



NCVHS ICD-11 Expert Roundtable Meeting August 3, 2023

# A practical strategy to use the ICD-11 for morbidity coding in the United States without a clinical modification

***Kin-Wah Fung***

***Julia Xu***

***Olivier Bodenreider***

*National Library of Medicine,  
National Institutes of Health*

***Donna Pickett***

***Shannon McConnell-Lamptey***

*National Center for Health Statistics,  
Centers for Disease Control and Prevention*

# ICD-11

- Official version of ICD
- Used by at least 35 countries for
  - Causes of death
  - Cancer registries
  - Primary care
  - Reimbursement

# What's new in ICD-11

- Moderate increase in size
  - 4,000 more (stem) codes than ICD-10 (40% increase)
- Foundation
  - Knowledge base from which classifications (“linearizations”) are derived
  - Frequent (daily) update
  - > 120,000 codable terms
- Postcoordination (cluster coding)
  - > 14,000 extension codes, potentially millions of different combinations
- WHO’s vision: common Foundation and extension for the WHO Family of International Classifications (WHO-FIC)
  - ICD (International Classification of Diseases)
  - ICHI (International Classification of Health Interventions)
  - ICF (International Classification of Functioning, Disability and Health)

November 25, 2019

The Honorable Alex Azar II  
Secretary  
Department of Health and Human Services  
200 Independence Avenue, S.W.  
Washington, D.C. 20201

**Re: Preparing for Adoption of ICD-11 as a Mandated U.S. Health Data Standard**

Dear Secretary Azar:

As stipulated by the Health Insurance Portability and Accountability Act of 1996, the National Committee on Vital and Health Statistics (NCVHS) monitors the effectiveness of adopted health data standards pursuant to the administrative simplification provisions. This includes making recommendations for the adoption of the International Classification of Diseases, version 11 (ICD-11).

The ICD is a classification system developed by the World Health Organization (WHO) as the foundation for identifying health trends and statistics. It is the international standard for reporting diseases and health conditions. WHO adopted ICD-11 in 2018 and the World Health Assembly formally adopted this version in 2019, effective beginning January 1, 2022. Adoption of ICD-11 by the U.S. has two dimensions:

- **First, adoption for mortality**, i.e., cause of death. The U.S. is a member of the World Health Organization (WHO) and participates in the WHO mortality surveillance. It is led by the National Center for Health Statistics (NCHS) in partnership with state vital registration and statistical systems.
- **Second, adoption for morbidity**, i.e., non-fatal health conditions, however, requires HHS regulatory action since ICD-11 is not part of the current code set. Its use for morbidity is mandatory for hospitals, physicians, and other health care provider and settings. Uses include monitoring the incidence and prevalence of diseases, supporting claims for reimbursement, tracking of safety and quality guidelines, population health monitoring, research as well as state health data reporting.

The U.S. implemented ICD-10 for mortality reporting in 1999. It implemented it for morbidity in 2015, 25 years after it was endorsed by the WHO, and after a protracted regulatory process. As

Research topics the Committee recommends include:

Whether ICD-11 can fully support morbidity classification in the U.S. without development of a U.S. clinical modification (CM) and if not, are there areas to be targeted in a CM version.

# Benefits of avoiding a Clinical Modification

- Avoid the cost of creating and maintaining ICD-11-CM
- Earlier use of an up-to-date, international medical classification
- Avoid divergence of the US Clinical Modification from the international core
  - Theoretically, ICD-10-CM should be totally compatible with ICD-10
  - However, significant differences can be observed e.g.
    - *E14 Unspecified diabetes mellitus* is not found in ICD-10-CM (diabetes unspecified is coded as type 2)
    - *K68 Disorders of retroperitoneum* is not found in ICD-10
- ICD-11 Foundation can be leveraged for
  - Alignment with other terminologies e.g., SNOMED CT
    - In the original design, SNOMED CT was to be used directly to build the Foundation. However, that was not realized for various reasons.
    - There is renewed interest to align the Foundation with SNOMED CT, a pilot project mapped a sample of codes.
  - Automated coding

