together due to the observation being performed on the same specimen in the same time period, or in the same test. Examples are a laboratory result panel. e.g., complete blood count, and blood pressure with its systolic and diastolic values.
  + **MicrobiologySensitivityResult**: Findings of the microbiology sensitivity test. This class is used to specify traditional, culture-isolate- run susceptibilities. It is not used to specify genetic methods for organism sensitivity.
* **Prediction**: The likely course of an existing disease or condition or the likelihood for that disease or condition to occur within a specified time frame. Examples are 5-year survival for a patient having small-cell lung cancer, 10-year risk of heart disease (Framingham score), and probability of motor function recovery 1 year after spinal cord injury. Such estimates may be arrived at by using different algorithms.

Each of these Observables must be used with the Observation modality. The latter has no subtypes. As with statements about actions,the determination of the allowable combinations of ClinicalStatements and Observables (the modality is fixed to Observation since it has no subtypes) and how those will be formally specified will be done within the scope of the logical model.







Rationale for Design

The QIDAM uses a combination of inheritance and composition to construct the model elements. We found this approach well-suited to creating a structure that is easy to use in writing and evaluating expressions, enabling extensibility of the model, and resulting in an internally consistent model.

Data about a patient are modeled as concrete subclasses of ClinicalStatement. While the ClinicalStatement provide the attributes about a statement (e.g., the author, the subject, the time of the statement), the modality and topic address the concern about the “clinical content” (e.g., the procedure to be performed, the body site). Thus, a concrete subclass is composed by “plugging in” the appropriate modality and topic. By reusing the modalities and topics, we achieve consistency in the model. For example, all statements about orders have the same attributes for an order because they use the same Order modality class. This approach also allows programs to reason about Orders (for any act) in a uniform manner.

Different subtypes of Action or an Observable classes are specified as subclasses of the appropriate parent. For example, different types of procedures such as respiratory care, diagnostic imaging, and laboratory tests, each have their own sets of attributes. Thus, the Procedure act has the respective specializations: RespiratoryCare, DiagnosticImaging, and LaboratoryTest. This object-oriented design enables one to reason about the various types of actions collectively as a Procedure (e.g., procedures with sedation might include certain diagnostic imaging procedures), and as the specialized type when needed.

QIDAM separates into distinct classes, statements about actions and observations that occurred, those that did not occur, or those whose occurrence is unknown. An alternative approach used in other models is to use an attribute to make these distinctions, e.g., a negation indicator attribute is used in the HL7 Reference Information Model. For decision-support and quality measurement applications, such a modeling approach predisposes to errors in logic. As an example, consider a data criterion like “Diagnosis with code in the Stroke value set”. Since the value of the negation indicator is not specified in the criterion, the result set would include diagnoses where the diagnosis was refuted. This could lead to erroneous decision-support recommendations creating a safety hazard for the patient. The QIDAM design approach, by separating out into distinct classes, events that occurred from those that did not occur, circumvents such errors in the logic specification. Furthermore, the design approach is interoperable with other models so that data could be stored and transported in a different model, then transformed and reasoned about using the QIDAM.

## Datatypes

Since QIDAM is a conceptual data model, it provides very high-level datatypes. These datatypes will be further subtyped and have detailed attributes specified in a logical model realized from QIDAM. These are the datatypes currently used within QIDAM classes and interfaces.

Table 4. Datatypes in QIDAM

|  |  |
| --- | --- |
| **QIDAM Datatype** | **Description** |
| Code | A concept taken from a controlled terminology, such as a code from LOINC |
| Range | A range expressed over a quantity (i.e., has low and high values) |
| Ratio | A relationship between two Quantity values expressed as a numerator and a denominator. |
| Quantity | A numeric value expressing an amount, with or without units |
| Text | A string of characters, formatted or unformatted for presentation |
| TimePoint | A particular time point that may be expressed at different levels of granularity such as date or date+time (e.g., Nov 15 2013, or Nov 15 2013 11:42:07 am EST) |
| TimePeriod | An interval of time bounded by TimePoint values indicating the beginning and the ending of the period |
| Value | Any of the above types |

## Entities and Other Extended Types

QIDAM also specifies the availability of certain entities and complex datatypes. That is, QIDAM names the types but does not model them in detail in the conceptual model. The types are listed here and described in detail in the next chapter.

* BodySite
* Participant
* Entity
* EntityCharacteristic
* Location
* Manufactured Product
  + Medication
  + Vaccine
  + Nutrition Product
  + Device
* Medication Ingredient
* Organization
* Person
  + Patient
  + Practitioner
  + RelatedPerson
* Schedule
* Specimen

Cardinality and Optionality

QIDAM specifies the cardinality of attributes and connections but not the optionality. The convention used in the class diagram is as follows:

* When the cardinality is intended to be single, cardinality is not specified in the class diagram.
* When the cardinality is intended to be multiple, the cardinality is specified as “0..\*”   
  (i.e., zero to many). The zero should not be interpreted as an indication of the optionality of the attribute or connection. This constraint is more appropriately specified in a logical model.

Logical Model for Quality Improvement

Adds cardinality/optionality

Adds specific datatypes

Defines which statements will be combined and how it will be specified

Any further changes to the model to facilitate computation and transformation of the model, particularly wrt FHIR

# Model Specification

This chapter provides a complete description of the model. It lists all classes and interfaces and their attributes and connections. While the previous chapter provide an overview of QIDAM and an explanation of the design, the objective of the material in this section is to provide a comprehensive reference to the elements in the domain analysis model.

The model is specified in the form of a UML class diagram. The website <http://www.sparxsystems.com/resources/uml2_tutorial/uml2_classdiagram.html> provides an introduction to class diagrams in UML and also describes the notation used in diagrams in this chapter. In addition to the reference format in this chapter, the supplementary material of this specification includes (1) the UML diagrams in the standard XMI format, and (2) reference documentation in HTML format that might be more convenient to browse.

Model Diagrams

ActionDescriptor - (Class diagram)



ActionPhase - (Class diagram)



Core - (Class diagram)



Enactable - Immunization - (Class diagram)



Enactable-Medication - (Class diagram)



Enactable-Nutrition - (Class diagram)



Enactable-Procedure - (Class diagram)



EntitiesAndExtendedTypes - (Class diagram)



Observable - (Class diagram)



Statements-AdverseEvent - (Class diagram)



Statements-Allergy - (Class diagram)



Statements-CareExperience - (Class diagram)



Statements-CareProgram - (Class diagram)



Statements-Communication - (Class diagram)



Statements-Condition - (Class diagram)



Statements-DeviceApplication - (Class diagram)



Statements-Encounter - (Class diagram)



Statements-Goal - (Class diagram)



Statements-Immunization - (Class diagram)



Statements-Inference - (Class diagram)



Statements-Medication-1 - (Class diagram)



Statements-Medication-2 - (Class diagram)



Statements-Nutrition - (Class diagram)



Statements-Observation - (Class diagram)



Statements-Procedure-1 - (Class diagram)



Statements-Procedure-2 - (Class diagram)



## ActionNonPerformance

Type: **Class** StatementAboutAction

A statement about an action that should not be performed, was not performed, or will not be performed.

*Connections*

| **Connector** | **Source** | **Target** | **Notes** |
| --- | --- | --- | --- |
| Generalization  Source -> Destination | Public  ActionNonPerformance | Public  StatementAboutAction |  |
| Generalization  Source -> Destination | Public  ProposalToNotPerformProcedure | Public  ActionNonPerformance |  |
| Generalization  Source -> Destination | Public  ProcedureNotPerformed | Public  ActionNonPerformance |  |
| Generalization  Source -> Destination | Public  DeviceApplicationNotPerformed | Public  ActionNonPerformance |  |

## ActionPerformance

Type: **Class** StatementAboutAction

A statement about an action that is being performed, will be performed, should be performed, or was performed.

*Connections*

| **Connector** | **Source** | **Target** | **Notes** |
| --- | --- | --- | --- |
| Generalization  Source -> Destination | Public  ActionPerformance | Public  StatementAboutAction |  |
| Generalization  Source -> Destination | Public  ProcedureProposal | Public  ActionPerformance |  |
| Generalization  Source -> Destination | Public  ProcedureEvent | Public  ActionPerformance |  |
| Generalization  Source -> Destination | Public  ProcedureOrder | Public  ActionPerformance |  |
| Generalization  Source -> Destination | Public  ScheduledProcedure | Public  ActionPerformance |  |
| Generalization  Source -> Destination | Public  MedicationStatement | Public  ActionPerformance |  |
| Generalization  Source -> Destination | Public  EncounterProposal | Public  ActionPerformance |  |
| Generalization  Source -> Destination | Public  EncounterRequest | Public  ActionPerformance |  |
| Generalization  Source -> Destination | Public  ScheduledEncounter | Public  ActionPerformance |  |
| Generalization  Source -> Destination | Public  EncounterEvent | Public  ActionPerformance |  |
| Generalization  Source -> Destination | Public  MedicationDoseAdministration | Public  ActionPerformance |  |
| Generalization  Source -> Destination | Public  MedicationDispense | Public  ActionPerformance |  |
| Generalization  Source -> Destination | Public  MedicationPrescription | Public  ActionPerformance |  |
| Generalization  Source -> Destination | Public  MedicationAdministrationProposal | Public  ActionPerformance |  |
| Generalization  Source -> Destination | Public  ImmunizationProposal | Public  ActionPerformance |  |
| Generalization  Source -> Destination | Public  ImmunizationOrder | Public  ActionPerformance |  |
| Generalization  Source -> Destination | Public  ImmunizationDoseAdministration | Public  ActionPerformance |  |
| Generalization  Source -> Destination | Public  DietProposal | Public  ActionPerformance |  |
| Generalization  Source -> Destination | Public  DietOrder | Public  ActionPerformance |  |
| Generalization  Source -> Destination | Public  DietAdministration | Public  ActionPerformance |  |
| Generalization  Source -> Destination | Public  GoalProposal | Public  ActionPerformance |  |
| Generalization  Source -> Destination | Public  GoalPerformance | Public  ActionPerformance |  |
| Generalization  Source -> Destination | Public  DeviceApplicationProposal | Public  ActionPerformance |  |
| Generalization  Source -> Destination | Public  DeviceApplicationOrder | Public  ActionPerformance |  |
| Generalization  Source -> Destination | Public  DeviceApplicationPerformed | Public  ActionPerformance |  |
| Generalization  Source -> Destination | Public  CommunicationProposal | Public  ActionPerformance |  |
| Generalization  Source -> Destination | Public  CommunicationOrder | Public  ActionPerformance |  |
| Generalization  Source -> Destination | Public  CommunicationEvent | Public  ActionPerformance |  |
| Generalization  Source -> Destination | Public  ProgramParticipationProposal | Public  ActionPerformance |  |
| Generalization  Source -> Destination | Public  ProgramParticipationOrder | Public  ActionPerformance |  |
| Generalization  Source -> Destination | Public  ParticipationInProgram | Public  ActionPerformance |  |

## AdverseEvent

Type: **Class** PhenomenonPresence

An unintended result or effect of exposure to some health action, that is undesirable and/or sometimes harmful.

*Connections*

| **Connector** | **Source** | **Target** | **Notes** |
| --- | --- | --- | --- |
| Generalization  Source -> Destination | Public  AdverseEvent | Public  PhenomenonPresence |  |
| Realization  Source -> Destination | Public  AdverseEvent | Public  ConditionDescriptor |  |

Attributes

| **Attribute** | **Notes** | **Constraints and tags** |
| --- | --- | --- |
| **agent** Code  Public | An agent that causes or contributes to the allergy or intolerance, identified with as much specificity as available. Used for allergies, intolerances, and other reactions to a known agent. E.g., penicillin, peanuts, latex. | *Default:* |
| **precedingExposure** ActionPerformance  Public | An action that led to the adverse event. Examples: administration of a substance, procedure. | *Default:* |

## AllergyIntolerance

Type: **Class** PhenomenonPresence

A statement about an allergy or intolerance triggered by a known or suspected agent.

*Connections*

| **Connector** | **Source** | **Target** | **Notes** |
| --- | --- | --- | --- |
| Realization  Source -> Destination | Public  AllergyIntolerance | Public  AllergyIntoleranceDescriptor |  |
| Generalization  Source -> Destination | Public  AllergyIntolerance | Public  PhenomenonPresence |  |

## AllergyIntoleranceUnknown

Type: **Class** PhenomenonPresenceUnknown

A statement asserting that patient is unknown of having allergy or intolerance to particular agent, e.g., patient is not known to have penicillin allergy since the patient is not able to provide that information.

*Connections*

| **Connector** | **Source** | **Target** | **Notes** |
| --- | --- | --- | --- |
| Realization  Source -> Destination | Public  AllergyIntoleranceUnknown | Public  AllergyIntoleranceDescriptor |  |
| Generalization  Source -> Destination | Public  AllergyIntoleranceUnknown | Public  PhenomenonPresenceUnknown |  |

## BodySite

Type: **Class**

A location on a person's body. E.g., left breast, heart.

Attributes

| **Attribute** | **Notes** | **Constraints and tags** |
| --- | --- | --- |
| **anatomicalLocation** Code  Public | A location on a patient's body. May or may not encompass laterality. E.g., lung, left lung. | *Default:* |
| **directionality** Code  Public | This is further specification of the body part by adding directionality, such as "upper", "lower", "frontal", "medial", etc. | *Default:* |
| **laterality** Code  Public | The side of the body, from the Patient's perspective. E.g., left, right, bilateral. | *Default:* |

## CareExperience

Type: **Class** PhenomenonPresence

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. The statement's source specifies the provider of the care experience information.

*Connections*

| **Connector** | **Source** | **Target** | **Notes** |
| --- | --- | --- | --- |
| Realization  Source -> Destination | Public  CareExperience | Public  CareExperienceDescriptor |  |
| Generalization  Source -> Destination | Public  CareExperience | Public  PhenomenonPresence |  |

## ClinicalStatement

Type: **Class**

A record of something of clinical relevance that is being done, has been done, can be done, or is intended or requested to be done or of something that is or was observed about the patient.

This is an abstract class that is further specialized to describe specific statements about the patient.

*Connections*

| **Connector** | **Source** | **Target** | **Notes** |
| --- | --- | --- | --- |
| Generalization  Source -> Destination | Public  StatementAboutAction | Public  ClinicalStatement |  |
| Generalization  Source -> Destination | Public  StatementAboutObservation | Public  ClinicalStatement |  |

Attributes

| **Attribute** | **Notes** | **Constraints and tags** |
| --- | --- | --- |
| **additionalText** Text  Public | Details about the clinical statement that were not represented at all or sufficiently in one of the attributes provided in a class. These may include for example a comment, an instruction, or a note associated with the statement. | *Default:* |
| **predecessorStatement** ClinicalStatement  Public    [0..\*] | The statements about the clinical actions that caused this action or observation.  The predecessorStatement and successorStatement properties are intended to describe workflow and data flow relationships amongst statements. For example, a procedure proposal may be the predecessor to a procedure order. Similarly, an observation result (e.g., a blood glucose result) may be a successor to a laboratory test order (e.g., for a blood glucose measurement test). | *Default:* |
| **semanticType** Code  Public    [0..\*] | Maps this clinical statement type to a type specified in an external ontology or taxonomy of clinical concept types. For example, the semanticType of a statement about Condition may specify the condition as a patient-reported symptom or a problem. | *Default:* |
| **statementAuthor** Person  Public | The person who created the statement. | *Default:* |
| **statementDateTime** TimePoint  Public | The time at which the statement was made/recorded. This may not be the same time as the occurrence of the action or the observation event. | *Default:* |
| **statementSource** Entity  Public | The person, device, or other system that was the source of this statement. | *Default:* |
| **subject** Patient  Public | The patient described by this statement. | *Default:* |
| **successorStatement** ClinicalStatement  Public    [0..\*] | The actions or observations that were caused by this clinical statement.  See also the description for predecessorStatement attribute in this class. | *Default:* |

## CommunicationEvent

Type: **Class** ActionPerformance

A communication event that is occurring or has occurred. E.g., an alert that was sent, a Direct message that was sent.

*Connections*

| **Connector** | **Source** | **Target** | **Notes** |
| --- | --- | --- | --- |
| Realization  Source -> Destination | Public  CommunicationEvent | Public  Performance |  |
| Realization  Source -> Destination | Public  CommunicationEvent | Public  CommunicationDescriptor |  |
| Generalization  Source -> Destination | Public  CommunicationEvent | Public  ActionPerformance |  |

## CommunicationOrder

Type: **Class** ActionPerformance

An order to communicate. E.g., a physician requests to be notified when a lab result is available.

*Connections*

| **Connector** | **Source** | **Target** | **Notes** |
| --- | --- | --- | --- |
| Realization  Source -> Destination | Public  CommunicationOrder | Public  CommunicationDescriptor |  |
| Realization  Source -> Destination | Public  CommunicationOrder | Public  Order |  |
| Generalization  Source -> Destination | Public  CommunicationOrder | Public  ActionPerformance |  |

## CommunicationProposal

Type: **Class** ActionPerformance

A proposal to communicate. E.g., the CDS system proposes that an alert be sent to a responsible provider, the CDS system proposes that the public health agency be notified about a reportable condition.

*Connections*

| **Connector** | **Source** | **Target** | **Notes** |
| --- | --- | --- | --- |
| Realization  Source -> Destination | Public  CommunicationProposal | Public  CommunicationDescriptor |  |
| Realization  Source -> Destination | Public  CommunicationProposal | Public  ProposalFor |  |
| Generalization  Source -> Destination | Public  CommunicationProposal | Public  ActionPerformance |  |

## ConditionAbsent

Type: **Class** PhenomenonAbsence

A statement asserting that the subject was known to NOT have the condition within the duration that is specified.

*Connections*

| **Connector** | **Source** | **Target** | **Notes** |
| --- | --- | --- | --- |
| Generalization  Source -> Destination | Public  ConditionAbsent | Public  PhenomenonAbsence |  |
| Realization  Source -> Destination | Public  ConditionAbsent | Public  ConditionDescriptor |  |

## ConditionPresenceUnknown

Type: **Class** PhenomenonPresenceUnknown

A statement asserting that it is unknown if the subject had the condition within the duration that is specified.

*Connections*

| **Connector** | **Source** | **Target** | **Notes** |
| --- | --- | --- | --- |
| Realization  Source -> Destination | Public  ConditionPresenceUnknown | Public  ConditionDescriptor |  |
| Generalization  Source -> Destination | Public  ConditionPresenceUnknown | Public  PhenomenonPresenceUnknown |  |

## ConditionPresent

Type: **Class** PhenomenonPresence

A statement about a condition that the patient has or is believed to have had.

