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HL7 Domain Analysis Model: Health Quality, Release 1

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HL7 Informative Ballot

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Acknowledgments

This guide was produced as part of a combined effort with members from multiple HL7 Workgroups related to health quality. This group gratefully acknowledges input from numerous HL7 community members, as well as members of the broader health care community.

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

Rev	Date	By Whom	Changes
1	12/9/13	Aziz Boxwala	Consolidate drafts into the HL7 template
2	12/11/13	Aziz Boxwala	Complete draft for review by WGs

Contents

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1 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 and 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 with the codes specified in the value set. This example uses the Problem class from the vMR to define the data specification.

Diagnosis	Diagnosis, Active: Pregnancy	Value Set Name	Pregnancy
		Value Set OID	2.16.840.1.113883.3.600.1622
		Value Set Version	20130614

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.

1.1 Purpose

The Health Quality Improvement Domain Analysis Model (QIDAM) seeks to create 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. It is designed as an abstract fact model. This model can be mapped onto existing logical models while defining the structure and domain concepts required by eCQMs and CDS artifacts.

1.2 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).

1.3 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 eCQM results. 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

As mentioned earlier, CDS artifacts use the Virtual Medical Record (vMR) as the data model, and eCQMs currently use QDM as their fact model.

The vMR logical model is an HL7 domain analysis model; HL7 is currently in the process of publishing release 2. 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, unlike, the QDM also includes classes modeling 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.

1.4 Approach

Prior to the development of the QIDAM, several different data models in addition to vMR and QDM were considered. These models were reviewed against the requirements listed in Chapter 3. Among the models considered were those in:

- HL7 Fast Healthcare Interoperability Resources (FHIR) Specification [3]
- Federal Health Information Model (FHIM) Specification [4]

These models covered the concepts to be represented in QIDAM. However, the structures in these models were not optimal for use in semantically precise and compact logical criteria and expressions.

Therefore, a new model was created that harmonizes the functional capabilities of vMR and QDM. The model reuses elements from the other models named above when appropriate for use in QIDAM.

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 Level 1 Templates [5]
- vMR Templates [6]
- Consolidated Clinical Document Architecture Templates [7]

The supplemental worksheet (QDM-vMR-cross-map.xlsx) maps each Quality Data Model (QDM) class and field [1] to equivalent classes and properties in the vMR and starts preliminary mapping to the QIDAM. The original mapping was against the Virtual Medical Record (vMR) for Clinical Decision Support [2]; changes in the current balloted version of vMR Release 2 (May 2013) have been annotated in the comments column of the worksheet as appropriate.

The summary worksheet shows the mapping of the QDM elements to the QRDA section (July 2012) and vMR classes, with each top-level QDM element category (e.g., Substance) followed by the specific element (e.g., Substance, 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 properties. The Additional Notes column notes exceptions or limitations.

1.5 Scope

The primary scope of this model is limited to the data elements needed to be represented in eCQMs and CDS artifacts. The working definition of the scope is the union of the existing concepts represented in QDM [1] and vMR [2] that are further informed by the templates specifications previously listed.

The primary objective of this version was to develop the core structure of the model and establish the design approach. Further, this version models many of the concepts in scope. In some cases, the model uses an inconsistent level of detail compared to other aspects of the model (e.g., Patient-Controlled Analgesia and Respiratory Care Procedures). This was done intentionally to illustrate how the model can be extended.

The model currently addresses concepts related to:

- Encounters
- Medication
- Procedures
- Observations
- Conditions including findings, diagnoses, symptoms
- Allergies, intolerances, and adverse events

However, in this version of the document, the complete scope of the QIDAM has not been specified. Future versions of QIDAM will model other concepts including, but not limited to:

- Immunizations
- Nutrition and Diet
- Communication
- Health Education
- Care Goals
- Care Plans and Protocols

Many of these concepts have placeholders (the names are prefixed with "TBD" for *to be developed*) in the current model. These will be further developed in the next version.

2 USE CASES

2.1 eCQM and CDS Artifact Development

Description	Developer creates clinical units of meaning (data criterion)
Scenario identifier	M1
Actors	eCQM developer or CDS artifact developer
Pre-conditions	A data criterion exists in a descriptive (free text) form in a measure or guideline (e.g., discharge medication: aspirin, dose).
Actions	1. Developer identifies the appropriate clinical concept type from the QIDAM to represent the data criterion (e.g., medication). 2. Developer identifies the context of the data criterion (e.g., discharge) and uses that to select the appropriate clinical concept class from the QIDAM. 3. Developer identifies properties of interest (e.g., medication dose) and specifies the QIDAM identifier of the properties.
Post-conditions	The QIDAM allows for an accurate and complete definition of the data criterion (e.g., discharge medication dose). The QIDAM includes appropriate attributes such as dosage, codes or value sets, and timestamps. The QIDAM does not preclude the use of the individual data criteria in the description of logic criteria (e.g., establishment of timing relationships or relationship to a particular encounter).
Comments	While the QIDAM provides attributes for codes, constraints on the codes to be used (e.g., value sets, terminologies) are outside the scope of a conceptual model.

2.2 eCQM and CDS Artifact Implementation

Description	Analyst at a clinical site maps data criteria defined using the QIDAM to record entries in an electronic health record system or a clinical data repository. This scenario applies equally to an analyst at a vendor of a complete EHR system or EHR module.
Scenario identifier	M2
Actors	eCQM implementer or CDS artifact implementer

Pre-conditions	A data criterion exists in an eCQM or CDS artifact. The data criterion maps a symbol used in the artifact to its definition in the QIDAM.
Actions	1. Implementer identifies the appropriate element (a table, a class) in the target system that is equivalent to the data criterion in the QIDAM. 2. Implementer uses the definition (including attribute values) to construct the equivalent data 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.
Post-conditions	Implementer correctly maps all data criteria from the eCQM or CDS artifact to the equivalent in the target environment.
Comments	Some data criteria may not have equivalent elements in the target environment; those will not be mapped according to the above use case.

3 REQUIREMENTS

3.1 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 clinical 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 everything in vMR and QDM
- Represents the canonical basis of clinical concepts
    - No overlap
- Is suitable for extension/refinement to create specialized concepts (e.g., SurgicalProcedure extends Procedure with data about anesthesia)

3.1.1 Out of scope

- The language used to specify data mapping expressions or other expressions is not in scope of the QIDAM.

3.2 Format

The QIDAM will be defined in the form of a UML class diagram and will be thoroughly and clearly documented. The purpose, scope, and constraints of each element in the model will be described.

3.3 Usability

The QIDAM will provide a bridge between clinical and technical users by using intuitive or clinical names for classes, especially at the leaf level. 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 element criteria in the QIDAM need to relate in a way that is intuitive both to authors of eCQMs and CDS artifacts as well as 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.

3.4 Computability

The QIDAM will balance the needs for human expressivity and computability. 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 human expressivity compete, 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).
- **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.
- **Incomplete knowledge and uncertainty** – The QIDAM will support the representation of uncertain knowledge and incomplete information. Source pedigree representation, non-deterministic model annotations, or non-exact concept alignments are examples of sources for such uncertainty.

3.5 Interoperability

Each concept and property of vMR and QDM must have an unambiguous mapping to a QIDAM equivalent.

3.6 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 properties for representing genes. The QIDAM will therefore be extensible to fill gaps in the model.

It is expected that gaps in the models will be addressed through the standardization process. However, there often is a need to incorporate additional classes and attributes into a model even before the standardization is completed. Thus, the QIDAM must be extensible by the users and implementers of the specification.

The approach to extending the QIDAM is not part of the conceptual model, the scope of this document. Thus, we do not specify an extension mechanism here. Rather, it will be specified as part of the health quality information logical model. However, we expect that extension 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.

4 MODEL OVERVIEW

4.1 Design Approach

The core concept in the model is an abstract class called Statement. Patient data are specified as Statements. The model dichotomizes statements into two types:

- **StatementAboutAction**: These are statements about performing actions (usually healthcare-related) on or for the patient (e.g., administering a medication). Statements about actions are further split into two subtypes: statements about performing actions (**ActionPerformance**) and statements about not performing an action (**ActionNonPerformance**, e.g., a missed dose of a medication).
- **StatementAboutObservation**: These are statements about observations about the patient's health (e.g., heart rate, diagnosis of hypertension). These statements also are further split into two subtypes: statements about an observation being present (**ObservationPresence**) and statements that an observation or a finding was not present (**ObservationAbsence**, e.g., no chest pain).

Concrete statement types are created by subclassing the four classes named above: ActionPerformance, ActionNonPerformance, ObservationPresence, and ObservationAbsence.

Further, the concrete statement types must implement specified interfaces.

Subclasses of ActionPerformance or ActionNonPerformance must implement at least these two interfaces: a subtype of the **EnactableDescriptor** interface and a subtype of the **EnactmentPhase** interface. The former provides a structured description of the action that was performed or is to be performed (e.g., a procedure). The latter provides a description of the phase (e.g., order, plan) of the action described in the statement. Thus, a concrete statement type like ProcedureOrder (subclassed from ActionPerformance) implements the interfaces ProcedureDescriptor and Order.

Table 1. List of statements about actions

Statement Type	Derived From	Enactable Interface	EnactmentPhase Interface
EncounterProposal	ActionPerformance	EncounterDescriptor	Proposal
EncounterRequest	ActionPerformance	EncounterDescriptor	Order
MissedAppointment	ActionNonPerformance	EncounterDescriptor	Plan
ScheduledEncounter	ActionPerformance	EncounterDescriptor	Plan
EncounterEvent	ActionPerformance	EncounterDescriptor	Performance
MedicationStatement	ActionPerformance	MedicationAdministtrationDescriptor	Performance
MedicationDispensation	ActionPerformance	MedicationAdministtrationDescriptor	Performance
MedicationDoseAdministration	ActionPerformance	MedicationAdministtrationDescriptor	Performance

Statement Type	Derived From	Enactable Interface	EnactmentPhase Interface
UndeliveredMedication Dose	ActionNonPerformance	MedicationAdministtrationDescriptor	Performance
MedicationPrescription	ActionPerformance	MedicationAdministtrationDescriptor	Order
MedicationAdministrationProposal	ActionPerformance	MedicationAdministtrationDescriptor	Proposal
ProcedureProposal	ActionPerformance	ProcedureDescriptor	Proposal
ProcedureOrder	ActionPerformance	ProcedureDescriptor	Order
ScheduledProcedure	ActionPerformance	ProcedureDescriptor	Plan
ProcedureEvent	ActionPerformance	ProcedureDescriptor	Performance
UndeliveredProcedure	ActionNonPerformance	ProcedureDescriptor	Performance

Subclasses of ObservationPresence and ObservationAbsence must implement a subtype of the **ObservableDescriptor** interface. This interface allows expression of the details of the observation such as a finding or a diagnostic test result.