# Options to augment coverage in ICD-11

- Use of the stem codes alone in the ICD-11 MMS (Mortality and Morbidity Statistics) linearization will be insufficient
- Options for expanding coverage
  - US Linearization
    - Exposing Foundation entities for coding
  - Postcoordination
    - Using existing postcoordination capability, with the option of adding US-specific extension codes (“US Extension of Extension”)
  - Adding new stem codes
    - Not linked to the Foundation
    - Likely to be a small set (“ICD-11-CM Lite”)

# A practical strategy of replacing ICD-10-CM

- Rank the available options according to
  - Level of effort in development and maintenance
  - Ease of implementation by users
  - Risk of divergence from the core ICD-11
- Proposed strategy
  1. Use MMS stem codes
  2. Use additional Foundation entities
  3. Postcoordination with existing extension codes
  4. Postcoordination with new extension codes
  5. New stem codes

# Study design

- Test the strategy on 2 samples of ICD-10-CM codes
  - Commonly used codes from all chapters (horizontal sample)
  - All codes in a single chapter (vertical sample)





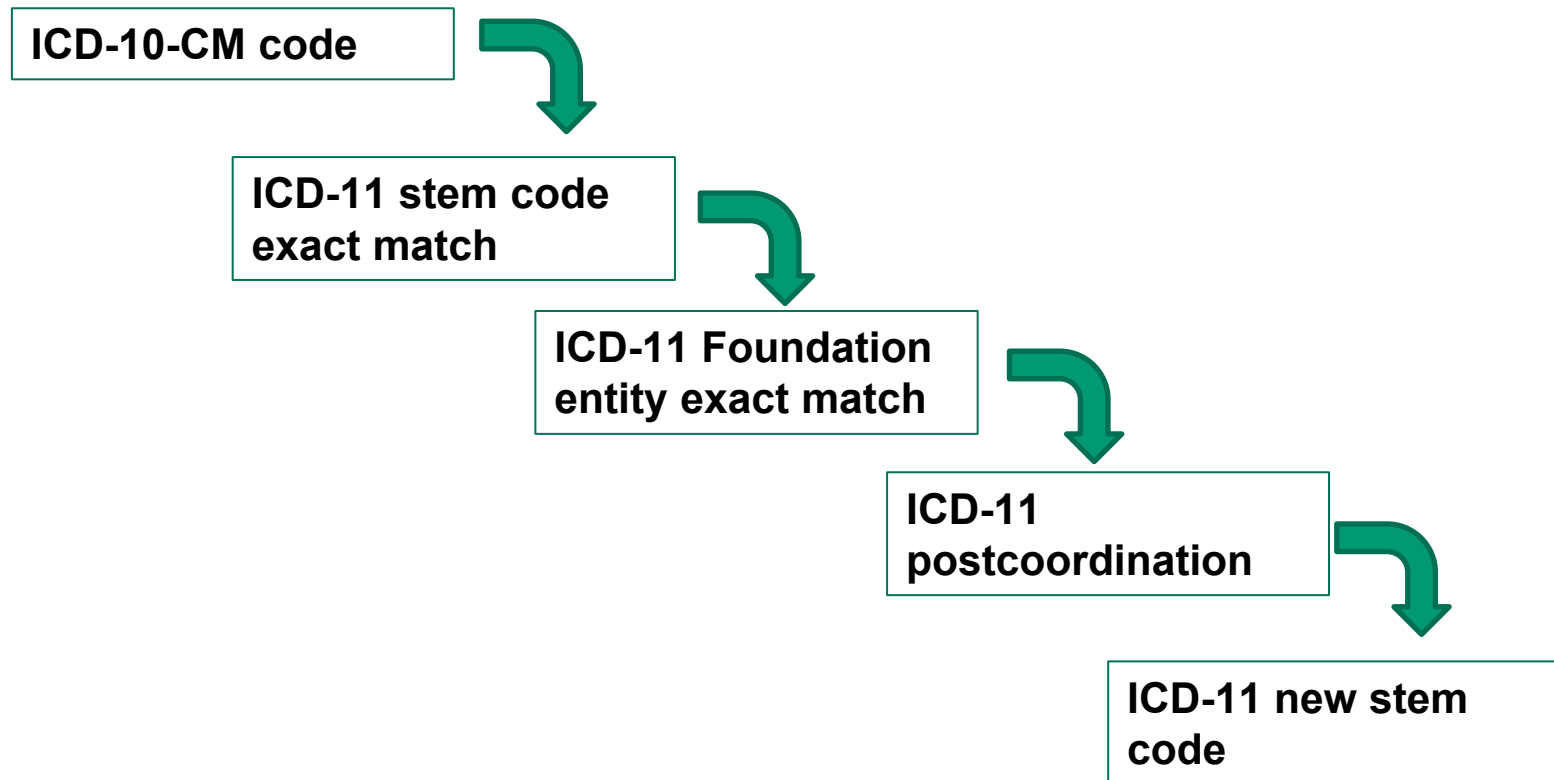
# Commonly used ICD-10-CM codes

- Medicare claims
  - One of the biggest collections of ICD-10-CM codes in use
  - De-identified data available to researchers through the CMS Virtual Research Data Center
- However, Medicare patients are mostly > 65 and so missing codes from 3 chapters
  - *Chapter 15 Pregnancy, childbirth and the puerperium*
  - *Chapter 16 Certain conditions originating in the perinatal period*
  - *Chapter 17 Congenital malformations, deformations and chromosomal abnormalities*
- Alternative source of ICD-10-CM codes for these 3 chapters: University of Nebraska Medical Center (thanks to James Campbell and Ellen Kerns)
- 909 codes covering at least 60% usage in each chapter (excluding digestive diseases)

## All codes from one chapter

- We selected *Chapter 11 Diseases of the digestive system* because, according to our previous study
  - Good spread of code usage (not overly concentrated)
  - Medium coverage (not extremely high or low) by ICD-11
  - Manageable number of codes – 817 codes