*Connections*

| **Connector** | **Source** | **Target** | **Notes** |
| --- | --- | --- | --- |
| Realization  Source -> Destination | Public  ConditionPresent | Public  ConditionDescriptor |  |
| Generalization  Source -> Destination | Public  ConditionPresent | Public  PhenomenonPresence |  |
| Aggregation  Source -> Destination | Public condition  ConditionPresent | Public  EncounterCondition | The link to the condition such as a problem |

## ContraindicationToMedication

Type: **Class** PhenomenonPresence

A patient condition or treatment in which the administration of the specified medication may lead to harm to the patient, e.g., anticoagulants are contraindicated for patients having bleeding disorders.

*Connections*

| **Connector** | **Source** | **Target** | **Notes** |
| --- | --- | --- | --- |
| Generalization  Source -> Destination | Public  ContraindicationToMedication | Public  PhenomenonPresence |  |
| Realization  Source -> Destination | Public  ContraindicationToMedication | Public  ContraindicationDescriptor |  |
| Association  Source -> Destination | Public  ContraindicationToMedication | Public contraindicatedMedication  MedicationAdministrationDescriptor | The medication that is contraindicated. |

## ContraindicationToProcedure

Type: **Class** PhenomenonPresence

A patient condition or treatment in which the performance of a procedure may lead to harm to the patient.

*Connections*

| **Connector** | **Source** | **Target** | **Notes** |
| --- | --- | --- | --- |
| Generalization  Source -> Destination | Public  ContraindicationToProcedure | Public  PhenomenonPresence |  |
| Realization  Source -> Destination | Public  ContraindicationToProcedure | Public  ContraindicationDescriptor |  |
| Association  Source -> Destination | Public  ContraindicationToProcedure | Public contraindicatedProcedure  ProcedureDescriptor | The procedure that is contraindicated. |

## Cycle

Type: **Class**

Represents a predictable periodic interval where events may occur at specific points within this interval. Examples may include:

1. An event that may occur TID.

2. An event that may occur TID but at specific times such as 8am, noon, and 3pm.

3. An event that may occur three times a day but the interval is not important.

4. An event that may occur three times a day where the interval between events must be 8hrs (Q8H).

Note that cycles may be nested. For instance,

A chemotherapy regimen where a substance is administered TID on day 1,5,10 of a 10-day cycle.

Attributes

| **Attribute** | **Notes** | **Constraints and tags** |
| --- | --- | --- |
| **cycleLagTime** Quantity  Public | Positive offset between the end of the first cycle and the start of the second one. That is, the start of the next cycle shall start after then end of the previous cycle. | *Default:* |
| **cycleLeadTime** Quantity  Public | Negative offset between the end of the previous cycle and the start of the next cycle. That is, the start of the next cycle shall start before the end of the previous cycle. | *Default:* |
| **cycleLength** Quantity  Public | The duration of the overall cycle or subcycle. | *Default:* |
| **cycleTiming** Code  Public    [0..\*] | Identifies a repeating pattern to the intended time periods such as the number of occurrences in a given time period, the days in a multi-day cycle, or a code representing the frequency of occurrence for a given cycle. | *Default:* |
| **endsOn** TimePeriod  Public | Point in time when the cycle should end. | *Default:* |
| **totalCycleCount** Quantity  Public | Number of times to repeat the cycle including the first one. When not specified, assumed to be 1. | *Default:* |

## Device

Type: **Class** ManufacturedProduct

This element identifies an instance of a manufactured thing that is used in the provision of healthcare without being substantially changed through that activity. The device may be a machine, an insert, a computer, an application, etc. This includes durable (reusable) medical equipment as well as disposable equipment used for diagnostic, treatment, and research for healthcare and public health.

*Connections*

| **Connector** | **Source** | **Target** | **Notes** |
| --- | --- | --- | --- |
| Realization  Source -> Destination | Public  Device | Public  Entity |  |
| Aggregation  Source -> Destination | Public device  Device | Public  DeviceApplicationDescriptor | The details of the device used or to be used. |
| Generalization  Source -> Destination | Public  Device | Public  ManufacturedProduct |  |

Attributes

| **Attribute** | **Notes** | **Constraints and tags** |
| --- | --- | --- |
| **location** Location  Public | The resource may be found in a literal location (i.e. GPS coordinates), a logical place (i.e. "in/with the patient"), or a coded location. | *Default:* |
| **model** Text  Public | Model identifier assigned by the manufacturer | *Default:* |
| **owner** Organization  Public | 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. | *Default:* |
| **patient** Patient  Public | Patient information, if the resource is affixed to a person. | *Default:* |
| **type** Code  Public | A code that identifies the type of device supplied with as much specificity as available. E.g., wheelchair | *Default:* |
| **url** TelecomAddress  Public | A network address on which the device may be contacted directly. | *Default:* |
| **version** Text  Public | The version of the device, if the device has multiple releases under the same model, or if the device is software or carries firmware. | *Default:* |

## DeviceApplicationNotPerformed

Type: **Class** ActionNonPerformance

The statement asserts that the device specified was not applied during the expected performance time.

*Connections*

| **Connector** | **Source** | **Target** | **Notes** |
| --- | --- | --- | --- |
| Generalization  Source -> Destination | Public  DeviceApplicationNotPerformed | Public  ActionNonPerformance |  |
| Realization  Source -> Destination | Public  DeviceApplicationNotPerformed | Public  DeviceApplicationDescriptor |  |
| Realization  Source -> Destination | Public  DeviceApplicationNotPerformed | Public  Performance |  |

## DeviceApplicationOrder

Type: **Class** ActionPerformance

A provider's order to dispense and apply the device.

*Connections*

| **Connector** | **Source** | **Target** | **Notes** |
| --- | --- | --- | --- |
| Generalization  Source -> Destination | Public  DeviceApplicationOrder | Public  ActionPerformance |  |
| Realization  Source -> Destination | Public  DeviceApplicationOrder | Public  Order |  |
| Realization  Source -> Destination | Public  DeviceApplicationOrder | Public  DeviceApplicationDescriptor |  |

## DeviceApplicationPerformed

Type: **Class** ActionPerformance

The provision of the deivce to the patient and their use of the device.

*Connections*

| **Connector** | **Source** | **Target** | **Notes** |
| --- | --- | --- | --- |
| Generalization  Source -> Destination | Public  DeviceApplicationPerformed | Public  ActionPerformance |  |
| Realization  Source -> Destination | Public  DeviceApplicationPerformed | Public  DeviceApplicationDescriptor |  |
| Realization  Source -> Destination | Public  DeviceApplicationPerformed | Public  Performance |  |

## DeviceApplicationProposal

Type: **Class** ActionPerformance

Proposal, e.g., by a CDS system, for the specified device to be applied

*Connections*

| **Connector** | **Source** | **Target** | **Notes** |
| --- | --- | --- | --- |
| Generalization  Source -> Destination | Public  DeviceApplicationProposal | Public  ActionPerformance |  |
| Realization  Source -> Destination | Public  DeviceApplicationProposal | Public  ProposalFor |  |
| Realization  Source -> Destination | Public  DeviceApplicationProposal | Public  DeviceApplicationDescriptor |  |

## DietAdministration

Type: **Class** ActionPerformance

The event of administering one or more items of nutrition.

*Connections*

| **Connector** | **Source** | **Target** | **Notes** |
| --- | --- | --- | --- |
| Realization  Source -> Destination | Public  DietAdministration | Public  NutritionDescriptor |  |
| Generalization  Source -> Destination | Public  DietAdministration | Public  ActionPerformance |  |
| Realization  Source -> Destination | Public  DietAdministration | Public  Performance |  |

## DietOrder

Type: **Class** ActionPerformance

An order to administer the specified type of nutrition to the patient

*Connections*

| **Connector** | **Source** | **Target** | **Notes** |
| --- | --- | --- | --- |
| Generalization  Source -> Destination | Public  DietOrder | Public  ActionPerformance |  |
| Realization  Source -> Destination | Public  DietOrder | Public  NutritionDescriptor |  |
| Realization  Source -> Destination | Public  DietOrder | Public  Order |  |

## DietProposal

Type: **Class** ActionPerformance

Proposal or recommendation to administer the specified type of nutrition to the patient

*Connections*

| **Connector** | **Source** | **Target** | **Notes** |
| --- | --- | --- | --- |
| Generalization  Source -> Destination | Public  DietProposal | Public  ActionPerformance |  |
| Realization  Source -> Destination | Public  DietProposal | Public  ProposalFor |  |
| Realization  Source -> Destination | Public  DietProposal | Public  NutritionDescriptor |  |

## EncounterCondition

Type: **Class**

A condition that is considered within the encounter and the role that the condition played within the encounter, e.g., diagnosis at discharge

*Connections*

| **Connector** | **Source** | **Target** | **Notes** |
| --- | --- | --- | --- |
| Aggregation  Source -> Destination | Public relatedCondition  EncounterCondition | Public  EncounterEvent | The conditions considered and cared for within this encounter. |
| Aggregation  Source -> Destination | Public condition  ConditionPresent | Public  EncounterCondition | The link to the condition such as a problem |

Attributes

| **Attribute** | **Notes** | **Constraints and tags** |
| --- | --- | --- |
| **conditionRole** Code  Public | The role of the condition within this encounter, e.g., chief complaint, admission diagnosis, discharge diagnosis, comorbidity | *Default:* |

## EncounterEvent

Type: **Class** ActionPerformance

EncounterEvent is the record of an interaction between a subject and the healthcare system.

*Connections*

| **Connector** | **Source** | **Target** | **Notes** |
| --- | --- | --- | --- |
| Generalization  Source -> Destination | Public  EncounterEvent | Public  ActionPerformance |  |
| Realization  Source -> Destination | Public  EncounterEvent | Public  EncounterDescriptor |  |
| Realization  Source -> Destination | Public  EncounterEvent | Public  Performance |  |
| Aggregation  Source -> Destination | Public relatedCondition  EncounterCondition | Public  EncounterEvent | The conditions considered and cared for within this encounter. |

## EncounterProposal

Type: **Class** ActionPerformance

A proposal for an encounter to take place between a patient and a provider, e.g., a proposed referral, a proposed hospitalization.

*Connections*

| **Connector** | **Source** | **Target** | **Notes** |
| --- | --- | --- | --- |
| Generalization  Source -> Destination | Public  EncounterProposal | Public  ActionPerformance |  |
| Realization  Source -> Destination | Public  EncounterProposal | Public  EncounterDescriptor |  |
| Realization  Source -> Destination | Public  EncounterProposal | Public  ProposalFor |  |

## EncounterRequest

Type: **Class** ActionPerformance

A request or order by a provider for an encounter, e.g., an admission order, a referral request.

*Connections*

| **Connector** | **Source** | **Target** | **Notes** |
| --- | --- | --- | --- |
| Generalization  Source -> Destination | Public  EncounterRequest | Public  ActionPerformance |  |
| Realization  Source -> Destination | Public  EncounterRequest | Public  EncounterDescriptor |  |
| Realization  Source -> Destination | Public  EncounterRequest | Public  Order |  |

## EntityCharacteristic

Type: **Class**

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

*Connections*

| **Connector** | **Source** | **Target** | **Notes** |
| --- | --- | --- | --- |
| Aggregation  Source -> Destination | Public characteristic  EntityCharacteristic | Public  Entity | The characteristics of this entity. |

Attributes

| **Attribute** | **Notes** | **Constraints and tags** |
| --- | --- | --- |
| **code** Code  Public | A code specifying the characteristic or feature | *Default:* |
| **presence** YesNo  Public | Whether the characteristic is present or absent | *Default:* |

## FamilyHistoryConditionAbsent

Type: **Class** PhenomenonAbsence

A statement asserting that the condition is not present in a family member

*Connections*

| **Connector** | **Source** | **Target** | **Notes** |
| --- | --- | --- | --- |
| Generalization  Source -> Destination | Public  FamilyHistoryConditionAbsent | Public  PhenomenonAbsence |  |
| Realization  Source -> Destination | Public  FamilyHistoryConditionAbsent | Public  FamilyHistoryDescriptor |  |

## FamilyHistoryConditionPresent

Type: **Class** PhenomenonPresence

A statement asserting the presence of a condition in a family member

*Connections*

| **Connector** | **Source** | **Target** | **Notes** |
| --- | --- | --- | --- |
| Realization  Source -> Destination | Public  FamilyHistoryConditionPresent | Public  FamilyHistoryDescriptor |  |
| Generalization  Source -> Destination | Public  FamilyHistoryConditionPresent | Public  PhenomenonPresence |  |

## FamilyHistoryConditionUnknown

Type: **Class** PhenomenonPresenceUnknown

A statement asserting that it is unknown if a condition is present in a family member.

*Connections*

| **Connector** | **Source** | **Target** | **Notes** |
| --- | --- | --- | --- |
| Generalization  Source -> Destination | Public  FamilyHistoryConditionUnknown | Public  PhenomenonPresenceUnknown |  |
| Realization  Source -> Destination | Public  FamilyHistoryConditionUnknown | Public  FamilyHistoryDescriptor |  |

## GoalPerformance

Type: **Class** ActionPerformance

The pursuit of a goal established for the patient. E.g., achieve and maintain LDL < 100

*Connections*

| **Connector** | **Source** | **Target** | **Notes** |
| --- | --- | --- | --- |
| Realization  Source -> Destination | Public  GoalPerformance | Public  GoalDescriptor |  |
| Realization  Source -> Destination | Public  GoalPerformance | Public  Performance |  |
| Generalization  Source -> Destination | Public  GoalPerformance | Public  ActionPerformance |  |

## GoalProposal

Type: **Class** ActionPerformance

Proposal, e.g., by a CDS system, for establishing the goal specified.

*Connections*

| **Connector** | **Source** | **Target** | **Notes** |
| --- | --- | --- | --- |
| Generalization  Source -> Destination | Public  GoalProposal | Public  ActionPerformance |  |
| Realization  Source -> Destination | Public  GoalProposal | Public  ProposalFor |  |
| Realization  Source -> Destination | Public  GoalProposal | Public  GoalDescriptor |  |

## ImmunizationDoseAdministration

Type: **Class** ActionPerformance

The administration of a dose of a vaccine.

*Connections*

| **Connector** | **Source** | **Target** | **Notes** |
| --- | --- | --- | --- |
| Realization  Source -> Destination | Public  ImmunizationDoseAdministration | Public  ImmunizationDescriptor |  |
| Realization  Source -> Destination | Public  ImmunizationDoseAdministration | Public  Performance |  |
| Generalization  Source -> Destination | Public  ImmunizationDoseAdministration | Public  ActionPerformance |  |

Attributes

| **Attribute** | **Notes** | **Constraints and tags** |
| --- | --- | --- |
| **reported** Code  Public | True if this statement describes the reported prior administration of a dose of vaccine rather than directly administered | *Default:* |

## ImmunizationOrder

Type: **Class** ActionPerformance

Order to administer a vaccine dose

*Connections*

| **Connector** | **Source** | **Target** | **Notes** |
| --- | --- | --- | --- |
| Generalization  Source -> Destination | Public  ImmunizationOrder | Public  ActionPerformance |  |
| Realization  Source -> Destination | Public  ImmunizationOrder | Public  ImmunizationDescriptor |  |
| Realization  Source -> Destination | Public  ImmunizationOrder | Public  Order |  |

## ImmunizationProposal

Type: **Class** ActionPerformance

Proposal or recommendation to administer a vaccine dose, e.g., dose 2 of DTaP

*Connections*

| **Connector** | **Source** | **Target** | **Notes** |
| --- | --- | --- | --- |
| Realization  Source -> Destination | Public  ImmunizationProposal | Public  ImmunizationDescriptor |  |
| Realization  Source -> Destination | Public  ImmunizationProposal | Public  ProposalFor |  |
| Generalization  Source -> Destination | Public  ImmunizationProposal | Public  ActionPerformance |  |

## Location

Type: **Class**

Details for a physical place where services are provided and resources and participants may be stored, found, contained or accommodated.

A Location includes both incidental locations (a place which is used for healthcare without prior designation or authorization) and dedicated, formally appointed locations. Locations may be private, public, mobile or fixed and scale from small freezers to full hospital buildings or parking garages.

Examples of Locations are:

Building, ward, corridor or room

Freezer, incubator

Vehicle or lift

Home, shed, or a garage

Road, parking place, a park

Attributes

| **Attribute** | **Notes** | **Constraints and tags** |
| --- | --- | --- |
| **address** Address  Public | An address for the location. | *Default:* |
| **function** Code  Public | Indicates the type of function performed at the location. | *Default:* |
| **name** Text  Public | A name for the location. Does not need to be unique. | *Default:* |
| **partOf** Location  Public | Another Location which this Location is physically part of. | *Default:* |
| **telecom** TelecomAddress  Public | The contact details of communication devices available at the location. This can include phone numbers, fax numbers, mobile numbers, email addresses and web sites. | *Default:* |

## ManufacturedProduct

Type: **Class**

Description of a product used in the care of a patient.

*Connections*

| **Connector** | **Source** | **Target** | **Notes** |
| --- | --- | --- | --- |
| Generalization  Source -> Destination | Public  Medication | Public  ManufacturedProduct |  |
| Generalization  Source -> Destination | Public  NutritionProduct | Public  ManufacturedProduct |  |
| Generalization  Source -> Destination | Public  Device | Public  ManufacturedProduct |  |
| Generalization  Source -> Destination | Public  Vaccine | Public  ManufacturedProduct |  |

Attributes

| **Attribute** | **Notes** | **Constraints and tags** |
| --- | --- | --- |
| **expiry** TimePoint  Public | Date of expiry of this product (if applicable). | *Default:* |
| **lotNumber** Text  Public | Lot number assigned by the manufacturer. | *Default:* |
| **manufacturerName** Text  Public | Name of the manufacturer of the product | *Default:* |

## Medication

Type: **Class** ManufacturedProduct

Primarily used for identification and definition of Medication, but also covers ingredients and packaging.

*Connections*

| **Connector** | **Source** | **Target** | **Notes** |
| --- | --- | --- | --- |
| Generalization  Source -> Destination | Public  Medication | Public  ManufacturedProduct |  |
| Aggregation  Source -> Destination | Public ingredient  MedicationIngredient | Public  Medication | A constituent of interest in the medication product (e.g., sulfamethoxazole 800 mg) |

Attributes

| **Attribute** | **Notes** | **Constraints and tags** |
| --- | --- | --- |
| **code** Code  Public | A code (or set of codes) that identify this medication. Usage note: This could be a standard drug code such as a drug regulator code, RxNorm code, SNOMED CT code, etc. It could also be a local formulary code, optionally with translations to the standard drug codes. | *Default:* |
| **form** Code  Public | Describes the form of the item. Powder; tables; carton. | *Default:* |
| **isBrand** YesNo  Public | Set to true if the item is attributable to a specific manufacturer | *Default:* |

## MedicationAdministrationProposal

Type: **Class** ActionPerformance

An proposal to supply and/or administer a medication to a patient.

