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Health informatics — Categorical structures for representation of nursing practice in terminological systems

Informatique de santé — Structures catégorielles destinées à la représentation des pratiques de soins infirmiers dans les systèmes terminologiques

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO document should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

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This document was prepared by Technical Committee ISO/TC 215, *Health informatics*, in collaboration with the European Committee for Standardization (CEN) Technical Committee CEN/TC 251, *Health informatics*, in accordance with the Agreement on technical cooperation between ISO and CEN (Vienna Agreement).

This third edition cancels and replaces the second edition (ISO 18104:2014), which has been technically revised.

The main changes are as follows:

- more comprehensive representation of nursing practice;
- inclusion of nurse sensitive outcomes, its sub-categories representing known confounding variables and their relationship with the care process;
- inclusion of reference to ISO 13606-2 and openEHR RIM;
- inclusion of reference to ICNP into the SNOMED CT® terminology;
- representation of the nursing action 'Assessment' as an Observation which is represented as a sub-category of NursingAction;
- recognition of the collaborative roles of nurses (and midwives) with their subject of care to inform actions and assessments;
- inclusion of a goal/ expected outcome category;
- inclusion of a number of specified sub-categories enabling the differentiation between Nursing Actions and actions undertaken by others, as listed in a new category titled Outcome Causation;

- category definitions were reviewed and updated;
- definitions are provided for all new categories and sub-categories.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

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Introduction

Development of terminological systems to support nursing has been motivated by multiple factors including the need to:

- represent nursing concepts in electronic systems and communications, including systems that support multi-professional team communications and personal health records;
- analyse data about the nursing contribution to subject of care and outcomes — for quality improvement, research, resource and performance management, reimbursement, policy and other purposes;
- describe nursing in order to educate and inform students and others.

Multiple terminologies exist to support representation of concepts for healthcare purposes; some of these are relevant to the nursing domain. In the context of health informatics, there is a clear requirement for both domain coverage and for interoperability among computer-processable terminological systems that support nursing. These requirements are best represented by clinical information models. Nursing terminologies, or those parts of healthcare-related terminologies that are relevant to nursing, include concept representations for nursing assessments, a nursing action undertaken to determine a nursing diagnoses (judgements). Nursing diagnoses inform the need for further nursing actions. Collectively these concepts represent the provision of nursing services whilst nurse sensitive outcomes represent the result of health services, including nursing services, delivered at any point in time.

A nursing diagnosis is used as an indicator of nursing service demand. Nursing actions represent nursing service delivery components undertaken to meet the service demand. These concepts and the scope of nursing practice are further elaborated in [Annex A](#).

It was identified that nursing outcome definitions need to differentiate between conceptual, structural or contextual viewpoints. A conceptual definition recognises that nurse-sensitive subject of care outcomes are the result of a number of defining aspects. Nurse-sensitive health outcomes not only pertain to individuals but also to groups, families, local communities and the population at large. This is further elaborated in [Annex A](#).

Nursing practice is best represented by terminological systems pertaining to three key categories, 1) Nursing Diagnosis, 2) Nursing Actions and 3) Nurse Sensitive Outcomes. These concepts and the scope of nursing practice reflect the nursing process, they are further elaborated in [Annex A](#). The categories that make up the nursing practice domain are shown in [Figure A.1](#). Semantic links between categories are shown in [Figures 1, 2 and 3](#). As this document deals with populations and groups of individuals, as well as individual subjects of care, the definition of 'subject of care' does not conform with ISO 13940:2015.

Many of the categories and subcategories included in this document are equally applicable to other clinical disciplines. This categorial structure represents a common pattern for all types of clinical practices. The terminologies association with each of these categories and sub-categories are likely to differ to best represent each discipline's knowledge base and service protocols.