# 'Waterfall' recoding in ICD-11



# ICD-11 browser

- Maintenance (“orange”) browser used because more complete display of Foundation entities as inclusions and index terms
- Identification of distinct Foundation entities by URIs

The screenshot shows the ICD-11 browser interface. The search bar contains 'seborrhoeic keratosis'. The left sidebar shows a tree of categories, with '2F21.0 Seborrhoeic keratosis' selected. The main content area displays the details for '2F21.0 Seborrhoeic keratosis', including its parent '2F21 Benign keratinocytic acanthomas', a description, and a list of inclusions: 'Basal cell papilloma' and 'Seborrhoeic wart'. Below the inclusions is a list of 'All Index Terms' which includes 'Seborrhoeic keratosis', 'Basal cell papilloma', 'Seborrhoeic wart', 'Acanthotic seborrhoeic keratosis', and 'Adenoid seborrhoeic keratosis'. Red arrows point from the text 'Synonymous with stem code' to 'Basal cell papilloma' and 'Seborrhoeic wart'. Another red arrow points from the text 'Not synonymous with stem code' to 'Acanthotic seborrhoeic keratosis' and 'Adenoid seborrhoeic keratosis'. A green box highlights the 'Foundation URI' at the top of the page: <http://id.who.int/icd/entity/1627987797>.

*Different URIs:*  
<http://id.who.int/icd/entity/1627987797>  
<http://id.who.int/icd/entity/1100061193>

The screenshot shows the ICD-11 browser interface for 'Acanthotic seborrhoeic keratosis'. The search bar contains 'Acanthotic seborrhoeic keratosis'. The left sidebar shows a tree of categories, with 'Acanthotic seborrhoeic keratosis' selected. The main content area displays the details for 'Acanthotic seborrhoeic keratosis', including its parent 'Seborrhoeic keratosis', a description, and a list of inclusions: 'Basal cell papilloma' and 'Seborrhoeic wart'. Below the inclusions is a list of 'All Index Terms' which includes 'Seborrhoeic keratosis', 'Basal cell papilloma', 'Seborrhoeic wart', 'Acanthotic seborrhoeic keratosis', and 'Adenoid seborrhoeic keratosis'. Red arrows point from the text 'Synonymous with stem code' to 'Basal cell papilloma' and 'Seborrhoeic wart'. Another red arrow points from the text 'Not synonymous with stem code' to 'Acanthotic seborrhoeic keratosis' and 'Adenoid seborrhoeic keratosis'. A green box highlights the 'Foundation URI' at the top of the page: <http://id.who.int/icd/entity/1100061193>.

