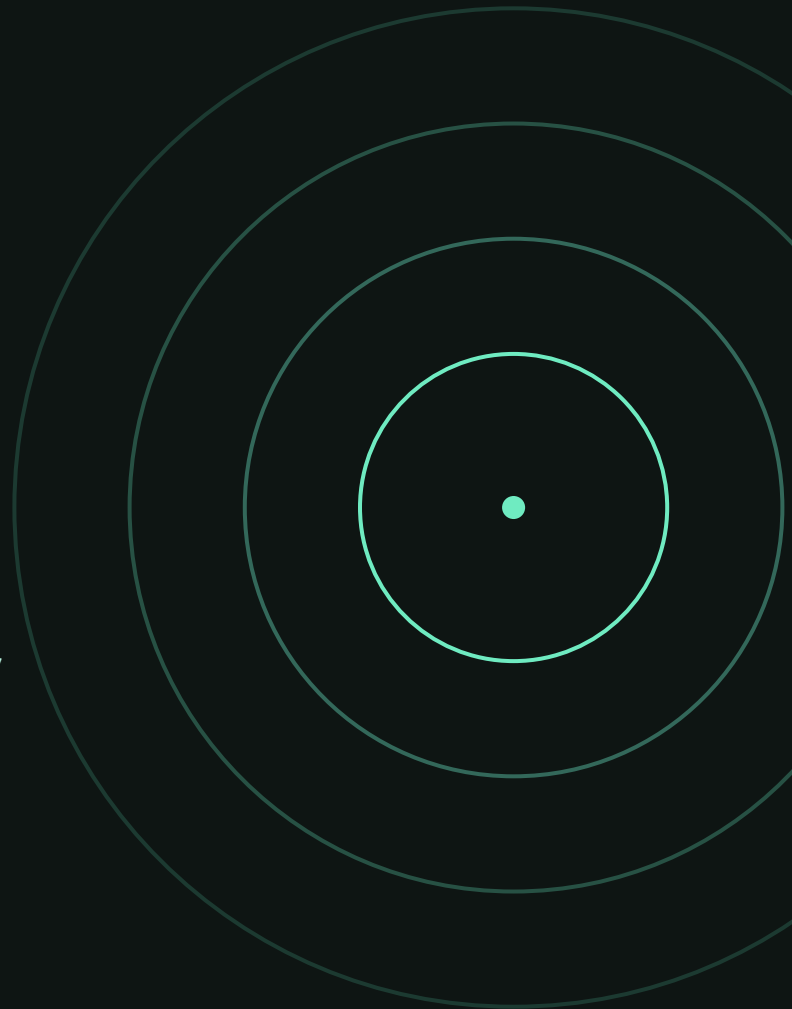


MEDICAL CODING DEEP DIVE

Terminologies, classifications, and what medical codes actually mean

Michael Harwood-Jones
Clinical Terminologist

June 2026



Coding Error: Misdiagnosis vs. Misclassification

~600,000

hospital admissions for pneumonia in England, 2024–25

>50%

of patients labelled with community-acquired pneumonia were misdiagnosed — clinicians used the term inconsistently (Daniel et al., BMJ, 2017)

<https://doi.org/10.1136/thoraxjnl-2016-209405>

“

“If names are not rectified, speech will not accord with reality; when speech does not accord with reality, things will not be successfully accomplished.”

— Confucius, Analects, c. 500 BCE

Medical coding is only as accurate as the clinical documentation that is presented to support it.

Terminology, encoding, grouping

01

Terminology

Clinical terminology

Capturing what the clinician means, in the clinician's own words, at the point of care.



02

Encoding

Ontology

Formal semantic structure that makes the meaning computable, not merely recordable.



03

Grouping

Classification

Aggregating into categories for reporting, statistics and funding.

A language of health in action: Read Codes, classifications and groupings
PMID: 8947631

Interface and reference: front end, back end



Interface terminology

The front end

The terms clinicians actually use at the point of care.
Optimised for data entry, readability and ease of use.



Reference terminology

The back end

Uniquely identified, formally defined concepts
connected through structured relationships. Enables
storage, management and analysis — longitudinally,
and across organisations.

