New concept proposal

Age

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1 Rationale

Most research projects cannot use the patient's date of birth data due to privacy preserving rules and regulations. Therefore, research projects work with age information. As projects look at a certain duration of time and age is relevant to different events during that time, it is necessary to relate age to various other data, such as admission date, diagnosis and analysis. Therefore, the age concept is crucial to be present in the SPHN Dataset.

2 Comparison to other standards/data models

2.1 HL7 FHIR

In HL7 FHIR, age seems to be a defined variation of quantity (https://www.hl7.org/fhir/datatypes.html).

Age

id	Level	Location	Description	Expression
age-1	Rule	(base)	There SHALL be a code if there is a value and it SHALL be an expression of time. If system is present, it SHALL be UCUM. If value is present, it SHALL be positive.	(code.exists() or value.empty()) and (system.empty() or system = %ucum) and (value.empty() or value.hasValue().not() or value > 0)

XML, JSON

Terminology Bindings

Path	Definition	Type	Reference
Age	Appropriate units for Age.	Extensible, but limited to AllUCUMExpressionForTime	CommonUCUMCodesForAge

The units defined for age in HL7 FHIR are the following:

- Resource: Age (Quantity / Extensible)

4.4.1.147.1 Content Logical Definition

This value set includes codes from the following code systems:

- Include these codes as defined in http://unitsofmeasure.org

Code	Display
min	minutes
h	hours
d	days
wk	weeks
mo	months
a	years

2.2 UMLS

In UMLS, there is a concept *Age* with the Concept Unique Identifier (CUI) C0001779 with five different definitions.

Age after birth. **(FMA)**
How long something has existed; elapsed time since birth. (NCI) **(NCI)**
Time elapsed after birth. **(NCI)**
How long something has existed; elapsed time since birth. **(NCI)**
The time elapsed since birth. **(NCI)**

Further concepts in UMS are for example Age at death (CUI: C1546180), or Fracture age (CUI: C5111827).

2.3 SNOMED CT

In SNOMED CT, there is a concept *Age* (397669002 |Age (qualifier value)|) within the qualifier value hierarchy. The parent concept of age is Descriptor (272099008 |Descriptor (qualifier value)|).

2.4 LOINC

In LOINC, there are several concepts present which are related to age, for example:

- 30525-0 Age
- 75272-5 Age at event onset
- 30972-4 Age at onset of adverse event
- 91386-3 Age when first used heroin
- 65223-0 Age of onset of symptoms
- 35659-2 Age at specimen collection
- 63932-8 Age at diagnosis
- 63903-9 Age at first cancer diagnosis

3 Concept information

Concept name	Description	Type	Standard	Value set	Meaning binding SNOMED CT	Meaning binding LOINC
Age	time elapsed since birth of the individual				397669002 |Age (qualifier value)|	30525-0 Age
age quantity	value and unit of the age	Quantity		Unit: min; h; d; wk; mo; a		
determination datetime	datetime of determination of age	temporal				

4 Impact on the SPHN Dataset

The new concept *Diagnosis* has been extended by a composedOf *subject age*.

5 Discussion

The *Age* concept discussed in this proposal is the age of an individual after birth. Gestational age or the age of other elements, such as fracture age are not in scope.

The units defined in the value set are according to the HL7 FHIR specification.

Age is not a stand alone information for a patient and therefore, the Age concept will be reused in concepts, such as Diagnosis in order to express that a patient had a certain age (e.g. 40 years) at the occurrence of a certain diagnosis (e.g. lung cancer).

The LOINC concpets related to patient's age are combining the age with the situation, e.g., Age of onset of symptoms. As the SPHN semantic strategy is to capture meanings separately those LOINC precomposed codes cannot be used for any meaning binding in the *Age* concept.

In general, calculating with exact dates, such as the date of birth and the diagnosis date, is preferred over working with age information. However, when only age is available in the data or projects are not allowed to use the exact date of birth and therefore cannot calculate the exact patient's age at certain events during data analysis, age information is helpful.