Table 2. List of statements about observations

Statement Name	Derived From	Implemented ObservationDescriptor Interface
AdverseEvent	ObservationPresence	ConditionDescriptor
NoAdverseEvent	ObservationAbsence	ConditionDescriptor
AllergyIntolerance	ObservationPresence	AllergyIntoleranceDescriptor
NoAllergyIntolerance	ObservationAbsence	AllergyIntoleranceDescriptor
Condition	ObservationPresence	ConditionDescriptor
ConditionAbsent	ObservationAbsence	ConditionDescriptor
ContraindicationToMedication	ObservationPresence	ContraindicationDescriptor
ContraindicationToProcedure	ObservationPresence	ContraindicationDescriptor
Prognosis	ObservationPresence	PrognosisDescriptor
FamilyHistoryObservation	ObservationPresence	ObservationResultDescriptor
ObservationResult	ObservationPresence	ObservationResultDescriptor

4.2 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 3. Datatypes in QIDAM

QIDAM Datatype	Description
Code	A value taken from a controlled terminology, such as a code from LOINC
IntervalOfQuantity	A range expressed over a quantity (i.e., has low and high values)
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

4.3 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
- Device
- Location
- Medication
- Organization
- Person
- Person Role
    - Patient
    - Practictioner
    - RelatedPerson
- Schedule
- Substance

4.4 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:

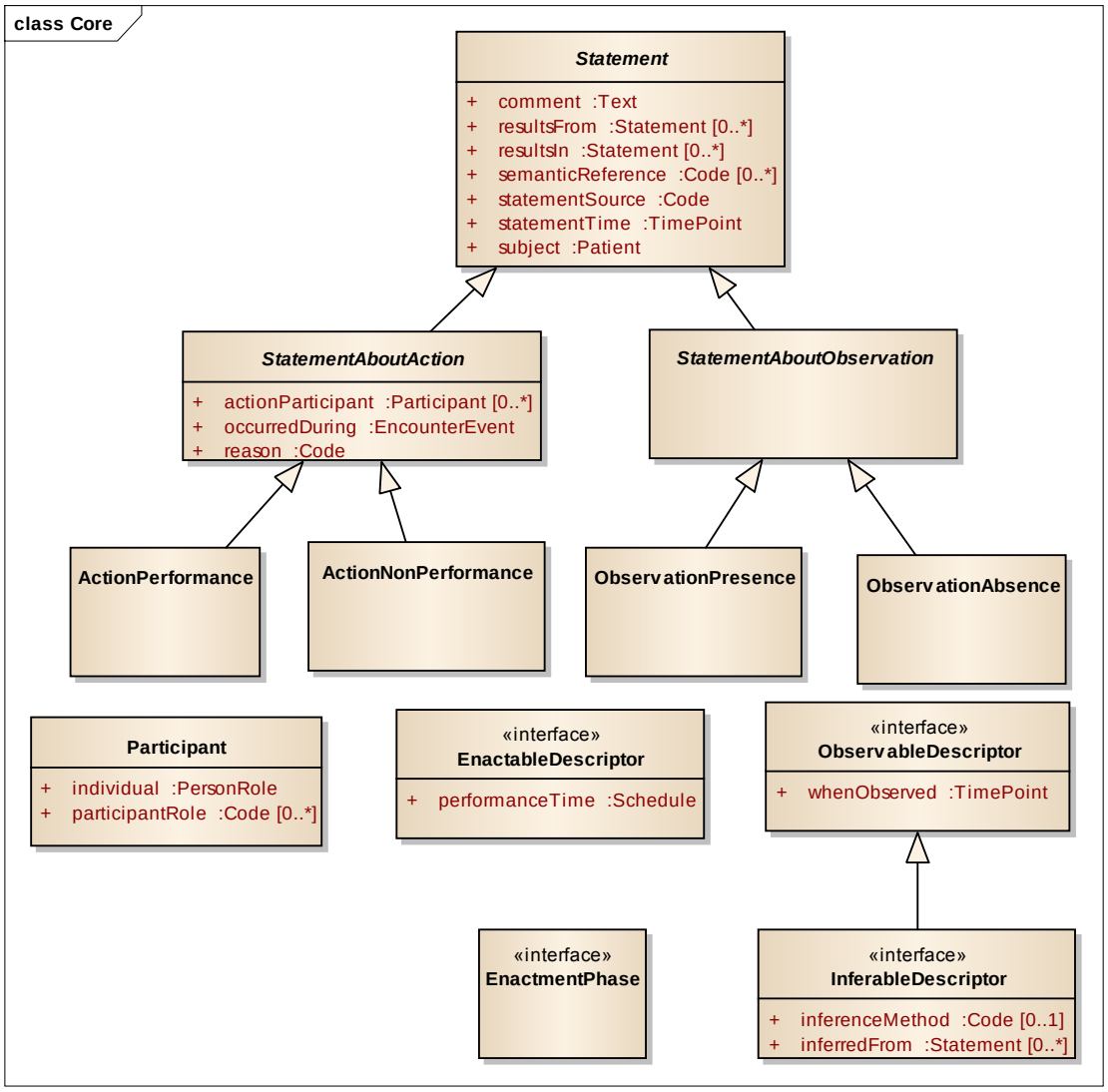
- When the cardinality is intended to be single, cardinality is not specified in the class diagram.
- When the cardinality is intended to be multiple, the cardinality is specified as "0..*" (i.e., zero to many). The zero should not be interpreted as an indication of the optionality of the attribute or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

5 MODEL SPECIFICATION

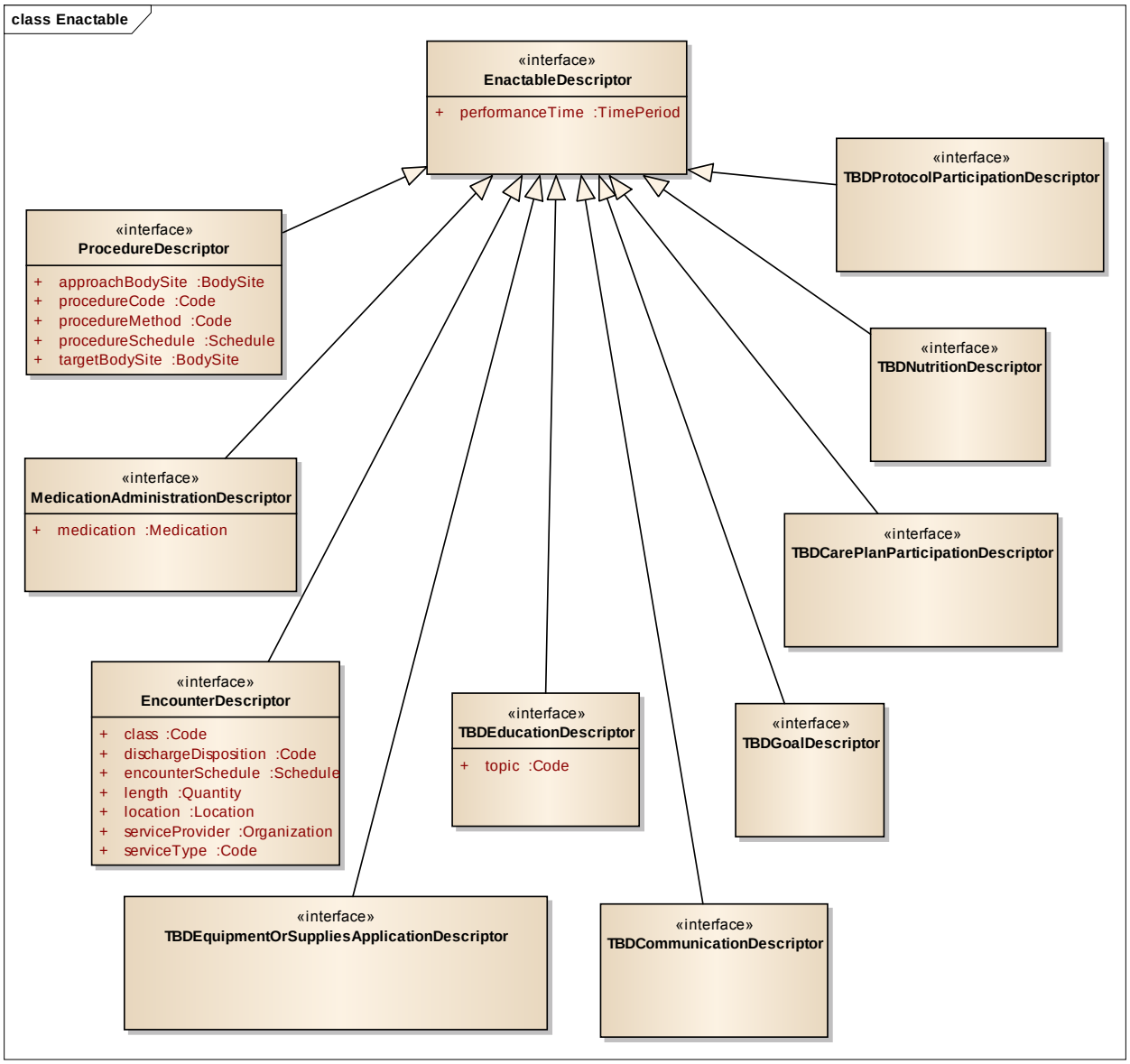
This document provides a complete overview of all element details. It lists all classes and interfaces and their attributes and connections.

5.1 Model Diagrams

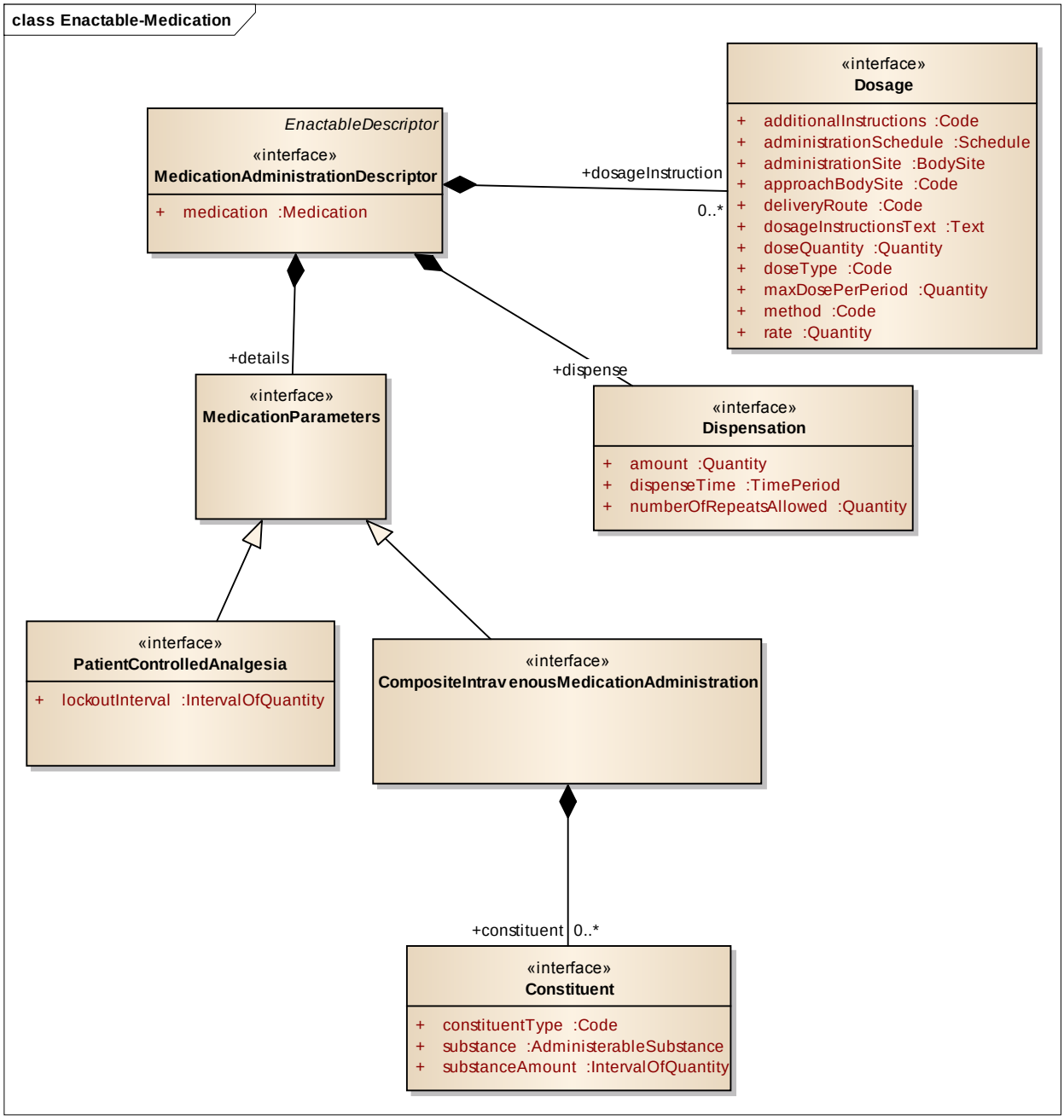
5.1.1 Core - (Class diagram)



