Specific Procedure Modeling

A surgical procedure is defined as a procedure that involves intentional non-transient alteration of structures of the body, and/or a procedure that necessarily involves cutting into the body. This definition includes all procedures defined by Method (attribute) with Surgical action (qualifier value).

SNOMED CT classifies concepts as surgical procedures if their methods are surgical actions based on the action hierarchy. The surgical action hierarchy distinguishes surgical from non-surgical actions based on the definition above. Note the *in the sentence; actions that do not involve cutting or incision, but do involve the intentional non-transient alteration of anatomy, are still surgical.

Surgical procedures are not defined simply as procedures done by a surgeon (despite some dictionary definitions). Surgeons can perform many non-surgical actions and surgical procedures need not necessarily be performed by a surgeon, i.e. if a non-surgeon performs a surgical procedure, it is still a surgical procedure.

**Surgical procedure (operation) vs. non-surgical action**

As mentioned above, the definition of surgical procedure includes intentional non-transient alteration of structures of the body and/or necessarily involves cutting into the body. Non-surgical actions do not significantly or non-transiently alter anatomy and do not necessarily involve cutting or incision.

For example,
- Fine needle biopsy (procedure) or brush biopsy (procedure)
- Phlebotomy, a synonym for venipuncture for blood test (procedure)
- Aspiration (procedure)
- Closed reduction of dislocation (procedure)

Examples of borderline actions, classified as surgical actions,
- Core needle biopsy (procedure); more invasive and more tissue removal compared to fine-needle biopsy
- Centesis (procedure), theoretically, combining puncture with removal, alters body structure (see also, Centesis below)

**Closed procedures**

- The general pattern <open, closed> <procedure> is accepted
- When a procedure is specified as closed, the closed procedure should be fully described, e.g. fine needle biopsy, endoscopic, etc.
Surgical repair

The definition of surgical repair is restoring, to the extent possible, the anatomical structure, using a surgical action. Repair is an objective or intended accomplishment, not a means (e.g. suturing, transplanting, etc.) nor a need (e.g. normal functioning, cosmetic appearance, pain relief, etc.).

Surgery that restores structure is usually intended to restore function and appearance. Restoring function, however, is not necessary for a procedure to be considered a repair. It is also possible for surgery to restore function, without restoring structure (e.g. surgery to attach a prosthetic limb after amputation). This type of surgery would not be strictly categorized as a repair.

The Method attribute is used to model both the objective of a procedure and the means used to accomplish it. If a procedure requires both a repair action and another type of action, then two relationship groups should be used.

Fistula

Closure action is a kind of repair action. All fistula closures use the closure action and are auto-classified as kinds of repair procedures.

For example,

79433000 | Closure of colon fistula (procedure) | has Method (attribute), Closure - action (qualifier value) with a parent, Repair of colon (procedure)

Plastic repair

Surgery that accomplishes a repair (a structural restoration) often use the suffix -plasty. The term plastic repair is also used. In order to avoid redundancy, the following terms are used:

- Prosthetic repair, using external (non-body) materials
- Plastic repair, reshaping the body

The suffix -plasty is widely used in concepts that apply to prosthetic repairs (e.g. total hip arthroplasty). So -plasty may refer to any general repair (prosthetic, plastic, or other), and not just plastic repairs.

Revision

A revision procedure is not a subtype of the original procedure.

Revision procedure concepts should be in the 118635009 | Revision (procedure) | sub-hierarchy.

For example, 171839006 | Re-release of carpal tunnel (procedure) is modeled as follows:
Bilateral procedures

The naming pattern is as follows:

- FSN: X procedure of bilateral X (procedure)
- PT: Bilateral X procedure
- SYN: X procedure of both Xs
- Other synonyms may be added if requested, e.g. left and right X

For example, 732212008 | Amputation of bilateral lower limbs (procedure) |

- FSN: Amputation of bilateral lower limbs (procedure)
- PT: Bilateral lower limb amputation
- SYN: Amputation of bilateral lower limbs
- SYN: Amputation of both lower limbs

The concept is modeled as follows:
Regime/therapy

A regime/therapy is a set, sequence, or group of procedures, a subtype of procedure. As a subtype of procedure, they have the same attributes and use the same model as procedures in general. Regime/therapies are either:

- Repeated multiple times, over an extended period of time
  
  For example,
  
  716872004 | Antineoplastic chemotherapy regimen (regime/therapy). This regime/therapy might include individual instances of administration of chemotherapy agents; the instances are at separate times, over a predetermined or planned period of time.

