

New concept proposal

Reference Range

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1 Rationale

Reference ranges are used in laboratory medicine as well as for physiologic measurements such as Heart Rate. Currently, there is a composedOf *normal range* included in the SPHN Dataset concept *Lab Result* (as string). A general concept for reference range which can be used for lab results and measurements, and allows for validation and analytics does not exist yet and should be added to the SPHN Dataset.

2 Comparison to other standards/data models

2.1 UMLS

In UMLS, there is a concept *Lower Limit of Normal* with the Concept Unique Identifier (CUI) C1518030 with the following definition:

The lowest value of the range of statistical characteristics that are supposed to represent accepted standard, non-pathological pattern for particular laboratory result or other quantitative parameter. (NCI)

In UMLS, there is a concept *Upper Limit of Normal* with the Concept Unique Identifier (CUI) C1519815 with the following definition:

The top value of the range of statistical characteristics that are supposed to represent accepted standard, non-pathological pattern for particular laboratory result or other quantitative parameter. (NCI)

2.2 HL7 FHIR

In HL7 FHIR, the Reference Range concept is a BackboneElement and is used for example in the Observation Resource.

referenceRange	I	0..*	BackboneElement	Provides guide for interpretation + Rule: Must have at least a low or a high or text
low	I	0..1	SimpleQuantity	Low Range, if relevant
high	I	0..1	SimpleQuantity	High Range, if relevant
type		0..1	CodeableConcept	Reference range qualifier Observation Reference Range Meaning Codes (Preferred)
appliesTo		0..*	CodeableConcept	Reference range population Observation Reference Range Applies To Codes (Example)
age		0..1	Range	Applicable age range, if relevant
text		0..1	string	Text based reference range in an observation

3 Concept information

Concept name	Description	Type	Meaning binding SNOMED CT	Additional Information
Reference Range	interval of values that is deemed normal for a physiologic measurement in healthy individuals	Range		do not use for therapeutic ranges
lower limit	lowest value of the range of statistical characteristics that are supposed to represent accepted standard, non-pathological pattern for a particular laboratory result or other quantitative parameter	Quantity	385524004 Lower limit of reference range (qualifier value)	
upper limit	top value of the range of statistical characteristics that are supposed to represent accepted standard, non-pathological pattern for a particular laboratory result or other quantitative parameter	Quantity	371933006 Upper limit of reference range (qualifier value)	

4 Impact on the SPHN Dataset

The *Reference Range* concept can be reused in the *Lab Result* concept and potentially in further concepts.

5 Discussion

The new *Reference Range* concept allows using the lower and upper reference values separately as numeric values (via *Quantity* concept) and thus enables calculations and analytics.