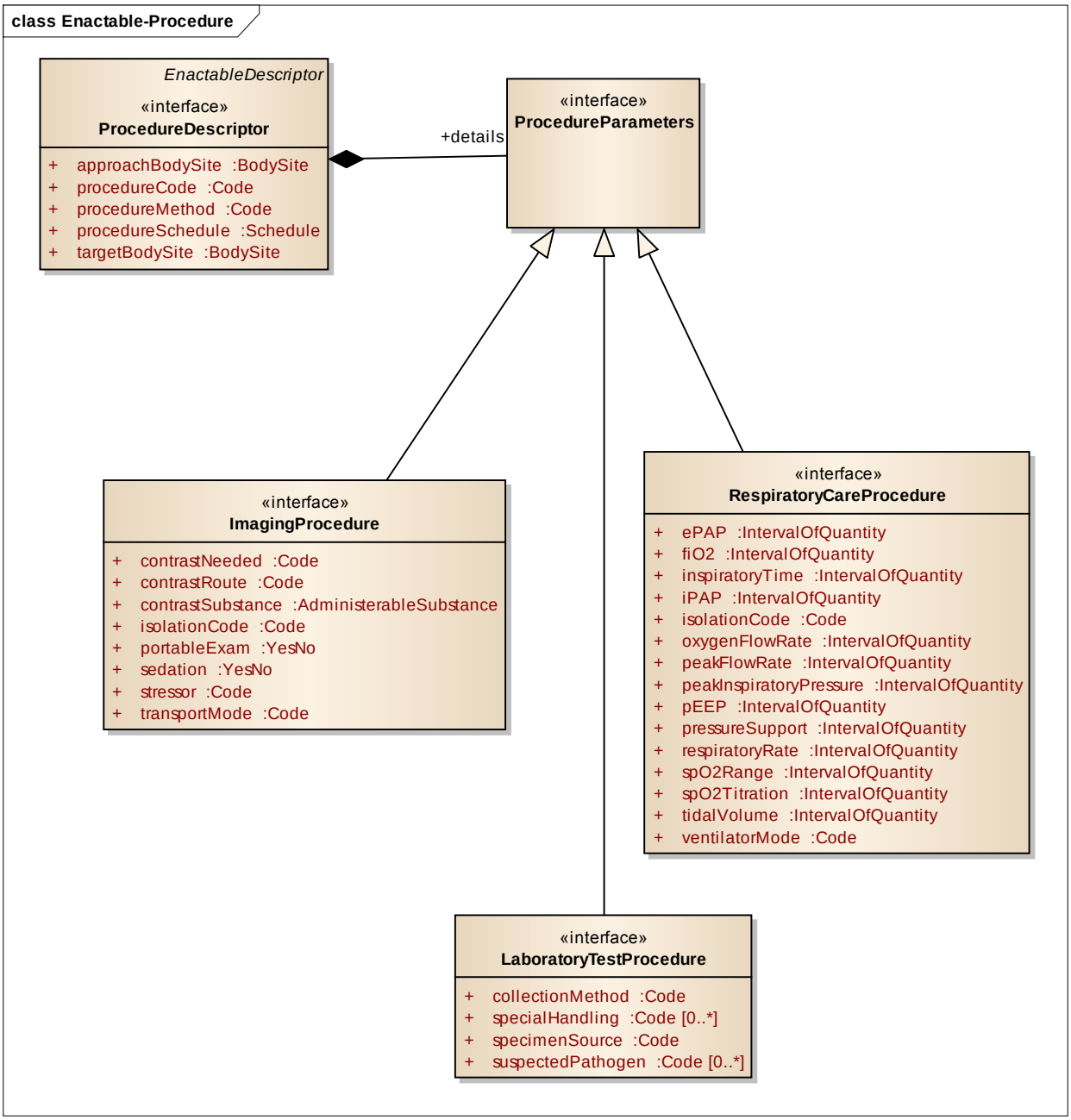
5.1.2 Enactable - (Class diagram)



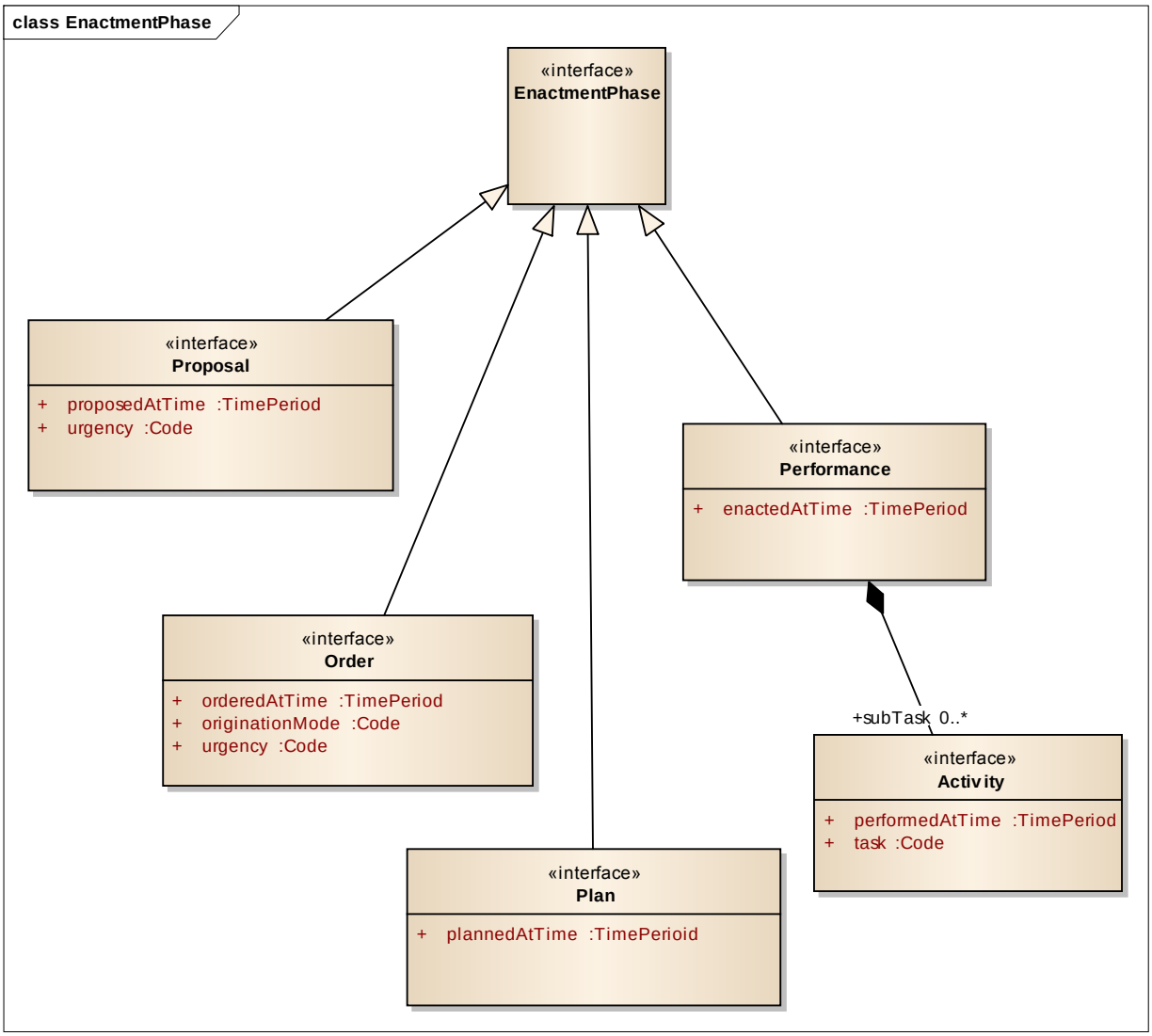
5.1.3 Enactable-Medication - (Class diagram)



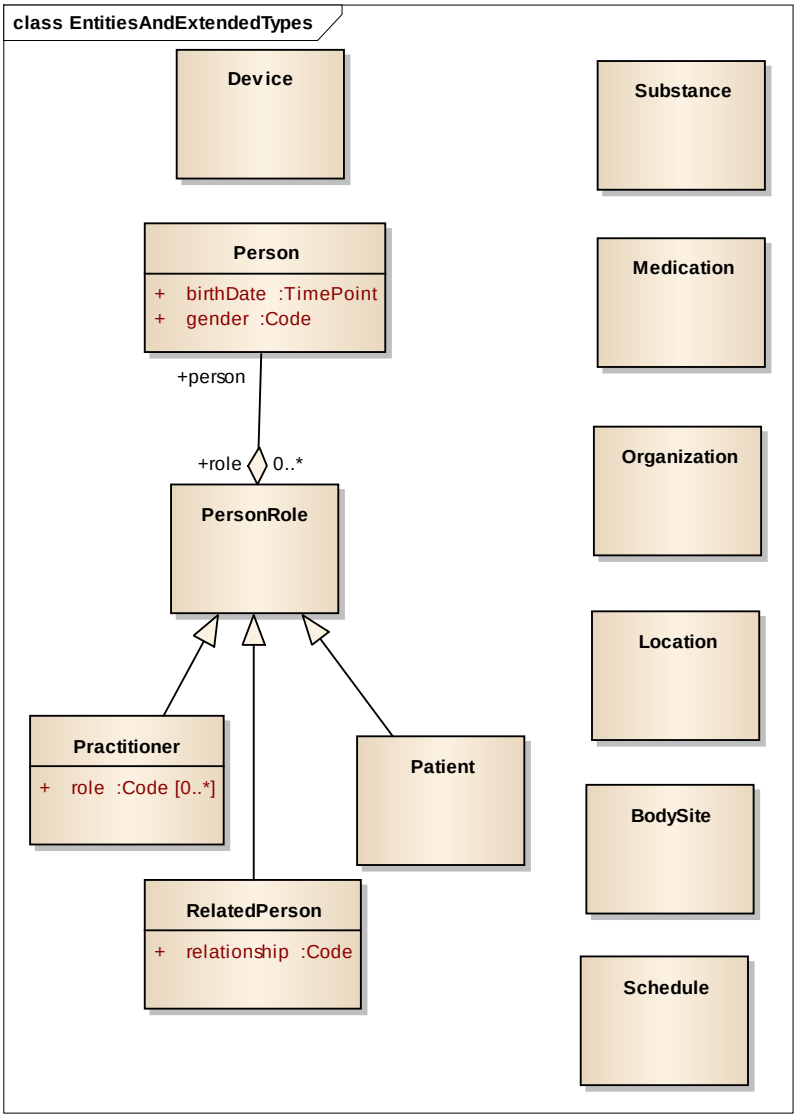
5.1.4 Enactable-Procedure - (Class diagram)