*Connections*

| **Connector** | **Source** | **Target** | **Notes** |
| --- | --- | --- | --- |
| Realization  Source -> Destination | Public  MedicationAdministrationProposal | Public  ProposalFor |  |
| Realization  Source -> Destination | Public  MedicationAdministrationProposal | Public  MedicationAdministrationDescriptor |  |
| Generalization  Source -> Destination | Public  MedicationAdministrationProposal | Public  ActionPerformance |  |

## MedicationDispense

Type: **Class** ActionPerformance

Dispensing a medication to a patient. This includes a description of the supply provided and the instructions for administering the medication.

*Connections*

| **Connector** | **Source** | **Target** | **Notes** |
| --- | --- | --- | --- |
| Generalization  Source -> Destination | Public  MedicationDispense | Public  ActionPerformance |  |
| Realization  Source -> Destination | Public  MedicationDispense | Public  MedicationAdministrationDescriptor |  |
| Realization  Source -> Destination | Public  MedicationDispense | Public  Performance |  |

## MedicationDoseAdministration

Type: **Class** ActionPerformance

Describes the event of a patient being given a dose of a medication. This may be as simple as swallowing a tablet or it may be a long running infusion. Related resources tie this event to the authorizing prescription, and the specific encounter between patient and health care practitioner.

*Connections*

| **Connector** | **Source** | **Target** | **Notes** |
| --- | --- | --- | --- |
| Generalization  Source -> Destination | Public  MedicationDoseAdministration | Public  ActionPerformance |  |
| Realization  Source -> Destination | Public  MedicationDoseAdministration | Public  Performance |  |
| Realization  Source -> Destination | Public  MedicationDoseAdministration | Public  MedicationAdministrationDescriptor |  |

## MedicationIngredient

Type: **Class**

The composition of the medication.

*Connections*

| **Connector** | **Source** | **Target** | **Notes** |
| --- | --- | --- | --- |
| Aggregation  Source -> Destination | Public ingredient  MedicationIngredient | Public  Medication | A constituent of interest in the medication product (e.g., sulfamethoxazole 800 mg) |

Attributes

| **Attribute** | **Notes** | **Constraints and tags** |
| --- | --- | --- |
| **amount** Quantity  Public | How many (or how much) of the items there are in this Medication. E.g. 250 mg per tablet. | *Default:* |
| **item** Code  Public | The actual ingredient item that makes up this medication. | *Default:* |

## MedicationPrescription

Type: **Class** ActionPerformance

An order for both supply of the medication and the instructions for administration of the medicine to a patient.

*Connections*

| **Connector** | **Source** | **Target** | **Notes** |
| --- | --- | --- | --- |
| Generalization  Source -> Destination | Public  MedicationPrescription | Public  ActionPerformance |  |
| Realization  Source -> Destination | Public  MedicationPrescription | Public  MedicationAdministrationDescriptor |  |
| Realization  Source -> Destination | Public  MedicationPrescription | Public  Order |  |

## MedicationStatement

Type: **Class** ActionPerformance

This is a record of medication being taken by a patient, or that the medication has been given to a patient where the record is the result of a report from the patient, or a clinician. A medication statement is not a part of the prescribe->dispense->administer sequence but is a report that such a sequence (or at least a part of it) did take place resulting in a belief that the patient has received a particular medication.

*Connections*

| **Connector** | **Source** | **Target** | **Notes** |
| --- | --- | --- | --- |
| Generalization  Source -> Destination | Public  MedicationStatement | Public  ActionPerformance |  |
| Realization  Source -> Destination | Public  MedicationStatement | Public  Performance |  |
| Realization  Source -> Destination | Public  MedicationStatement | Public  MedicationAdministrationDescriptor |  |

## NoAdverseEvent

Type: **Class** PhenomenonAbsence

Although the patient was exposed to the action, no adverse event was observed.

*Connections*

| **Connector** | **Source** | **Target** | **Notes** |
| --- | --- | --- | --- |
| Generalization  Source -> Destination | Public  NoAdverseEvent | Public  PhenomenonAbsence |  |
| Realization  Source -> Destination | Public  NoAdverseEvent | Public  ConditionDescriptor |  |

Attributes

| **Attribute** | **Notes** | **Constraints and tags** |
| --- | --- | --- |
| **agent** Code  Public | An agent that causes or contributes to the allergy or intolerance, identified with as much specificity as available. Used for allergies, intolerances, and other reactions to a known agent. E.g., penicillin, peanuts, latex. | *Default:* |
| **precedingExposure** ActionPerformance  Public | An action that led to the adverse event. Examples: administration of a substance, procedure. | *Default:* |

## NoAllergyIntolerance

Type: **Class** PhenomenonAbsence

A statement asserting that the subject is not known to have an allergy or intolerance to the specified substance or group of substances.

Example. no allergy to penicillin, no known drug allergy.

When the statement asserts an allergy to a broad group such as "no known drug allergy", or more generally "no known to a class of substance", the stimulus attribute's value will indicate this broad group.

*Connections*

| **Connector** | **Source** | **Target** | **Notes** |
| --- | --- | --- | --- |
| Realization  Source -> Destination | Public  NoAllergyIntolerance | Public  AllergyIntoleranceDescriptor |  |
| Generalization  Source -> Destination | Public  NoAllergyIntolerance | Public  PhenomenonAbsence |  |

## NutritionProduct

Type: **Class** ManufacturedProduct

A manufactured item that is administered for a patient's nutrition

*Connections*

| **Connector** | **Source** | **Target** | **Notes** |
| --- | --- | --- | --- |
| Generalization  Source -> Destination | Public  NutritionProduct | Public  ManufacturedProduct |  |

Attributes

| **Attribute** | **Notes** | **Constraints and tags** |
| --- | --- | --- |
| **attribute** Code  Public    [0..\*] | A set of codes that define traits of the product, e.g., spicy food | *Default:* |
| **type** Code  Public | A code that indicates the general classification of the product. This can be a class of products (e.g. Vegetables), a specific product (e.g. Broccoli). | *Default:* |

## ObservationResult

Type: **Class** PhenomenonPresence

A statement containing an observation result.

*Connections*

| **Connector** | **Source** | **Target** | **Notes** |
| --- | --- | --- | --- |
| Realization  Source -> Destination | Public  ObservationResult | Public  ObservationResultDescriptor |  |
| Generalization  Source -> Destination | Public  ObservationResult | Public  PhenomenonPresence |  |

## Organization

Type: **Class**

A formally or informally recognized grouping of people or organizations formed for the purpose of achieving some form of collective action. Includes companies, institutions, corporations, departments, community groups, healthcare practice groups, etc.

*Connections*

| **Connector** | **Source** | **Target** | **Notes** |
| --- | --- | --- | --- |
| Realization  Source -> Destination | Public  Organization | Public  Entity |  |

Attributes

| **Attribute** | **Notes** | **Constraints and tags** |
| --- | --- | --- |
| **address** Address  Public | The place or the name of the place where a organization is located or may be reached. | *Default:* |
| **name** Text  Public | A name by which the organization is known. | *Default:* |
| **telecom** TelecomAddress  Public | A locatable resource of the organization such as a web page, a telephone number (voice, fax or some other resource mediated by telecommunication equipment), an e-mail address, or any other locatable resource. | *Default:* |
| **type** Code  Public | The kind of organization that this is., e.g., hospital, long-term care facility, hospital department, government agency, educational institution. | *Default:* |

## Participant

Type: **Class**

Person playing a specified role in an action.

Attributes

| **Attribute** | **Notes** | **Constraints and tags** |
| --- | --- | --- |
| **individual** Person  Public | The healthcare professional or related person participating in the encounter. | *Default:* |
| **participantRole** Code  Public    [0..\*] | Role of participant in encounter, e.g., admitter, attending, primary care physician | *Default:* |

## ParticipationInProgram

Type: **Class** ActionPerformance

The actual participation of the patient in a care program. The performedAtTime attribute specifies the

*Connections*

| **Connector** | **Source** | **Target** | **Notes** |
| --- | --- | --- | --- |
| Realization  Source -> Destination | Public  ParticipationInProgram | Public  CareProgramParticipationDescriptor |  |
| Realization  Source -> Destination | Public  ParticipationInProgram | Public  Performance |  |
| Generalization  Source -> Destination | Public  ParticipationInProgram | Public  ActionPerformance |  |

## Patient

Type: **Class** Person

Demographics and other administrative information about a person receiving care or other health-related services.

The data in the element covers the "who" information about the patient: it's attributes are focused on the demographic information necessary to support the administrative, financial and logistic procedures.

*Connections*

| **Connector** | **Source** | **Target** | **Notes** |
| --- | --- | --- | --- |
| Generalization  Source -> Destination | Public  Patient | Public  Person |  |

Attributes

| **Attribute** | **Notes** | **Constraints and tags** |
| --- | --- | --- |
| **ethnicity** Code  Public | The person's ethnicity. An ethnicity or ethnic group is a group of people whose members identify with each other through a common heritage. E.g., Hispanic. | *Default:* |
| **isDeceased** YesNo  Public | Whether the patient is deceased. | *Default:* |
| **maritalStatus** Code  Public | The patient's most recent marital (civil) status. | *Default:* |
| **race** Code  Public | The person's race. Race is a classification of humans into large groups by various factors, such as heritable phenotypic characteristics or geographic ancestry. E.g., White, Asian. | *Default:* |
| **timeOfDeath** TimePoint  Public | The time when the patient died. | *Default:* |

## Person

Type: **Class**

Demographic and identification information for an individual.

Additional attributes to be added in future versions.

*Connections*

| **Connector** | **Source** | **Target** | **Notes** |
| --- | --- | --- | --- |
| Realization  Source -> Destination | Public  Person | Public  Entity |  |
| Generalization  Source -> Destination | Public  Practitioner | Public  Person |  |
| Generalization  Source -> Destination | Public  RelatedPerson | Public  Person |  |
| Generalization  Source -> Destination | Public  Patient | Public  Person |  |

Attributes

| **Attribute** | **Notes** | **Constraints and tags** |
| --- | --- | --- |
| **address** Address  Public | The place or the name of the place where a person is located or may be reached. | *Default:* |
| **birthTime** TimePoint  Public | The date and time of birth for the individual. | *Default:* |
| **gender** Code  Public | Administrative Gender - the gender that the patient is considered to have for administration and record keeping purposes. | *Default:* |
| **name** Text  Public | A name by which the patient is known. | *Default:* |
| **telecom** TelecomAddress  Public | A locatable resource of a person such as a web page, a telephone number (voice, fax or some other resource mediated by telecommunication equipment), an e-mail address, or any other locatable resource. | *Default:* |

## PhenomenonAbsence

Type: **Class** StatementAboutObservation

An observation asserting that a phenomenon is not present, e.g., no headache.

Note that this is different than stating that an action was not conducted to assess the value or presence of a phenomenon. Such a statement would be specified as a subtype of an ActionNonPerformance.

*Connections*

| **Connector** | **Source** | **Target** | **Notes** |
| --- | --- | --- | --- |
| Generalization  Source -> Destination | Public  PhenomenonAbsence | Public  StatementAboutObservation |  |
| Generalization  Source -> Destination | Public  NoAllergyIntolerance | Public  PhenomenonAbsence |  |
| Generalization  Source -> Destination | Public  NoAdverseEvent | Public  PhenomenonAbsence |  |
| Generalization  Source -> Destination | Public  ConditionAbsent | Public  PhenomenonAbsence |  |
| Generalization  Source -> Destination | Public  FamilyHistoryConditionAbsent | Public  PhenomenonAbsence |  |

## PhenomenonPresence

Type: **Class** StatementAboutObservation

An observation asserting the presence or value of a phenomenon.

*Connections*

| **Connector** | **Source** | **Target** | **Notes** |
| --- | --- | --- | --- |
| Generalization  Source -> Destination | Public  PhenomenonPresence | Public  StatementAboutObservation |  |
| Generalization  Source -> Destination | Public  AllergyIntolerance | Public  PhenomenonPresence |  |
| Generalization  Source -> Destination | Public  ContraindicationToProcedure | Public  PhenomenonPresence |  |
| Generalization  Source -> Destination | Public  ContraindicationToMedication | Public  PhenomenonPresence |  |
| Generalization  Source -> Destination | Public  FamilyHistoryConditionPresent | Public  PhenomenonPresence |  |
| Generalization  Source -> Destination | Public  Prognosis | Public  PhenomenonPresence |  |
| Generalization  Source -> Destination | Public  AdverseEvent | Public  PhenomenonPresence |  |
| Generalization  Source -> Destination | Public  ObservationResult | Public  PhenomenonPresence |  |
| Generalization  Source -> Destination | Public  ConditionPresent | Public  PhenomenonPresence |  |
| Generalization  Source -> Destination | Public  CareExperience | Public  PhenomenonPresence |  |

## PhenomenonPresenceUnknown

Type: **Class** StatementAboutObservation

An observation asserting that the presence or absence of phenomenon is unknown, e.g., unknown if patient has diabetes.

*Connections*

| **Connector** | **Source** | **Target** | **Notes** |
| --- | --- | --- | --- |
| Generalization  Source -> Destination | Public  PhenomenonPresenceUnknown | Public  StatementAboutObservation |  |
| Generalization  Source -> Destination | Public  ConditionPresenceUnknown | Public  PhenomenonPresenceUnknown |  |
| Generalization  Source -> Destination | Public  FamilyHistoryConditionUnknown | Public  PhenomenonPresenceUnknown |  |
| Generalization  Source -> Destination | Public  AllergyIntoleranceUnknown | Public  PhenomenonPresenceUnknown |  |

## Practitioner

Type: **Class** Person

Demographics and qualification information for an individual who is directly or indirectly involved in the provisioning of healthcare.

Practitioner covers all individuals who are engaged in the healthcare process and healthcare-related services as part of their professional responsibilities. This class is used for attribution of activities and responsibilities to these individuals. Practitioners include (but are not limited to):

* physicians, dentists, pharmacists
* physician assistants, nurses, scribes
* midwives, dietitians, therapists, optometrists, paramedics
* medical technicians, laboratory scientists, prosthetic technicians, radiographers
* social workers, professional home carers, official volunteers
* receptionists handling patient registration
* IT personnel merging or unmerging patient records

*Connections*

| **Connector** | **Source** | **Target** | **Notes** |
| --- | --- | --- | --- |
| Generalization  Source -> Destination | Public  Practitioner | Public  Person |  |

Attributes

| **Attribute** | **Notes** | **Constraints and tags** |
| --- | --- | --- |
| **organization** Organization  Public | The organization that the practitioner represents. | *Default:* |
| **role** Code  Public    [0..\*] | Roles which this practitioner is authorized perform for the organization. | *Default:* |
| **speciality** Code  Public    [0..\*] | The professional specialty of the practitioner, e..g, cardiologist, midwife | *Default:* |

## ProcedureEvent

Type: **Class** ActionPerformance

The actual event of performing a procedure.

*Connections*

| **Connector** | **Source** | **Target** | **Notes** |
| --- | --- | --- | --- |
| Realization  Source -> Destination | Public  ProcedureEvent | Public  Performance |  |
| Realization  Source -> Destination | Public  ProcedureEvent | Public  ProcedureDescriptor |  |
| Generalization  Source -> Destination | Public  ProcedureEvent | Public  ActionPerformance |  |

## ProcedureNotPerformed

Type: **Class** ActionNonPerformance

The statement asserts that the procedure specified in procedureCode was not performed during the expectedPerformanceTime.

*Connections*

| **Connector** | **Source** | **Target** | **Notes** |
| --- | --- | --- | --- |
| Realization  Source -> Destination | Public  ProcedureNotPerformed | Public  ProcedureDescriptor |  |
| Realization  Source -> Destination | Public  ProcedureNotPerformed | Public  Performance |  |
| Generalization  Source -> Destination | Public  ProcedureNotPerformed | Public  ActionNonPerformance |  |

## ProcedureOrder

Type: **Class** ActionPerformance

An order for procedure to be performed.

*Connections*

| **Connector** | **Source** | **Target** | **Notes** |
| --- | --- | --- | --- |
| Generalization  Source -> Destination | Public  ProcedureOrder | Public  ActionPerformance |  |
| Realization  Source -> Destination | Public  ProcedureOrder | Public  ProcedureDescriptor |  |
| Realization  Source -> Destination | Public  ProcedureOrder | Public  Order |  |

## ProcedureProposal

Type: **Class** ActionPerformance

Proposals for a procedure to take place, e.g., generated by a CDS system or by a consulting clinician.

*Connections*

| **Connector** | **Source** | **Target** | **Notes** |
| --- | --- | --- | --- |
| Generalization  Source -> Destination | Public  ProcedureProposal | Public  ActionPerformance |  |
| Realization  Source -> Destination | Public  ProcedureProposal | Public  ProcedureDescriptor |  |
| Realization  Source -> Destination | Public  ProcedureProposal | Public  ProposalFor |  |

## Prognosis

Type: **Class** PhenomenonPresence

A statement forecasting the course or probable outcome of a condition in a specified time period, e.g., recovery of function after a spinal cord injury, risk of heart disease in the next 10 years, survival from cancer

*Connections*

| **Connector** | **Source** | **Target** | **Notes** |
| --- | --- | --- | --- |
| Realization  Source -> Destination | Public  Prognosis | Public  ConditionLikelihoodDescriptor |  |
| Generalization  Source -> Destination | Public  Prognosis | Public  PhenomenonPresence |  |

## ProgramParticipationOrder

Type: **Class** ActionPerformance

An order to enroll a patient in a care program

*Connections*

| **Connector** | **Source** | **Target** | **Notes** |
| --- | --- | --- | --- |
| Realization  Source -> Destination | Public  ProgramParticipationOrder | Public  CareProgramParticipationDescriptor |  |
| Realization  Source -> Destination | Public  ProgramParticipationOrder | Public  Order |  |
| Generalization  Source -> Destination | Public  ProgramParticipationOrder | Public  ActionPerformance |  |

## ProgramParticipationProposal

Type: **Class** ActionPerformance

A proposal to enroll a patient in a care program.

*Connections*

| **Connector** | **Source** | **Target** | **Notes** |
| --- | --- | --- | --- |
| Realization  Source -> Destination | Public  ProgramParticipationProposal | Public  CareProgramParticipationDescriptor |  |
| Realization  Source -> Destination | Public  ProgramParticipationProposal | Public  ProposalFor |  |
| Generalization  Source -> Destination | Public  ProgramParticipationProposal | Public  ActionPerformance |  |

## ProposalToNotPerformProcedure

Type: **Class** ActionNonPerformance

A proposal or a recommendation that a procedure NOT be performed.

*Connections*

| **Connector** | **Source** | **Target** | **Notes** |
| --- | --- | --- | --- |
| Realization  Source -> Destination | Public  ProposalToNotPerformProcedure | Public  ProcedureDescriptor |  |
| Realization  Source -> Destination | Public  ProposalToNotPerformProcedure | Public  ProposalAgainst |  |
| Generalization  Source -> Destination | Public  ProposalToNotPerformProcedure | Public  ActionNonPerformance |  |

## RelatedPerson

Type: **Class** Person

Information about a person that is involved in the care for a patient, but who is not the target of healthcare, nor has a professional responsibility in the care process.

