New concept proposal

Laterality

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Dataset release	2022.1	**Consulted expert**	-

1 Rationale

In diagnostics and therapy, laterality is important information. Laterality describes the side of a paired organ, such as lung, or side of the body structure, such as right arm, left arm. Laterality refers clearly to right-sided or left-sided and should not be mixed with topographical modifiers, such as axial, basal or central. In cardiology, it is for example important to express which ventricle has been assessed during a transthoracic echocardiography, the left cardiac ventricle or the right cardiac ventricle, and which one has been found normal or abnormal. When it comes to imaging procedures in general, the side is important as well, e.g., documenting if the X-ray has been performed on the right leg or the left leg. For imaging on organ body structures, laterality seems not to be of utmost importance as an MRI of the brain for example is performed on the entire brain, similarly a CT of the thorax produces an image of the entire thorax body structure. However, the assessment of the image leads to the diagnosis encoded in ICD and there the location for example of neoplasms is captured without laterality. For example, the ICD-O code C34.3 (Lower lobe, lung) does not reveal whether the tumour is located in the right side of the lung or in the left side of the lung. Therefore, cancer registries capture the information about the laterality of the tumour in a separate field, and SPO added the laterality information to the *Oncology Diagnosis* concept. Laterality is an important concept also in other medical fields. In urology, for example, laterality helps distinguish between recurrent and new stones, and the information is essential for any machine learning application in this field.

The document contains two proposals that have been discussed during concept development. A combination of proposal A and B has been selected and integrated into the SPHN Dataset release 2022.1 (the new *Laterality* concept is reused in the *Body Site* concept).

2 Comparison to other standards/data models

2.1 HL7 FHIR

FHIR defines laterality with the following value set from SNOMED CT:

419161000 |Unilateral left (qualifier value)| --> inactive concept

419465000 |Unilateral right (qualifier value)| --> inactive concept

51440002 |Right and left (qualifier value)|

Source consulted on 17.08.2021: https://www.hl7.org/fhir/valueset-bodysite-laterality.html

2.2 ICD-11

In ICD-11 published version by WHO, there are the following extension codes for laterality:

- Laterality
  - XK9J Bilateral
  - XK8G Left
  - XK9K Right
  - XK70 Unilateral, unspecified

Source consulted on 19.08.2021: https://icd.who.int/browse11/l-m/en

2.3 LOINC

Code: 20228-3 Anatomical part Laterality

Example Answer List LL3803-5

Source: Regenstrief LOINC

Answer	Code	Score	Answer ID
Left			LA4585-1
Right			LA4306-2
Bilateral			LA25377-5
Unilateral			LA25378-3

2.4 UMLS

UMLS concept “with laterality” (C0332304) defined as “The localization with respect to the side of the body of the specified phenotypic abnormality. [HPO:probinson]”

2.5 SNOMED CT

SNOMED CT provides the possibility to express laterality together with the body structure in a pre-coordinated concept, e.g. 19801004 |Right side of neck (surface region) (body structure)|; or to express the body structure and the laterality in two separate elements:

- body site: 182328005 |Structure of surface region of side of neck (body structure)|
- laterality: 24028007 |Right (qualifier value)|.

In SNOMED CT, the attribute laterality is used the following way: |Laterality| provides information on whether a body structure is left, right, bilateral or unilateral. It is applied only to bilaterally symmetrical body structures which exist on opposite sides of the body.

3 Proposal A

The information element of laterality can be added as a composedOf to the existing *Body Site* concept.

3.1 Concept information

3.1.1 Currently released concept *Body Site*

SPHN Dataset version: 2021.1

Unique concept ID: 0000000263

3.2 Concept information Body Site

Concept name	Description	Type	Standard	Value set	Meaning binding SNOMED CT	Meaning binding LOINC
Body Site	any anatomical structure, any nonspecific and anatomical site, as well as morphologic abnormalities				123037004 |Body structure (body structure)|	39111-0 Body site
code	code, name, coding system and version assigned to the body site	Code	SNOMED CT	child of : 123037004 | body structure (body structure) |		