SNOMED CT: the canonical reference terminology

380,000+

active concepts in the
International Edition

53

member countries

50,000+

individual and organisational
affiliates

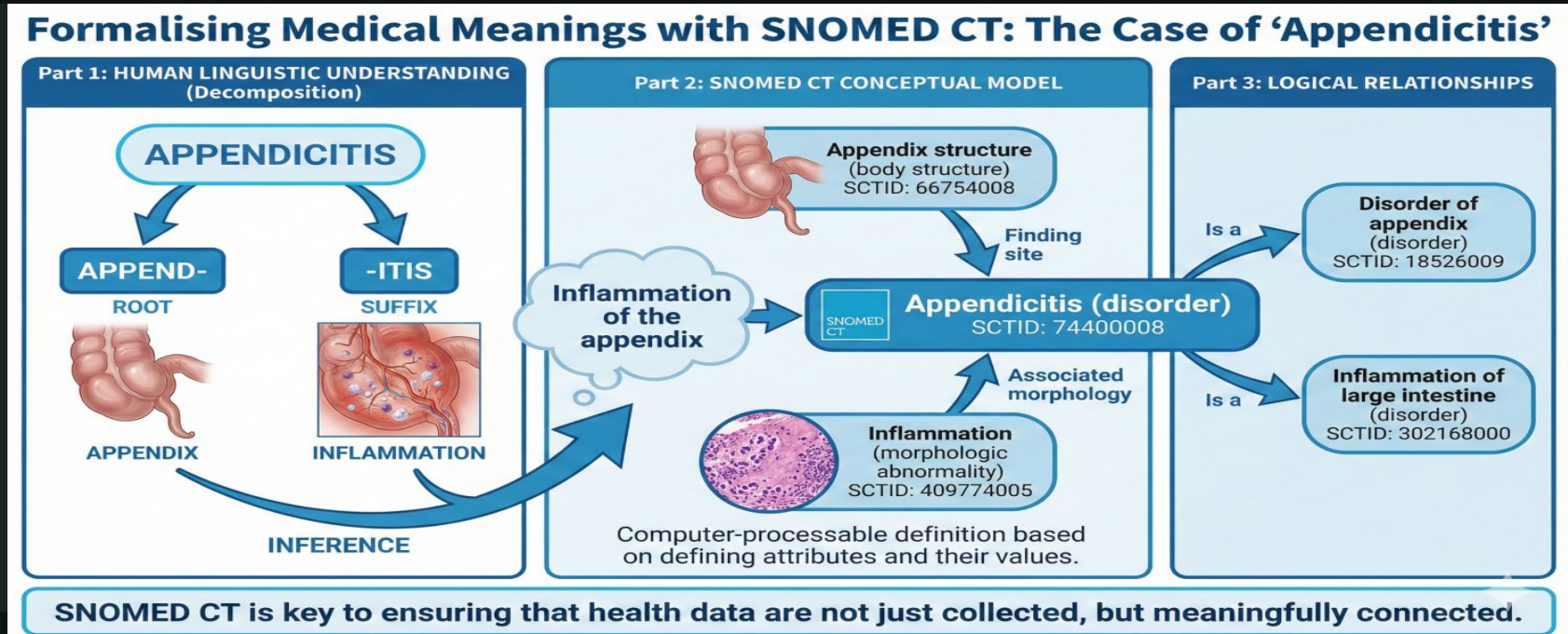
OWL 2 EL

formal description-logic
foundation

Polyhierarchy: a concept may have multiple parents. Coverage spans findings, disorders, procedures, body structures, substances, organisms, products and devices.

The significance is not the number of concepts. It is the architecture.

Description logic in action: appendicitis



The Open World Assumption



Closed world

Traditional databases

If a fact is not recorded, it is assumed false. No blood-pressure reading on file? The system behaves as though none exists. Completeness is taken for granted.



Open world

Description logic

If a statement is not explicitly false, it is unknown — not false. The ontology constrains which states of the world are possible, whilst leaving much unspecified.

The **unique names assumption (UNA)** is the assumption that distinct ground terms denote different individuals.

Invariants versus generalisations

Rector, Schulz and colleagues — “On beyond Gruber”: the limits of OWL in clinical modelling

DOI: 10.1016/j.yjbinx.2019.100002

INVARIANT

“Pneumococcal pneumonia is pneumonia caused by Streptococcus pneumoniae.”

True by definition. Admits no exceptions, in any case, ever.

GENERALISATION

“Myocardial infarction presents with acute chest pain.”

Typically correct, but not universally true. Atypical presentations exist!

In SNOMED CT, every axiom is treated as an invariant. Statistical associations are the domain of classifications.

Grouping for analysis

“

“A set of boxes — metaphorical or literal — into which things can be put to then do some kind of work.” — Bowker & Star, *Sorting Things Out* (1999)

What classification powers

- Epidemiology and public health surveillance
- Mortality statistics and outcomes data
- Reimbursement and resource allocation

The UK stack

ICD-10 + OPCS-4

Hospital Episode Statistics

ONS national statistics

MECE: the structural principle

ME

Mutually exclusive

Each category is defined so that no item falls into more than one. Every coded diagnosis belongs to exactly one ICD category.