  229586001 | Rest, ice, compression and elevation treatment program (regime/therapy). This regime/therapy refers to repeated rest, ice, compression and elevation (RICE) for an indefinite period of time.

- Focused on a single purpose, but do not have any single sub-procedure as a necessary part.
  
  For example,

  385695003 | Cast care (regime/therapy). The sub-procedures are all done for the purpose of properly monitoring and maintaining an orthopedic cast, but the sub-procedures may vary from one cast, patient, or healthcare setting to the next. Sub-procedures may include inspecting the cast, checking the skin, reinforcing padding, or etc. There is not a single sub-procedure as a necessary part, although the purpose of the sub-procedures is to take care of a cast.

  It is possible to have a regime/therapy as an instance of care. An instance of cast care could be the specific care for Mr. Smith’s cast on the morning of April 23rd, consisting of the set of procedures: examining the cast; examining his arm; asking about his symptoms; and cleaning the skin.

Has focus

Regime/therapy may be the value for the Has focus (attribute).

For example,

385978009 | Cardiac rehabilitation assessment (procedure) with Has focus, cardiac rehabilitation (regime/therapy)
Endoscopy vs. endoscopic procedure

Endoscopic procedures are distinguished from endoscopy procedures. The distinction depends on the Action (qualifier value) of the Method (attribute).

In an endoscopy, the Method is Inspection - action (qualifier value). For these procedures, Endoscope, device (physical object) is the value for Using device (attribute).

For example,

- 427595003 | Capsule endoscopy (procedure) | has the Relationship group
  - Using device, Endoscope, device (physical object)
  - Procedure site, Direct, Gastrointestinal tract structure (body structure)
  - Method, Inspection - action (qualifier value)

In an endoscopic procedure, the Method (attribute) has some other action. It is accomplished by gaining access to the procedure site via an endoscope. For these procedures Endoscope device (physical object) is the value for Using Access Device (attribute). This specifies that the endoscope is used to access the site.

For example,

- 53767003 | Endoscopic biopsy (procedure) | has the Relationship group
  - Using access device, Endoscope, device (physical object)
  - Method, Biopsy, action (qualifier value)

Centesis

Centesis may be defined as the act of puncturing a body cavity or space with a hollow needle and drawing out fluid. Each centesis procedure involves both a puncture action and a needle aspiration action. It is correct to have two relationship groups for centesis procedures.

One group has a Method, puncture action and a Procedure site - Direct, the structure being punctured.

For example,

- 91602002 | Thoracentesis (procedure) | has Procedure site - Direct, Pleural membrane structure (body structure)

The second group has a Method, aspiration action and a Procedure site - Indirect, space being aspirated.

For example,

- 91602002 | Thoracentesis (procedure) | has Procedure site - Indirect, Pleural cavity structure (body structure)

Transplantation and grafting

Transplantation includes procedures that are not grafting

Transplantation

The term transplantation should, in general, be reserved for the transplantation of whole organs or body parts (e.g., liver transplant, finger transplant, hair transplant, or etc.).

Grafting

Although the use of terminology may vary across specialties, in general, grafting is where tissue is completely separated from its source of origin or donor without its own blood supply, then fixed or attached to a recipient site. The recipient site provides the vascularity.

Fixation or attachment, for example, is of tissue involves skin, bone, cartilage, or fat, rather than whole organs. The term can also be used for fixation or attachment of some synthetic materials (e.g., a bioengineered skin graft is a manufactured skin graft grown in the laboratory from the patient’s own cells, or from other allogeneic or xenogeneic sources, and/or synthetic materials, for example, silicone graft, or combined sources).
For example,

- **Graft of skin**
  - A skin graft is a section of skin, of variable size, thickness and origin.
  - A skin graft is completely detached from its original site and moved to cover the area to be repaired without the benefit of any blood supply.

For example,

- 783285007 Full thickness graft of skin to skin of neck (procedure)
  - Proximal primitive Is a attribute value of 71388002 Procedure (procedure).
  - One relationship group:
    - 260686004 Method (attribute) = 129407005 grafting - action (qualifier value)
    - 405813007 Procedure site - Direct (attribute) = 43081002 skin structure of neck (body structure)
    - 363701004 Direct substance (attribute) = 782792007 full thickness graft of skin (substance)
      - Values for direct substance should be from the 420934007 Graft of skin (substance) hierarchy that includes the origin of the material in the description and a text definition.