3.2.1 Proposed new concept *Body Site*

Concept name	Description	Type	Standard	Value set	Meaning binding SNOMED CT	Meaning binding LOINC
Body Site	any anatomical structure, any nonspecific and anatomical site, as well as morphologic abnormalities				123037004 |Body structure (body structure)|	39111-0 Body site
code	code, name, coding system and version	Code	SNOMED CT	child of : 123037004 | body		

	assigned to the body site			structure (body structure) |
laterality	localization with respect to the side of the body	Code	SNOMED CT	7771000 |Left (qualifier value)|; 24028007 |Right (qualifier value)|; 51440002 |Right and left (qualifier value)|; 66459002 |Unilateral (qualifier value)|; 261665006 |Unknown (qualifier value)|

3.3 Pros and cons

Advantages

- Information regarding laterality, such as right, left can be represented explicitly and as distinct piece of information according to the semantic strategy best practices

Disadvantages

- Possible duplication of information as some SNOMED CT concepts under the Body Structure hierarchy contain laterality already, e.g. 19801004 |Right side of neck (surface region) (body structure)|
- SPO would not be able to use the laterality information as in oncology concepts the *Body Site* concept is not reused (because the body site information is represented in the ICD-O Diagnosis via ICD-O-3 topography code)

3.4 Impact on the SPHN Dataset

The concept *Body Site* is extended with one additional new composedOf *Laterality*.

4 Proposal B

The information element of laterality is a separate concept and can be reused if needed in specific composed concepts, such as in the new SPO concept Oncology Diagnosis.

4.1 Concept information

Concept name	Description	Type	Standard	Value set	Meaning binding SNOMED CT	Meaning binding LOINC
Laterality	localization with respect to the side of the body				272741003 |Laterality (attribute)|	20228-3 Anatomical part Laterality
code	code, name, coding system and version of the laterality	Code	SNOMED CT 2021-07-31	7771000 |Left (qualifier value)|; 24028007 |Right (qualifier value)|; 51440002 |Right and left (qualifier value)|; 66459002 |Unilateral (qualifier value)|; 261665006 |Unknown (qualifier value)|		

4.2 Pros and cons

Advantages

- Laterality can be added on request when it is needed

Disadvantages

- Simple queries for all symptoms on the right sided or left sided body structures are not possible
- Risk of possible duplication of information as some concepts under body structure contain laterality already, e.g. 19801004 |Right side of neck (surface region) (body structure)|

4.3 Impact on the SPHN Dataset

One new concept has to be added: *Laterality*. For each composed concept holding body structure, it needs to be decided if laterality needs to be included or not.

5 Discussion

HL7 FHIR suggests SNOMED CT as the semantic standard to capture the single values in the value set of laterality. HL7 FHIR suggests three distinct values, whereas ICD-11 states four different choices/codes under the extension concept “Laterality”. The example answer list from LOINC (LL3803-5) contains four codes which correspond to the choices given in ICD-11. Therefore, both proposals for *laterality* include SNOMED CT as the semantic standard and the four distinct choices from ICD-11/LOINC as SNOMED CT codes.

The risk of duplication of information, e.g.

- Body Site: 19801004 |Right side of neck (surface region),
- Laterality: 24028007 |Right (qualifier value)|,

could be minimized by clear coding guidance to separate distinct meanings (based on the semantic strategy best practices), e.g.

- Body Site: 272611009 |Surface region of neck (body structure)|,
- Laterality: 24028007 |Right (qualifier value)|.

It seems combining the two proposals different use cases can be served best. The new SPO concept *Oncology Diagnosis* is not reusing the concept *Body Site* as the location of the tumor is already represented in the ICD-O Diagnosis (ICD-O topography code). If only adding laterality to *Body Site*, the SPO project would not be able to reuse this information and multiple definitions of the same meaning in different places within the Dataset would be the result. As per guiding principles each meaning should be represented only once. When creating a new concept *Laterality* and reusing it in *Body Site* and *Oncology Diagnosis*, laterality is defined once in the SPHN Dataset and reused where needed. It would also prevent major review of the existing concepts where **Body Site** is reused as it would not need to be actively decided if laterality needs to be included or not. Laterality comes with the adapted concept *Body Site* as an optional additional piece of information that can be captured when needed.