# Postcoordination

- Not restricted to options in browser
  - Postcoordination sanction rules in browser are primarily for detecting redundancy arising from post-coordinated expression synonymous with an existing stem code
  - We allow combinations if clinically meaningful e.g.,
    - *MC41 Tinnitus & XK9J Bilateral*
- Allow use of stem codes, extension codes and Foundation entities
- Propose new extension codes if necessary

# Use of multiple stem codes

- Apart from their use in postcoordination, multiple stem codes are allowed if that results in exact match
- These are broad-to-narrow matches e.g.,
  - ICD-10-CM code *K56.2 Volvulus* →
    - *DA91.1 Volvulus of small intestine*, **OR**
    - *DB30.1 Volvulus of large intestine*
- Interpretation is different from postcoordination e.g.,
  - ICD-10-CM CODE *K22.11 Ulcer of esophagus with bleeding* →
    - *DA25.Z Oesophageal ulcer, unspecified*, **AND**
    - *ME24.A2 Oesophageal haemorrhage*

# Summary of recoding results

Level of recoding	Frequently used codes		Digestive disease codes		Combined	
	Count(%)	Cumulative %	Count(%)	Cumulative %	Count(%)	Cumulative %
L1. Stem code	291(32%)	32.0%	316(38.7%)	38.7%	607(35.2%)	35.2%
L2. Foundation entity	58(6.4%)	38.4%	137(16.8%)	55.5%	195(11.3%)	46.5%
L3a. Postcoordination - existing code	483(53.1%)	91.5%	257(31.5%)	87.0%	740(42.9%)	89.4%
L3b. Postcoordination – new extension code	62(6.8%)	98.3%	60(7.4%)	94.3%	122(7.1%)	96.5%
L4. New stem code	15(1.7%)	100.0%	46(5.6%)	100.0%	61(3.5%)	100.0%
Total	909(100%)		816*(100%)		1725(100%)	

\*one unmappable code K56.41 Fecal impaction excluded

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# K43.1 Incisional hernia with gangrene

## ICD-11 for Mortality and Morbidity Statistics

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DD52 Femoral hernia

DD53 Umbilical hernia

DD54 Paraumbilical hernia

DD55 Epigastric hernia

DD56 Incisional hernia

DD57 Parastomal hernia

DD5Y Other specified hernias

DD5Z Hernias, unspecified

► Inflammatory bowel diseases

► Functional gastrointestinal disorders

► Postprocedural disorders of digestive system

► Digestive system disorders of fetus or newborn

► Symptoms, signs or clinical findings of the digestive system or abdomen

► Structural developmental anomalies of the digestive tract

JB64.6 Diseases of the digestive system complicating pregnancy, childbirth or the puerperium

DE2Y Other specified diseases of the digestive system

DE2Z Diseases of the digestive system, unspecified

► 14 Diseases of the skin

► 15 Diseases of the musculoskeletal system or connective tissue

► 16 Diseases of the genitourinary system

► 17 Conditions related to sexual health

► 18 Pregnancy, childbirth or the puerperium

► 19 Certain conditions originating in the perinatal period

► 20 Developmental anomalies

► 21 Symptoms, signs or clinical findings, not elsewhere classified

Foundation URI : <http://id.who.int/icd/entity/1163063637>

### DD56 Incisional hernia

#### Parent

[Hernias](#)