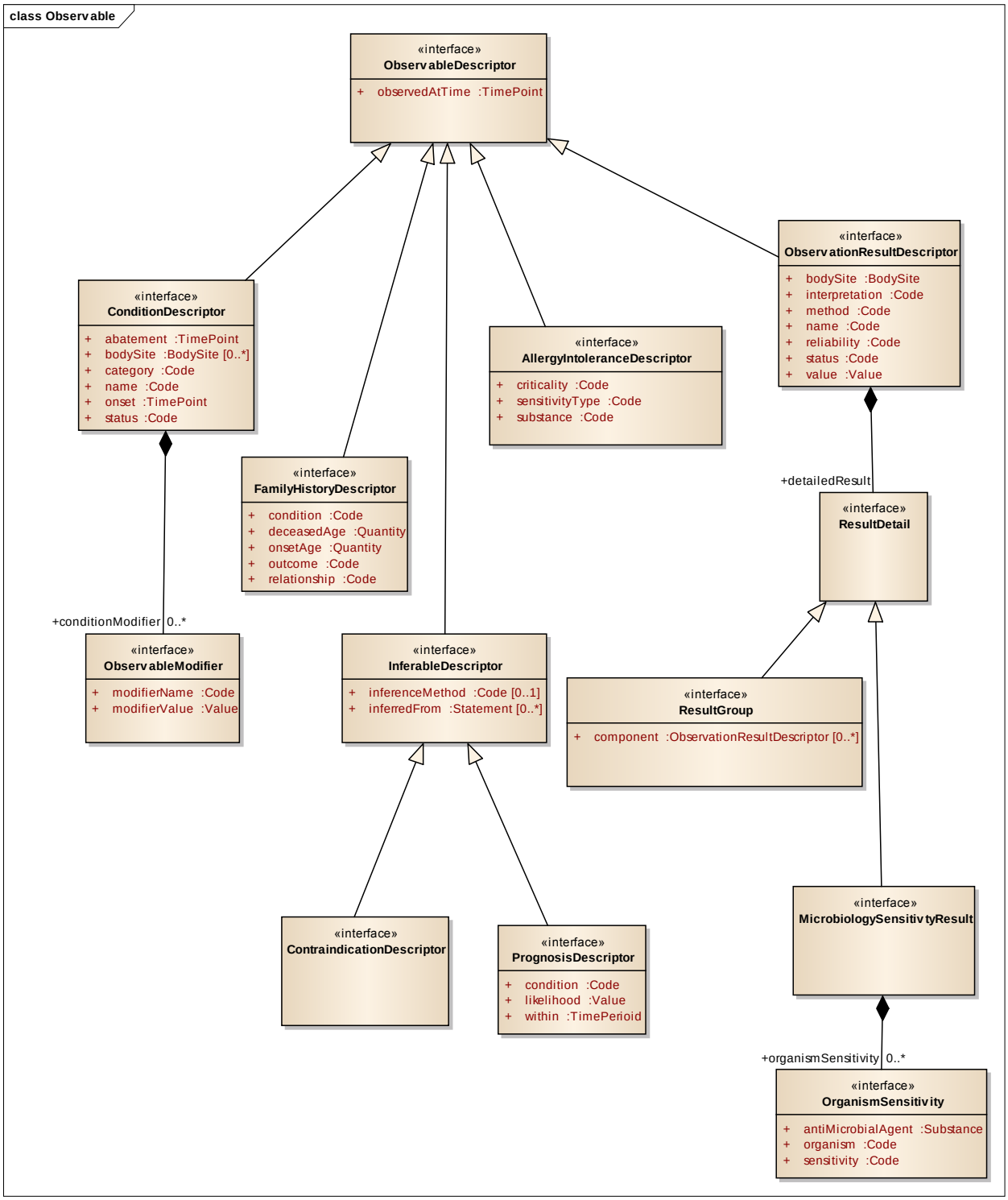
5.1.5 EnactmentPhase - (Class diagram)



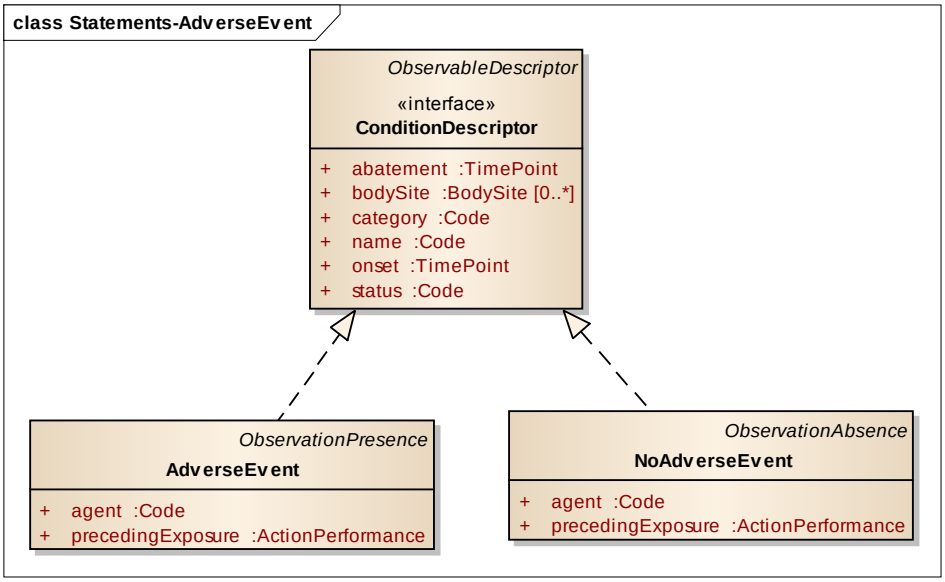
5.1.6 EntitiesAndExtendedTypes - (Class diagram)



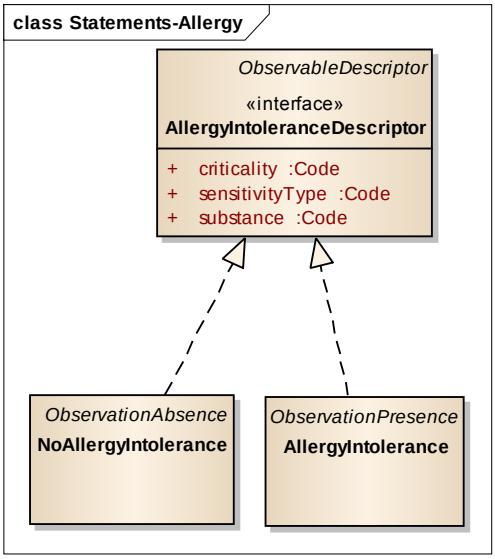
5.1.7 Observable - (Class diagram)



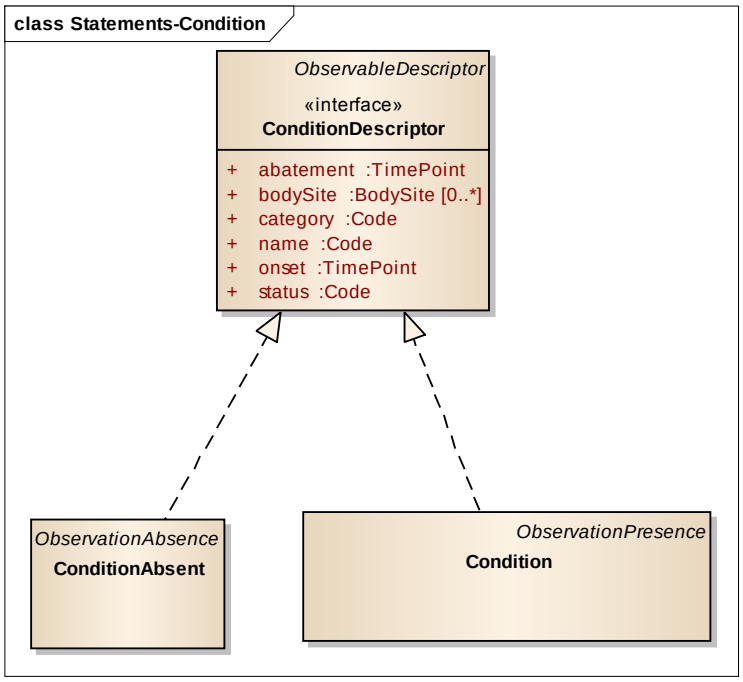
5.1.8 Statements-AdverseEvent - (Class diagram)



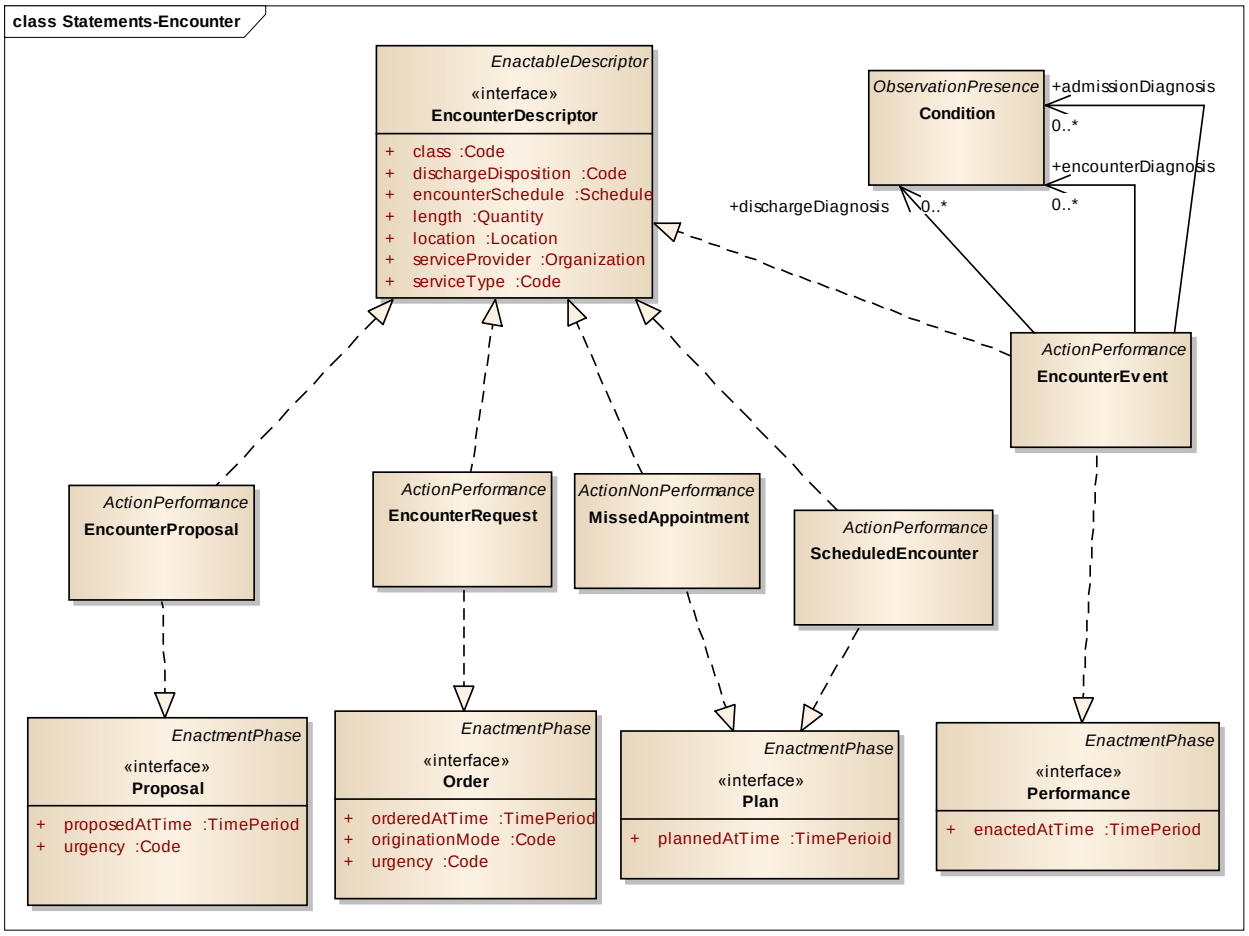
5.1.9 Statements-Allergy - (Class diagram)



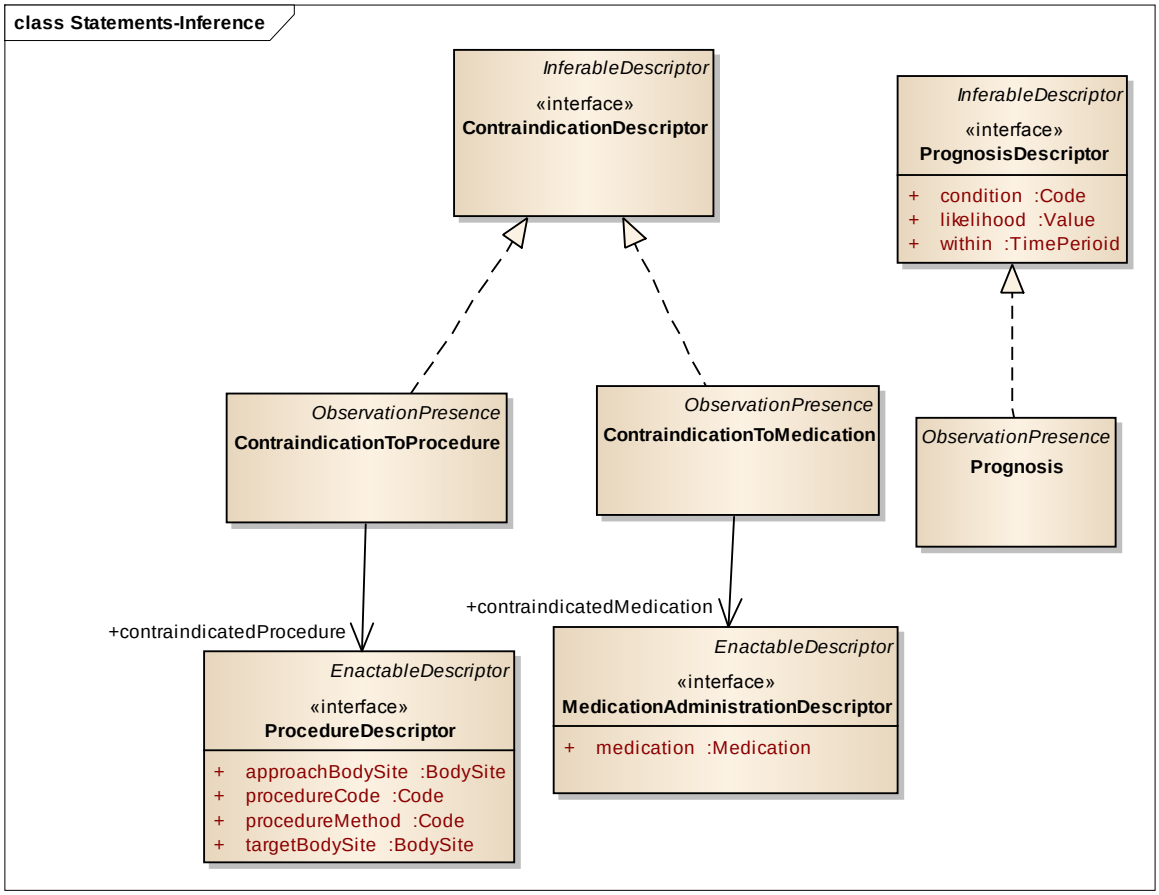
5.1.10 Statements-Condition - *(Class diagram)*