CE

Collectively exhaustive

Every possible concept has a home somewhere in the system. Nothing falls outside.

The payoff: hospital episode data from 1998 is comparable with 2024 — across time, institutions and countries. No other system offers that.

The price is granularity.

The shoreline

Above the shoreline — an explicit code of its own. Common enough, distinct enough, important enough to count.



Below the shoreline — an inclusion term under a broader category. A home, but no name of its own.

Late-onset asthma

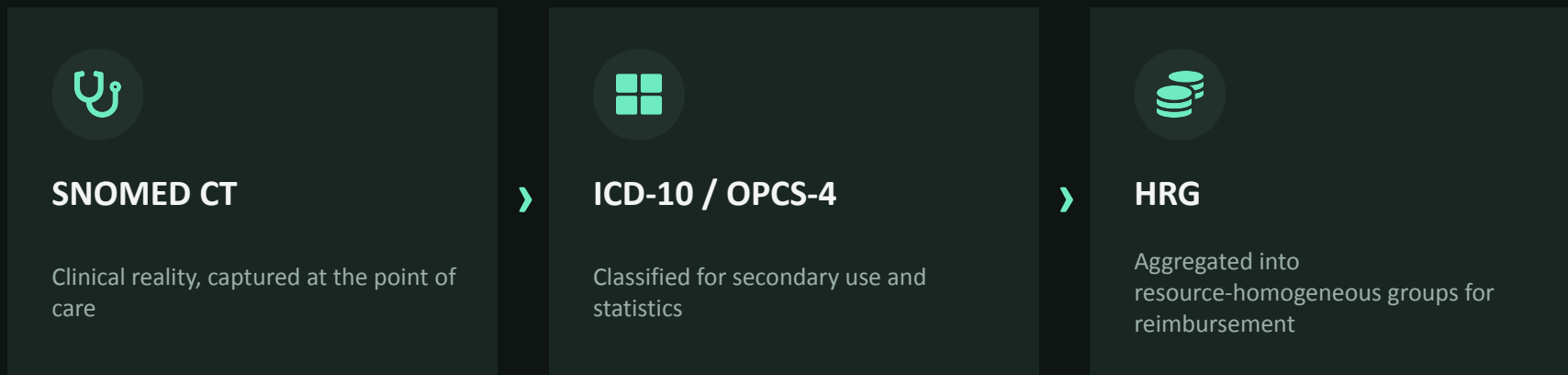
→ inclusion term under ICD-11 CA23.32, “Unspecified asthma, uncomplicated”. It is not unspecified — any clinician will tell you that.

NEC Not Elsewhere Classified — specific meaning, no code of its own

NOS Not Otherwise Specified — documentation too thin to be precise

The classification is not trying to represent clinical reality. It is trying to count it.

The cascade: each step serves a different master



Each step: more abstraction, less granularity, a different purpose. Grouper software assigns the HRG from ICD codes, procedures and episode data — it determines what a trust is paid.

None is 'better'. All are necessary. They are complementary — not competitors.

Foundation and linearisations: one source, many outputs

Endorsed by the WHO in May 2019 · in effect 1 January 2022 · adopted so far in only a handful of countries

The Foundation

A unified layer of clinical content — concepts, relationships, properties. Authored once.

ICD-10, by contrast: a Tabular List plus an Alphabetical Index, with a few poorly maintained speciality adaptations.



Morbidity linearisation — clinical coding in hospitals

Mortality linearisation — death certification

Primary care linearisation — simpler settings

Content separated from context of use: the classification view is generated according to purpose.

Post-coordination: two philosophies

ICD-11 cluster coding

stem / extension · joined with “/” and “&”

The symbols are arbitrary — they carry no specific meaning. Whether the extension is an infectious agent, a medicament or a histological type, the convention is identical. The relationship is only ever implied; it requires human interpretation. There is no computational test of equivalence.

SNOMED CT expressions

built on the machine-readable concept model

A formally specified description-logic framework governs which combinations are valid. New clinical meanings can be expressed compositionally without being pre-defined — and computed exactly like pre-coordinated content.

Not just stitching codes together — qualifying the strings between the things.

The boundary problem

One clinical meaning — a plain X-ray of the left foot — two computable forms:

Pre-coordinated

426908009 |Plain X-ray of left foot|

The complete clinical concept as a single terminology code.