#### Description

A hernia occurs through the weak area on the incision of the

#### All Index Terms

- Incisional hernia
- Incisional hernia with obstruction, without gangrene ⇒
  - ventral hernia with obstruction, without gangrene
  - incarcerated incisional hernia without gangrene
  - incarcerated ventral hernia without gangrene
  - incisional hernia causing obstruction without gangrene
  - irreducible incisional hernia without gangrene
  - irreducible ventral hernia without gangrene
  - obstructed hernia of anterior abdominal wall
  - obstructed incisional hernia of anterior abdominal wall
  - obstructed incisional ventral hernia
  - obstructed ventral hernia
  - ventral hernia with obstruction
  - ventral hernia causing obstruction without gangrene
  - strangulated ventral hernia without gangrene
  - strangulated incisional hernia without gangrene
- Recurrent hernia of anterior abdominal wall with obstruction ⇒
  - recurrent obstructed hernia of anterior abdominal wall
  - recurrent obstructed ventral hernia
  - recurrent ventral hernia with obstruction
- Incisional hernia with gangrene ⇒
  - gangrenous ventral hernia
  - hernia of anterior abdominal wall with gangrene
  - ventral hernia with gangrene
  - Gangrenous incisional hernia

Incisional hernia with gangrene

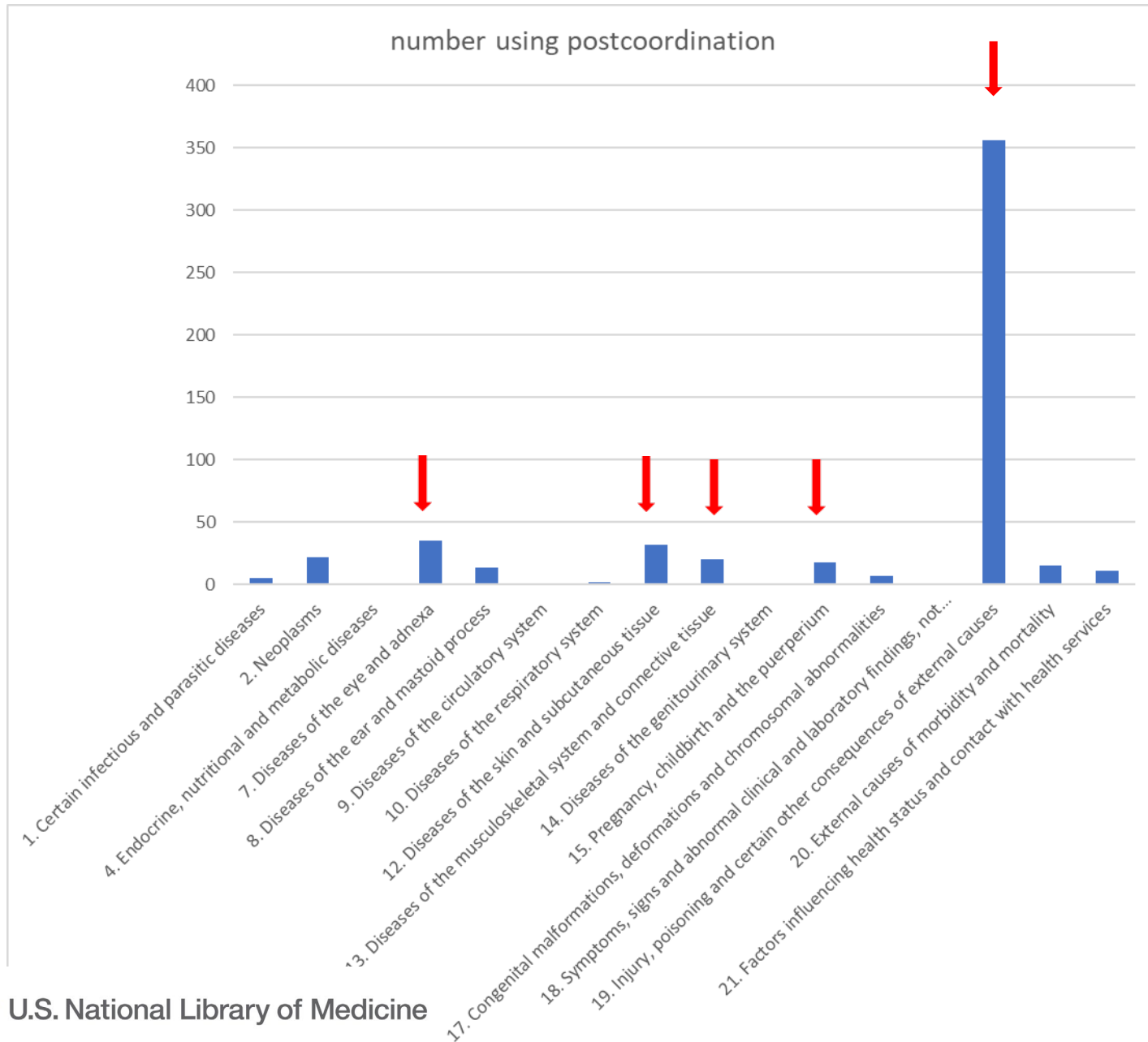
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## Use of postcoordination among frequently used codes