RelatedPersons typically have a personal or non-healthcare-specific professional relationship to the patient. A RelatedPerson element is primarily used for attribution of information, since RelatedPersons are often a source of information about the patient. Example RelatedPersons are:

* A patient's wife or husband
* A patient's relatives or friends
* A neighbour bringing a patient to the hospital
* A patient's attorney or guardian

*Connections*

| **Connector** | **Source** | **Target** | **Notes** |
| --- | --- | --- | --- |
| Generalization  Source -> Destination | Public  RelatedPerson | Public  Person |  |

Attributes

| **Attribute** | **Notes** | **Constraints and tags** |
| --- | --- | --- |
| **relationship** Code  Public | The nature of the relationship between a patient and the related person. | *Default:* |

## Schedule

Type: **Class**

The recurrence pattern of events, e.g., three times a day after meals.

A schedule that specifies an event that may occur multiple times. Schedules should not be used to record when events did happen but rather when actions or events are expected or requested to occur.

A schedule can be either a list of 'calendar time' events - periods on which the event ought to occur, or a single event with repeating criteria, or just repeating criteria with no actual event as represented by the 'cycle' concept and attribute.

Attributes

| **Attribute** | **Notes** | **Constraints and tags** |
| --- | --- | --- |
| **cycle** Cycle  Public    [0..\*] | Identifies a repeating pattern to the intended time periods.  If present, the Schedule.event indicates the time of the first occurrence. | *Default:* |
| **event** TimePeriod  Public | Identifies specific time periods when the event should occur.  Some schedules are just explicit lists of times. | *Default:* |

## ScheduledEncounter

Type: **Class** ActionPerformance

An encounter that has been scheduled (e.g., an outpatient visit). Status can be used to represent a planned, in-progress, canceled or rescheduled encounter as well as an encounter that was (i) scheduled, (ii) not rescheduled or canceled, and (iii) for which the Patient did not show up (i.e. missed appointment).

*Connections*

| **Connector** | **Source** | **Target** | **Notes** |
| --- | --- | --- | --- |
| Generalization  Source -> Destination | Public  ScheduledEncounter | Public  ActionPerformance |  |
| Realization  Source -> Destination | Public  ScheduledEncounter | Public  EncounterDescriptor |  |
| Realization  Source -> Destination | Public  ScheduledEncounter | Public  Plan |  |

## ScheduledProcedure

Type: **Class** ActionPerformance

A procedure that has been scheduled to take place.

*Connections*

| **Connector** | **Source** | **Target** | **Notes** |
| --- | --- | --- | --- |
| Generalization  Source -> Destination | Public  ScheduledProcedure | Public  ActionPerformance |  |
| Realization  Source -> Destination | Public  ScheduledProcedure | Public  ProcedureDescriptor |  |
| Realization  Source -> Destination | Public  ScheduledProcedure | Public  Plan |  |

## Specimen

Type: **Class**

A sample of tissue, blood, urine, water, air, etc., taken for the purposes of diagnostic examination or evaluation.

Attributes

| **Attribute** | **Notes** | **Constraints and tags** |
| --- | --- | --- |
| **collectionMethod** Code  Public | The technique used to collect the specimen, e.g., aspiration, scraping | *Default:* |
| **collectionSite** BodySite  Public | Site from which the specimen was collected. | *Default:* |
| **subject** Patient  Public | The patient from whom the specimen was obtained. | *Default:* |
| **type** Code  Public | The kind of material, e.g., blood, urine, tissue | *Default:* |

## StatementAboutAction

Type: **Class** ClinicalStatement

Actions are healthcare related activities performed on patients by patients, caregivers, and healthcare professionals. A statement about action is a statement recording such an action.

*Connections*

| **Connector** | **Source** | **Target** | **Notes** |
| --- | --- | --- | --- |
| Generalization  Source -> Destination | Public  StatementAboutAction | Public  ClinicalStatement |  |
| Generalization  Source -> Destination | Public  ActionPerformance | Public  StatementAboutAction |  |
| Generalization  Source -> Destination | Public  ActionNonPerformance | Public  StatementAboutAction |  |

Attributes

| **Attribute** | **Notes** | **Constraints and tags** |
| --- | --- | --- |
| **actionParticipant** Participant  Public    [0..\*] | A participant in the action,e.g., the attending physician, the performer of a procedure, etc. | *Default:* |
| **occurredDuring** EncounterEvent  Public | The encounter within which the action occurs. | *Default:* |
| **patientPreference** Code  Public | Preferences are choices made by patients about options for care or treatment (including scheduling, care experience, and meeting of personal health goals) and the sharing and disclosure of their health information. | *Default:* |
| **providerPreference** Code  Public | Provider preferences are choices made by care providers relative to options for care or treatment (including scheduling, care experience, and meeting of personal health goals). | *Default:* |
| **reason** Code  Public | The thought process or justification for proposing performance of an action or for not proposing the performance of an action. In some scenarios, specific actions require a reason to justify them. Reasons may also be specified for not performing an action. Examples include patient, system, or medical-related reasons for declining to perform specific actions. | *Default:* |

## StatementAboutObservation

Type: **Class** ClinicalStatement

An observation is a phenomenon about a patient's health including physiological and pathological ones. It also includes an inferred phenomenon such as a contraindication.

A statement about an observation records such a phenomenon.

*Connections*

| **Connector** | **Source** | **Target** | **Notes** |
| --- | --- | --- | --- |
| Generalization  Source -> Destination | Public  StatementAboutObservation | Public  ClinicalStatement |  |
| Generalization  Source -> Destination | Public  PhenomenonPresence | Public  StatementAboutObservation |  |
| Generalization  Source -> Destination | Public  PhenomenonAbsence | Public  StatementAboutObservation |  |
| Generalization  Source -> Destination | Public  PhenomenonPresenceUnknown | Public  StatementAboutObservation |  |

## Vaccine

Type: **Class** ManufacturedProduct

Details about the vaccine product administered to the patient

*Connections*

| **Connector** | **Source** | **Target** | **Notes** |
| --- | --- | --- | --- |
| Aggregation  Source -> Destination | Public vaccine  Vaccine | Public  ImmunizationDescriptor | The vaccine product that is administered. |
| Generalization  Source -> Destination | Public  Vaccine | Public  ManufacturedProduct |  |

Attributes

| **Attribute** | **Notes** | **Constraints and tags** |
| --- | --- | --- |
| **vaccineType** Code  Public | The kind of vaccine that is or was or was not administered, e.g., DTaP, pertussis, influenze whole | *Default:* |

## ActionDescriptor

Type: **Interface**

Description of a healthcare action, independent of the performance of the action.

*Connections*

| **Connector** | **Source** | **Target** | **Notes** |
| --- | --- | --- | --- |
| Generalization  Source -> Destination | Public  MedicationAdministrationDescriptor | Public  ActionDescriptor |  |
| Generalization  Source -> Destination | Public  EncounterDescriptor | Public  ActionDescriptor |  |
| Generalization  Source -> Destination | Public  ProcedureDescriptor | Public  ActionDescriptor |  |
| Generalization  Source -> Destination | Public  CommunicationDescriptor | Public  ActionDescriptor |  |
| Generalization  Source -> Destination | Public  GoalDescriptor | Public  ActionDescriptor |  |
| Generalization  Source -> Destination | Public  NutritionDescriptor | Public  ActionDescriptor |  |
| Generalization  Source -> Destination | Public  CareProgramParticipationDescriptor | Public  ActionDescriptor |  |
| Generalization  Source -> Destination | Public  DeviceApplicationDescriptor | Public  ActionDescriptor |  |
| Generalization  Source -> Destination | Public  ImmunizationDescriptor | Public  ActionDescriptor |  |

Attributes

| **Attribute** | **Notes** | **Constraints and tags** |
| --- | --- | --- |
| **expectedPerformanceTime** TimePeriod  Public | The time when the action is expected to be performed. | *Default:* |

## ActionPhase

Type: **Interface**

A healthcare action may evolve through multiple phases from being proposed, considered to being delivered and then completed. A statement about an action specifies the phase of that action.

*Connections*

| **Connector** | **Source** | **Target** | **Notes** |
| --- | --- | --- | --- |
| Generalization  Source -> Destination | Public  Plan | Public  ActionPhase |  |
| Generalization  Source -> Destination | Public  Proposal | Public  ActionPhase |  |
| Generalization  Source -> Destination | Public  Order | Public  ActionPhase |  |
| Generalization  Source -> Destination | Public  Performance | Public  ActionPhase |  |

Attributes

| **Attribute** | **Notes** | **Constraints and tags** |
| --- | --- | --- |
| **currentStatus** ActionStatus  Public | The status of an action. It is expected that the range of values for statusCode (i.e., the value set) will vary by the subtypes of ActionPhase. For example, Proposal might have one of its status value as Declined. | *Default:* |
| **statusHistory** ActionStatus  Public    [0..\*] | The past statuses of this action, e.g., an order may evolve from draft to placed to in progress to completed or canceled. | *Default:* |

## ActionStatus

Type: **Interface**

Class describing the status of an action.

Attributes

| **Attribute** | **Notes** | **Constraints and tags** |
| --- | --- | --- |
| **reason** Code  Public | A coded reason for the status. This is used typically when the status indicates the action was canceled, rejected, or not performed. E.g., patient declined. | *Default:* |
| **statusCode** Code  Public | A coded value for the status, e.g., Completed, Rejected, Pending | *Default:* |
| **updated** TimePoint  Public | The date and time when the status was updated. | *Default:* |

## Activity

Type: **Interface**

A defined task within the performance of the overall action. e.g., administration of sedation prior to a procedure.

Typically, these activities are not proposed, ordered, and scheduled by themselves. Rather, these are components of a larger action that is proposed or ordered. The activity element can be used to track the performance of the components within the overall action.

*Connections*

| **Connector** | **Source** | **Target** | **Notes** |
| --- | --- | --- | --- |
| Aggregation  Source -> Destination | Public subTask  Activity | Public  Performance | The performance of an action may have multiple subtasks or activities associated with it. For example, a surgical procedure may have anesthesia administration, incision, actual procedure, close up. A care plan might involve enrollment, executing the plan, and possibly discharging.  Subtasks may not be used to specify instances of a repeating action. |

Attributes

| **Attribute** | **Notes** | **Constraints and tags** |
| --- | --- | --- |
| **performedAtTime** TimePeriod  Public | The time period in which the task was performed. | *Default:* |
| **task** Code  Public | The task to be performed, e.g., anesthesia, sedation, incision. | *Default:* |

## AllergyIntoleranceDescriptor

Type: **Interface** ObservableDescriptor

A description of an undesirable physiologic or other reaction to an external stimulus.

*Connections*

| **Connector** | **Source** | **Target** | **Notes** |
| --- | --- | --- | --- |
| Generalization  Source -> Destination | Public  AllergyIntoleranceDescriptor | Public  ObservableDescriptor |  |
| Realization  Source -> Destination | Public  AllergyIntolerance | Public  AllergyIntoleranceDescriptor |  |
| Realization  Source -> Destination | Public  NoAllergyIntolerance | Public  AllergyIntoleranceDescriptor |  |
| Realization  Source -> Destination | Public  AllergyIntoleranceUnknown | Public  AllergyIntoleranceDescriptor |  |

Attributes

| **Attribute** | **Notes** | **Constraints and tags** |
| --- | --- | --- |
| **criticality** Code  Public | The potential seriousness of a future reaction. This represents a clinical judgment about the worst case scenario for a future reaction. It would be based on the severity of past reactions, the strength of the stimulus (e.g., the dose and route of exposure) that produced past reactions, and the life-threatening or organ system threatening potential of the reaction type. | *Default:* |
| **effectiveTime** TimePeriod  Public | The time period during which the allergy or intolerance is effective. | *Default:* |
| **reaction** Code  Public    [0..\*] | The possible reactions to the stimulus, e.g., respiratory distress. | *Default:* |
| **sensitivityType** Code  Public | A code that indicates whether this sensitivity is of an allergic nature or an intolerance to a stimulus. | *Default:* |
| **stimulus** Code  Public | The stimulus that causes the undesirable effect, or when a non-allergy is being specified, the stimulus that does not lead to an undesirable effect.  The stimulus may be a substance (amount of a substance that would not produce a reaction in most individuals) or other agents, e.g., a signal, confined space.  A substance is a physical entity and for purposes of this aspect of the model can mean a drug or biologic, food, chemical agent, plants, animals, plastics etc. | *Default:* |

## CareExperienceDescriptor

Type: **Interface** ObservableDescriptor

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.

*Connections*

| **Connector** | **Source** | **Target** | **Notes** |
| --- | --- | --- | --- |
| Realization  Source -> Destination | Public  CareExperience | Public  CareExperienceDescriptor |  |
| Generalization  Source -> Destination | Public  CareExperienceDescriptor | Public  ObservableDescriptor |  |

Attributes

| **Attribute** | **Notes** | **Constraints and tags** |
| --- | --- | --- |
| **about** ActionPerformance  Public | The action (e.g., encounter, procedure) that is the basis for the experience | *Default:* |
| **experience** Code  Public | The actual experience, e.g., poor communication. | *Default:* |

## CareProgramParticipationDescriptor

Type: **Interface** ActionDescriptor

Description of the participation of a patient in a recognized program of care such as a care plan, a chemotherapy protocol, or a clinical trial.

*Connections*

| **Connector** | **Source** | **Target** | **Notes** |
| --- | --- | --- | --- |
| Generalization  Source -> Destination | Public  CareProgramParticipationDescriptor | Public  ActionDescriptor |  |
| Realization  Source -> Destination | Public  ProgramParticipationProposal | Public  CareProgramParticipationDescriptor |  |
| Realization  Source -> Destination | Public  ProgramParticipationOrder | Public  CareProgramParticipationDescriptor |  |
| Realization  Source -> Destination | Public  ParticipationInProgram | Public  CareProgramParticipationDescriptor |  |

Attributes

| **Attribute** | **Notes** | **Constraints and tags** |
| --- | --- | --- |
| **goals** GoalPerformance  Public    [0..\*] | The goals that have been established for the patient as part of the care plan and the performance against those goals. | *Default:* |
| **participationStatus** Code  Public | A patient's state of participation within the care plan, e.g., enrolled, ongoing, completed, suspended. | *Default:* |
| **programType** Code  Public | The type of the care program such as Care Plan, Clinical Trial, Chemotherapy Protocol | *Default:* |

## CommunicationDescriptor

Type: **Interface** ActionDescriptor

A communication is a message sent between a sender and a recipient for a purpose and about a topic.

*Connections*

| **Connector** | **Source** | **Target** | **Notes** |
| --- | --- | --- | --- |
| Generalization  Source -> Destination | Public  CommunicationDescriptor | Public  ActionDescriptor |  |
| Realization  Source -> Destination | Public  CommunicationProposal | Public  CommunicationDescriptor |  |
| Realization  Source -> Destination | Public  CommunicationOrder | Public  CommunicationDescriptor |  |
| Realization  Source -> Destination | Public  CommunicationEvent | Public  CommunicationDescriptor |  |

Attributes

| **Attribute** | **Notes** | **Constraints and tags** |
| --- | --- | --- |
| **medium** Code  Public | The communication medium, e.g., email, fax | *Default:* |
| **message** Text  Public | Text and other information to be communicated to the recipient | *Default:* |
| **recipient** Entity  Public | The entity (e.g., person, organization, clinical information system, or device) which is the intended target of the communication | *Default:* |
| **sender** Entity  Public | The entity (e.g., person, organization, clinical information system, or device) which is the source of the communication | *Default:* |
| **topic** ClinicalStatement  Public    [0..\*] | Any statement that is pertinent to the message | *Default:* |

## CompositeIntravenousMedicationAdministration

Type: **Interface** MedicationParameters

Parameters for IV fluid administration that may consist of one or more additives mixed into a diluent. Additives and diluents are represented as constituents with the appropriate constituentType.

*Connections*

| **Connector** | **Source** | **Target** | **Notes** |
| --- | --- | --- | --- |
| Generalization  Source -> Destination | Public  CompositeIntravenousMedicationAdministration | Public  MedicationParameters |  |
| Aggregation  Source -> Destination | Public constituent  Constituent | Public  CompositeIntravenousMedicationAdministration | The constituent of this composite IV medication. |

## ConditionDescriptor

Type: **Interface** ObservableDescriptor

Use to record detailed information about conditions, problems or diagnoses recognized by a clinician. There are many uses including: recording a Diagnosis during an Encounter; populating a problem List or a Summary Statement, such as a Discharge Summary.

*Connections*

| **Connector** | **Source** | **Target** | **Notes** |
| --- | --- | --- | --- |
| Aggregation  Source -> Destination | Public conditionDetail  ConditionDetail | Public  ConditionDescriptor | The modifiers allow specifying more details or restrictions. e.g., severity, triggering factors, stage. |
| Generalization  Source -> Destination | Public  ConditionDescriptor | Public  ObservableDescriptor |  |
| Realization  Source -> Destination | Public  ConditionPresent | Public  ConditionDescriptor |  |
| Realization  Source -> Destination | Public  ConditionAbsent | Public  ConditionDescriptor |  |
| Realization  Source -> Destination | Public  NoAdverseEvent | Public  ConditionDescriptor |  |
| Realization  Source -> Destination | Public  AdverseEvent | Public  ConditionDescriptor |  |
| Realization  Source -> Destination | Public  ConditionPresenceUnknown | Public  ConditionDescriptor |  |

Attributes

| **Attribute** | **Notes** | **Constraints and tags** |
| --- | --- | --- |
| **bodySite** BodySite  Public    [0..\*] | Indicates the location of the symptom on the subject's body. | *Default:* |
| **category** Code  Public | A category assigned to the condition. E.g. finding | diagnosis | concern | symptom. | *Default:* |
| **effectiveTime** TimePeriod  Public | The time period during which the condition is effective. | *Default:* |
| **name** Code  Public | Identification of the condition, problem or diagnosis. e.g., diabetes mellitus type II, headache. | *Default:* |
| **status** Code  Public | The state of the condition at the time of the observation, e.g., active, inactive. | *Default:* |

## ConditionDetail

Type: **Interface**

Further detail about the condition, for example, intensity of pain.

