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Health informatics — Categorial 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

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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.

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.

3.3.8
use case type
usage scenario used in system analysis to identify, clarify and organize data retrieval to suit a specific purpose

EXAMPLE *Measure* (3.3.12) operational effectiveness, *clinical findings* (3.7.1) relative to treatment/care options, identify impact of nursing skill mix allocation.

Note 1 to entry: Measure the cause of a type of *nurse sensitive outcome* (3.6.1) to generate new knowledge for one of many purposes to be used to improve an operational activity.

3.3.9
relationship to subject of care
way in which or purpose of another individual to be connected to the *subject of care* (3.2.2)

Note 1 to entry: This may be one or many of the following formal or informal connections, social, legal, financial, practical, family to share with or meet the needs of a subject of care.

3.3.10
allergy
damaging immune response by the body to one or many substances

Note 1 to entry: A known likely physiological response to a medication or material such latex or wool or food substance.

Note 2 to entry: Shall be differentiated from *diet intolerance* (3.3.11).

3.3.11
diet intolerance
difficulty digesting certain foods known to result in one or more damaging immune responses by the body to one or more substances

3.3.12
measure
quantified size, amount, value or degree of (something) observed by using an instrument or device marked in standard units

EXAMPLE Apgar score, pain scale.

Note 1 to entry: This includes qualitative *observation* (3.2.1) converted by using a standard scale.

Note 2 to entry: May be documented as an evaluative statement.

3.3.13
status
situation at a particular point in time during a process

Note 1 to entry: *Observation* (3.2.1) that form part of an assessment process, including potential of risk.

3.3.14
information from subject of care/carer
contributions provided by the subject of care and/or significant other

3.4 Categories of healthcare entities for NursingActions not previously specified

3.4.1
NursingAction
activity intended directly or indirectly to improve or maintain a health state

EXAMPLE Injection, teaching, dressing, removal.

Note 1 to entry: Includes assessments made to specify a Nursing Diagnosis as represented by observatory activities.

Note 2 to entry: Includes assessment, evaluation and planning actions as well as those that include the actions of "caring for", "administration", "feeding", "performance".

Note 3 to entry: A nursing diagnosis is a label for the result of an action (*observation* (3.2.1) performed by or under the direction of a nurse, with the intention of directly or indirectly improving or maintaining the health and well being of a person, group or population, the precise scope of nursing actions being delineated in each jurisdiction.

3.4.2
target
entity (3.1.6) that is affected by the *nursing action* (3.4.1) or that provides the content of the nursing action

EXAMPLE 1 Entity affected by the Nursing Action: Wound, foreign body or insulin: as in debridement of wound, removal of foreign body, injection of insulin.

EXAMPLE 2 Entity that provides the content of the Nursing Action: Vital signs or diabetes self care*:* as in assessment of vital signs, diabetes self care education.

Note 1 to entry: *Category* (3.1.3) that are valid for expressions of *target* (3.4.2) are body component, device, substance, resource, process, physical environment, individual, group, *clinical finding* (3.7.1), and other categories that have the role of focus in the *nursing diagnosis* (3.2.7) categorial structure. A nursing diagnosis can also be the target of a *nursing action* (3.4.1).

3.5 Sub-categories of healthcare entities for Nursing Actions and its sub-categories not previously specified.

3.5.1
service delivery method
ways nursing values and human resources are used to care for and treat *subject of care* (3.2.2)

EXAMPLE Methods commonly referred to as team nursing, subject of care allocation, task allocation, primary care, mobile care, total/special care.

3.5.2
action type
observatory or behavioural or physical or social or educational activity undertaken by one or more actor

Note 1 to entry: *Nursing action* (3.4.1) are also known as nursing interventions which may be specified within a nursing terminology.

3.5.3
action frequency
number of repeating occurrences of a *nursing action* (3.4.1)

3.5.4
technique
way of undertaking a particular task

3.5.5
tool used
piece of equipment or device used to support a *nursing action* (3.4.1)

EXAMPLE Toilet chair, lifting machine, electronic monitor, disposable vs recyclable items, automatic blood pressure monitor, EMR system.