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# New extension codes

Extension code category	Example	Frequently used codes	Digestive disease codes	Combined
Anatomy and topography	fifth metatarsal bone	22(35.5%)	13(20.6%)	35(28%)
Health Devices, Equipment and Supplies	urinary catheter	18(29%)	0(0%)	18(14.4%)
Temporality	First trimester	12(19.4%)	0(0%)	12(9.6%)
Severity Scale Value	loss of teeth class I	7(11.3%)	50(79.4%)	57(45.6%)
Dimensions of injury	Complex tear meniscus	2(3.2%)	0(0%)	2(1.6%)
Dimensions of external causes	prolonged static or awkward postures	1(1.6%)	0(0%)	1(0.8%)
Total		62(100%)	63(100%)	125(100%)

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# New stem codes - examples

ICD-10-CM	Closest ICD-11
O36.80X0 Pregnancy with inconclusive fetal viability, not applicable or unspecified	JA86.Y Maternal care for other specified fetal problems
R41.82 Altered mental status, unspecified	MB21.Y Other specified symptoms and signs involving cognition
Z51.81 Encounter for therapeutic drug level monitoring	QB9Y Other specified contact with health services for nonsurgical interventions not involving devices
Z66 Do not resuscitate	QB0Y Other specified health care related circumstances influencing the episode of care without injury or harm
K63.4 Enteroptosis	DE2Y Other specified diseases of the digestive system
Z79.01 Long term (current) use of anticoagulants	QF4Y Other specified factors influencing health status or contact with health services



# Postcoordination can reduce number of new stem codes

- Some codes with similar pattern:
  - *Z79.01 Long term (current) use of anticoagulants*
  - *Z79.4 Long term (current) use of insulin*
  - *Z79.82 Long term (current) use of aspirin*
- No existing stem codes
  - Can't use *QC48.0 Personal history of long-term use of anticoagulants* because it lumps the meaning of
    - *Z79.- Long term (current) use* – current use
    - *Z92.- Personal history of medical treatment* - no longer current
- Only 1 new stem code needed, the drug can be added by postcoordination
  - (new stem code) *Long term (current) use of medicaments*, combine with
    - *XM17B1 Anticoagulant and antithrombotic enzymes*
    - *XM1DZ9 Insulin injection, soluble*
    - *XM4G06 Acetylsalicylic acid,*

# Postcoordination with other WHO-FIC classifications

- Further code parsimony if postcoordination can extend across WHO-FIC classifications e.g.,
  - *K94.30 Esophagostomy complications, unspecified*
  - *K95.09 Other complications of gastric band procedure*
- Can be represented by postcoordination with ICHI codes
  - ICD-11 stem code *PK80.3Z Gastrointestinal, abdominal, or abdominal wall procedure associated with injury or harm in therapeutic use, unspecified approach*, combine with ICHI codes
    - *KBA.LI.AA Oesophagostomy*
    - *KBF.LL.AB Laparoscopic gastroplasty* (inclusion: Laparoscopic gastric banding)

# Cardinality analysis

- Matches that are not 1→1 could present challenges
  - 1 ICD-10-CM → multiple ICD-11 codes
    - 36 (2.1%) codes
    - broad to narrow matches e.g., K56.2 Volvulus →
      - DA91.1 Volvulus of small intestine, 'OR'
      - DB30.1 Volvulus of large intestine
    - Not a big problem for backward compatibility with ICD-10-CM, because the multiple ICD-11 codes will roll up to the same ICD-10-CM code
  - multiple ICD-10-CM → 1 ICD-11 code
    - 59 (3.4%) codes
    - Can be problematic when translating ICD-11 codes back to ICD-10-CM
    - Can be subdivided into 3 categories

