

Semantic Boundaries for Registry Elements



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Background

Registries that wish to standardize their semantics

This would allow

- More consistent understanding of elements
- Broader vetting of elements across stakeholder groups
- Extension of data sets that have semantic overlap
- Creation of standards-based quality measures

Projects include emergency medical services, trauma, and neonatal registries. These are not patient tracking tools; they are designed exclusively to support research.

Purpose: Decide Which Elements

to model in SNOMED CT and which to represent in the data model

Approach

1. Begin modeling data elements with available concepts.
2. Identify gaps, and draft concept-model solutions to illustrate issues graphically.
3. Re-draft using expression constraint language.
4. Sketch boundaries based on feasibility of modeling.
5. Compare consistency of boundaries across test elements.
6. Adjust boundaries and articulate their rationales.

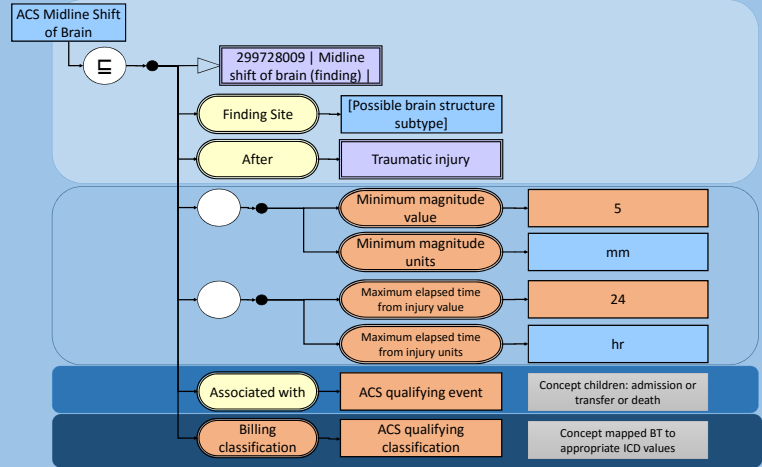
Cases

1. Specification of element to inform collector.
2. Specification of element to support automated collection.
3. Specification of element to support element-specific inference within research repository.
4. Specification of element to support inference across elements within or across research repositories.
5. Specification of element to support construction of quality measures.
6. Specification of element to support construction of decision support prompts.

Conclusions

- A. The concept model has limits both **accidental** and **essential** that make recording all relevant information in concepts undesirable.
- a. **Accidental** limits include the absence of certain concepts (post-mortem exam).
 - b. **Essential** limits include elements with no definitional relationship to the focal concept; e.g., registry admission criteria, which are related to the finding only incidentally.
 - c. It may be **difficult** in certain circumstances to assign a property to one of these categories. E.g., while concrete domains seem appropriate to define product strength, as a product may be taken to be an ontologically coherent entity, it is not clear whether the size of a phenomenon can be used as an ontological definition of a phenomenon.
 - d. Similarly, symptoms may be used as evidence for findings, but they cannot be used as definitional attributes. Whether they might in future be used in expression constraints is questionable; at present no attribute supports this use.
 - e. Finally, elements that are properties of attribution, e.g., quantification of "after," have no mechanism for expression other than relationship group association.
- B. The **selection of specification formalism** may be specific to the use case.
- a. Cases for **extraction** will require query languages (SQL, SPARQL) as well as expression constraint language specifications for the identification of relevant facts outside the purview of the concept definition. The facts so represented may not specify all qualifying data, e.g. registry inclusion criteria.
 - b. Cases for **inference** may require full specification of relevant properties of concepts (e.g., in definitions or compositional grammar expressions).

American College of Surgeons' National Trauma Data Bank Midline Shift (Element PM_05)



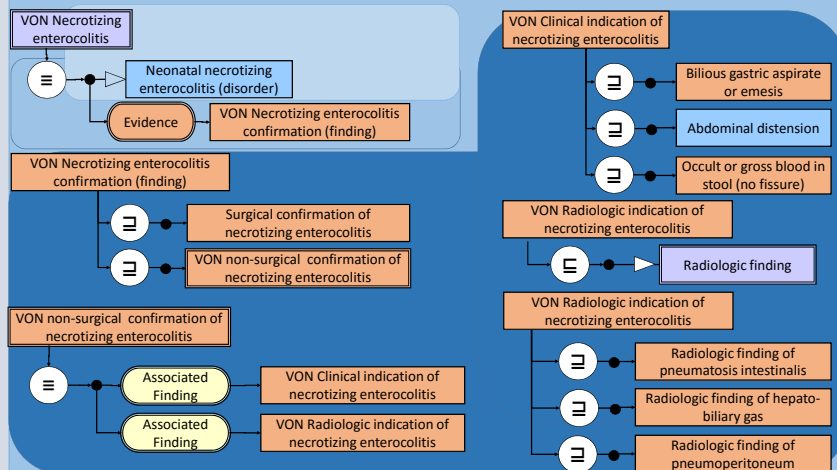
Appropriate to model in SNOMED CT

Possible in future, with concrete domains and other additions.

Record relationship; no deterministic cause. Use information model to identify encounter outcome.

Record criterion with no SNOMED CT semantics. Use information model to identify assigned classification.

Vermont Oxford Network Necrotizing Enterocolitis (Element 40a)



Appropriate to model in SNOMED CT

Possible in future, with additions, e.g., "evidence."

Record relationship; no deterministic cause. May be preferable as refsets, or expressed as Expression Constraints.

Record criterion with no SNOMED CT semantics. Use information model to identify assigned classification. (Associated with live birth; Birth weight > 400 g; gestational age >22 < 30; Died or admitted < 28 days after birth without going home).