Skin flaps are under review and not included here.

**Imaging guidance (see also Clinical imaging procedure naming conventions)**

Imaging guidance can be modeled using the attribute Has Intent. The concept 429892002 Guidance intent (qualifier value), a child of 363675004 Intents (nature of procedure values) (qualifier value), is the value for Has Intent for imaging guided procedures.

For example,

- 432666003 Biopsy of brain using computed tomography guidance (procedure) has two relationship groups, the second one below with Has Intent:
  - Method: Biopsy - action (qualifier value)
  - Procedure Site - Direct: Brain structure (body structure)
    - Procedure Site - Direct: Brain structure (body structure)
    - Method: Computed tomography imaging - action (qualifier value)
    - Has Intent: Guidance intent (qualifier value)

Biopsy of brain using computed tomography guidance

432666003 Biopsy of brain using computed tomography guidance (procedure) is subsumed by 702707005 Biopsy of head (procedure) and by 34227000 Computerized axial tomography of brain (procedure).

**Fluoroscopic guidance**

Using fluoroscopic guidance (procedure) is a subtype of fluoroscopy (procedure).

For example,

- 710291004 Endoscopy using fluoroscopic guidance (procedure) with the following relationship groups,
  - Using device: Endoscopic device (physical object)
  - Method: Inspection - action (qualifier value)
    - Method: Fluoroscopic imaging - action (qualifier value)
    - Has intent: Guidance intent (qualifier value)

**Excision, incision, biopsy**

Excision, incision, and biopsy may be difficult to interpret. They are organized according to the following general structure.

**Excision**

Organ excision. Any excisional act involving the organ; usually (organ)-ectomy, or similar, is a synonym. *Organ excision*, itself, does not specify whether it is complete or partial, nor does it specify what is excised.

For example,

- 107963000 Liver excision (procedure) or one of the synonyms, Hepatectomy
Complete or total excision

Concepts may include complete or total to indicate complete removal or excision of the organ.

For example,

- 63016009 Total resection of urinary bladder (procedure) with the synonyms Complete cystectomy, Total excision of bladder, and etc

Partial excision

Concepts may include partial or total to indicate removal or excision of part of the organ. Specifying partial excision does not differentiate between a partial excision of or from the organ.

For example,

- 708929007 Laparoscopic partial excision of kidney using robotic assistance (procedure) or one of the synonyms, Partial nephrectomy, laparoscopic with robot assistance

Lesion or tissue

Concepts may indicate removal of a lesion or tissue; excision of a lesion or tissue from an organ may be complete or partial.

For example,

- 72106008 Excision of lesion of liver (procedure)
- 69031006 Excision of breast tissue (procedure)

Lesion modeling

The word lesion can be used to refer to both structural and functional abnormalities. If a procedure (or disorder) refers to a lesion in a way that makes it clear that it is a generic term for a structural abnormality, then the correct modeling approach is to use Procedure morphology (attribute) for procedures or (Associated morphology (attribute), Morphologically abnormal structure (morphologic abnormality) for disorders).

Excision(al) biopsy

Excisional biopsy of entire organ (organ structure)

For example,

- 447412005 Excisional biopsy of lymph node of neck (procedure)

Excisional biopsy of organ generally means that tissue or a lesion or suspected lesion is necessarily entirely excised, not the entire organ. It is a partial excision of (from) the organ. This is true even when small polyps are removed.

For example,

- 116237003 Excisional biopsy of lesion of rectum by transanal approach (procedure)

Incisional biopsy

Incisional biopsy of organ; incisional biopsy of lesion of organ; usually with open approach. Incisional biopsy of organ necessarily implies incision and removal of a lesion, and is by definition a partial excision, since the site is the organ, and an excision is done, but the entire lesion is not necessarily removed.
For example,

- 237378001 | Incisional biopsy of breast (procedure)

### Biopsy

A *biopsy* may not be an excision.

For example,

- 445713002 | Brush biopsy of endocervix (procedure)
- 48426002 | Fine needle biopsy of kidney (procedure)

### Modeling biopsy

Biopsies, like other removal procedures, may have two direct objects, the *morphology* and the *site*. It is permissible to use Procedure site - Direct for biopsies, even if subtypes might have a direct object that is a morphology.