3.5.6
timing
choice, request, order or control of when an action must be and/or is undertaken

3.5.7
location
place, position, point, spot or area targeted for a *nursing action* (3.4.1)

Note 1 to entry: Place refers to physical location.

3.5.8
record
semantically indivisible clinical statement which can be structurally large or small, but which loses meaning if broken up

Note 1 to entry: An indivisible clinical statement represents a piece of evidence recorded in the record.

3.6 Categories of healthcare entities for Nurse Sensitive Outcomes

3.6.1
nurse sensitive outcome
state observed and/or measured directly or indirectly concerning a *subject of care* (3.2.2) and their relationship with the environment at a point in time and documented to suit a use case

Note 1 to entry: For instance, to assess the performance of a method or service delivery process associated with a *nursing action* (3.4.1) or an organization or *subject of care* (3.2.2).

Note 2 to entry: A single descriptor (e.g. anxiety, pain) can serve the role of the sub-category, *focus of goal* (3.3.7) *target timeframe* (3.3.6) and *clinical finding* (3.7.1). Such clinical finding expressions are also valid for the representation of a type of assessment, including a *nursing diagnosis* (3.2.7).

Note 3 to entry: Measures include the application of a standard or indicators making use of one or more dimensions of performance, such as timeliness or availability.

Note 4 to entry: Result of *observation* (3.2.1) made pertaining to a set of processes associated with the delivery of health and nursing services, as determined by *nursing action* (3.4.1) taken and influenced by one or more of the *outcome causation* (3.6.2) sub-categories

Note 5 to entry: The health outcome status referred to here is within the context of admission health status, one or many causations, social determinants of health and other environmental factors associated with the *subject of care* (3.2.2) relevant to a specified time period.

Note 6 to entry: The correct manner is determined by the current state of knowledge, to achieve the desired or projected outcome for the *subject of care* (3.2.2).

Note 7 to entry: A *nurse sensitive outcome* (3.6.1) is a label assigned to the status of a *nursing diagnosis* (3.2.7) at points of time after one or more *nursing action* (3.4.1) which may be referred to as interventions by a terminological system in use.

Note 8 to entry: A *nurse sensitive outcome* (3.6.1) identifies the extent of change in a finding or nursing diagnosis or the achievement of goals/expected outcomes or the value of nursing services delivered, including modifications made due to the constraints that were outside the control of the nursing service provided.

3.6.2
outcome causation
way by which one of its sub-categories were demonstrated to have contributed to (causality) necessary modifications of one of the action category's attributes resulting in the *nurse sensitive outcome* (3.6.1)

EXAMPLE Inability to take a risk mitigation action due to non-availability of equipment or device.

3.7 Sub-categories of healthcare entities for nurse sensitive outcomes

3.7.1
clinical finding
clinical assessment, including a *nursing diagnosis* (3.2.7), resulting from assessment *observation* (3.2.1) made

Note 1 to entry: This is data that includes measured or observed results relative to provider and/or recipient(s) desired or projected outcome *goal* (3.2.3), actual outcome state at a point in time.

Note 2 to entry: Includes a clinical (evaluative statement) reported outcome: Assessment of *subject of care* (3.2.2) outcomes made by a clinician. These outcomes are usually based on objective or subjective data evaluated by the clinician.

Note 3 to entry: Can be qualified by *site* (3.3.3), and *measure* (3.3.12) for example, movement of leg, tissue integrity of left heel, size of wound.

3.7.2
medical diagnosis
determination of which disease or condition explains a person's signs and symptoms

Note 1 to entry: Provisional diagnosis may change during the episode of care and may be coded based on the ICD terminology.

3.7.3
treatment impact
causal effect of the chosen set of all clinical actions (treatment) undertaken by teams of health professionals on an outcome

Note 1 to entry: Treatment options usually have evidence-based protocols or clinical guidelines.