Post-coordinated

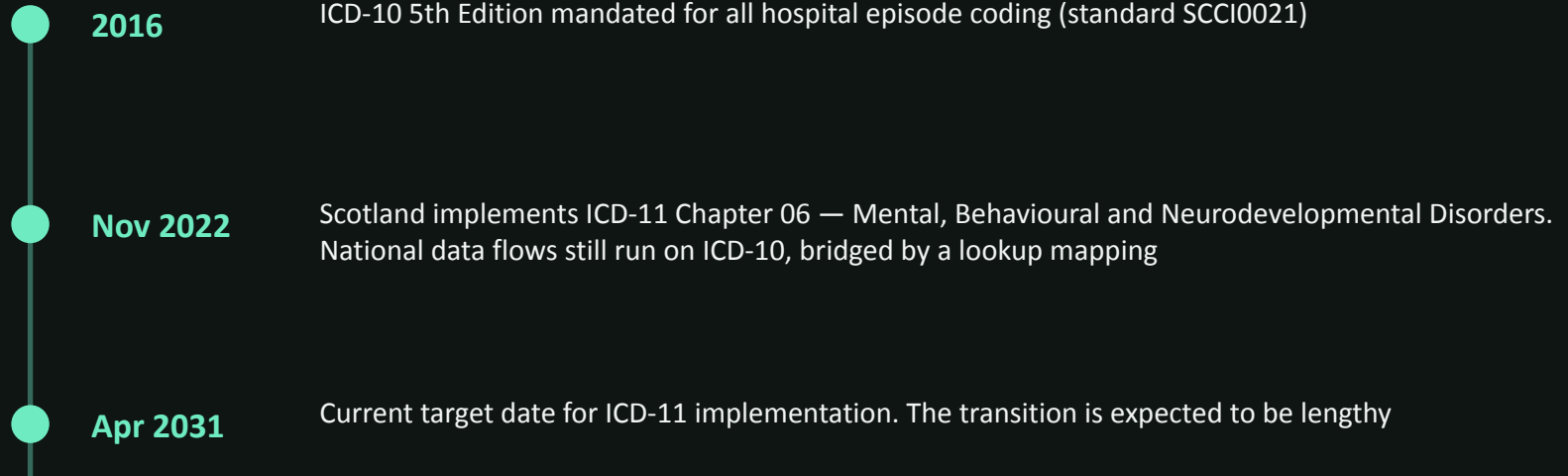
Plain X-ray procedure + left foot body structure

Composed from simpler concepts — or split across structured fields of the information model.

Clinically equivalent. Computationally different.

Systems draw the model–terminology boundary in different places. When they exchange data, the same fact arrives in structurally incompatible forms — recognising equivalence demands an isosemantic transformation, or a mapper who understands both sides in detail.

ICD-11 in the UK: a long runway



Meanwhile, at the ONS: mortality infrastructure for England and Wales is currently incompatible with ICD-11 extension codes. Impact under active assessment; not yet resolved.

The BRIDGE: Collect Once, Use Many Times

Document once, precisely, at the point of care — transform into whatever downstream processes require. Mapping is the mechanism.



1 · Scoping & preparation

Purpose, source and target, rules of equivalence, edge cases. This is where most mapping projects fail — before a single concept is touched.



2 · Mapping

Apply the agreed rules; document the rationale for complex decisions; handle the cases no rule covers.



3 · Validation & maintenance

Permanent. SNOMED CT releases twice a year; ICD-11 updates continuously. An unmaintained map quietly misleads.

A map begins going stale the moment either code system updates.

Equivalence is the exception, not the rule



“Where is the wisdom we have lost in knowledge? Where is the knowledge we have lost in information?”

Choruses from The Rock, T. S. Elliot

A model trained on ICD-coded data learns a classification, not a representation of it. The expressivity of the training data sets the ceiling of what can be learned from it.

● SECTION 5 · MAPPING

K65 Peritonitis

Excl.: peritonitis:

- aseptic ([T81.6](#))
- benign paroxysmal ([E85.0](#))
- chemical ([T81.6](#))
- due to talc or other foreign substance ([T81.6](#))
- neonatal ([P78.0-P78.1](#))
- pelvic, female ([N73.3-N73.5](#))
- periodic familial ([E85.0](#))
- puerperal ([O85](#))
- with or following:
 - abortion or ectopic or molar pregnancy ([O00-O07](#), [O08.0](#))
 - appendicitis ([K35.-](#))
 - diverticular disease of intestine ([K57.-](#))

K65.0 Acute peritonitis

Abscess (of):

- abdominopelvic
- mesenteric
- omentum
- peritoneum
- retrocaecal
- retroperitoneal
- subdiaphragmatic
- subhepatic
- subphrenic

Peritonitis (acute):

- generalized
- pelvic, male
- subphrenic
- suppurative

Use additional code (B95-B98), if desired, to identify infectious agent.

