Challenges, Opportunities, and Approaches in a Health KOS Vocabulary’s Revisions

Insights from ICD-11

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1. Introduction
ICD in the WHO Family of International Classifications (WHO FIC)

**RELATED Classifications**
- International Classification of Primary Care (ICPC)
- Technical aids for persons with disabilities – Classification and Terminology (ISO 9999)
- The Anatomical Therapeutic Chemical Classification System with Defined Daily Doses (ATC/DDD)
- International Classification for Nursing Practice (ICNP)
- Verbal autopsy standards: ascertaining and attributing causes of death tool

**REFERENCE Classifications**
- International Classification of Diseases (ICD)
- International Classification of Functioning, Disability and Health (ICF)
- International Classification of Health Interventions (ICHI)

**DERIVED Classifications**
- International Classification of Diseases for Oncology, 3rd Edition (ICD-O-3)
- ICD-10 Classification of Mental and Behavioral Disorders
- Application of the International Classification of Diseases to Neurology (ICD-NA)
- Application of the International Classification of Diseases to Dentistry and Stomatology (ICD-DA)
- The Start-Up Mortality List (ICD-10-SMoL)

Source: Generated based on the info on WHO FIC webpage [https://www.who.int/standards/classifications](https://www.who.int/standards/classifications)
ICD has been used World-wide

ICD-10 (Endorsed 1990, came into effect 1993-)

has promoted collaboration in
• collection
• production
• classification
• analysis
of global health data

-- allows for
• easy storage and retrieval of health information
• sharing of health information among hospitals, regions, and countries.

• Is available in 43 languages and used in over 100 countries
• Has more than two dozen modifications
• Several national clinical modifications of ICD-10 have been developed, with permission from the WHO.

https://icd.who.int/browse10/
ICD-11 has been used World-wide

ICD-11 (Endorsed 2019, came into effect 2022.)
- Available in Arabic, Chinese, English, French, & Spanish.
- Russian and 20 more languages are underway.
- [https://www.who.int/publications/m/item/icd-11-fact-sheet](https://www.who.int/publications/m/item/icd-11-fact-sheet)
Challenges

Situation:
A widely used standard health KOS needs to respond to
• all the essentials that come along with the health situations in the world
• the evolutions in treating health issues in the quickly-advancing digital age

Challenges:
A dramatic revision may need to adjust its
• contents
• structures
• coding systems
• use guidelines
This KOS must ensure the
• semantic interoperability
• data reusability
• community’s agreement

Emergency use ICD codes for COVID-19 disease outbreak

2. ICD Revisions
2-a). Timeline view, with titles of the revisions

2-b). Timeline view, with titles of the revisions, + the notation structures

Image source: Hong and Zeng. 2022. Figure 2 History of ICD Revisions.
2-c). Chapters of ICD-10 and ICD-11

Image source: Compiled with added chapter notes on Figure 3, Hong and Zeng. 2022.

ICD-10 Version:2019

ICD-11 for Mortality and Morbidity Statistics (Version : 02/2022)

Ch.03 & Ch 04: Split from a previous unified chapter III, distinguishing differences in etiology, manifestations, and care.

Ch.07 and Ch.17: Consolidate the more prominent topics since ICD-10

Ch.26: Extended to cover traditional medicine concepts

V: a "section"; aligned with International Classification of Functioning, Disability and Health (ICF)

X: an addendum chapter. When linked to a stem code representing a clinical state, the extension codes add significant detail and allow for multidimensional coding (including disease stage, severity, histopathology, medicaments, and anatomical details).
2d. ICD-11 code structure

For the details, read Hong & Zeng 2022. Section 4.2 Notation system / Code structure, with Figure 4.
3. ICD-11 Features
ICD-11 Highlights

• Legally mandated health data standard (WHO Constitution and Nomenclature Regulations).
• In effect from January 2022.
• Conceptual framework independent of language and culture.
• Integration of terminology and classification.
• End-to-end digital solution (API, tools, online and offline).
• Up-to-date scientific knowledge.
• Comparable statistics and semantic interoperability - for 150 years.
• ICD-11 is accessible to everybody.
• ICD-11 is distributed under Creative Commons Attribution-NoDerivs 3.0 IGO license.
• ICD-11 enables, for the first time, the counting of traditional medicine services and encounters.
• The 11th revision is more extensive and has greater implications for what can be done with the ICD, and how, than any revision since the 6th, in 1948.

Source: https://www.who.int/standards/classifications/classification-of-diseases
3-a). Having a framework beyond one classification

ICD-11's information framework components:
1) a semantic knowledge base (referred as the Foundation),
2) a biomedical ontology linked to the Foundation, and
3) classifications derived from the Foundation.

3-b). As a classification AND terminology

ICD purpose and uses

As a classification and terminology ICD-11:

- allows the systematic recording, analysis, interpretation and comparison of mortality and morbidity data collected in different countries or regions and at different times;
- ensures semantic interoperability and reusability of recorded data for the different use cases beyond mere health statistics, including decision support, resource allocation, reimbursement, guidelines and more.

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ICD-11 is combining the elements of classification and terminology and is designed to be linked to other terminologies that may provide additional detail or serve different purposes.

ICD-11 (entirely digital) contains
• around 17,000 unique codes,
• more than 120,000 codable terms

ICD-11’s smart coding algorithm interprets
• more than 1.6 million terms

3-c). Providing Foundation URIs

With the innovative use of the URIs, ICD-11 entities are fully language independent while having a specific place in a hierarchy of groups, categories, and narrower terms. Coding in ICD-11 can draw on statistical codes and on URIs (World Health Organization 2022. *ICD-11 Reference Guide* Sec. 1.1.2).

Source: Searching results captured from ICD-11
3-d). Delivering with an Implementation Package.

In addition to the ICD Browser, ICD-11 comes with an implementation package that includes
• an online coding tool
• an ICD-11 Implementation or Transition Guide
• an ICD-API that provides web services
to enable remote programmatic access to ICD-11, with enhanced capability to
• capture and combine clinically relevant characteristics of cases and
• integrated support for multiple languages.
ICD-11 Coding Tool
ICD-11 Reference Guide


ICD-11 Reference Guide

https://icd.who.int/icd11refguide/en/
Conclusion

The insights from ICD-11 reveal that:

- a revision of a KOS vocabulary could have unique methods of
  - embracing the digital technologies and
  - unifying the principal KOS approaches.

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Source: ICD webpage https://www.who.int/standards/classifications/classification-of-diseases

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Ref: Hong, Yi. & M. Zeng. 2022. “International Classification of Diseases (ICD)”.
ISKO Encyclopedia of Knowledge Organization (IEKO) https://www.isko.org/cyclo/icd
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