Table 4. Identified global semantic standards

| **Standard** | **Name** | **Organization** | **Domain** | **Type of Semantic Standard** | **Goal** |
| --- | --- | --- | --- | --- | --- |
| **LOINC ®** | Logical Observation Identifiers Names and Codes | Regenstrief Institute | Healthcare and research | Coding System | Universalcode system, identifying health measurements, observations, and documents. Represent the “question” for a test or measurement |
| **SNOMED CT** | Systematized Nomenclature of Medicine -Clinical Terms | SNOMED International | Healthcare and research | Terminology | Health(care) terminology, enables the consistent, processable representation of clinical content in electronic health records |
| **ATC** | Anatomical Therapeutic Chemical | WHO Collaborating Centre for Drug Statistics Methodology | Pharmacy | Classification | Classification of pharmacological substances in a hierarchical system with 5 levels, enables to monitor the use of medication and facilitates research on the topic of quality improvement of drug utilization |
| **ORPHA** | Orphanet Rare Disease Ontology | Orphanet and the EBI | Rare Diseases | Vocabulary | Structured vocabulary for rare diseases capturing relationships between diseases, genes and other relevant features which will form a useful resource for the computational analysis of rare diseases |
| **ICD-10** | International Statistical Classification of Diseases, 10th Version | World Health Organization (WHO) | Health | Classification | Classification, codes for diseases, signs and symptoms, abnormal findings, complaints, social circumstances, and external causes of injury or diseases. |
| **ICD-11** | International Classification of Diseases 11th Revision | World Health Organization (WHO) | Health | Classification | In force since January 2021, supports not only statistical purposes but also decision support, respect of guidelines, billing and resource allocation |
| **RxNorm** | - | National Library of Medicine (maintenance) | Pharmacy | Terminology | Pharmacy management and drug interaction software, normalized names for clinical drugs links its names to many of the drug vocabularies  ; US-specific terminolog |
| **RadLex ®** | - | Radiology Society of North America | radiology | Terminology | Unified language of radiology terms , for standardized indexing and retrieval of radiology information resources, It unifies and supplements other lexicons and standards, such as SNOMED-CT and DICOM, managed by the Radiological Society of North America |
| **MEDCIN** | - | maintained by Medicomp Systems | EHR | Terminology | Medical terminology developed as interface terminology and intended for use in Electronic Health Record systems; includes terms for symptoms, history, physical examination, tests, diagnoses and therapies |
| **NCIt** | National Cancer Institute Thesaurus | National Cancer Institute | Oncology | Terminology | Reference terminology and ontology providing concepts for clinical care, translational and basic research, and public information and administrative activities for National Cancer Institutes and other systems. |
| **MedDRA** | Medical Dictionary of Regulatory Activities | International Council for Harmonisation of Technical Requirements for Pharmaceuticals for Human Use (ICH) | Medical products (regulation) | Terminology | Medical terminology aiming to facilitate the international exchange of regulatory information related to medical products, including pharmaceuticals, biologics, vaccines and drug-device combination products. |
| **ICF** | International classification of functioning, disability and health | World Health Organization (WHO) | Health | Classification | Classification of health and health-related domain including environmental factors and enabling to measure health and disability at population and individual levels. |
| **OAE** | Ontology of Adverse Events | (Community-based) | Health | Ontology | Ontology aiming to standardize the annotation and integration of adverse events data and to facilitate computer-assisted reasoning |
| **HPO** | Human Phenotype Ontology | Monarch Initiative (NIH-supported project) | Genetics / Phenotypes | Ontology | Standardized vocabulary to describe phenotypic abnormalities in human diseases, developed based on medical literature, Orphanet, DECIPHER and OMIM. |
| **DCM** | DICOM Controlled Terminology | Medical Imaging Technology Association (MITA) - a division of the National Electrical Manufacturers Association | Radiology | Terminology | Controlled terms for DICOM |
| **MESH** | Medical Subject Headings | National Library of Medicine | Journal Articles | Vocabulary | Controlled vocabulary for indexing journal articles and books in the life sciences serving as a thesaurus facilitating search. Mesh includes the subject headings appearing in MEDLINE/pubmed, the NLM Catalog, and other NLM databases |