*Connections*

| **Connector** | **Source** | **Target** | **Notes** |
| --- | --- | --- | --- |
| Aggregation  Source -> Destination | Public conditionDetail  ConditionDetail | Public  ConditionDescriptor | The modifiers allow specifying more details or restrictions. e.g., severity, triggering factors, stage. |

Attributes

| **Attribute** | **Notes** | **Constraints and tags** |
| --- | --- | --- |
| **property** Code  Public | What detail about the condition is being specified. e.g.., intensity of the pain condition | *Default:* |
| **value** Value  Public | The value of this detail property, e.g., severe for the value of pain intensity | *Default:* |

## ConditionLikelihoodDescriptor

Type: **Interface** InferableDescriptor

Describes the likelihood of a patient having a condition in the specified timespan. The condition may be a new disease state in which case the ConditionLikelihoodDescriptor specifies the risk to the patient, e.g., probability of heart disease in 10 years is 20%. The condition may be a progression or regression of an existing disease state or body function in which case the ConditionLikelihoodDescriptor specifies the prognosis for the patient, e.g., the probability of recovering speech after stroke.

*Connections*

| **Connector** | **Source** | **Target** | **Notes** |
| --- | --- | --- | --- |
| Generalization  Source -> Destination | Public  ConditionLikelihoodDescriptor | Public  InferableDescriptor |  |
| Realization  Source -> Destination | Public  Prognosis | Public  ConditionLikelihoodDescriptor |  |

Attributes

| **Attribute** | **Notes** | **Constraints and tags** |
| --- | --- | --- |
| **condition** Code  Public | The condition that is being predicted. e.g., heart disease | *Default:* |
| **likelihood** Value  Public | The likelihood of acquiring the condition specified as a numeric probability or a coded ordinal value. | *Default:* |
| **within** TimePeriod  Public | The time span within which the condition will be reached. e.g., 10 years. | *Default:* |

## Constituent

Type: **Interface**

A component of a multi-component substance administration. May be an additive in a composite IV.

*Connections*

| **Connector** | **Source** | **Target** | **Notes** |
| --- | --- | --- | --- |
| Aggregation  Source -> Destination | Public constituent  Constituent | Public  CompositeIntravenousMedicationAdministration | The constituent of this composite IV medication. |

Attributes

| **Attribute** | **Notes** | **Constraints and tags** |
| --- | --- | --- |
| **constituent** MedicationIngredient  Public | Generally the ingredient of the constituent (e.g., dopamine) and the quantity such as an additive in a composite IV. | *Default:* |
| **constituentType** Code  Public | Indicates the category of the constituent. For instance, for a composite IV, the constituent may be either a 'diluent' or an 'additive'. For a TPN order, the constituent category may be a nutrient grouping such as 'electrolyte' or 'lipid', etc. | *Default:* |

## ContraindicationDescriptor

Type: **Interface** InferableDescriptor

Describes a contraindication to a healthcare related action, e.g., medication intake, procedure.

A contraindication is a specific situation in which a drug, procedure, or surgery should not be used because it may be harmful to the patient.

*Connections*

| **Connector** | **Source** | **Target** | **Notes** |
| --- | --- | --- | --- |
| Generalization  Source -> Destination | Public  ContraindicationDescriptor | Public  InferableDescriptor |  |
| Realization  Source -> Destination | Public  ContraindicationToProcedure | Public  ContraindicationDescriptor |  |
| Realization  Source -> Destination | Public  ContraindicationToMedication | Public  ContraindicationDescriptor |  |

## DeviceApplicationDescriptor

Type: **Interface** ActionDescriptor

Application or use of equipment or device for the patient. E.g., wheelchair, Holter monitor, pacemaker, intra-uterine contraceptive device

*Connections*

| **Connector** | **Source** | **Target** | **Notes** |
| --- | --- | --- | --- |
| Generalization  Source -> Destination | Public  DeviceApplicationDescriptor | Public  ActionDescriptor |  |
| Realization  Source -> Destination | Public  DeviceApplicationProposal | Public  DeviceApplicationDescriptor |  |
| Realization  Source -> Destination | Public  DeviceApplicationOrder | Public  DeviceApplicationDescriptor |  |
| Realization  Source -> Destination | Public  DeviceApplicationPerformed | Public  DeviceApplicationDescriptor |  |
| Realization  Source -> Destination | Public  DeviceApplicationNotPerformed | Public  DeviceApplicationDescriptor |  |
| Aggregation  Source -> Destination | Public device  Device | Public  DeviceApplicationDescriptor | The details of the device used or to be used. |

Attributes

| **Attribute** | **Notes** | **Constraints and tags** |
| --- | --- | --- |
| **applicationSchedule** Schedule  Public | If the application or use of the supply or equipment is repeated, the frequency pattern for repetitions. | *Default:* |
| **targetBodySite** BodySite  Public | Body site where supply is to be used. | *Default:* |

## Dispense

Type: **Interface**

Details of the dispensation such as the days supply and quantity of medication (to be) dispensed.

*Connections*

| **Connector** | **Source** | **Target** | **Notes** |
| --- | --- | --- | --- |
| Aggregation  Source -> Destination | Public dispense  Dispense | Public  MedicationAdministrationDescriptor | Dispensation details to be used only when needed, e.g., as part of a statement about a prescription or a dispensation event. |

Attributes

| **Attribute** | **Notes** | **Constraints and tags** |
| --- | --- | --- |
| **amount** Quantity  Public | The number of units of the supply to be or that are actually dispensed. e.g., 30 tablets | *Default:* |
| **dispenseTime** TimePeriod  Public | The time at which the supply was dispensed. | *Default:* |
| **numberOfRepeatsAllowed** Quantity  Public | The number of times the supply may be dispensed. For example, the number of times the prescribed quantity is to be supplied including the initial standard fill. | *Default:* |

## Dosage

Type: **Interface**

Indicates how the medication is to be administered to or used by the patient.

*Connections*

| **Connector** | **Source** | **Target** | **Notes** |
| --- | --- | --- | --- |
| Aggregation  Source -> Destination | Public dosageInstruction  Dosage | Public  MedicationAdministrationDescriptor | Details for the dose or doses of medication administered or to be administered to the patient |
| Aggregation  Source -> Destination | Public dosageInstruction  Dosage | Public  ImmunizationDescriptor | Details for the dose or doses of vaccine administered or to be administered to the patient |
| Aggregation  Source -> Destination | Public administration  Dosage | Public  EnteralFormula | Dosage and administration instructions for the enteral nutrition. |

Attributes

| **Attribute** | **Notes** | **Constraints and tags** |
| --- | --- | --- |
| **additionalInstructions** Code  Public | Additional instructions such as "Swallow with plenty of water" which may or may not be coded. | *Default:* |
| **administrationSchedule** Schedule  Public | The frequency pattern for administration of doses. e.g., three times per day after meals | *Default:* |
| **administrationSite** BodySite  Public | The anatomic site where the medication first enters the body, e.g., left subclavian vein. | *Default:* |
| **approachBodySite** Code  Public | The body site used for gaining access to the target body site for the purposes of the substance administration. | *Default:* |
| **deliveryRoute** Code  Public | The physical route through which the substance is administered. E.g., IV, PO. | *Default:* |
| **dosageInstructionsText** Text  Public | Free text dosage instructions for cases where the instructions are too complex to code. | *Default:* |
| **doseQuantity** Quantity  Public | The amount of the therapeutic or other substance given at one administration event. e.g., 500 mg, 1 tablet, 1 teaspoon | *Default:* |
| **doseType** Code  Public | The type of dose. E.g., initial, maintenance, loading. | *Default:* |
| **infuseOver** Quantity  Public | Represents the actual time the medication is infused. Note the difference between infuseOver and duration. An orderable may call for infusing a patient TID for an hour each time over a duration of 5 days. | *Default:* |
| **maxDosePerPeriod** Quantity  Public | The maximum total quantity of a therapeutic substance that may be administered to a subject over the period of time. E.g. 1000mg in 24 hours. | *Default:* |
| **method** Code  Public | A coded value indicating the method by which the medication is introduced into or onto the body. Most commonly used for injections. Examples: Slow Push; Deep IV. Terminologies used often pre-coordinate this term with the route and or form of administration. | *Default:* |
| **rate** Quantity  Public | The speed with which the substance is introduced into the subject. Typically the rate for an infusion. e.g., 200ml in 2 hours. | *Default:* |

## EncounterDescriptor

Type: **Interface** ActionDescriptor

Description of an interaction between a patient and healthcare provider(s) for the purpose of providing healthcare service(s) or assessing the health status of a patient.

*Connections*

| **Connector** | **Source** | **Target** | **Notes** |
| --- | --- | --- | --- |
| Generalization  Source -> Destination | Public  EncounterDescriptor | Public  ActionDescriptor |  |
| Realization  Source -> Destination | Public  EncounterProposal | Public  EncounterDescriptor |  |
| Realization  Source -> Destination | Public  EncounterRequest | Public  EncounterDescriptor |  |
| Realization  Source -> Destination | Public  ScheduledEncounter | Public  EncounterDescriptor |  |
| Realization  Source -> Destination | Public  EncounterEvent | Public  EncounterDescriptor |  |

Attributes

| **Attribute** | **Notes** | **Constraints and tags** |
| --- | --- | --- |
| **admissionSourceType** Code  Public | The location type from where the patient arrived for admission, e.g., ED, another hospital, an ambulatory care facility | *Default:* |
| **class** Code  Public | Classification of the encounter. For example, inpatient, outpatient, virtual | *Default:* |
| **dischargeDisposition** Code  Public | The final place or setting to which the patient was discharged on the day of discharge. e.g., home, hospice, expired | *Default:* |
| **encounterSchedule** Schedule  Public | If the encounter is repeated, the frequency pattern for repetitions. | *Default:* |
| **length** Quantity  Public | Quantity of time the encounter lasted. | *Default:* |
| **location** Location  Public | The location the encounter takes place, e.g., clinic location, hospital bed | *Default:* |
| **serviceProvider** Organization  Public | Department or team providing care. | *Default:* |
| **serviceType** Code  Public | The type of service provided during the encounter. For example, surgery, rehabilitation, annual physical exam | *Default:* |

## EnteralFormula

Type: **Interface** NutritionItem

A way to provide food through a tube placed in the nose, mouth, the stomach, or the small intestine.

*Connections*

| **Connector** | **Source** | **Target** | **Notes** |
| --- | --- | --- | --- |
| Generalization  Source -> Destination | Public  EnteralFormula | Public  NutritionItem |  |
| Aggregation  Source -> Destination | Public administration  Dosage | Public  EnteralFormula | Dosage and administration instructions for the enteral nutrition. |

Attributes

| **Attribute** | **Notes** | **Constraints and tags** |
| --- | --- | --- |
| **caloricDensity** Quantity  Public | An amount of calories per volume which identifies the type of formula. | *Default:* |
| **product** NutritionProduct  Public | The nutritional product to be administered | *Default:* |

## Entity

Type: **Interface**

An entity is something that has a distinct existence. It can participate in the creation or consumption of patient data and communications.

*Connections*

| **Connector** | **Source** | **Target** | **Notes** |
| --- | --- | --- | --- |
| Realization  Source -> Destination | Public  Device | Public  Entity |  |
| Realization  Source -> Destination | Public  Organization | Public  Entity |  |
| Realization  Source -> Destination | Public  Person | Public  Entity |  |
| Aggregation  Source -> Destination | Public characteristic  EntityCharacteristic | Public  Entity | The characteristics of this entity. |

## FamilyHistoryDescriptor

Type: **Interface** ObservableDescriptor

Significant health event or condition for people related to the subject, relevant in the context of care for the subject.

This information can be known to different levels of accuracy. Sometimes the exact condition ('asthma') is known, and sometimes it is less precise ('some sort of cancer'). Equally, sometimes the person can be identified ('my aunt agatha') and sometimes all that is known is that the person was an uncle.

*Connections*

| **Connector** | **Source** | **Target** | **Notes** |
| --- | --- | --- | --- |
| Generalization  Source -> Destination | Public  FamilyHistoryDescriptor | Public  ObservableDescriptor |  |
| Realization  Source -> Destination | Public  FamilyHistoryConditionPresent | Public  FamilyHistoryDescriptor |  |
| Realization  Source -> Destination | Public  FamilyHistoryConditionUnknown | Public  FamilyHistoryDescriptor |  |
| Realization  Source -> Destination | Public  FamilyHistoryConditionAbsent | Public  FamilyHistoryDescriptor |  |

Attributes

| **Attribute** | **Notes** | **Constraints and tags** |
| --- | --- | --- |
| **condition** Code  Public | Condition that the related person had. | *Default:* |
| **deceasedAge** Quantity  Public | If dead, age at which family member died. | *Default:* |
| **onsetAge** Quantity  Public | When condition first manifested | *Default:* |
| **outcome** Code  Public | deceased | permanent disability | etc. | *Default:* |
| **relationship** Code  Public | Relationship to the subject | *Default:* |

## GoalDescriptor

Type: **Interface** ActionDescriptor

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.

*Connections*

| **Connector** | **Source** | **Target** | **Notes** |
| --- | --- | --- | --- |
| Generalization  Source -> Destination | Public  GoalDescriptor | Public  ActionDescriptor |  |
| Realization  Source -> Destination | Public  GoalProposal | Public  GoalDescriptor |  |
| Realization  Source -> Destination | Public  GoalPerformance | Public  GoalDescriptor |  |

Attributes

| **Attribute** | **Notes** | **Constraints and tags** |
| --- | --- | --- |
| **associatedCarePlan** ClinicalStatement  Public    [0..\*] | The overall care plan or plans within which this goal is being pursued. | *Default:* |
| **goalAchievementTargetTime** TimePeriod  Public | The time that is targeted for the goal to be attained. For example, there may be a goal to reach a weight of X pounds by a particular date. | *Default:* |
| **goalFocus** Code  Public | This is the code that identifies the metric that is the clinical subject of the goal with as much specificity as available, or as required by a template. Typically a measurable clinical attribute of the subject. E.g., weight, blood pressure, hemoglobin A1c level. | *Default:* |
| **goalPursuitEffectiveTime** TimePeriod  Public | The time in which the subject pursues the goal. This includes pursuing maintenance of a goal that has already been achieved.  The end time of the interval may be "open" or not stated, if the goal is being indefinitely pursued. This time is optional, as, for example, one may simply wish to propose weight loss without specifying a pursuit effective time. | *Default:* |
| **goalValue** Value  Public | The metric whose achievement would signify the fulfillment of the goal. E.g., 150 pounds, 7.0%. | *Default:* |

## ImagingProcedure

Type: **Interface** ProcedureParameters

Parameters for an Imaging examination. For instance, Chest Radiograph - PA and Lateral.

*Connections*

| **Connector** | **Source** | **Target** | **Notes** |
| --- | --- | --- | --- |
| Generalization  Source -> Destination | Public  ImagingProcedure | Public  ProcedureParameters |  |

Attributes

| **Attribute** | **Notes** | **Constraints and tags** |
| --- | --- | --- |
| **contrast** MedicationAdministrationDescriptor  Public | Contrast if any to be administered for this procedure. | *Default:* |
| **isolationCode** Code  Public | Specification for type of precautions that should be taken when in proximity to the patient. For instance, Airborne Precautions, Contact Precautions, Droplet Precautions, Standard Precautions. | *Default:* |
| **portableExam** YesNo  Public | Designation of whether or not the imaging procedure should be performed at the patient's bedside (Yes) or if the procedure can be conducted in the location of the performing department (No). | *Default:* |
| **sedation** YesNo  Public | Sedation is required or was administered for this procedure. | *Default:* |
| **stressor** Code  Public | Type of physiologic or pharmacologic stress that will be subjected to the patient during the imaging procedure. For example, Adenosine, Dipyrdomole, Persantine, Thallium, Cardiolite, Dobutamine, Treadmill. | *Default:* |
| **transportMode** Code  Public | How a patient will be moved from their hospital room to the performing department | *Default:* |

## ImmunizationDescriptor

Type: **Interface** ActionDescriptor

Descriptor for the administration of vaccines to patients across all healthcare disciplines in all care settings and all regions. This does not include the administration of non-vaccine agents, even those that may have or claim immunological effects.

*Connections*

| **Connector** | **Source** | **Target** | **Notes** |
| --- | --- | --- | --- |
| Generalization  Source -> Destination | Public  ImmunizationDescriptor | Public  ActionDescriptor |  |
| Realization  Source -> Destination | Public  ImmunizationProposal | Public  ImmunizationDescriptor |  |
| Realization  Source -> Destination | Public  ImmunizationOrder | Public  ImmunizationDescriptor |  |
| Realization  Source -> Destination | Public  ImmunizationDoseAdministration | Public  ImmunizationDescriptor |  |
| Aggregation  Source -> Destination | Public vaccine  Vaccine | Public  ImmunizationDescriptor | The vaccine product that is administered. |
| Aggregation  Source -> Destination | Public dosageInstruction  Dosage | Public  ImmunizationDescriptor | Details for the dose or doses of vaccine administered or to be administered to the patient |
| Aggregation  Source -> Destination | Public protocol  VaccinationProtocol | Public  ImmunizationDescriptor | The role of the dose in an immunization protocol |

## InferableDescriptor

Type: **Interface** ObservableDescriptor

An inference made, about the patient's health, from other statements.

*Connections*

| **Connector** | **Source** | **Target** | **Notes** |
| --- | --- | --- | --- |
| Generalization  Source -> Destination | Public  InferableDescriptor | Public  ObservableDescriptor |  |
| Generalization  Source -> Destination | Public  ContraindicationDescriptor | Public  InferableDescriptor |  |
| Generalization  Source -> Destination | Public  ConditionLikelihoodDescriptor | Public  InferableDescriptor |  |

Attributes

| **Attribute** | **Notes** | **Constraints and tags** |
| --- | --- | --- |
| **inferenceMethod** Code  Public    [0..1] | The algorithm, tool, or instrument used to make the inference. E.g., Framingham Risk Score, Immunization Rule Set. | *Default:* |
| **inferredFrom** ClinicalStatement  Public    [0..\*] | The statements that form the basis for the inference. E.g., diagnosis of diabetes mellitus, and blood pressure observations to calculate risk of heart disease. | *Default:* |

## LaboratoryTestProcedure

Type: **Interface** ProcedureParameters

Parameters for a procedure to test a specimen from a patient.

*Connections*

| **Connector** | **Source** | **Target** | **Notes** |
| --- | --- | --- | --- |
| Generalization  Source -> Destination | Public  LaboratoryTestProcedure | Public  ProcedureParameters |  |

Attributes

| **Attribute** | **Notes** | **Constraints and tags** |
| --- | --- | --- |
| **collectionMethod** Code  Public | Specification of how the specimen for testing should be obtained | *Default:* |
| **specialHandling** Code  Public    [0..\*] | Special instructions on how to handle a laboratory specimen. For example, 'Keep on ice'. | *Default:* |
| **specimenSource** Specimen  Public | The source of the laboratory specimen to be collected. | *Default:* |
| **suspectedPathogen** Code  Public    [0..\*] | The pathogen or pathogens that are felt to be the most likely cause of the patient's condition that led to the laboratory procedure proposal. For instance, Staphylococcus, Streptococcus, Pseudomonas, Neisseria. | *Default:* |

## MedicationAdministrationDescriptor

Type: **Interface** ActionDescriptor

A description of the action of prescribing or administering medication to a patient.