## Many-to-one matches

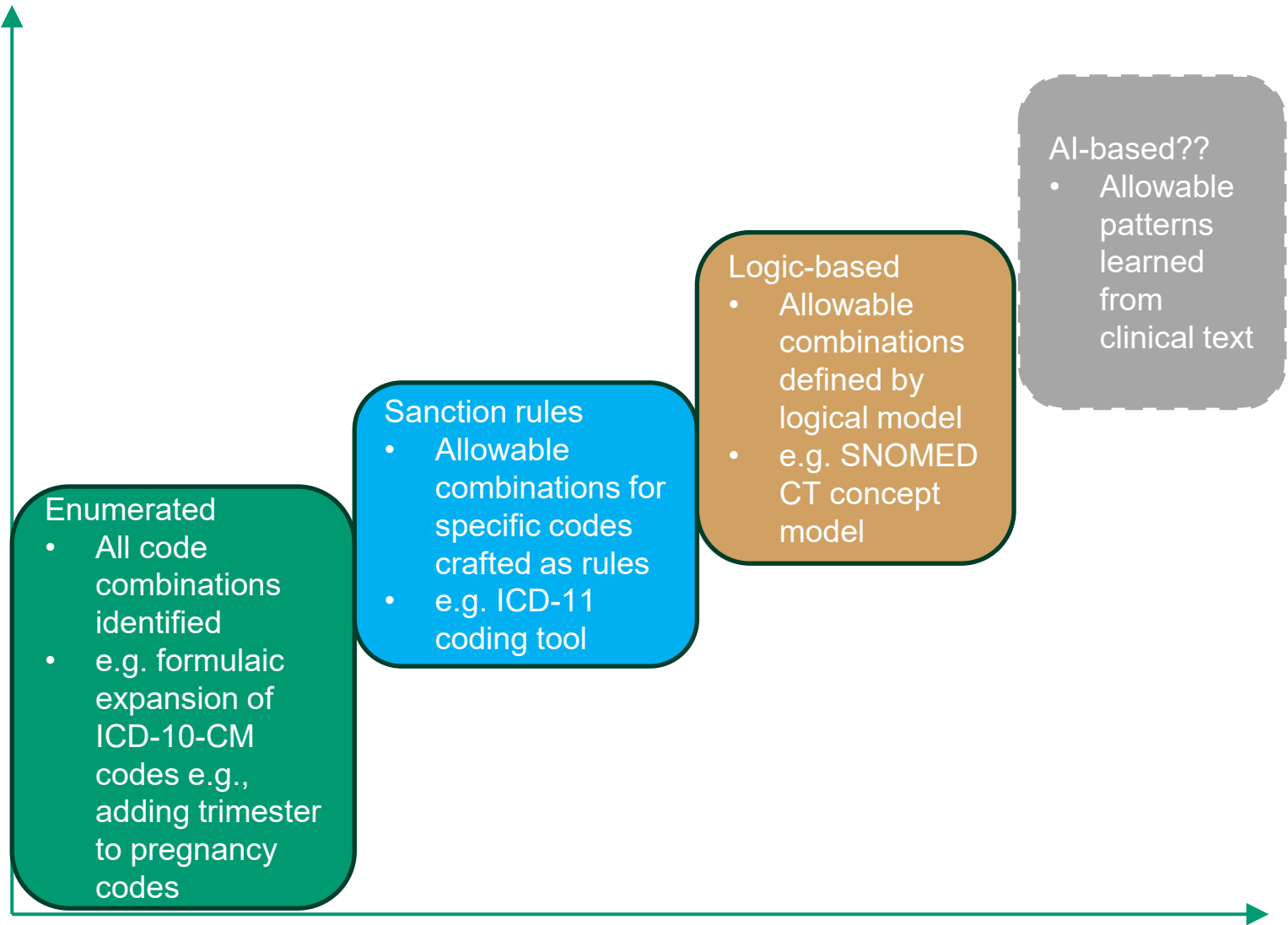
Type	ICD-10-CM	ICD-11
Residual categories	K12.30 Oral mucositis (ulcerative), unspecified K12.39 Other oral mucositis (ulcerative)	DA01.11 Oral mucositis
ICD-10-CM codes indistinguishable	K50.90 Crohn's disease, unspecified, without complications; K50.919 Crohn's disease, unspecified, with unspecified complications	DD70.Z Crohn disease, unspecified site
ICD-11 synonymy questionable	G47.30 Sleep apnea, unspecified; G47.33 Obstructive sleep apnea (adult) (pediatric)	7A41 Obstructive sleep apnoea (“synonymous” index term <i>sleep apnoea nos</i> )