Topics considered outside the scope of this document include

- complete categorial structures that would cover all the potential details that could appear in expressions of nursing diagnoses, nursing actions and nurse sensitive outcomes,
- a detailed terminology of nursing diagnoses or nursing actions or nurse sensitive outcomes,
- a "state model" for nursing diagnoses or nursing actions or nurse sensitive outcomes — for example, provisional nursing diagnosis or absent nursing diagnosis, planned nursing action or nursing action not to be done — see [Annex A](#),
- nursing diagnoses made and nursing actions undertaken by nurses working in other professional roles — see [Annex A](#), and
- knowledge relationships such as causal relationships between concepts — see [Annex B](#).

NOTE 1 Throughout the main body of this document, where terms such as nursing diagnosis, nursing action and nurse sensitive outcome are used, these refer to representation of these concepts in electronic systems, not to the professional activity of making a diagnosis or performing an action or determining their relationship with nurse sensitive outcomes.

This document is applicable to the following user groups:

- developers of terminologies that include nursing diagnosis, nursing action and nurse sensitive outcome concepts;
- developers of categorial structures and terminologies for other healthcare domains, to support clarification of a relationship to or overlap with nursing concepts;
- developers of models for health information management systems such as electronic health records and decision support systems, to describe the expected content of terminological value domains for particular sub-categories and data elements in the information models, including archetypes or templates^[45];
- developers of information systems, including electronic health/medical records, that require an explicit system of concepts for internal organization, data repository management or middleware services;
- developers of software for natural language processing, to facilitate harmonization of their output with coding systems.

It is not intended for use by clinical nurses without health informatics expertise. However, [Annex B](#) provides an introduction to categorial structures to assist those without health informatics expertise to contribute to its development, review, implementation and evaluation.

NOTE 2 Although the scope of testing and review of the first edition of this document has been limited to nursing, the three categorial structures have features in common with the more general framework for clinical findings [ISO/TS 22789, the domain-specific categorial structure for surgical procedures (ISO 1828),^[20] ISO 13940 as well as with the WHO ICHI.^[2]] This document can therefore inform development of other general and domain-specific categorial structures in healthcare.

Health informatics — Categorial structures for representation of nursing practice in terminological systems

1 Scope

This document specifies the characteristics of categorial structures, representing nursing practice. The overall aim of this document is to support interoperability in the exchange of meaningful information between information systems in respect of nursing diagnoses, nursing actions and nurse sensitive outcomes. Categorial structures for nursing diagnoses, nursing actions, nurse sensitive outcomes and associated categories support interoperability by providing common frameworks with which to

- a) analyse the features of different terminologies, including pre- and post-coordinated expressions, those of other healthcare disciplines, and to establish the nature of the relationship between them,^{[3][4][5][6][7][8]}
- b) develop terminologies for representing nursing diagnoses, nursing actions,^{[9][10][11][12]} and nurse sensitive outcomes,
- c) develop terminologies that are able to be related to each other,^{[3][8][13]} and
- d) establish relationships between terminology models, information models, including archetypes, and ontologies in the nursing domain.^{[14][15][16][45]}

There is early evidence that the categorial structures can be used as a framework for analysing nursing practice,^[17] for developing nursing content of electronic record systems,^{[18][19]} document the value of nursing services provided and to make nursing's contribution visible^{[16][36][47][50]}.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 17115, *Health informatics — Representation of categorial structures of terminology (CatStructure)*

ISO/TS 22789, *Health informatics — Conceptual framework for patient findings and problems in terminologies*

EN 12264, *Health informatics — Categorial structures for systems of concepts*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

- ISO Online browsing platform: available at <https://www.iso.org/obp>
- IEC Electropedia: available at <https://www.electropedia.org/>

3.1 General terms

3.1.1

concept

subset of knowledge constructed through combining *characteristic* (3.1.4)

Note 1 to entry: A concept can have one or more names. It can be represented using one or more terms, pictures, icons or sounds.