*Connections*

| **Connector** | **Source** | **Target** | **Notes** |
| --- | --- | --- | --- |
| Generalization  Source -> Destination | Public  MedicationAdministrationDescriptor | Public  ActionDescriptor |  |
| Association  Source -> Destination | Public  ContraindicationToMedication | Public contraindicatedMedication  MedicationAdministrationDescriptor | The medication that is contraindicated. |
| Realization  Source -> Destination | Public  MedicationStatement | Public  MedicationAdministrationDescriptor |  |
| Realization  Source -> Destination | Public  MedicationDispense | Public  MedicationAdministrationDescriptor |  |
| Realization  Source -> Destination | Public  MedicationPrescription | Public  MedicationAdministrationDescriptor |  |
| Realization  Source -> Destination | Public  MedicationDoseAdministration | Public  MedicationAdministrationDescriptor |  |
| Aggregation  Source -> Destination | Public dosageInstruction  Dosage | Public  MedicationAdministrationDescriptor | Details for the dose or doses of medication administered or to be administered to the patient |
| Realization  Source -> Destination | Public  MedicationAdministrationProposal | Public  MedicationAdministrationDescriptor |  |
| Aggregation  Source -> Destination | Public dispense  Dispense | Public  MedicationAdministrationDescriptor | Dispensation details to be used only when needed, e.g., as part of a statement about a prescription or a dispensation event. |
| Aggregation  Source -> Destination | Public details  MedicationParameters | Public  MedicationAdministrationDescriptor | Specification of parameters applicable to the particular type of medication administration. |

Attributes

| **Attribute** | **Notes** | **Constraints and tags** |
| --- | --- | --- |
| **medication** Medication  Public | Identifies the medication being dispensed or administered. | *Default:* |

## MedicationParameters

Type: **Interface**

Parameters for specific types of medications that can be administered.

*Connections*

| **Connector** | **Source** | **Target** | **Notes** |
| --- | --- | --- | --- |
| Generalization  Source -> Destination | Public  PatientControlledAnalgesia | Public  MedicationParameters |  |
| Generalization  Source -> Destination | Public  CompositeIntravenousMedicationAdministration | Public  MedicationParameters |  |
| Aggregation  Source -> Destination | Public details  MedicationParameters | Public  MedicationAdministrationDescriptor | Specification of parameters applicable to the particular type of medication administration. |

## MicrobiologySensitivityResult

Type: **Interface** ResultDetail

Findings of the microbiology sensitivity test. This element is used to specify traditional, culture-isolate- run susceptibilities. It is not used to specify genetic methods for organism sensitivity.

*Connections*

| **Connector** | **Source** | **Target** | **Notes** |
| --- | --- | --- | --- |
| Generalization  Source -> Destination | Public  MicrobiologySensitivityResult | Public  ResultDetail |  |
| Aggregation  Source -> Destination | Public organismSensitivity  OrganismSensitivity | Public  MicrobiologySensitivityResult | Components of the microbiology sensitivity result. Each of the OrganismSensitivity items represent a the sensitivity of an organism to one agent. |

## NutrientModification

Type: **Interface**

Nutrient modifications allows specification of constraints on the quantity of components of diet.

NutrientModification consists of the nutrient (e.g., Sodium) and the amount in the diet (e.g., 20-30g).

*Connections*

| **Connector** | **Source** | **Target** | **Notes** |
| --- | --- | --- | --- |
| Aggregation  Source -> Destination | Public nutrient  NutrientModification | Public  OralDiet | Consists of the nutrient (e.g., Sodium) and the amount in the diet (e.g., 20-30g). |

Attributes

| **Attribute** | **Notes** | **Constraints and tags** |
| --- | --- | --- |
| **nutrientType** Code  Public | The type of nutrient that this diet contains. Nutrient types include: carbohydrates, lipids and fats, salts such as Sodium or Potassium, fibers, and also fluids. | *Default:* |
| **quantity** IntervalOfQuantity  Public | Indicates how much of the nutrient is to be or was administered | *Default:* |

## NutritionDescriptor

Type: **Interface** ActionDescriptor

Description of diet/nutrition to be administered to a patient.

*Connections*

| **Connector** | **Source** | **Target** | **Notes** |
| --- | --- | --- | --- |
| Generalization  Source -> Destination | Public  NutritionDescriptor | Public  ActionDescriptor |  |
| Aggregation  Source -> Destination | Public nutritionItem  NutritionItem | Public  NutritionDescriptor | Different items that combine to make a complete description of the nutrition to be administered. |
| Realization  Source -> Destination | Public  DietOrder | Public  NutritionDescriptor |  |
| Realization  Source -> Destination | Public  DietProposal | Public  NutritionDescriptor |  |
| Realization  Source -> Destination | Public  DietAdministration | Public  NutritionDescriptor |  |

Attributes

| **Attribute** | **Notes** | **Constraints and tags** |
| --- | --- | --- |
| **foodModifier** String  Public | This modifier is used to convey order-specific modifiers about the type of food that should be given. These can be derived from patient allergies, intolerances, or preferences. They can also be specific to the order and not have any relationship to the allergies, intolerances, or preferences | *Default:* |

## NutritionItem

Type: **Interface**

The details of the nutrition item, with specific attributes depending on the mode by which the nutrition is administered.

*Connections*

| **Connector** | **Source** | **Target** | **Notes** |
| --- | --- | --- | --- |
| Generalization  Source -> Destination | Public  EnteralFormula | Public  NutritionItem |  |
| Generalization  Source -> Destination | Public  OralDiet | Public  NutritionItem |  |
| Generalization  Source -> Destination | Public  NutritionalSupplement | Public  NutritionItem |  |
| Aggregation  Source -> Destination | Public nutritionItem  NutritionItem | Public  NutritionDescriptor | Different items that combine to make a complete description of the nutrition to be administered. |

## NutritionalSupplement

Type: **Interface** NutritionItem

A preparation intended to supplement the diet and provide calories or nutrients, such as vitamins, minerals, fiber, fatty acids, carbohydrates, or amino acids, that may be missing or may not be consumed in sufficient quantity in a person's diet. Such products may be ordered in addition to the diet (either general or therapeutic) to enhance a person’s intake. Supplemental food products provide some but not all of a patient’s nutritional needs.

*Connections*

| **Connector** | **Source** | **Target** | **Notes** |
| --- | --- | --- | --- |
| Generalization  Source -> Destination | Public  NutritionalSupplement | Public  NutritionItem |  |

Attributes

| **Attribute** | **Notes** | **Constraints and tags** |
| --- | --- | --- |
| **frequency** Schedule  Public | The frequency with which this supplement is administered. | *Default:* |
| **product** NutritionProduct  Public | The supplement to be provided or administered | *Default:* |
| **quantity** IntervalOfQuantity  Public | How much of the nutritional supplement to administer | *Default:* |

## ObservableDescriptor

Type: **Interface**

Description of the pathology, physiology, or behavior that is being recorded.

*Connections*

| **Connector** | **Source** | **Target** | **Notes** |
| --- | --- | --- | --- |
| Generalization  Source -> Destination | Public  InferableDescriptor | Public  ObservableDescriptor |  |
| Generalization  Source -> Destination | Public  FamilyHistoryDescriptor | Public  ObservableDescriptor |  |
| Generalization  Source -> Destination | Public  AllergyIntoleranceDescriptor | Public  ObservableDescriptor |  |
| Generalization  Source -> Destination | Public  ConditionDescriptor | Public  ObservableDescriptor |  |
| Generalization  Source -> Destination | Public  ObservationResultDescriptor | Public  ObservableDescriptor |  |
| Generalization  Source -> Destination | Public  CareExperienceDescriptor | Public  ObservableDescriptor |  |

Attributes

| **Attribute** | **Notes** | **Constraints and tags** |
| --- | --- | --- |
| **observedAtTime** TimePoint  Public | The time at which the observation was made. This may be different than the time at which the finding occurred and when the statement was created. This is the time at which history is elicited or an examination is conducted. | *Default:* |

## ObservationResultDescriptor

Type: **Interface** ObservableDescriptor

Assertions and measurements made about a patient, device or other subject.

ObservationResults are a central element in healthcare, used to support diagnosis, monitor progress, determine baselines and patterns and even capture demographic characteristics. Fundamentally, observations are name/value pair assertions. Simple observation values, such a body temperature, are specified in the value attribute. Richer values, e.g., result panels, aggregate observations from diagnostic imaging, and microbiology sensitivity results, are specified in the detailedResult attribute.,

This data type does not support the storage of the image or signal sequences such as electrocardiogram data. However, the observations and interpretation made from the images and signals can be represented here.

*Connections*

| **Connector** | **Source** | **Target** | **Notes** |
| --- | --- | --- | --- |
| Generalization  Source -> Destination | Public  ObservationResultDescriptor | Public  ObservableDescriptor |  |
| Realization  Source -> Destination | Public  ObservationResult | Public  ObservationResultDescriptor |  |
| Aggregation  Source -> Destination | Public detailedResult  ResultDetail | Public  ObservationResultDescriptor | Detailed complex result values. |

Attributes

| **Attribute** | **Notes** | **Constraints and tags** |
| --- | --- | --- |
| **bodySite** BodySite  Public | Indicates where on the subject's body the observation was made. | *Default:* |
| **interpretation** Code  Public | The assessment made based on the result of the observation. | *Default:* |
| **method** Code  Public | The technique or mechanism used to perform the observation. | *Default:* |
| **name** Code  Public | Identifies what type of observation was performed. e.g., body temperature | *Default:* |
| **reliability** Code  Public | An estimate of the degree to which quality issues have impacted on the value reported. e.g., result is ok, measurement still ongoing, results are questionable. Usually, unreliable results are not recorded, but that is not always possible. In such cases, this attribute makes the receiver aware of the quality of the result. | *Default:* |
| **status** Code  Public | The status of the result value. e.g., preliminary, final | *Default:* |
| **validationMethod** Code  Public | Method by which the observation result was validated, e.g., human review, sliding average. | *Default:* |
| **value** Value  Public | The information determined as a result of making the observation. e.g., 120 mm Hg, small, 2013-11-30 | *Default:* |

## OralDiet

Type: **Interface** NutritionItem

Concept generally representing food and/or a nutritional supplement prepared from food ingredients that is self-administered by a patient and consumed orally.

A patient can have only one effective oral diet at a time.

*Connections*

| **Connector** | **Source** | **Target** | **Notes** |
| --- | --- | --- | --- |
| Generalization  Source -> Destination | Public  OralDiet | Public  NutritionItem |  |
| Aggregation  Source -> Destination | Public texture  TextureModification | Public  OralDiet | Specifies or modifies the texture for one or more types of food in a diet |
| Aggregation  Source -> Destination | Public nutrient  NutrientModification | Public  OralDiet | Consists of the nutrient (e.g., Sodium) and the amount in the diet (e.g., 20-30g). |

Attributes

| **Attribute** | **Notes** | **Constraints and tags** |
| --- | --- | --- |
| **dietType** Code  Public    [0..\*] | Specifies the type of diet ordered. The dietCode may specify what kind of diet is ordered such as 'Consistent carbohydrate diet'. | *Default:* |
| **foodType** Code  Public | Indicates what type of food the diet should contain. | *Default:* |
| **frequency** Schedule  Public | The frequency with which this diet item is administered. | *Default:* |

## Order

Type: **Interface** ActionPhase

An order is an instruction by a healthcare provider to another healthcare provider to perform some action.

*Connections*

| **Connector** | **Source** | **Target** | **Notes** |
| --- | --- | --- | --- |
| Generalization  Source -> Destination | Public  Order | Public  ActionPhase |  |
| Realization  Source -> Destination | Public  ProcedureOrder | Public  Order |  |
| Realization  Source -> Destination | Public  EncounterRequest | Public  Order |  |
| Realization  Source -> Destination | Public  MedicationPrescription | Public  Order |  |
| Realization  Source -> Destination | Public  ImmunizationOrder | Public  Order |  |
| Realization  Source -> Destination | Public  CommunicationOrder | Public  Order |  |
| Realization  Source -> Destination | Public  DietOrder | Public  Order |  |
| Realization  Source -> Destination | Public  DeviceApplicationOrder | Public  Order |  |
| Realization  Source -> Destination | Public  ProgramParticipationOrder | Public  Order |  |

Attributes

| **Attribute** | **Notes** | **Constraints and tags** |
| --- | --- | --- |
| **orderedAtTime** TimePoint  Public | The time at which the order was created. | *Default:* |
| **originationMode** Code  Public | The mode the order was received (such as by telephone, electronic, verbal, written). | *Default:* |
| **urgency** Code  Public | Characterizes how quickly the action must be initiated. Includes concepts such as stat, urgent, routine. | *Default:* |

## OrganismSensitivity

Type: **Interface**

Sensitivity of an organism to a specified antimicrobial agent

*Connections*

| **Connector** | **Source** | **Target** | **Notes** |
| --- | --- | --- | --- |
| Aggregation  Source -> Destination | Public organismSensitivity  OrganismSensitivity | Public  MicrobiologySensitivityResult | Components of the microbiology sensitivity result. Each of the OrganismSensitivity items represent a the sensitivity of an organism to one agent. |

Attributes

| **Attribute** | **Notes** | **Constraints and tags** |
| --- | --- | --- |
| **antiMicrobialAgent** Substance  Public | The antimicrobial agent that was tested for sensitivity, e.g., vancomycin | *Default:* |
| **organism** Code  Public | The microorganism whose sensitivity is being tested. | *Default:* |
| **sensitivity** Code  Public | The response of the microorgranism to the agent. For example, resistant, susceptible. | *Default:* |

## PatientControlledAnalgesia

Type: **Interface** MedicationParameters

Parameters for Patient Controlled Analgesia administration. For instance, morphine PCA, 5 mg loading dose, followed by 10 mg/hr basal rate, 1 mg demand dose, lockout interval 10 min.

*Connections*

| **Connector** | **Source** | **Target** | **Notes** |
| --- | --- | --- | --- |
| Generalization  Source -> Destination | Public  PatientControlledAnalgesia | Public  MedicationParameters |  |

Attributes

| **Attribute** | **Notes** | **Constraints and tags** |
| --- | --- | --- |
| **lockoutInterval** IntervalOfQuantity  Public | The amount of time that must elapse after a PCA demand dose is administered before the next PCA demand dose can be delivered. For example, 10 minutes. | *Default:* |

## Performance

Type: **Interface** ActionPhase

The actual performance or execution of a healthcare-related action, e.g., 3rd dose of Hepatitis B vaccine administered on Dec 4th 2012, appendectomy performed today.

*Connections*

| **Connector** | **Source** | **Target** | **Notes** |
| --- | --- | --- | --- |
| Generalization  Source -> Destination | Public  Performance | Public  ActionPhase |  |
| Realization  Source -> Destination | Public  ProcedureEvent | Public  Performance |  |
| Realization  Source -> Destination | Public  MedicationStatement | Public  Performance |  |
| Realization  Source -> Destination | Public  EncounterEvent | Public  Performance |  |
| Realization  Source -> Destination | Public  MedicationDoseAdministration | Public  Performance |  |
| Realization  Source -> Destination | Public  MedicationDispense | Public  Performance |  |
| Aggregation  Source -> Destination | Public subTask  Activity | Public  Performance | The performance of an action may have multiple subtasks or activities associated with it. For example, a surgical procedure may have anesthesia administration, incision, actual procedure, close up. A care plan might involve enrollment, executing the plan, and possibly discharging.  Subtasks may not be used to specify instances of a repeating action. |
| Realization  Source -> Destination | Public  ImmunizationDoseAdministration | Public  Performance |  |
| Realization  Source -> Destination | Public  CommunicationEvent | Public  Performance |  |
| Realization  Source -> Destination | Public  DietAdministration | Public  Performance |  |
| Realization  Source -> Destination | Public  ProcedureNotPerformed | Public  Performance |  |
| Realization  Source -> Destination | Public  GoalPerformance | Public  Performance |  |
| Realization  Source -> Destination | Public  DeviceApplicationPerformed | Public  Performance |  |
| Realization  Source -> Destination | Public  DeviceApplicationNotPerformed | Public  Performance |  |
| Realization  Source -> Destination | Public  ParticipationInProgram | Public  Performance |  |

Attributes

| **Attribute** | **Notes** | **Constraints and tags** |
| --- | --- | --- |
| **performedAtTime** TimePeriod  Public | The overall time period in which the action is performed. This may be different than the scheduled time or the expected performance time. Time for different activities performed within this action can be specified as subTasks. | *Default:* |

## Plan

Type: **Interface** ActionPhase

Description of action that is planned to be performed. Typically, this would include a time at which the action is scheduled to be performed.

*Connections*

| **Connector** | **Source** | **Target** | **Notes** |
| --- | --- | --- | --- |
| Generalization  Source -> Destination | Public  Plan | Public  ActionPhase |  |
| Realization  Source -> Destination | Public  ScheduledProcedure | Public  Plan |  |
| Realization  Source -> Destination | Public  ScheduledEncounter | Public  Plan |  |

Attributes

| **Attribute** | **Notes** | **Constraints and tags** |
| --- | --- | --- |
| **plannedAtTime** TimePoint  Public | The time at which the plan was created. | *Default:* |

## ProcedureDescriptor

Type: **Interface** ActionDescriptor

A procedure is an activity that is performed with or on a patient as part of the provision of care. This can be a physical 'thing' like an operation, or less invasive like counseling or hypnotherapy. Examples include surgical procedures, diagnostic procedures, endoscopic procedures, biopsies, and exclude things for which there are specific types of action descriptors defined, such as those for immunizations, medication administrations, nutrition administration, and application of devices.