### Division, lysis, transection, bisection

#### Division and lysis

*Division action* is a subtype of Incision - action (qualifier value). This does not mean that all procedures, that include the word *division*, should necessarily be modeled with Method, Division - action (qualifier value); like those where the division is accomplished using *blunt dissection*, not incision.

For example,

- Division of adhesion concepts, like 173269002 | Division of adhesions of lip (procedure), should be modeled the same as *lysis of adhesion* concepts, like 45602008 | Lysis of adhesions of peritoneum (procedure)

Both use *dissection - action*. Adhesions are *broken down* by blunt dissection, often without incising them. This does not exclude procedures that may also involve division by incision.

The preferred name of *division of adhesions* concepts can be changed to *lysis of adhesions* for consistency. The use of *lysis of adhesions* also helps with correct modeling and avoidance of interpreting *divisions* as necessarily being kinds of incision.

#### Transection and bisection

*Transection* is defined as a division across the longitudinal axis of a structure by cutting. *Bisection* is defined as division into two parts by cutting. *Incision - action* (qualifier value) is a subtype of *Division - action* (qualifier value) and *Incisional biopsy of breast (procedure)*.

For example,

- 53176004 | Transection of muscle of eye (procedure)
- 60158005 | Bilateral bisection of ovary (procedure)

### Skeletal system

Since the skeletal system includes bones and cartilage, it is possible to have a procedure on the skeletal system, i.e. on cartilage, that is not a procedure on bone.

For example,

- 77825002 | Division of cartilage of wrist (procedure)

### Skeletal system subdivision

*SNOMED CT* considers the *skeletal system subdivision* part of the entire bone (system). This may change if there are procedures on cartilaginous skeleton that involve skeletal system subdivisions.

### Osteotomy

*Osteotomy* is defined as *cutting into or through a bone*. There are 3 meanings in *SNOMED CT*.
• Cutting into a bone, regardless of whether the bone is divided (incision, general meaning). Model using Method, Incision - action (qualifier value), and Procedure site - Direct (attribute), bone structure (or subtypes).

  For example,
  * 118483001 [Incision of rib (procedure)]

• Cutting through a bone and dividing it (division by cutting). Model using Method, Division - action (qualifier value), and Procedure site - Direct (attribute), bone structure (or subtypes).

  For example,
  * 447867002 [Division of ulna (procedure)]

• Cutting into a bone without cutting through it and therefore without dividing it (incision without division). This is unnecessary. Procedures that do not explicitly involve division are modeled simply as Incision.

Reduction and fixation of fractures

Reduction and fixation has two actions by two different means; open reduction of a fracture and insertion of an orthopedic fixation device. This provides an opportunity for general concept inclusion axioms (GCIs) in order to fully represent the meanings, without heavy postcoordination modeling. Open reduction of a fracture necessarily involves open manipulation of the fracture and internal fixation of a fracture necessarily involves the insertion of an orthopedic internal fixation device.

  For example,
  * 74011006 [Open reduction of fracture of tibia and fibula with internal fixation (procedure)]

Immunization and vaccination

Immunization may be active (introduction of a vaccine) or passive (introduction of immunoglobulin/antibodies). A vaccine is a substance that can induce active immunity. Vaccination, by definition, is the introduction of a vaccine, and is, therefore, synonymous with active immunization. Some descriptions include the word vaccination, where it is clear that vaccination is intended. Other descriptions have preferred terms with the word vaccination and synonyms with the word immunization, to include both active and passive immunization.

  For example,
  * 38598009 [Measles-mumps-rubella vaccination (procedure)] has vaccination in all descriptions
  * 86198006 [Influenza vaccination (procedure)] has the synonym, influenza immunization

Encounter

An encounter is defined as an in-person meeting between a patient and a healthcare provider for the purpose of the provision of healthcare services to the patient. An encounter is a kind of procedure.

  For example,
  * 185349003 [Encounter for check up (procedure)]

An indirect encounter is not actually an encounter, since there is no face-to-face meeting. Therefore encounter and indirect encounter are siblings in the procedure hierarchy.

  For example,
  * 11797002 [Telephone call by physician to patient or for consultation (procedure)]