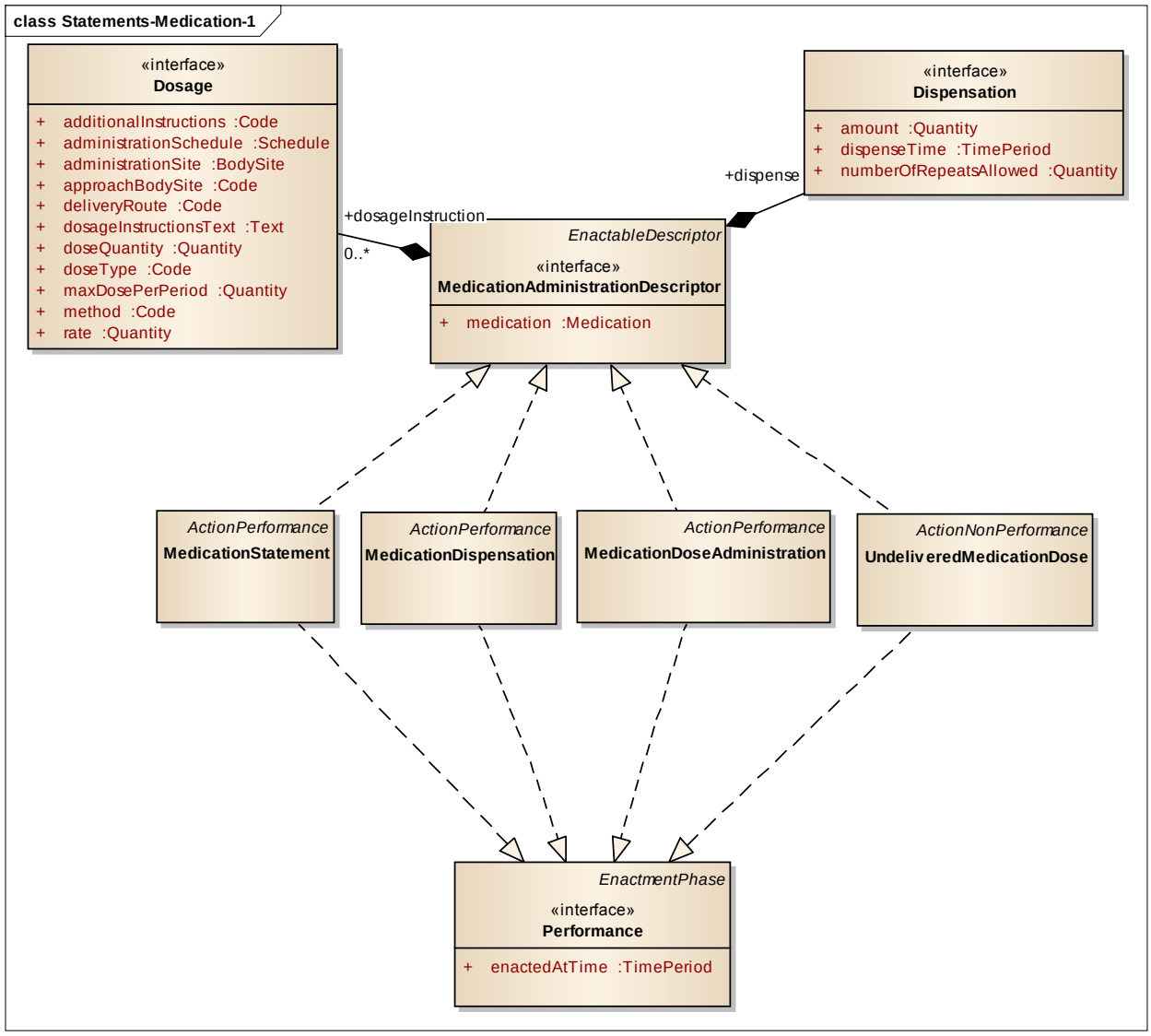
5.1.11 Statements-Encounter - (Class diagram)



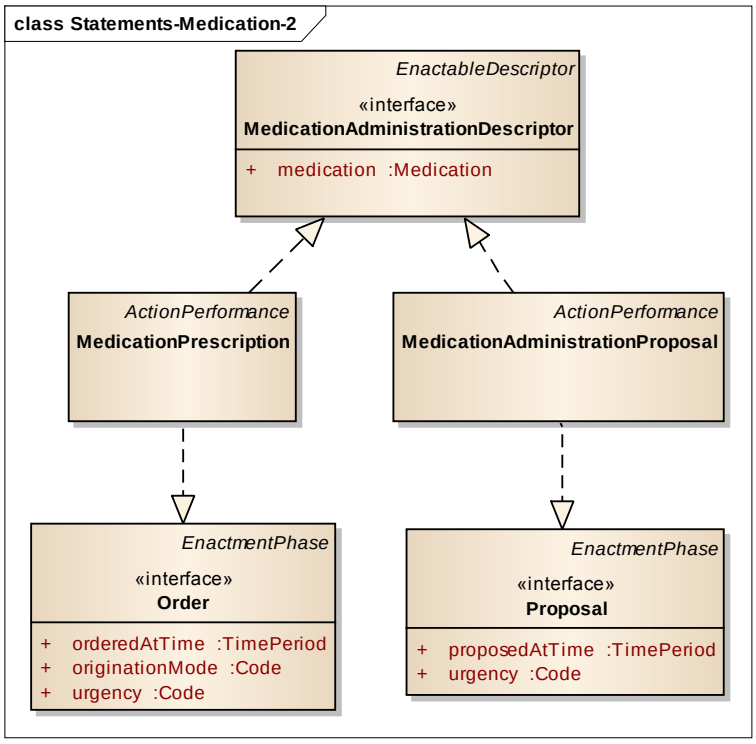
5.1.12 Statements-Inference - (Class diagram)



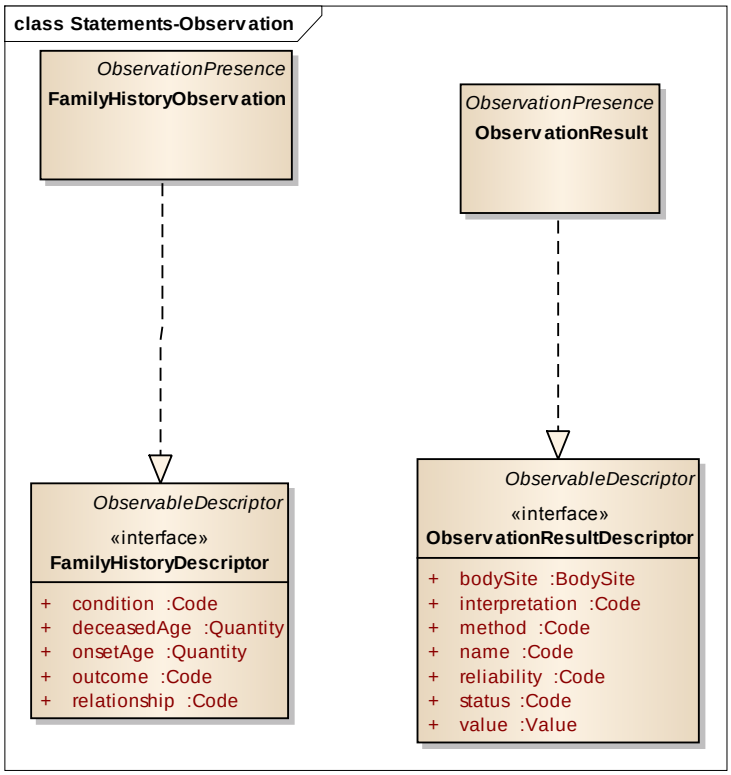
5.1.13 Statements-Medication-1 - (Class diagram)



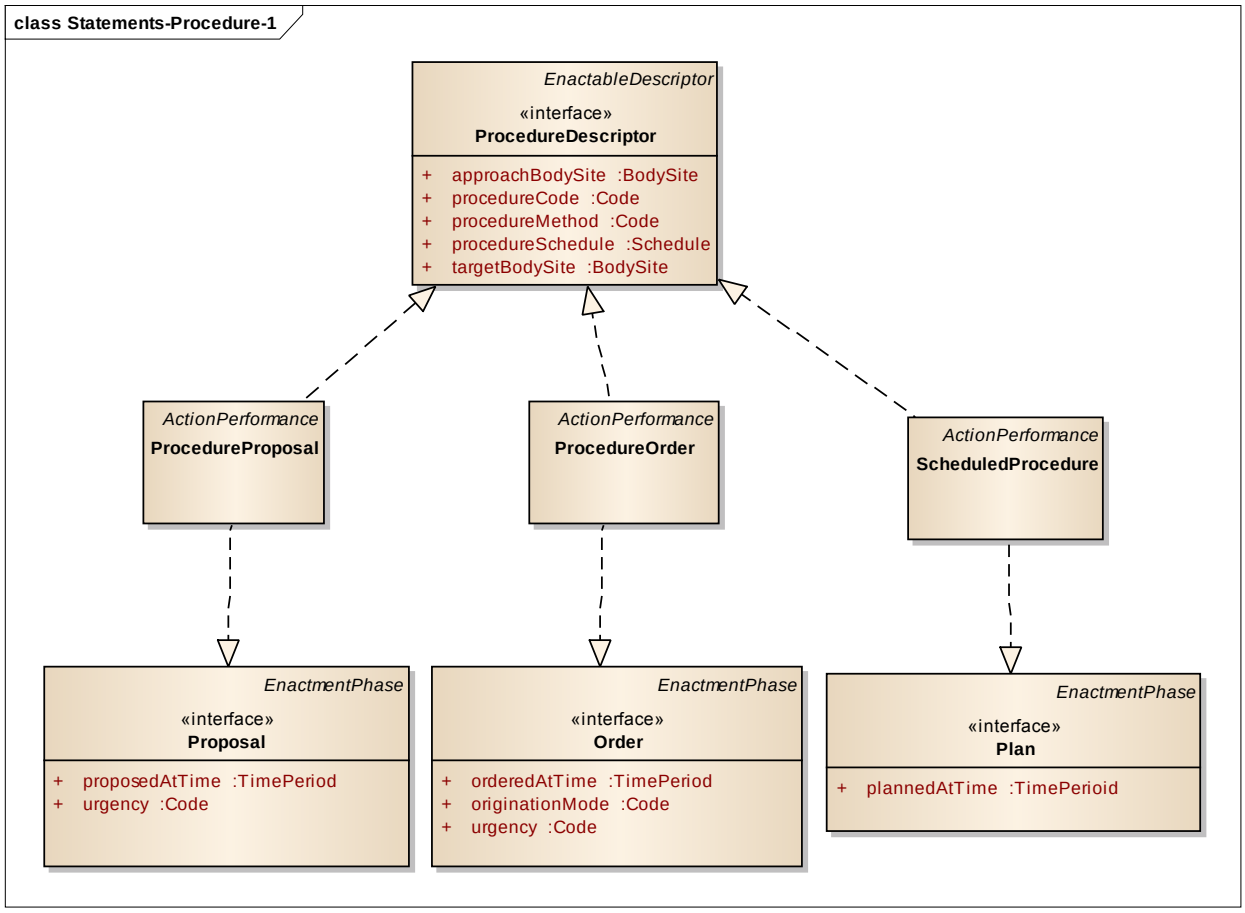
5.1.14 Statements-Medication-2 - (Class diagram)