*Connections*

| **Connector** | **Source** | **Target** | **Notes** |
| --- | --- | --- | --- |
| Generalization  Source -> Destination | Public  ProcedureDescriptor | Public  ActionDescriptor |  |
| Realization  Source -> Destination | Public  ProcedureProposal | Public  ProcedureDescriptor |  |
| Realization  Source -> Destination | Public  ProcedureEvent | Public  ProcedureDescriptor |  |
| Realization  Source -> Destination | Public  ProcedureOrder | Public  ProcedureDescriptor |  |
| Realization  Source -> Destination | Public  ScheduledProcedure | Public  ProcedureDescriptor |  |
| Association  Source -> Destination | Public  ContraindicationToProcedure | Public contraindicatedProcedure  ProcedureDescriptor | The procedure that is contraindicated. |
| Aggregation  Source -> Destination | Public details  ProcedureParameters | Public  ProcedureDescriptor | Specification of parameters applicable to the particular procedure. |
| Realization  Source -> Destination | Public  ProposalToNotPerformProcedure | Public  ProcedureDescriptor |  |
| Realization  Source -> Destination | Public  ProcedureNotPerformed | Public  ProcedureDescriptor |  |

Attributes

| **Attribute** | **Notes** | **Constraints and tags** |
| --- | --- | --- |
| **approachBodySite** BodySite  Public | The body site used for gaining access to the target body site. E.g., femoral artery for a coronary angiography. | *Default:* |
| **procedureCode** Code  Public | This is the code that identifies the procedure with as much specificity as available, or as required. E.g., appendectomy, coronary artery bypass graft surgery. | *Default:* |
| **procedureMethod** Code  Public | Describes the method used for the procedure and can vary depending on the procedure. For example, a surgical procedure method might be laparoscopic surgery or robotic surgery; an imaging procedure such as a chest radiograph might have methods that represent the views such as PA and lateral; a laboratory procedure like urinalysis might have a method of clean catch; a respiratory care procedure such as supplemental oxygen might have a method of nasal cannula, hood, face mask, or non-rebreather mask. | *Default:* |
| **procedureSchedule** Schedule  Public | If the procedure is repeated, the frequency pattern for repetitions. | *Default:* |
| **targetBodySite** BodySite  Public | The body site where the procedure takes place. E.g., left lower arm for fracture reduction. | *Default:* |

## ProcedureParameters

Type: **Interface**

The parameters that are specific to different types of procedures.

*Connections*

| **Connector** | **Source** | **Target** | **Notes** |
| --- | --- | --- | --- |
| Generalization  Source -> Destination | Public  ImagingProcedure | Public  ProcedureParameters |  |
| Generalization  Source -> Destination | Public  RespiratoryCareProcedure | Public  ProcedureParameters |  |
| Aggregation  Source -> Destination | Public details  ProcedureParameters | Public  ProcedureDescriptor | Specification of parameters applicable to the particular procedure. |
| Generalization  Source -> Destination | Public  LaboratoryTestProcedure | Public  ProcedureParameters |  |

## Proposal

Type: **Interface** ActionPhase

The proposal may be a recommendation from a clinical decision support system or advice from a consultation.

This is an abstract interface and should not be realized by a StatementAboutAction. Instead, one of this interface's subtypes should be used.

*Connections*

| **Connector** | **Source** | **Target** | **Notes** |
| --- | --- | --- | --- |
| Generalization  Source -> Destination | Public  Proposal | Public  ActionPhase |  |
| Generalization  Source -> Destination | Public  ProposalFor | Public  Proposal |  |
| Generalization  Source -> Destination | Public  ProposalAgainst | Public  Proposal |  |

Attributes

| **Attribute** | **Notes** | **Constraints and tags** |
| --- | --- | --- |
| **proposedAtTime** TimePoint  Public | The time when the proposal was made. | *Default:* |

## ProposalAgainst

Type: **Interface** Proposal

Description of a an action that is being proposed to NOT be performed.

*Connections*

| **Connector** | **Source** | **Target** | **Notes** |
| --- | --- | --- | --- |
| Generalization  Source -> Destination | Public  ProposalAgainst | Public  Proposal |  |
| Realization  Source -> Destination | Public  ProposalToNotPerformProcedure | Public  ProposalAgainst |  |

## ProposalFor

Type: **Interface** Proposal

Description of a an action that is being proposed to be performed.

*Connections*

| **Connector** | **Source** | **Target** | **Notes** |
| --- | --- | --- | --- |
| Realization  Source -> Destination | Public  ProcedureProposal | Public  ProposalFor |  |
| Realization  Source -> Destination | Public  EncounterProposal | Public  ProposalFor |  |
| Realization  Source -> Destination | Public  MedicationAdministrationProposal | Public  ProposalFor |  |
| Realization  Source -> Destination | Public  ImmunizationProposal | Public  ProposalFor |  |
| Realization  Source -> Destination | Public  CommunicationProposal | Public  ProposalFor |  |
| Generalization  Source -> Destination | Public  ProposalFor | Public  Proposal |  |
| Realization  Source -> Destination | Public  DietProposal | Public  ProposalFor |  |
| Realization  Source -> Destination | Public  GoalProposal | Public  ProposalFor |  |
| Realization  Source -> Destination | Public  DeviceApplicationProposal | Public  ProposalFor |  |
| Realization  Source -> Destination | Public  ProgramParticipationProposal | Public  ProposalFor |  |

Attributes

| **Attribute** | **Notes** | **Constraints and tags** |
| --- | --- | --- |
| **urgency** Code  Public | Characterizes how quickly an action must be initiated. Includes concepts such as stat, urgent, routine. | *Default:* |

## RespiratoryCareProcedure

Type: **Interface** ProcedureParameters

Procedures that encompass supplemental oxygen (eg, nasal cannula, face mask), BiPAP/CPAP, and mechanical ventilation.

Note: While these are vastly different respiratory care concepts, the associated data elements can be constrained through templates.

*Connections*

| **Connector** | **Source** | **Target** | **Notes** |
| --- | --- | --- | --- |
| Generalization  Source -> Destination | Public  RespiratoryCareProcedure | Public  ProcedureParameters |  |

Attributes

| **Attribute** | **Notes** | **Constraints and tags** |
| --- | --- | --- |
| **ePAP** IntervalOfQuantity  Public | Expiratory positive airway pressure, often expressed in cmH20 in the United States. Example: 5 cmH2O | *Default:* |
| **fiO2** IntervalOfQuantity  Public | Fraction of inspired oxygen, expressed as a percentage. For example, 100%. | *Default:* |
| **inspiratoryTime** IntervalOfQuantity  Public | Specification of the duration of the positive airway pressume applied by a mechanical ventilator. For example, 1 second. | *Default:* |
| **iPAP** IntervalOfQuantity  Public | Inspiratory positive airway pressure, often expressed in cmH20 in the United States. For example, 10 cmH2O. | *Default:* |
| **isolationCode** Code  Public | Describes the kinds of precautions that should be taken for the patient. Values include: Airborne Precautions, Contact Precautions, Droplet Precautions, Standard Precautions, Neutropenic (Reverse) Precautions. | *Default:* |
| **oxygenFlowRate** IntervalOfQuantity  Public | The rate at which oxygen is administered to the patient; generally in liters per minute | *Default:* |
| **peakFlowRate** IntervalOfQuantity  Public | Specification of the maximum allowable rate of airflow delivered by a mechanical ventilator. For example, 60 L/min. | *Default:* |
| **peakInspiratoryPressure** IntervalOfQuantity  Public | Specification of the maximum airway pressure allowed to be delivered by the ventilator in order to prevent barotrauma, applies to volume-controlled ventilation modes. For example, 35 cmH2O. | *Default:* |
| **pEEP** IntervalOfQuantity  Public | Positive end expiratory pressure, the alveolar pressure above atmospheric pressure that exists at the end of expiration, often expressed in cmH20 in the United States. For example, 5 cmH2O. | *Default:* |
| **pressureSupport** IntervalOfQuantity  Public | Specification of the additional amount of pressure that is added to a mechanical ventilation mode, often CPAP mode. Not to be confused with pressure control ventilation mode. For example, 500 mL | *Default:* |
| **respiratoryRate** IntervalOfQuantity  Public | Number of machine-delivered breaths per minute, in the context of mechanical ventilation, expressed as breaths/minute. For example, 14 breaths/minute. | *Default:* |
| **spO2Range** IntervalOfQuantity  Public | Target oxygen saturation, expressed as a percentage. For instance, 95-100%. | *Default:* |
| **spO2Titration** IntervalOfQuantity  Public | Titration instructions to achieve target oxygen saturation. An example might include: "Titrate oxygen to maintain SpO2 > 93%". | *Default:* |
| **tidalVolume** IntervalOfQuantity  Public | Volume of air delivered with each machine-delivered breath, often expressed in mL in the United States. For example, 500 mL. | *Default:* |
| **ventilatorMode** Code  Public | Primary setting on a mechanical ventilator that specifies how machine breaths will be delivered to a patient.  Examples:Assist Control (AC), Synchronized Intermittent Mandatory Ventilation (SIMV), Pressure Support Ventilation (PS or PSV), Pressure-Regulated Volume Control (PRVC). | *Default:* |

## ResultDetail

Type: **Interface**

Result values that have more complex structures than can be represented by the simple value attribute.

It is expected that this general type will be extended for representation of specific type of result values.

*Connections*

| **Connector** | **Source** | **Target** | **Notes** |
| --- | --- | --- | --- |
| Generalization  Source -> Destination | Public  ResultGroup | Public  ResultDetail |  |
| Aggregation  Source -> Destination | Public detailedResult  ResultDetail | Public  ObservationResultDescriptor | Detailed complex result values. |
| Generalization  Source -> Destination | Public  MicrobiologySensitivityResult | Public  ResultDetail |  |

## ResultGroup

Type: **Interface** ResultDetail

A group of related result values such as a laboratory result panel. e.g., complete blood count, blood pressure

*Connections*

| **Connector** | **Source** | **Target** | **Notes** |
| --- | --- | --- | --- |
| Generalization  Source -> Destination | Public  ResultGroup | Public  ResultDetail |  |

Attributes

| **Attribute** | **Notes** | **Constraints and tags** |
| --- | --- | --- |
| **component** ObservationResultDescriptor  Public    [0..\*] | An observation result that is one of the components of the group, e.g., systolic blood pressure, white blood cell count. | *Default:* |

## TextureModification

Type: **Interface**

TextureModification specifies or modifies the texture for one or more types of food in a diet, e.g., ground, chopped, or puree. Texture modification is part of the diet specification and may have different textures ordered for different food groups, e.g., ground meat.

*Connections*

| **Connector** | **Source** | **Target** | **Notes** |
| --- | --- | --- | --- |
| Aggregation  Source -> Destination | Public texture  TextureModification | Public  OralDiet | Specifies or modifies the texture for one or more types of food in a diet |

Attributes

| **Attribute** | **Notes** | **Constraints and tags** |
| --- | --- | --- |
| **foodType** Code  Public | Indicates the type of food to which the texture modification applies. | *Default:* |
| **textureModifier** Code  Public | A further modification to the texture, e.g. Pudding Thick. | *Default:* |
| **textureType** Code  Public | A code that identifies any texture modifications that should be made, e.g., Pureed, Easy to Chew | *Default:* |

## VaccinationProtocol

Type: **Interface**

Information about the protocol(s) under which the vaccine was administered

*Connections*

| **Connector** | **Source** | **Target** | **Notes** |
| --- | --- | --- | --- |
| Aggregation  Source -> Destination | Public protocol  VaccinationProtocol | Public  ImmunizationDescriptor | The role of the dose in an immunization protocol |

Attributes

| **Attribute** | **Notes** | **Constraints and tags** |
| --- | --- | --- |
| **authority** Organization  Public | Indicates the authority who published the protocol? E.g. ACIP. | *Default:* |
| **description** Text  Public | The description about the protocol under which the vaccine was administered. | *Default:* |
| **doseSequence** Quantity  Public | Nominal position of dose in a series. | *Default:* |
| **doseStatus** Code  Public | Indicates if the immunization event should "count" against the protocol. | *Default:* |
| **doseStatusReason** Code  Public | Provides an explanation as to why a immunization event should or should not count against the protocol | *Default:* |
| **doseTarget** Code  Public | The targeted disease. | *Default:* |
| **series** Text  Public | One possible path to achieve presumed immunity against a disease - within the context of an authority | *Default:* |
| **seriesDoses** Quantity  Public | The recommended number of doses to achieve immunity | *Default:* |

# Examples

The examples below illustrate the use of the QIDAM in creating data mapping expressions. The leftmost column shows the identifier of the document from which the source expression was obtained. Where the source document ID is prefixed with NQF, it indicates the document was from the National Quality Forum, and where it is prefixed with CMS it indicates a Centers for Medicare and Medicaid Services eCQM. The subsequent digits provide the identifier assigned by NQF or CMS to that measure. The second column contains the expression from the source document. In the third column, the expressions are written in pseudocode. For the semantic references, these examples use the QIDAM category. Where the abbreviation VS is used, it indicates a value set.