3.1.2

categorial structure

minimal set of *domain constraints* (3.1.5) for representing concept systems in a precise domain to achieve a precise *goal* (3.2.3)

Note 1 to entry: [Annex B](#) provides further explanation.

[SOURCE: ISO 17115:2020, 3.1.1 modified — “subject field” replaced by “precise domain to achieve a precise goal”.]

3.1.3

category

division of sets of *entities* (3.1.6) regarded as having particular shared *characteristics* (3.1.4)

EXAMPLE 1 Parenteral route is more general than intravenous route.

EXAMPLE 2 ‘target’ (3.4.2) isA ‘site’ (3.3.3) which has attributes.

Note 1 to entry: Categories can be more or less general and include groups of individual subject of cares or carers. Where one category is subsumed by another, the isA relation is asserted to obtain a hierarchy between the more specific or subsumed category (sub-category) and the more general or subsuming category.

Note 2 to entry: Each *entity* (3.1.6) instantiates some category.

3.1.4

characteristic

abstraction of a property

EXAMPLE Fever is a characteristic symptom of flu.

Note 1 to entry: Characteristics are used for describing *concepts* (3.1.1) and for differentiating *category* (3.1.3).

3.1.5

domain constraint

rule prescribing the set of *sanctioned characteristics* (3.1.8) that are valid to specialize a concept representation in a subject field

EXAMPLE ‘Administration of drug’ hasRoute ‘subcutaneous’ is used to describe the fact that drugs can be administered subcutaneously in the specific context that the terminology applies to.

Note 1 to entry: Different levels of sanctioning are possible, e.g. conceivable, sensible, usually in the context of, normal, necessary.

3.1.6

entity

concept (3.1.1) represented as a diagrammatic grouping of a concrete or abstract thing of interest

EXAMPLE As shown in a relational database entity-relationship diagram.

3.1.7**representation relation**

semantic link

formal representation of a directed associative relation or partitive relation between two *concepts* (3.1.1)

EXAMPLE hasFocus; actsOn.

Note 1 to entry: a *representation relation* (3.1.7) always has an inverse, i.e. another representation relation with the opposite direction. The inverse may or may not be explicitly stated. For example, isFocusOf (inverse of hasFocus); isTargetOf (inverse of actsOn).

3.1.8**sanctioned characteristic**

formal representation of a type of *characteristic* (3.1.4)

EXAMPLE hasFocus symptom; hasSite altered structure.

3.1.9**terminological system**

structured human and machine-readable representation of clinical *concepts* (3.1.1) required directly or indirectly to describe health conditions and healthcare activities, and allow their subsequent retrieval or analysis

3.1.10**attribute**

piece of information which determines the properties of a field or tag in a database

Note 1 to entry: Attributes may be represented by a terminology.

3.1.11**qualifier**

limits or modifies the meaning of the category to which this belongs

3.1.12**information model**

model that expresses in a standardized and reusable manner one or more healthcare or clinical concepts and their context in a conceptual and logical model, specifying healthcare information as a discrete set of data elements, their characteristics and relationships, and appropriate terminology bindings

[SOURCE: ISO 13972:2022, 3.1.13, modified]

3.1.13**nurse**

specially trained individual who provides autonomous, collaborative and holistic healthcare for the subject of care, carers and significant others in response to their health, behavioural, social and physical situation at a point in time

Note 1 to entry: The subject of care may include individuals or all ages, families, groups and communities, sick or well in any healthcare setting in accordance with their scope of practice.

Note 2 to entry: Nursing includes midwives and obstetric care and other specialist services provided in a nursing context.

Note 3 to entry: Nurses provide support and comfort to subjects of care, carers and significant others in response to health services received including treatment received.

3.1.14**significant other**

friends, partners and family with close relationship to the subject of care

3.2 Categories of healthcare entities for nursing diagnoses

3.2.1

observation

assessment of the status of a *subject of care* (3.2.2)

Note 1 to entry: It is a sub-category of *nursing action* (3.4.1).