K65.8 Other peritonitis

Chronic proliferative peritonitis

Mesenteric:

- fat necrosis
- saponification

Peritonitis due to:

- bile
- urine

K65.9 Peritonitis, unspecified

Peritonitis (disorder)



SCTID: 48661000

48661000 | Peritonitis (disorder) |

en Peritonitis (disorder)

en Peritonitis

- Acute gangrenous appendicitis with perforation and peritonitis
- Acute peritonitis (disorder)
- Aseptic peritonitis (disorder)
- Bile peritonitis (disorder)
- Chronic peritonitis (disorder)
- Eosinophilic peritonitis (disorder)
- Fibrinous peritonitis (disorder)
- Granulomatous peritonitis (disorder)
- Infectious peritonitis (disorder)
- Neonatal peritonitis (disorder)
- Pelvic peritonitis (disorder)
- Perimetritis (disorder)
- Peritoneal granuloma (disorder)
- Peritonitis due to abscess (disorder)
- Postoperative peritonitis (disorder)
- Primary peritonitis (disorder)
- Puerperal peritonitis (disorder)
- Retractable mesenteritis (disorder)
- Sclerosing peritonitis (disorder)
- Subphrenic peritonitis (disorder)
- Urine peritonitis (disorder)
- Ventriculoperitoneal shunt-associated peritonitis (disorder)

SECTION 5 · MAPPING

K65 Peritonitis

Excl.: peritonitis:

- aseptic (T81.6)
- benign paroxysmal (E85.0)
- chemical (T81.6)
- due to talc or other foreign substance (T81.6)
- neonatal (P78.0-P78.1)
- pelvic, female (N73.3-N73.5)
- periodic familial (E85.0)
- puerperal (O85)
- with or following:
 - abortion or ectopic or molar pregnancy (O00-O07, O08.0)
 - appendicitis (K35.-)
 - diverticular disease of intestine (K57.-)

K65.0 Acute peritonitis

Abscess (of):

- abdominopelvic
- mesenteric
- omentum
- peritoneum
- retrocecal
- retroperitoneal
- subdiaphragmatic
- subhepatic
- subphrenic

Peritonitis (acute):

- generalized
- pelvic, male
- subphrenic
- suppurative

Use additional code (B95-B98), if desired, to identify infectious agent.

K65.8 Other peritonitis

Chronic proliferative peritonitis

Mesenteric:

- fat necrosis
- saponification

Peritonitis due to:

- bile
- urine

K65.9 Peritonitis, unspecified

ICD-10:
Descriptive, grouped
classification.

SNOMED CT:
Formal, semantic
computable structure.

Acute
Acute
Aseptic
Disoritic
Bile
Chronic
Esteptic
Peritonium
Granulomatougmatic
Peritonitis
Subphrenic

Peritonitis (disorder) ☆

SCTID: 48661000

48661000 | Peritonitis (disorder) |

en Peritonitis (disorder)

en Peritonitis

- Acute gangrenous appendicitis with perforation and peritonitis
- Acute peritonitis (disorder)
- Aseptic peritonitis (disorder)
- Bile peritonitis (disorder)
- Chronic peritonitis (disorder)
- Eosinophilic peritonitis (disorder)
- Fibrous peritonitis (disorder)
- Granulomatous peritonitis (disorder)
- Infectious peritonitis (disorder)
- Neonatal peritonitis (disorder)
- Pelvic peritonitis (disorder)
- Perimetritis (disorder)
- Peritoneal granuloma (disorder)
- Peritonitis due to abscess (disorder)
- Postoperative peritonitis (disorder)
- Primary peritonitis (disorder)
- Puerperal peritonitis (disorder)
- Retractable mesenteritis (disorder)
- Sclerosing peritonitis (disorder)
- Subphrenic peritonitis (disorder)
- Urine peritonitis (disorder)
- Ventriculoperitoneal shunt-associated peritonitis (disorder)

Recap

SNOMED CT the foundation for computable clinical knowledge — semantic interoperability, decision support, AI-ready records

ICD the lingua franca of outcomes data, mortality statistics and reimbursement — how systems count, compare and fund

Mapping the bridge between them — imperfect, necessary, and always at some cost to precision

Questions?