Table 5. Example expressions written with QIDAM

|  |  |  |
| --- | --- | --- |
| **Source  Document ID** | **Source Expression** | **QIDAM based expression** |
| NQF 0068 | Diagnosis, Active: Acute Myocardial Infarction" <= 12 month(s) starts before start of "Measurement Period" using "Acute Myocardial Infarction Grouping Value Set (2.16.840.1.113883.3.464.1003.104.12.1001)" | **ConditionPresent** with - semanticReference = "Diagnosis, Active" - name in AMI Grouping VS - status = Active - effectiveTime starts <= 12 months before start of "Measurement period" |
| NQF 0068 | Procedure, Performed: Percutaneous Coronary Interventions <= 12 month(s) ends before start of "Measurement Period" using "Percutaneous Coronary Interventions Grouping Value Set (2.16.840.1.113883.3.464.1003.104.12.1010) | **ProcedureEvent** with - semanticReference = "Procedure, Performed" - procedureCode in PCI Grouping VS - performedAtTime ends <= 12 months before start of "Measurement period" |
| NQF 0068 | Medication, Active: Aspirin and Other Anti-thrombotics" ends before start of "Measurement Period | **MedicationStatement** with - semanticReference = "Medication, Active" - medication in ASA+AT Grouping VS - performedAtTime ends <= start of "Measurement period" |
| NQF 0440 | Encounter, Performed: Non-Elective Inpatient Encounter (admission datetime)" <= 1 hour(s) starts after end of "Occurrence A of Encounter, Performed: Emergency Department Visit (facility location departure datetime)" | **EncounterEvent** with -semanticReference="Encounter, Performed" -serviceType in Non-Elective Inpatient Encounter VS -performedAtTime begins <=1 hour after end of "Encounter, Performed: Emergency Department Visit" |
| NQF 0002 | "Laboratory Test, Result: Group A Streptococcus Test (result)" <= 3 day(s) starts before or during "Occurrence A of Encounter, Performed: Ambulatory/ED Visit" | **ObservationResult** with -semanticReference="Laboratory Test, Result" -name in Group A Streptococcus Test VS -observedAtTime <=3 days before "Encounter, Performed: Ambulatory/ED visit" |
| NQF 0565 | "Physical Exam, Finding: Best Corrected Visual Acuity (result: 'Visual acuity 20/40 or Better')" <= 90 day(s) starts after end of "Occurrence A of Procedure, Performed: Cataract Surgery" | **ObservationResult** with -semanticReference="Physical Exam, Finding" -name in Best Corrected Visual Acuity VS -value > Visual acuity 20/40 -observedAtTime <=90 days after" Procedure, performed: Cataract surgery" |
| NQF 0018 | "Physical Exam, Finding: Systolic Blood Pressure (result < 140 mmHg)" during MOST RECENT: "Encounter, Performed: Office Visit" | **ObservationResult** with - semanticReference="Physical Exam, Finding" - name in Systolic BP VS - value < 140 mm Hg - observedAtTime within (mostRecentOfficeVisitEnc - performedAtTime) |
| NQF 0059 | Laboratory Test, Result: HbA1c Laboratory Test" during "Measurement Period" AND: "Occurrence A of Laboratory Test, Result: HbA1c Laboratory Test (result > 9 %)" | **ObservationResult** with -semanticReference="Laboratory Test, Result" -name in HbA1c Laboratory Test in -observedAtTime within measurement period -value > 9% |
| NQF 1659 | "Procedure, Performed not done: Drug not available" during "Occurrence A of Encounter, Performed: Encounter Inpatient" | **ScheduledProcedure** with -semanticReference="Procedure, Performed"  -currentStatus={  -status=“Not Done”  -reason in Drug not available VS  }  -occurredDuring = "Encounter, Performed: Encounter Inpatient |
| NQF 528 | "Medication, Administered: Hospital measures-IV Vancomycin (route: "Hospital measures-Route IV")" <=1440 minutes(s) starts before start of "Occurrence A of Procedure, Performed: Hospital measures-Joint Commission evidence of a surgical procedure requiring general or neuraxial anesthesia (incision datetime)" | **MedicationDoseAdministration** with -semanticReference="Medication, Administered" -medication in IV Vancomycin VS -deliveryRoute in Hospital measures-Route IV VS -performedAtTime.begin<=1440 minute(s) before (Procedure, Performed: Hospital measures-Joint commission evidence of a surgical procedure requiring general or neuraxial anesthesia" - performedAtTime.begin) |
| [https://www.icsi.org/\_asset/dwy1nl/ACSOS1112.doc](https://www.google.com/url?q=https://www.icsi.org/_asset/dwy1nl/ACSOS1112.doc&sa=D&usg=ALhdy293yqCgXMDh4Sqs4psot1WwM8XFmQ) | Glucose by finger stick screening 4 times daily (before meals and at bedtime) for 24 hours | **ProcedureOrder** with -semanticReference="Procedure, Order" -procedureCode in Glucose Measurement by Finger stick screening VS -procedureSchedule=4 times daily (before meals and at bedtime) for 24 hrs |
| [https://www.icsi.org/\_asset/dwy1nl/ACSOS1112.doc](https://www.google.com/url?q=https://www.icsi.org/_asset/dwy1nl/ACSOS1112.doc&sa=D&usg=ALhdy293yqCgXMDh4Sqs4psot1WwM8XFmQ) | Ticagrelor 180 mg loading dose by mouth once 90 mg by mouth twice daily | **MedicationPrescription** with -semanticReference="Medication, Order" -medication.code in Ticagrelor VS -dosageInstruction {  - doseType=loadingDose  - deliveryRoute=oral  - doseQuantity=180 mg  - schedule=Once on day 1  }  -dosageInstruction { - deliveryRoute=oral - doseQuantity=90 mg - administrationSchedule=twice daily one day starting day 2  } |
| NQF 0070 | Medication Adverse Event to Beta Blocker Therapy. | **AdverseEvent** with  -semanticReference=“Medication, Adverse Effects”  -agent in Beta Blocker VS  -status=Active |
| NQF 0055 | Medication dispensed:  Medications indicative  of diabetes <= 2 years  before or simultaneously to  “Measurement end date”. | **MedicationDispense** with  -semanticReference=“Medication Dispensed”  - medication in medications indicative of diabetes VS  -dispense.dispenseTime <=2years before or simultaneously to “measurement end date” |
| Corticosteroid inhaler reminder | Allergy To inhaled corticosteroids | **AllergyIntolerance** with  -semanticReference=“Medication,Allergy”  -stimulus in corticosteroids VS  -sensitivityType=Allergy |
| Heart Failure Admission To  MedSurgOrderSets | Not allergic to an ACE inhibitor. | **NoAllergyIntolerance** with  -semanticReference=“Medication,Allergy  -stimulus in ACE inhibitor VS  -sensitivityType=Allergy |
| CMS 147v2 | Communication from patient to provider: Previous receipt of influenza vaccine | **CommunicationEvent** with  -semanticReference=“Communication From Patient to Provider”  -performedAtTime during MeasurementPeriod  -recipient=provider  -sender=patient  -topic: {ImmunizationDoseAdministration with  -vaccine.vaccineType in Influenza vaccine VS  } |
| <http://www.uspreventiveservicestaskforce.org/breastcancer.htm> | Family History Of breast cancer in mother. | **FamilyHistoryConditionPresent** with  -semanticReference=“Diagnosis, Family History”  -relationship=mother  -condition= Breast Cancer |
| NQF0038 | "[Medication administered: rubella vaccine](http://ushik.org/ViewItemDetails?&system=mu&itemKey=122568000&enableAsynchronousLoading=true#qde_123518000)", occurring <2 years after "[Patient characteristic: birth date](http://ushik.org/ViewItemDetails?&system=mu&itemKey=122568000&enableAsynchronousLoading=true#qde_123397000) | **ImmunizationDoseAdministration with**  **-**semanticReference=“Medication, Administered”  -performedAtTime= <2years after birth date  -vaccine,vaccineType in Rubella Vaccine VS |
| CMS135v1 | "[Medication, Allergy: ACE inhibitor or ARB Allergen](http://ushik.org/ViewItemDetails?&system=mu&itemKey=161732000&enableAsynchronousLoading=true#qde_161734000)" | **AllergyIntolerance** with  **-**semanticReference=“Medication Allergy”  -sensitivityType=Allergy  -stimulus in ACE inhibitor or ARB Allergen VS |
| CMS142v1 | [Communication: From Provider to Provider: Level of Severity of Retinopathy Findings](http://ushik.org/ViewItemDetails?&system=mu&itemKey=162036000&enableAsynchronousLoading=true#qde_162048000) | **CommunicationEven**t with  -semanticReference=“Communication From Provider to Provider”  -recipient=provider  -sender=provider  -message=“ObservationResult statement containing level of severity of retinopathy findings” |
| CMS73v1 | [Medication, Administered: Parenteral Anticoagulant](http://ushik.org/ViewItemDetails?&system=mu&itemKey=161140000&enableAsynchronousLoading=true#qde_161150000) | **MedicationStatement** with  -semanticReference=“Medication, Administered”  -medication in Anticoagulant VS |
| CMS73v1 | [Laboratory Test, Result: INR](http://ushik.org/ViewItemDetails?&system=mu&itemKey=161140000&enableAsynchronousLoading=true#qde_161145000) (result<2) | **ObservationResult** with  -semanticReference=“Laboratory Test, Result”  -value <2  -name in INR VS |
| USPSTF Screening For Syphilis Infection In Pregnancy | Screen for syphilis infections | **ProcedureProposal** with  -semanticReference=“Procedure, Recommended”  -procedureCode in Screening Test for Syphilis Infection VS |
| CMS135v2 | [Encounter, Performed: Care Services in Long-Term Residential Facility](http://ushik.org/ViewItemDetails?&system=mu&itemKey=161732000&enableAsynchronousLoading=true#qde_161741000) during Measurement Period | **EncounterEvent** with  -semanticReference=“Encounter, Performed”  -location.function=Long-Term Residential Facility  -performedAtTime=during Measurement Period |
| CMS190v1 | [Device, Applied not done: Patient Refusal](https://ushik.ahrq.gov/details?itemKey=160837000&System=mu&enableAsynchronousLoading=true#qde_160876000) for Graduated compression stockings (GCS) | **DeviceApplicationNotPerformed** with  -semanticReference=“Device, Applied”  -device.type in Graduated compression stockings VS  -reason patient refusal |
| CMS178v2 | [Device, Applied: Hospital Measures-Indwelling urinary catheter](https://ushik.ahrq.gov/details?itemKey=160677000&System=mu&enableAsynchronousLoading=true#qde_160682000) | **DeviceApplicationPerformed** with  -semanticReference=“Device, Applied”  -device.type in Indwelling urinary catheter VS |
| CMS157v1 | Occurrence A of [Diagnosis, Active: Cancer](https://ushik.ahrq.gov/details?itemKey=162435000&System=mu&enableAsynchronousLoading=true#qde_162440000) | **ConditionPresent** with  -semanticReference=“Diagnosis, Active”  -name in Active Cancer VS |
| Acute Coronary Syndrome, Admission to CCU for - <https://www.icsi.org/_asset/dwy1nl/ACSOS1112.doc> | Consistent carbohydrate (CHO)  Diet | **OralDietOrder** with  -semanticReference=“Substance, Order”  -nutritionItem[OralDiet].dietType= carbohydrates |
| Acute Coronary Syndrome, Admission to CCU for - <https://www.icsi.org/_asset/dwy1nl/ACSOS1112.doc> | Tirofiban 25 mcg/kg IV bolus, followed by a maintenance infusion of 0.075 mcg/kg/min | **MedicationPrescription** with  -semanticReference=“Medication, Order”  -medication.code = Tirofiban  -dosageInstruction[1]={  -deliveryRoute=IV  -dose=25mcg/kg  -doseType=bolus  }  -dosageInstruction[2]={  -deliveryRoute= IV  -rate= 0.075 mcg/kg/min  -doseType=maintenance  } |
| USPSTF Routine Screening for Iron Deficiency Anemia in Asymptomatic Pregnant Women | recommends routine screening for iron deficiency anemia | **ProcedureProposal** with  -semanticReference=“Procedure, Recommended”  -procedureCode in screening test for iron deficiency anemia VS |
| CMS114v1 | [Medication, Administered not done: Medical Contraindication](https://ushik.ahrq.gov/details?itemKey=160451000&System=mu&enableAsynchronousLoading=true#qde_160472000)" for "Injectable Factor Xa Inhibitor | **MedicationAdministrationProposal** with  -semanticReference=“[Medication, Administered not done”](https://ushik.ahrq.gov/details?itemKey=160451000&System=mu&enableAsynchronousLoading=true#qde_160472000)  -medication.code in Injectable Factor Xa VS  -currentStatus={  -statusCode=NotAccepted  -reason=MedicalContraindication  } |
| CMS157v1 | [Procedure, Performed: Chemotherapy Administration](https://ushik.ahrq.gov/details?itemKey=162435000&System=mu&enableAsynchronousLoading=true#qde_162438000) | **ProcedureEvent** with  -semanticReference=“Procedure, Performed”  -procedureCode in Chemotherapy Administration VS |
| CMS53v1 | [Diagnostic Study, Result: Hospital Measures-ECG Impression](https://ushik.ahrq.gov/details?itemKey=160997000&System=mu&enableAsynchronousLoading=true#qde_161014000) | **ObservationResult** with  -semanticReference=“Diagnostic Study, Result”  -name in ECG-Impression |
| CMS136v2 | [Encounter, Performed: Discharge Services- Observation Care](https://ushik.ahrq.gov/details?itemKey=161771000&System=mu&enableAsynchronousLoading=true#qde_161782000) | **EncounterEvent** with  -semanticReference=“Encounter, Performed”  -serviceType in Discharge services Observation care VS |
| HL7 V3 DAM, Diet and Nutrition Orders, DSTU Release 2 | a standard, polymeric enteral formula was selected from the hospital’s established formulary, and a total energy target of 20–25 kcal per kg actual body weight | **DietOrder** with  -semanticReference=“Substance, Administered, Enteral Feeding”  -nutritionItem=  {EnteralFormula with  -caloricDensity=20–25 kcal per kg  -product=standard, polymeric enteral formula  } |
| Stroke for Patient not Receiving tPA, Ischemic; Admission for - <https://www.icsi.org/_asset/gd1yy3/StrokeOSnontPA0712.doc> | keep patient with nothing by mouth | **OralDietProposal** with  -semanticReference=“Substance, Recommended”  -dietType=NPO code |
| CMS113v1 | [Diagnosis, Active: Spontaneous Rupture of Membranes](https://ushik.ahrq.gov/ViewItemDetails?&system=mu&itemKey=160421000&enableAsynchronousLoading=true#qde_160433000) | **ConditionPresent** with  -semanticReference=“Diagnosis, Active”  -name in spontaneous rupture of membranes VS  -status=Active |
| QIDAM developers | Patient is not pregnant. | **ConditionAbsent** with  -semanticReference=“Diagnosis, Inactive”  -name in Pregnancy VS |
| QIDAM developers | Unknown if patient has history of rheumatic fever | **ConditionPresenceUnknown** with  -semanticReference=“Diagnosis, Active”  -name in Rheumatic fever VS |
| QIDAM developers | Patient is advised to wear holter monitor | **DeviceApplicationProposal** with  -semanticReference=“Device, Recommended”  -device.type in Holter monitor VS |
| QIDAM developers | Begin NTP (Non-Invasive Transcutaneous Pacing) immediately by trained nurse | **DeviceApplicationOrder** with  -semanticReference=“Device, Order”  -device.type=NTP  -urgency=urgent |
| QIDAM developers | Cholecystectomy was not performed | **ProcedureNotPerformed** with  -semanticReference=“Procedure, Performed”  -procedureCode in cholecystectomy VS |
| QIDAM developers | Hep B dose 1 due now. Total of 3 doses required to obtain protection from Hepatitis B infection. | **ImmunizationRecommendation** with  -semanticReference=“Medication, Order”  -vaccine.vaccineType=hepatitis B vaccine  -protocol={  -doseTarget=hepatitis B  -doseSequence=1  -seriesDoses=3  } |
| QIDAM developers | Aspirin 81 mg ,one tablet per day orally | **MedicationAdministrationProposal** with  -semanticReference=“Medication, Order”  -medication.code in Aspirin VS  -dosageInstruction={  -doseQuantity=81mg  -administrationSchedule=one per day  -deliveryRoute=oral  } |
| QIDAM developers | Lumpectomy is contraindicated in pregnancy | **ContraindicationToProcedure** with  -semanticReference=“Procedure, Intolerance”  -contraindicatedProcedure.procedureCode in lumpectomy VS  -reason=Pregnancy |
| QIDAM developers | No family history of lung cancer in patient | **FamilyHistoryConditionAbsent** with  -semanticReference=“Problem,Inactive  -condition in lung cancer VS |
| San Diego County Pertussis Notification Criteria | Phone epidemiology program at SDDHS | **CommunicationProposal** with  -semanticReference=“Communication From Provider to Patient”  -medium=telephone  -sender=provider  -recipient=organization (SDDHS)  -message= notification of pertussis case |
| QIDAM developers | notify MD if temperature goes above 104 F | **CommunicationOrder** with  -semanticReference=“Communication From Provider to Provider”  -message=temperature above 104 F  -recipient=attending  -sender=nurse |
| QIDAM developers | Unknown whether patient has Penicillin allergy | **AllergyIntoleranceUnknown** with  -semanticReference=“Substance, Allergy”  -sensitivityType=Allergy  -stimulus=Penicillin |
| QIDAM developers | Patient receiving chemotherapy did not respond to first line medications | **CareExperience** with  **-**semanticReference=“Patient Care Experience”  -experience=poor response  -about={<MedicationStatement about first-line chemotherapy medications>} |
| QIDAM developers | Participation in a government guarantee program for immunizations (e.g., Vaccines for Children) impacts which vaccine stock is used to treat the patient | **ParticipationInCareProgram** with  -semanticReference=“Care Plan Participation”  -participationStatus=ongoing  -programType=Government Guarantee Program for Immunization |
| QIDAM developers | Recommend HbA1c of less than 6.5% within next 3 months. | **GoalProposal** with  -semanticReference=“Care goal”  -goalFocus in HbA1c VS  -goalValue=6.5%  -goalPursuitEffectiveTime=3 months |
| QIDAM developers | Goal of LDL level of 100 mg/dL has been established | **GoalPerformance** with  **-**semanticReference=“Care goal”  -goalFocus in LDL VS  -goalValue=100 mg/dL |
| QIDAM developers | There are ventilators present in this long-term care facility. | **Organization** with  -type=long-term care facility  -characteristic={  -code=ventilator  -presence=yes  } |
| VMR | Increased fiber diet | **DietOrder** with  -semanticReference=“Substance, Order”  -nutritionItem[OralDiet].dietType=increased fiber diet |
| VMR | High-calorie protein shake | **DietProposal** with  -semanticReference=“Substance, Recommended”  -nutritionItem[NutritionalSupplement].product=protein shake |
| VMR | Easy to chew diet (regime/therapy) | **DietProposal** with  -semanticReference=“Substance, Recommeded”  -nutritionItem[OralDiet].texture.textureType=easy to chew |
| CMS100v1 | [Transfer To: Hospital Measures - Inpatient Hospice Care](https://ushik.ahrq.gov/ViewItemDetails?&system=mu&itemKey=160114000&enableAsynchronousLoading=true#qde_160121000) | **EncounterEvent** with  -semanticReference=“Transfer to”  -dischargeDisposition in Inpatient hospice care VS  -class=in-patient |
| USPSTF Screening for Hepatitis B Virus Infection in Pregnancy | High risk patients and patients who test positive for HBV should be referred to an appropriate case-management program. | **ProgramParticipationProposal** with  -programType=code for case-management program for HBV |
| CMS188v2 | [Diagnosis, Inactive: Cystic Fibrosis](http://ushik.org/ViewItemDetails?&system=mu&itemKey=160754000&enableAsynchronousLoading=true#qde_160805000) | **ConditionPresent** with  -semanticReference=“Diagnosis, Inactive”  -name in Cystic Fibrosis VS  -status=Inactive |
| CMS 160v1 | "[Patient Characteristic Expired: Deceased](https://ushik.ahrq.gov/details?itemKey=162499000&System=mu&enableAsynchronousLoading=true#qde_162504000)" | **Patient** with  -isDeceased=yes |
| CMS 171v2 | [Device, Applied: Hospital measures-Pacemaker or implantable defibrillator device](http://ushik.org/ViewItemDetails?&system=mu&itemKey=160501000&enableAsynchronousLoading=true#qde_160525000)" | **DeviceApplicationPerformed** with  -semanticReference=“Device, Applied”  -type in Pacemaker or Implantable defibrillator VS |
| CMS22v1 | [Intervention, Order: Referral to Alternative Provider / Primary Care Provider](http://ushik.org/ViewItemDetails?&system=mu&itemKey=162796000&enableAsynchronousLoading=true#qde_162806000) (reason: 'Finding of Hypertension') | **EncounterRequest** with  -semanticReference=“Intervention,Order”  -class=out-patient  -reason=Finding of Hypertension |
| CMS155v1 | [Intervention, Performed: Counseling for Physical Activity](https://ushik.ahrq.gov/details?itemKey=162381000&System=mu&enableAsynchronousLoading=true#qde_162395000) | **ProcedureEvent** with  -semanticReference=“Intervention, Performed”  -procedureCode in counseling for physical activity VS |
| Stroke for Patients Receiving tPA, Ischemic; Admission for -  https://www.icsi.org/\_asset/c6pjdr/StroketPA0712.doc | Oxygen two liters per minute by nasal cannula if O2 saturation less than 94%. Titrate O2 to maintain  saturation greater than or equal to 94% | **ProcedureProposal** with  -semanticReference=“Procedure, Order”  -procedureCode in oxygen by nasal canula VS  -details={  RespiratoryCareProcedure with  -spO2Range > or = 94%  -oxygenFlowRate=two liters per minute  -spO2Titration >= 94%  } |
| QIDAM Developers | Migraine triggered by bright light | **ConditionPresent** with  -semanticReference=“Diagnosis, Active”  -name in Migraine VS  -conditionDetails={  -name=triggering factor  -value=Bright Light  } |
| CMS64v3 | Risk Category Assessment: Framingham coronary heart disease 10 year risk (result > 20 %)" during "Measurement Period” | **Prognosis** with  -semanticReference= “Risk Category Assessment”  -condition=coronary heart disease  -likelihood > 20%  -within 10 years  -observedAtTime during “Measurement Period”  -inferenceMethod=Framingham Risk Score code |

# Glossary of Terms

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| **Term** | **Description** |
| Action Specification | A structured and encoded description of a healthcare action. This specification is often part of the consequence of a rule, where the recommendation is described as an action specification. |
| CCDA | Consolidated Clinical Document Architecture. A specification from HL7 for templates for clinical documents. See [6] |
| Clinical Decision Support (CDS) | Clinical decision support (CDS) provides clinicians, staff, patients or other individuals with knowledge and person-specific information, intelligently filtered or presented at appropriate times, to enhance health and health care. CDS encompasses a variety of tools to enhance decision-making in the clinical workflow. [9] |
| CDS Knowledge Artifact | A specification of knowledge encoded so that it can be used for computer-based CDS, e.g., a rule, an order set. |
| Clinical Concepts | Mental representations of physical or non-physical things of interests in the clinical/healthcare domain, e.g., disease, drugs |
| Conceptual Data Model | An abstract simplified view of things of interest in a particular domain. |
| Clinical Statement | An expression of a discrete item of clinical, clinically-related or public health information that is recorded because of its relevance to the care of a patient or other entities. |
| Domain Analysis Model | An abstract representation of a subject area of interest, complete enough to allow instantiation of all necessary concrete classes needed to develop child design artifacts. |
| Electronic Clinical Quality Measure (eCQM) | A clinical quality measure (CQM) is specification of criteria for measuring the quality of a healthcare process, outcome, structure, or patient experience. An electronic CQM (eCQM) encodes the criteria to enable their use by computer software. |
| Data Specification | A structured and encoded description of data such that it can be used to retrieve or select instances of the data from some source of data (e.g., database). Data specifications are used in CDS knowledge artifacts and eCQMs, to express the data elements needed in logical criteria and expressions. |
| EHR | An electronic health record |
| Interface | In object-oriented programming, an interface is a set of grouped behaviors for objects to communicate with each other. In QIDAM, interfaces are used with clinical statements to enable statements to specify the data that must be be provided by the statements implemented by the behaviors. For example, the ProcedureOrder statement must provide a procedureCode attribute. |
| Logical Criteria | These computational expressions are elements of CDS knowledge artifacts and eCQMs that perform operations over data (see Data Specifications). Typically, the logical criteria result in true or false values and determine if an action should be carried out (in CDS) or whether data items should be included in a calculation (eCQM). |
| Logical Model | A logical model or a logical data model is a type of data model showing a detailed representation of data in a domain of interest. The representation is independent of any particular data management technology, and described in business language. It is typically represented as a diagram, organized in terms of entities or classes and relationships, with underlying definitions.(Adapted from http://en.wikipedia.org/wiki/Logical\_data\_model). |
| QIDAM | Health Quality Improvement Domain Analysis Model. The term refers to this specification. |
| QRDA | Quality Reporting Document Architecture |
| UML | The Unified Modeling Language (UML) is a general-purpose modeling language in the field of software engineering. In this specification, we use the class diagram notation of UML to specify the model. |
| Value Sets | A value set specifies a set of codes drawn from one or more code systems (e.g, SNOMED-CT, LOINC) that represent a particular concept of interest (e.g., blood culture tests). |
| vMR | Virtual Medical Record, an HL7 specification of a logical data model developed for use in clinical decision support applications. See [2] |

# References

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