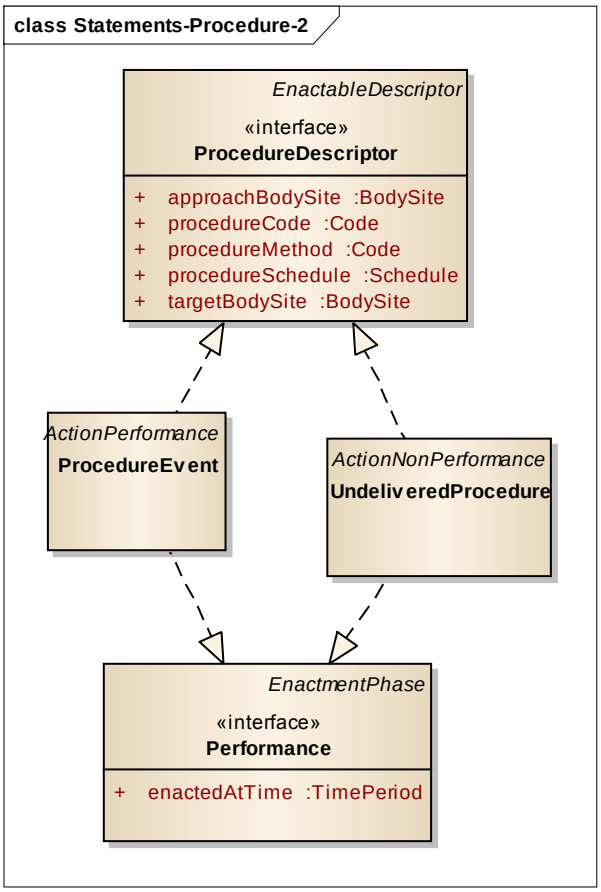
5.1.15 Statements-Observation - (Class diagram)



5.1.16 Statements-Procedure-1 - (Class diagram)



5.1.17 Statements-Procedure-2 - (Class diagram)



5.2 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 MissedAppointment	Public ActionNonPerformance	
Generalization	Public	Public	

Connector	Source	Target	Notes
Source -> Destination	UndeliveredMedication Dose	ActionNonPerformance	
Generalization Source -> Destination	Public UndeliveredProcedure	Public ActionNonPerformance	

5.3 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	

Connector	Source	Target	Notes
Generalization Source -> Destination	Public EncounterEvent	Public ActionPerformance	
Generalization Source -> Destination	Public MedicationDoseAdministration	Public ActionPerformance	
Generalization Source -> Destination	Public MedicationDispensation	Public ActionPerformance	
Generalization Source -> Destination	Public MedicationPrescription	Public ActionPerformance	
Generalization Source -> Destination	Public MedicationAdministrationProposal	Public ActionPerformance	

5.4 AdverseEvent

Type: **Class ObservationPresence**

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 ObservationPresence	
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:*

5.5 AllergyIntolerance

Type: **Class ObservationPresence**

An 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 ObservationPresence	

5.6 BodySite

Type: **Class**

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

5.7 Condition

Type: **Class ObservationPresence**

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

Connections

Connector	Source	Target	Notes
Association Source -> Destination	Public EncounterEvent	Public admissionDiagnosis Condition	
Association Source -> Destination	Public EncounterEvent	Public dischargeDiagnosis Condition	
Association Source -> Destination	Public EncounterEvent	Public encounterDiagnosis Condition	
Realization Source -> Destination	Public Condition	Public ConditionDescriptor	
Generalization Source -> Destination	Public Condition	Public ObservationPresence	

5.8 ConditionAbsent

Type: **Class ObservationAbsence**

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

Connections

Connector	Source	Target	Notes
Generalization Source -> Destination	Public ConditionAbsent	Public ObservationAbsence	
Realization Source -> Destination	Public ConditionAbsent	Public ConditionDescriptor	

5.9 ContraindicationToMedication

Type: **Class ObservationPresence**

Connections

Connector	Source	Target	Notes
Generalization Source -> Destination	Public ContraindicationToMedication	Public ObservationPresence	
Realization Source -> Destination	Public ContraindicationToMedication	Public ContraindicationDescriptor	
Association Source -> Destination	Public ContraindicationToMedication	Public contraindicatedMedication MedicationAdministrationDescriptor	

5.10 ContraindicationToProcedure

Type: **Class ObservationPresence**

Connections

Connector	Source	Target	Notes
Generalization Source -> Destination	Public ContraindicationToProcedure	Public ObservationPresence	
Realization Source -> Destination	Public ContraindicationToProcedure	Public ContraindicationDescriptor	
Association Source -> Destination	Public ContraindicationToProcedure	Public contraindicatedProcedure ProcedureDescriptor	

Connector	Source	Target	Notes

5.11 Device

Type: **Class**

This resource 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.

5.12 EncounterEvent

Type: **Class ActionPerformance**

EncounterEvent is the record of an interaction between an EvaluatedPerson 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	
Association Source -> Destination	Public EncounterEvent	Public admissionDiagnosis Condition	
Association Source -> Destination	Public EncounterEvent	Public dischargeDiagnosis Condition	
Association Source -> Destination	Public EncounterEvent	Public encounterDiagnosis Condition	

5.13 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 Proposal	

5.14 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	

5.15 FamilyHistoryObservation

Type: **Class ObservationPresence**

Connections

Connector	Source	Target	Notes
Realization Source -> Destination	Public FamilyHistoryObservation	Public FamilyHistoryDescriptor	
Generalization Source -> Destination	Public FamilyHistoryObservation	Public ObservationPresence	

5.16 InferenceOpposed

Type: **Class StatementAboutInference**

Connections

Connector	Source	Target	Notes
Generalization Source -> Destination	Public InferenceOpposed	Public StatementAboutInference	

5.17 InferenceSupported

Type: **Class StatementAboutInference**

Connections

Connector	Source	Target	Notes
Generalization Source -> Destination	Public InferenceSupported	Public	

Connector	Source	Target	Notes
		StatementAboutInference	

5.18 Location

Type: **Class**

Details and position information 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

5.19 Medication

Type: **Class**

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

5.20 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 Proposal	
Realization Source -> Destination	Public MedicationAdministrationProposal	Public MedicationAdministrationDescriptor	
Generalization Source -> Destination	Public MedicationAdministrationProposal	Public ActionPerformance	

5.21 MedicationDispensation

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 MedicationDispensation	Public ActionPerformance	
Realization Source -> Destination	Public MedicationDispensation	Public MedicationAdministrationDescriptor	
Realization Source -> Destination	Public MedicationDispensation	Public Performance	

5.22 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	

5.23 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	

5.24 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	

5.25 MissedAppointment

Type: **Class ActionNonPerformance**

An appointment that was (i) scheduled, (ii) not rescheduled or canceled, and (iii) for which the EvaluatedPerson did not show up.

Connections

Connector	Source	Target	Notes
Generalization Source -> Destination	Public MissedAppointment	Public ActionNonPerformance	
Realization Source -> Destination	Public MissedAppointment	Public EncounterDescriptor	
Realization Source -> Destination	Public MissedAppointment	Public Plan	

5.26 NoAdverseEvent

Type: **Class ObservationAbsence**

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

Connections

Connector	Source	Target	Notes
Generalization Source -> Destination	Public NoAdverseEvent	Public ObservationAbsence	
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:*

5.27 NoAllergyIntolerance

Type: **Class ObservationAbsence**

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

Connections

Connector	Source	Target	Notes
Realization Source -> Destination	Public NoAllergyIntolerance	Public AllergyIntoleranceDescriptor	

Connector	Source	Target	Notes
Generalization Source -> Destination	Public NoAllergyIntolerance	Public ObservationAbsence	

5.28 ObservationAbsence

Type: **Class StatementAboutObservation**

A statement asserting that an observation 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 an observation. Such a statement would be specified as a subtype of an ActionNonPerformance.

Connections

Connector	Source	Target	Notes
Generalization Source -> Destination	Public ObservationAbsence	Public StatementAboutObservation	
Generalization Source -> Destination	Public NoAllergyIntolerance	Public ObservationAbsence	
Generalization Source -> Destination	Public NoAdverseEvent	Public ObservationAbsence	
Generalization Source -> Destination	Public ConditionAbsent	Public ObservationAbsence	

5.29 ObservationPresence

Type: **Class StatementAboutObservation**

A statement asserting the presence or value of an observation.

Connections

Connector	Source	Target	Notes
Generalization	Public	Public	

Connector	Source	Target	Notes
Source -> Destination	ObservationPresence	StatementAboutObservation	
Generalization Source -> Destination	Public AllergyIntolerance	Public ObservationPresence	
Generalization Source -> Destination	Public ContraindicationToProcedure	Public ObservationPresence	
Generalization Source -> Destination	Public ContraindicationToMedication	Public ObservationPresence	
Generalization Source -> Destination	Public Symptom	Public ObservationPresence	
Generalization Source -> Destination	Public FamilyHistoryObservation	Public ObservationPresence	
Generalization Source -> Destination	Public Prognosis	Public ObservationPresence	
Generalization Source -> Destination	Public AdverseEvent	Public ObservationPresence	
Generalization Source -> Destination	Public ObservationResult	Public ObservationPresence	
Generalization Source -> Destination	Public Condition	Public ObservationPresence	

5.30 ObservationResult

Type: **Class ObservationPresence**

Connections

Connector	Source	Target	Notes
Realization Source -> Destination	Public ObservationResult	Public ObservationResultDescriptor	
Generalization Source -> Destination	Public ObservationResult	Public ObservationPresence	

5.31 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.

5.32 Participant

Type: **Class**

Person playing a specified role in an action.

Attributes

Attribute	Notes	Constraints and tags
individual PersonRole 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:*

5.33 Patient

Type: **Class PersonRole**

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

This Resource covers data about persons and animals involved in a wide range of health-related activities, including:

- Curative activities
- Psychiatric care
- Social services
- Pregnancy care
- Nursing and assisted living
- Dietary services
- Tracking of personal health and exercise data

The data in the Resource 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. A Patient record is generally created and maintained by each organization providing care for a patient. A person or animal receiving care at multiple organizations may therefore have its information present in multiple Patient Resources.

Connections

Connector	Source	Target	Notes
Generalization Source -> Destination	Public Patient	Public PersonRole	

5.34 Person

Type: **Class**

Demographic and identification information for an individual.

Additional attributes to be added in future versions.

Connections

Connector	Source	Target	Notes
Aggregation Source -> Destination	Public person Person	Public role PersonRole	

Attributes

Attribute	Notes	Constraints and tags
birthDate 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:*

5.35 PersonRole

Type: **Class**

The role of individuals in a healthcare action.

Connections

Connector	Source	Target	Notes
Generalization Source -> Destination	Public Practitioner	Public PersonRole	
Generalization Source -> Destination	Public Patient	Public PersonRole	
Generalization Source -> Destination	Public RelatedPerson	Public PersonRole	
Aggregation Source -> Destination	Public person Person	Public role PersonRole	

5.36 Practitioner

Type: **Class PersonRole**

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 formal responsibilities and this Resource 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

The Resource SHALL not be used for persons involved without a formal responsibility like individuals taking care for friends, relatives or neighbours. These can be registered as a Patient's Contact.

Practitioner performs different roles within the same or even different organizations. Depending on jurisdiction and custom, it may be necessary to maintain a specific Practitioner Resource for each such role or have a single Practitioner with multiple roles. The role can be limited to a specific period, after which authorization for this role ends. Note that the represented organization need not necessarily be the (direct) employer of a Practitioner.