| **UMLS** | Unified Medical Language System | National Library of Medicine | Biomedical Information Services | Metathesaurus | UMLS integrates and distributes key terminology, classification and coding standards, and associated resources to promote creation of more effective and interoperable biomedical information systems and services, including electronic health records |
| **OBI** | Ontology for Biomedical Investigations | OBO Foundry | Biomedical Investigations | Ontology | Ontology that provides terms with precisely defined meanings to describe all aspects of how investigations in the biological and medical domains are conducted |
| **PICO** | Patient, Population or Problem / Intervention / Comparison / Outcome Ontology | Cochrane | Evidence-based health | Ontology | Model established by Cochrane to draft research questions, search strategies, and to describe studies or meta-analyses by gathering information on “Patient, Population or Problem”, “Intervention”, “Comparison” and “outcome”. Different vocabularies and terminologies have been specified to annotate the content. |
| **GO** | Gene Ontology | Gene Ontology Consortium | Biomedical | Ontology | Representation of the current state of knowledge of the biological domain with respect to the aspects "molecular function", "cellular component" and "biological process". |
| **ICHI** | International Classification of Health Interventions | World Health Organization (WHO) | Health | Classification | System of classifying procedure codes, good coverage of public health interventions, |
| **EMDN** | European Medical Device Nomenclature | Medical Device Coordination Group | Medical Devices | Nomenclature | The primary purpose of the EMDN is to support MDR and IVDR requirements |
| **UMDNS** | Universal Medical Device Nomenclature System | ECRI Institute | Medical Devices | Nomenclature | Facilitates identifying, processing, filing, storing, retrieving, transferring, and communicating data about medical devices |
| **GS1 DataMatrix** | - | GS1 | Pharmacy and Medical Devices | Coding System | Worldwide unique/unambiguous identification code/number ; GS1 datamatrix is mainly used in healthcare to identify medication, medicinal products or patients. |
| **GIVD** | Global In Vitro Diagnostic Product Classification | European Diagnostic Manufacturers Association (EDMA) | (In vitro diagnostic) Medical devices | Classification | Product classification to be used to code in vitro diagnostic medical devices. |
| **ICD-O** | International Classification of Diseases for Oncology | World Health Organization (WHO) | Oncology | Classification | Classification comprised of two axis (morphology and topography) and widely used by cancer registries. ICD-O is a domain-specific extension of ICD and its third revision is currently in use (ICD-O-3). |
| **UCUM** | Unified Code for Units of Measure | Regenstrief Institute and UCUM Organization | Sciences, Engineering and Business | Coding System | Units of measures used in international science, engineering and business, to facilitate unambiguous electronic communication of quantities together with their units ; Adopted by many organizations and included in the ISO 11240:2012 standard |
| **HGVS** | Human Genome Variation Society | Human Genome Organisation (HUGO) | Genetics / Phenotypes | Nomenclature | Nomenclature standard to describe any sequence variant (Mutation, polymorphism and pathogenic) |
| **DRG** | Diagnosis Related Groups | Defined by each country | medicare reimbursement | Classification | System to classify hospital cases (patients) into groups based on medical informations |
| **DUO** | GA4GH Data Use Ontology (DUO) | GA4GH | Healthcare and research (OMICS) | Classification | Classification that allows users to semantically tag genomic datasets with usage restrictions, allowing them to become automatically discoverable based on a health, clinical, or biomedical researcher’s authorization level or intended use. DUO is based on the OBO Foundry principles and developed using the W3C Web Ontology Language. It is being used in production by the European Genome-phenome Archive (EGA) at EMBL-EBI/CRG as well as the Broad Institute for the Data Use Oversight System (DUOS). |
| **CMO** | Clinical Measurement Ontology |  | Healthcare and research | Nomenclature | CMO is designed to be used to standardize morphological and physiological measurement records generated from clinical and model organism research and health programs. |
| **DOID** | Disease Ontology | University of Maryland School of Medicine | Healthcare and research | Nomenclature | Description of the classification of human diseases organized by etiology |
| **OMRSE** | Ontology of Medically Related Social Entities |  | Healthcare and research | Nomenclature | Covers the domain of social entities that are related to health care, such as demographic information (social entities for recording gender (but not sex) and marital status, for example) and the roles of various individuals and organizations (patient, hospital,etc.) |