# Discussion

- Our findings represent the best-case scenario of replacing ICD-10-CM with ICD-11 codes
- Prerequisites to achieve these results
  - Postcoordination can be used, otherwise coverage will reduce drastically (from 96.5% → 46.5%)
    - Impact on tooling, coder education and coding variability
    - Need to be compatible with messaging and other standards (e.g., HL7, FHIR, NCPDP)

## Approaches to implement postcoordination

Effort to  
implement



Expressivity

## Prerequisites (continued)

- Residual categories are made compatible – needs alignment of hierarchical structure and coding guidelines
- Coding guidelines are harmonized
  - Inclusions, exclusions and an index provide guidance to coders and delineate the boundaries of a code
  - In our previous study, we found 10% code matches are associated with potential conflicts in the coding guidelines, which may affect coding in specific situations
  - The most severe coding guideline conflict can render a code unmappable

# Unmappable code K56.41 Fecal impaction

- ▼ ⓘ K00-K95: Diseases of the digestive system (K00-K95)
- ▼ ⓘ K55-K64: Other diseases of intestines (K55-K64)
- ▼ ⓘ K56: Paralytic ileus and intestinal obstruction without hernia
- ▼ ⓘ K56.4: Other impaction of intestine
- ✍ ⓘ K56.41 : Fecal impaction

## Exclusion

- EXCLUDES1: constipation (K59.0-)
- EXCLUDES2: incomplete defecation (R15.0)

## Preferred

- Fecal impaction

ICD-11 for Mortality and Morbidity Statistics

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Proposals

Info

ME05.0 Constipation

- ME05.1 Diarrhoea
- ME05.Z Other and unspecified change in bowel habit

ME06 Chronic enteritis of uncertain aetiology

ME07 Faecal incontinence

ME08 Flatulence and related conditions

ME09 Rectal tenesmus

ME0A Visible peristalsis

ME0B Problems with defaecation, not otherwise specified

ME24.A3 Haematochezia

ME24.A1 Haemorrhage of anus and rectum

KB87.2 Meconium ileus without perforation

ME24.A4 Melaena

ME0Y Other specified symptoms related to the lower gastrointestinal tract or abdomen

ME10 Abnormalities related to hepatobiliary system

Foundation URI : <http://id.who.int/icd/entity/502284069>

**ME05.0 Constipation**

**Parent**  
ME05 Change in bowel habit  
[Show all ancestors](#)

**Description**  
Constipation is an acute or chronic condition in which bowel movements occur less often than usual or consist of hard, dry stools that are often painful or difficult to pass. Here constipation other than specifically described elsewhere, such as in motility disorders of intestine or in functional bowel diseases, is described.

**Inclusions**

- faecal impaction

**Exclusions**

- Functional constipation (DD91.1)
- Functional constipation of infants, toddlers or children (DD93)



# Limitations of our study

- Sample codes may not be generalizable to all diseases and settings
- Recoding was done by two terminologies and not externally validated
- Judgment of clinically acceptable postcoordination may be subjective

# Conclusion

- Using a U.S. linearization augmented by postcoordination, the existing content of ICD-11 can fully represent 89.4% of the ICD-10-CM codes examined in our study
- The remainder requires new extension or stem codes
- This stepwise strategy should be carefully considered before embarking on building a full-fledged ICD-11-CM





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*Thank you!*