Connections

Connector	Source	Target	Notes
Generalization Source -> Destination	Public Practitioner	Public PersonRole	

Attributes

Attribute	Notes	Constraints and tags
role Code Public [0..*]	Roles which this practitioner is authorized perform for the organization.	*Default:*

5.37 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	

5.38 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	

5.39 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 Proposal	

5.40 Prognosis

Type: **Class ObservationPresence**

Connections

Connector	Source	Target	Notes
Realization Source -> Destination	Public Prognosis	Public PrognosisDescriptor	
Generalization Source -> Destination	Public Prognosis	Public ObservationPresence	

5.41 RelatedPerson

Type: **Class PersonRole**

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

RelatedPersons typically have a personal or non-healthcare-specific professional relationship to the patient. A RelatedPerson resource is primarily used for attribution of information, since RelatedPersons are often a source of information about the patient. For keeping information about persons for contact purposes for a patient, use a Patient's Contact element instead. Example RelatedPersons are:

- A patient's wife or husband
- A patient's relatives or friends
- A neighbour bringing a patient to the hospital
- The owner or trainer of a horse

- A patient's attorney or guardian

Connections

Connector	Source	Target	Notes
Generalization Source -> Destination	Public RelatedPerson	Public PersonRole	

Attributes

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

5.42 Schedule

Type: **Class**

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

5.43 ScheduledEncounter

Type: **Class ActionPerformance**

An encounter that has been scheduled, e.g., an outpatient visit.

Connections

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

Connector	Source	Target	Notes
Realization Source -> Destination	Public ScheduledEncounter	Public Plan	

5.44 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	

5.45 Statement

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 Statement	
Generalization Source -> Destination	Public StatementAboutObservation	Public Statement	

Connector	Source	Target	Notes
Generalization Source -> Destination	Public StatementAboutInference	Public Statement	

Attributes

Attribute	Notes	Constraints and tags
comment Text Public	A comment, instruction, or note associated with the statement.	*Default:*
resultsFrom Statement Public [0..*]	The statements about the clinical actions that caused this action or observation. For example, a blood glucose observation may be the result of an order for a blood glucose test; a prescription for atenolol may result from a proposal to prescribe a beta-blocker. The resultsFrom and resultsIn properties are intended to describe associations amongst statements; they are not to be used for describing clinical causal relationships, e.g., administration of statin caused muscle pain.	*Default:*
resultsIn Statement Public [0..*]	This statement may result in other clinical actions and observations which are recorded as statements. For example, a statement about a laboratory test order can result in one or more observations.	*Default:*
semanticReference 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:*

Attribute	Notes	Constraints and tags
statementSource Code Public	The person, device, or other system that was the source of this statement. ISSUES: NEED TO MAKE THE DISTINCTION BETWEEN PERSON RECORDING THE STATEMENT AND THE SYSTEM THAT STORES THE SYSTEM. NEED ALSO TO ABLE TO VERIFY/AUTHENTICATE STATEMENTS	*Default:*
statementTime 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:*
subject Patient Public		*Default:*

5.46 StatementAboutAction

Type: **Class Statement**

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 Statement	
Generalization Source -> Destination	Public ActionPerformance	Public StatementAboutAction	
Generalization Source -> Destination	Public ActionNonPerformance	Public StatementAboutAction	

Connector	Source	Target	Notes

Attributes

Attribute	Notes	Constraints and tags
actionParticipant Participant Public [0..*]	A participant in the action. ,e.g., the attending physician, performer of a procedure	*Default:*
occurredDuring EncounterEvent Public	The encounter within which the action occurs.	*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:*

5.47 StatementAboutInference

Type: **Class Statement**

Connections

Connector	Source	Target	Notes
Generalization Source -> Destination	Public StatementAboutInference	Public Statement	
Generalization	Public	Public	

Connector	Source	Target	Notes
Source -> Destination	InferenceSupported	StatementAboutInference	
Generalization Source -> Destination	Public InferenceOpposed	Public StatementAboutInference	

5.48 StatementAboutObservation

Type: **Class Statement**

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 Statement	
Generalization Source -> Destination	Public ObservationPresence	Public StatementAboutObservation	
Generalization Source -> Destination	Public ObservationAbsence	Public StatementAboutObservation	

5.49 Substance

Type: **Class**

A homogeneous material with a definite composition used in healthcare.

5.50 Symptom

Type: **Class ObservationPresence**

Connections

Connector	Source	Target	Notes
Generalization Source -> Destination	Public Symptom	Public ObservationPresence	

5.51 UndeliveredMedicationDose

Type: **Class ActionNonPerformance**

Documents the non-delivery of a medication dose. E.g., documents that a dose of an anti-tuberculosis medication was not taken or given.

Connections

Connector	Source	Target	Notes
Generalization Source -> Destination	Public UndeliveredMedicationDose	Public ActionNonPerformance	
Realization Source -> Destination	Public UndeliveredMedicationDose	Public MedicationAdministrationDescriptor	
Realization Source -> Destination	Public UndeliveredMedicationDose	Public Performance	

5.52 UndeliveredProcedure

Type: **Class ActionNonPerformance**

Assertion that a procedure was not delivered. E.g., documentation that a surgery was not performed because the patient refused.

Connections

Connector	Source	Target	Notes
Generalization Source -> Destination	Public UndeliveredProcedure	Public ActionNonPerformance	
Realization Source -> Destination	Public UndeliveredProcedure	Public ProcedureDescriptor	
Realization Source -> Destination	Public UndeliveredProcedure	Public Performance	

5.53 Activity

Type: **Interface**

Connections

Connector	Source	Target	Notes
Aggregation Source -> Destination	Public subTask Activity	Public Performance	The performance of an action may have multiple subtasks 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:*

Attribute	Notes	Constraints and tags
task Code Public	The task to be performed, e.g., anesthesia, sedation, incision.	*Default:*

5.54 AllergyIntoleranceDescriptor

Type: **Interface ObservableDescriptor**

A description of an undesirable physiologic reaction to an amount of a substance that would not produce a reaction in most individuals.

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	

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 dose and route of exposure that produced past reactions, and the life-threatening or organ system threatening potential of the reaction type.	*Default:*
sensitivityType Code Public	A code that indicates whether this sensitivity is of an allergic nature or an intolerance to a substance.	*Default:*
substance Code Public	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:*

5.55 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 CompositeIntravenous MedicationAdministration	Public MedicationParameters	
Aggregation Source -> Destination	Public constituent Constituent	Public CompositeIntravenous MedicationAdministration	The constituent of this composite IV medication.

5.56 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 conditionModifier ObservableModifier	Public ConditionDescriptor	The modifiers allow specifying more details or restrictions. e.g., severity, triggering factors, stage.
Generalization Source -> Destination	Public ConditionDescriptor	Public ObservableDescriptor	
Aggregation Source -> Destination	Public ConditionDescriptor	Public ConditionDetail	
Realization Source -> Destination	Public Condition	Public ConditionDescriptor	
Realization Source -> Destination	Public ConditionAbsent	Public ConditionDescriptor	
Realization Source -> Destination	Public NoAdverseEvent	Public ConditionDescriptor	
Realization Source -> Destination	Public AdverseEvent	Public ConditionDescriptor	

Attributes

Attribute	Notes	Constraints and tags
abatement TimePoint Public	The date or estimated date that the condition resolved or went into remission. This is called "abatement" because of the many overloaded connotations associated with "remission" or "resolution" - Conditions are never really resolved, but they can abate.	*Default:*

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:*
name Code Public	Identification of the condition, problem or diagnosis. e.g., diabetes mellitus type II, headache.	*Default:*
onset TimePoint Public	Estimated or actual date the condition began, in the opinion of the clinician.	*Default:*
status Code Public	The state of the condition at the time of the observation, e.g., active, inactive.	*Default:*

5.57 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 CompositeIntravenous MedicationAdministration	The constituent of this composite IV medication.

Attributes

Attribute	Notes	Constraints and tags
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:*
substance AdministerableSubstance Public	Generally the ingredient of the constituent (e.g., dopamine) such as an additive in a composite IV.	*Default:*
substanceAmount IntervalOfQuantity Public	The amount of the constituent that makes up the whole. e.g., 500 mL (of D5w).	*Default:*

5.58 ContraindicationDescriptor

Type: **Interface InferableDescriptor**

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

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	

5.59 Dispensation

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 Dispensation	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:*

Attribute	Notes	Constraints and tags
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:*

5.60 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	

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:*

Attribute	Notes	Constraints and tags
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:*

Attribute	Notes	Constraints and tags
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:*
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:*

5.61 EnactableDescriptor

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 EnactableDescriptor	
Generalization Source -> Destination	Public EncounterDescriptor	Public EnactableDescriptor	
Generalization Source -> Destination	Public ProcedureDescriptor	Public EnactableDescriptor	
Generalization Source -> Destination	Public TBDCommunicationDescriptor	Public EnactableDescriptor	
Generalization Source -> Destination	Public TBDGoalDescriptor	Public EnactableDescriptor	
Generalization Source -> Destination	Public TBDEducationDescriptor	Public EnactableDescriptor	
Generalization Source -> Destination	Public TBDNutritionDescriptor	Public EnactableDescriptor	
Generalization Source -> Destination	Public TBDCarePlanParticipationDescriptor	Public EnactableDescriptor	
Generalization Source -> Destination	Public TBDEquipmentOrSuppliesApplicationDescriptor	Public EnactableDescriptor	
Generalization Source -> Destination	Public TBDProtocolParticipationDescriptor	Public EnactableDescriptor	

Attributes

Attribute	Notes	Constraints and tags
performanceTime TimePeriod Public	The time when the action is performed.	*Default:*

5.62 EnactmentPhase

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 EnactmentPhase	
Generalization Source -> Destination	Public Proposal	Public EnactmentPhase	
Generalization Source -> Destination	Public Order	Public EnactmentPhase	
Generalization Source -> Destination	Public Performance	Public EnactmentPhase	

5.63 EncounterDescriptor

Type: **Interface EnactableDescriptor**

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 EnactableDescriptor	
Realization Source -> Destination	Public EncounterProposal	Public EncounterDescriptor	
Realization Source -> Destination	Public EncounterRequest	Public EncounterDescriptor	
Realization Source -> Destination	Public MissedAppointment	Public EncounterDescriptor	
Realization Source -> Destination	Public ScheduledEncounter	Public EncounterDescriptor	
Realization Source -> Destination	Public EncounterEvent	Public EncounterDescriptor	

Attributes

Attribute	Notes	Constraints and tags
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:*

Attribute	Notes	Constraints and tags
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:*

5.64 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 FamilyHistoryObservation	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:*

Attribute	Notes	Constraints and tags
outcome Code Public	deceased | permanent disability | etc.	*Default:*
relationship Code Public	Relationship to the subject	*Default:*

5.65 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
contrastNeeded Code Public	Specification of whether contrast should be administered as part of the imaging study (e.g., Yes, No, Per Radiology)	*Default:*

Attribute	Notes	Constraints and tags
contrastRoute Code Public	Specification of the route of contrast (e.g., Oral, IV, Per Radiology) to be given as part of an imaging proposal.	*Default:*
contrastSubstance AdministerableSubstance Public	Specification of the kind of contrast (e.g., Barium, Gastrograffin) to be given as part of an imaging proposal. For example, Barium, Gastrograffin.	*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:*

Attribute	Notes	Constraints and tags
transportMode Code Public	How a patient will be moved from their hospital room to the performing department	*Default:*

5.66 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 PrognosisDescriptor	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:*

Attribute	Notes	Constraints and tags
inferredFrom Statement 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:*

5.67 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:*

Attribute	Notes	Constraints and tags
specimenSource Code 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:*

5.68 MedicationAdministrationDescriptor

Type: **Interface EnactableDescriptor**

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

Connections

Connector	Source	Target	Notes
Generalization Source -> Destination	Public MedicationAdministrationDescriptor	Public EnactableDescriptor	
Association Source -> Destination	Public ContraindicationToMedication	Public contraindicatedMedication MedicationAdministrationDescriptor	
Realization Source -> Destination	Public MedicationStatement	Public MedicationAdministrationDescriptor	
Realization Source -> Destination	Public MedicationDispensation	Public MedicationAdministrationDescriptor	
Realization	Public	Public	

Connector	Source	Target	Notes
Source -> Destination	MedicationPrescription	MedicationAdministrationDescriptor	
Realization Source -> Destination	Public MedicationDoseAdministration	Public MedicationAdministrationDescriptor	
Aggregation Source -> Destination	Public dosageInstruction Dosage	Public MedicationAdministrationDescriptor	
Realization Source -> Destination	Public MedicationAdministrationProposal	Public MedicationAdministrationDescriptor	
Aggregation Source -> Destination	Public dispense Dispensation	Public MedicationAdministrationDescriptor	Dispensation details to be used only when needed, e.g., as part of a statement about a prescription or a dispensation event.
Realization Source -> Destination	Public UndeliveredMedicationDose	Public MedicationAdministrationDescriptor	
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:*

5.69 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.