Note 2 to entry: Assessment includes one or a combination of a measurement, evaluation or judgment that relates to a variable pertaining to the status of a *subject of care* (3.2.2).

Note 3 to entry: Observation sub-category that are valid for representation of a type of assessment or activity, including a *nursing diagnosis* (3.2.7), include, but are not limited to *measure* (3.3.12), *status* (3.3.13), *site* (3.3.3), *information from subject of care/carer* (3.3.14) and from other care providers.

3.2.2

subject of care

one or more persons scheduled to receive, receiving, or having received a health service

Note 1 to entry: Subject of care *category* (3.1.3) valid for representation of a type of assessment or activity, including *nursing diagnosis* (3.2.7), are subjected to associated individuals, e.g. personal carer, or subject of care preferences and event objectives.

Note 2 to entry: Includes individuals, family, community or population groups.

3.2.3

goal

specified outcome or condition to be achieved in the process of *subject of care* (3.2.2) care

Note 1 to entry: Its sub-categories are *focus of goal* (3.3.7) and *target timeframe* (3.3.6).

3.2.4

event objective

determines data differentiation from other data required for a different user or use case

Note 1 to entry: Its sub-category is the *use case type* (3.3.8).

3.2.5

associated individual

person of significance to the *subject of care* (3.2.2)

Note 1 to entry: Its *attribute* (3.1.10) is the relationship to the *subject of care* (3.2.2).

3.2.6

choice

subject of care (3.2.2) preferred treatment or care option

3.2.7

nursing diagnosis

result of a nursing assessment following a *nursing action* (3.4.1)

Note 1 to entry: This result is used to inform *nursing service delivery method* (3.5.1) requirements at the point of care or *nurse sensitive outcome* (3.6.1) at a subsequent point in time.

Note 2 to entry: A nursing diagnosis is a label assigned to a judgement based on an assessment finding, event, situation or other health issue to indicate that it is considered to be noteworthy by the nurse and where possible, the subject of care.

3.3 Sub-categories of healthcare entities applicable to a clinical assessment including nursing diagnoses

3.3.1

clinical course

characteristic (3.1.4) of the evolution of the health state over time in conjunction with medical treatment

EXAMPLE Acute, chronic, sudden.

Note 1 to entry: See [Annex A](#) for discussion of clinical course.

Note 2 to entry: Does not include time related expressions [see *timing* (3.5.6)].

Note 3 to entry: Refers to the individual's response to medical treatment as observed at any point in time.

3.3.2

severity

degree of seriousness of *clinical finding* (3.7.1) or intensity

EXAMPLE Mild, moderate, severe.

Note 1 to entry: A number of scoring systems are in use to take into account factors that influence type and *timing* (3.5.6) of *nursing action* (3.4.1) to be taken and their outcomes. Their use enables comparisons to be made between *subject of care* (3.2.2).

3.3.3

site

anatomical structure

Note 1 to entry: Site *category* (3.1.3) that are valid for expressions of *nursing diagnoses* (3.2.7) are body component, and altered structure (e.g. a wound).

3.3.4

related event

occurrence that can be considered as a symptom or a cause when correlated with a *nursing diagnosis* (3.2.7)

Note 1 to entry: Events include an adversity such as post-operative infection, a fall, drug administration error or another incident.

3.3.5

identifier

unique object, token, code or set of variables that differentiates between individual *subjects of care* (3.2.2)

3.3.6

target timeframe

date/time of desired goal attainment of a change in, or termination of a *nursing diagnosis* (3.2.7) at a subsequent point in time

EXAMPLE Desired discharge date.

3.3.7

focus of goal

area of attention

EXAMPLE Tissue integrity, body temperature, activity of daily living.

Note 1 to entry: Focus may be qualified by *site* (3.3.3), and *measure* (3.3.12) for example, movement of leg, tissue integrity of left heel.