5.70 MicrobiologySensitivtyResult

Type: **Interface ResultDetail**

Connections

Connector	Source	Target	Notes
Generalization Source -> Destination	Public MicrobiologySensitivtyResult	Public ResultDetail	
Aggregation Source -> Destination	Public organismSensitivity OrganismSensitivity	Public MicrobiologySensitivtyResult	

5.71 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	

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:*

5.72 ObservableModifier

Type: **Interface**

Further modification or limitation on the finding, for example intensity, volume.

Connections

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

Attributes

Attribute	Notes	Constraints and tags
modifierName Code Public	What about the observation is being modified. e.g.., color	*Default:*
modifierValue Value Public	How the observation is being modified. e.g., red	*Default:*

5.73 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	

Connector	Source	Target	Notes
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:*

Attribute	Notes	Constraints and tags
reliability Code Public	An estimate of the degree to which quality issues have impacted on the value reported. e.g., ok, error, ongoing	*Default:*
status Code Public	The status of the result value. e.g., preliminary, final	*Default:*
value Value Public	The information determined as a result of making the observation. e.g., 120 mm Hg, small, 2013-11-30	*Default:*

5.74 Order

Type: **Interface EnactmentPhase**

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 EnactmentPhase	
Realization Source -> Destination	Public ProcedureOrder	Public Order	
Realization Source -> Destination	Public EncounterRequest	Public Order	
Realization Source -> Destination	Public MedicationPrescription	Public Order	

Connector	Source	Target	Notes

Attributes

Attribute	Notes	Constraints and tags
orderedAtTime TimePeriod 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:*

5.75 OrganismSensitivity

Type: **Interface**

Connections

Connector	Source	Target	Notes
Aggregation Source -> Destination	Public organismSensitivity OrganismSensitivity	Public MicrobiologySensitivty Result	

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 microorganism to the agent. For example, resistant, susceptible.	*Default:*

5.76 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:*

5.77 Performance

Type: **Interface EnactmentPhase**

The actual performance of a healthcare-related action, e.g.., administer a medication, perform a procedure.

Connections

Connector	Source	Target	Notes
Generalization Source -> Destination	Public Performance	Public EnactmentPhase	
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 MedicationDispensation	Public Performance	
Aggregation Source -> Destination	Public subTask Activity	Public Performance	The performance of an action may have multiple subtasks associated with it. For example, a surgical procedure may have anesthesia administration, incision, actual

Connector	Source	Target	Notes
			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 UndeliveredMedicationDose	Public Performance	
Realization Source -> Destination	Public UndeliveredProcedure	Public Performance	

Attributes

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

5.78 Plan

Type: **Interface EnactmentPhase**

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 EnactmentPhase	
Realization Source -> Destination	Public ScheduledProcedure	Public Plan	

Connector	Source	Target	Notes
Realization Source -> Destination	Public MissedAppointment	Public Plan	
Realization Source -> Destination	Public ScheduledEncounter	Public Plan	

Attributes

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

5.79 ProcedureDescriptor

Type: **Interface EnactableDescriptor**

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 resources, such as immunizations, drug administrations.

Connections

Connector	Source	Target	Notes
Generalization Source -> Destination	Public ProcedureDescriptor	Public EnactableDescriptor	
Realization Source -> Destination	Public ProcedureProposal	Public ProcedureDescriptor	
Realization Source -> Destination	Public ProcedureEvent	Public ProcedureDescriptor	
Realization Source -> Destination	Public ProcedureOrder	Public ProcedureDescriptor	

Connector	Source	Target	Notes
Realization Source -> Destination	Public ScheduledProcedure	Public ProcedureDescriptor	
Association Source -> Destination	Public ContraindicationToProcedure	Public contraindicatedProcedure ProcedureDescriptor	
Aggregation Source -> Destination	Public details ProcedureParameters	Public ProcedureDescriptor	Specification of parameters applicable to the particular procedure.
Realization Source -> Destination	Public UndeliveredProcedure	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:*

Attribute	Notes	Constraints and tags
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:*

5.80 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	

5.81 PrognosisDescriptor

Type: **Interface InferableDescriptor**

An inference about the likelihood of a patient's risk for a condition in the specific timespan.

Connections

Connector	Source	Target	Notes
Generalization Source -> Destination	Public PrognosisDescriptor	Public InferableDescriptor	
Realization Source -> Destination	Public Prognosis	Public PrognosisDescriptor	

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 TimePerioid Public	The time span within which the condition will be reached. e.g., 10 years.	*Default:*

5.82 Proposal

Type: **Interface EnactmentPhase**

Description of a an action that is being proposed to be performed. The proposal may be a recommendation from a clinical decision support system or advice from a consultation.

Connections

Connector	Source	Target	Notes
Generalization Source -> Destination	Public Proposal	Public EnactmentPhase	
Realization Source -> Destination	Public ProcedureProposal	Public Proposal	
Realization Source -> Destination	Public EncounterProposal	Public Proposal	
Realization Source -> Destination	Public MedicationAdministrationProposal	Public Proposal	

Attributes

Attribute	Notes	Constraints and tags
proposedAtTime TimePeriod Public	The time when the proposal was made.	*Default:*
urgency Code Public	Characterizes how quickly an action must be initiated. Includes concepts such as stat, urgent, routine.	*Default:*

5.83 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:*

Attribute	Notes	Constraints and tags
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:*

Attribute	Notes	Constraints and tags
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:*

Attribute	Notes	Constraints and tags
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:*

5.84 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 MicrobiologySensitivtyResult	Public ResultDetail	

5.85 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:*

5.86 TBDCarePlanParticipationDescriptor

Type: **Interface EnactableDescriptor**

This concept has not been modeled yet. It will be developed in the next version of the specification.

Connections

Connector	Source	Target	Notes
Generalization Source -> Destination	Public TBDCarePlanParticipationDescriptor	Public EnactableDescriptor	

5.87 TBDCommunicationDescriptor

Type: **Interface EnactableDescriptor**

This concept has not been modeled yet. It will be developed in the next version of the specification.

Connections

Connector	Source	Target	Notes
Generalization Source -> Destination	Public TBDCommunicationDescriptor	Public EnactableDescriptor	

5.88 TBDEducationDescriptor

Type: **Interface EnactableDescriptor**

This concept has not been modeled yet. It will be developed in the next version of the specification.

Connections

Connector	Source	Target	Notes
Generalization Source -> Destination	Public TBDEducationDescriptor	Public EnactableDescriptor	

Attributes

Attribute	Notes	Constraints and tags
topic Code Public		*Default:*

5.89 TBDEquipmentOrSuppliesApplicationDescriptor

Type: **Interface EnactableDescriptor**

This concept has not been modeled yet. It will be developed in the next version of the specification.
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Connections

Connector	Source	Target	Notes
Generalization Source -> Destination	Public	Public EnactableDescriptor	

Connector	Source	Target	Notes
	TBDEquipmentOrSuppliesApplicationDescriptor		

5.90 TBDGoalDescriptor

Type: **Interface EnactableDescriptor**

This concept has not been modeled yet. It will be developed in the next version of the specification.

Connections

Connector	Source	Target	Notes
Generalization Source -> Destination	Public TBDGoalDescriptor	Public EnactableDescriptor	

5.91 TBDNutritionDescriptor

Type: **Interface EnactableDescriptor**

This concept has not been modeled yet. It will be developed in the next version of the specification.

Connections

Connector	Source	Target	Notes
Generalization Source -> Destination	Public TBDNutritionDescriptor	Public EnactableDescriptor	

5.92 TBDProtocolParticipationDescriptor

Type: **Interface EnactableDescriptor**

This concept has not been modeled yet. It will be developed in the next version of the specification.

Connections

Connector	Source	Target	Notes
Generalization Source -> Destination	Public TBDProtocolParticipationDescriptor	Public EnactableDescriptor	

6 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 is prefixed with NQF, it indicates the document was from the National Quality Forum. The subsequent digits provide the identifier assigned by NQF to that measure. The second column contains the original 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.

Table 4. 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)"	Condition with - semanticReference = "Diagnosis, Active" - name in AMI Grouping VS - status = Active - onset <= 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 - enactedAtTime.end <= 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 - enactedAtTime.end <= 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" -serviceTypeCode in Non-Elective Inpatient Encounter VS -enactedAtTime.begin<=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.begin<=3 days before "Encounter, Performed: Ambulatory/ED visit"

NQF 0565	AND: "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.begin <=90 days after" Procedure, performed: Cataract surgery"
NQF 0018	AND: "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 - enactedAtTime)
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	AND: "Procedure, Performed not done: Drug not available" during "Occurrence A of Encounter, Performed: Encounter Inpatient"	UndeliveredProcedure with -semanticReference="Procedure, Performed" -reasonCode in Drug not available VS -occurredDuring = "Encounter, Performed: Encounter Inpatient
NQF 528	OR: "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 -enactedAtTime.begin<=1440 minute(s) before (Procedure, Performed: Hospital measures-Joint commission evidence of a surgical procedure requiring general or neuraxial anesthesia" - enactedAtTime.begin)
https://www.icsi.org/_asset/dwy1nl/ACSOS1112.doc	Glucose by finger stick screening 4 times daily (before meals and at bedtime) for 24 hours	ProcedureOrder with -semanticReference="Procedure, Order" -procedureCode=Glucose Measurement by Finger stick screening VS -performanceTime=4 times daily (before meals and at bedtime) for 24 hrs

https://www.icsi.org/_asset/dwy1nl/ACSOS1112.doc	Ticagrelor 180 mg loading dose by mouth once 90 mg by mouth twice daily	MedicationPrescription with -semantic type="Medication, Order" -medicationCode in Ticagrelor VS -dosage - doseType=loadingDose - deliveryRoute=oral - doseQuantity=180 mg - schedule=Once on day 1 -dosage - deliveryRoute=oral - doseQuantity=90 mg - administrationSchedule=twice daily one day starting day 2

7 REFERENCES

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[3] "FHIR Specification Home Page," HL7, 2013. [Online]. Available: http://www.hl7.org/fhir. [Accessed 01 11 2013].

[4] "The Federal Health Information Model," J P Systems, Inc., 2013. [Online]. Available: http://www.fhims.org/. [Accessed 01 11 2013].

[5] "HL7 Implementation Guide for CDA® Release 2: Quality Reporting Document Architecture (QRDA) – Category I, DSTU Release 2 – July," HL7, Ann Arbor, MI, 2013.

[6] "HL7 Virtual Medical Record for Clinical Decision Support (vMR-CDS) Templates, Release 1 Sep Ballot," HL7, Ann Arbor, MI, 2013.

[7] "HL7 Implementation Guide for CDA® Release2: IHE Health Story Consolidation, DSTU Release 1.1," Ann Arbor, MI, 2012.

[8] "HL7 Implementation Guide: Clinical Decision Support Knowledge Artifact Implementation Guide, Release 1 (pending publication)," HL7, Ann Arbor, MI, 2013.

[9] "HL7 Version 3 DSTU: Representation of the Health Quality Measures Format (eMeasure), DSTU Release 2 (pending publication)," Ann Arbor, MI, 2013.

[10] "HL7 Version 3: Reference Information Model (RIM)," HL7, Ann Arbor, MI, 2013.