3.7.4
confounding factor
third variable that might have contributed to the primary cause and effect relationship

EXAMPLE Language difficulties, religious or cultural beliefs, resistance to adopt recommended actions.

3.7.5
supply availability
provision of necessary, surgical, linen, nutritional or medication supplies at the time and location when required to support an action

3.7.6
local environment
prevailing circumstances, locality and setting that support or hinder *nursingActions* (3.4.1) to be taken

EXAMPLE 1 Subject of care falls in bathroom, physical boundaries limit use of lifting machine or optimal lifting technique.

EXAMPLE 2 Non availability of negative air pressure, single room with or without ensuite, airflow, isolation unit, a hospital department or community setting, translation service, subject of care's family member(s) behaviour.

EXAMPLE 3 Information system downtime.

Note 1 to entry: Environment refers to physical, social and/or cultural phenomena, including medical dominance, organizational culture, entity specific ethical, philosophical or moral determinants.

Note 2 to entry: This also includes social determinants.

3.7.7
scheduling issues
match between required additional services and *subject of care* (3.2.2) needs

Note 1 to entry: Human resources and specialist services, such as a diagnostic test or specialist treatment option availability. Non-availability when required influences *nursing action* (3.4.1).

3.7.8
tool availability
provision of desirable or necessary equipment or devices required to support action

Note 1 to entry: Tools include lifting machines, alternating pressure mattresses, IV pumps, monitors.

3.7.9
risk minimization
initiatives taken or omitted to be taken as strategies to positively influence *subject of care* (3.2.2) or provider actions known to minimize or prevent harm

Note 1 to entry: Many *nursing action* (3.4.1) are designed to prevent harm based on known evidence-based risk minimization actions documented in, for example, procedure manuals.

Note 2 to entry: A risk is a potential for a negative diagnosis, an opportunity (or chance) is a potential for a positive diagnosis.

3.7.10
healthcare provider
person or organization who is involved in, or associated with, or has the responsibility for the delivery of healthcare to a client, *subject of care* (3.2.2) or caring for client wellbeing

3.7.11
human resource management
coordinated activity by organisational care provider to realize value from its human resource assets

Note 1 to entry: Nurses have variable specialist qualifications and experience (skill mix) which need to be matched with service demand in terms of number of nurses, their collective capacity and registered scope of practice. Care teams also rely on the availability of various non-nursing support services, such as porters, cleaners.

3.7.12
self-care behaviour
decisions and actions taken by the *subject of care* (3.2.2) who is, has been or will be the recipient of care services or by their *associated individual* (3.2.5)

3.7.13
social determinant
condition relative to the environments where people are born, live, learn, work, play, worship, and age that affect a wide range of health, functioning, and quality-of-life outcomes and risks

EXAMPLE Homelessness, living with food insecurity, low income, air pollution, drinking water quality.

4 Semantic links

4.1 'Representation relation' to 'Nursing Diagnosis'

4.1.1 Applied to

Nursing Diagnoses, known as a component of the nursing process that represents nursing practice.

It expresses the semantic links between 'nursing diagnosis' (see 3.2.7), which is the result of a 'observation' (see 3.2.1) followed by one or many 'nursing action' (see 3.4.1) influenced by 'outcome

causation' (see 3.6.2), resulting in 'nurse sensitive outcome' (see 3.6.1). representing a new result following a 'observation' (see 3.2.1) at a different point in time, as shown in Figure 1.

4.1.2 Located in

A relation between independent concepts, the 'event objective' (see 3.2.4) category, or 'focus of goal' (see 3.3.7) including its sub-category, and the 'nurse sensitive outcome' (see 3.6.1) category.

It expresses the semantic link as determined by the 'use case type' (see 3.3.8), when using aggregated data, or the 'focus of goal' (see 3.3.7) when applied at the point of care. Both categories relate to the purpose of determining 'nurse sensitive outcome' (see 3.6.1) relative to a 'subject of care' (see 3.2.2) at a point in time.

The value of determining a 'nurse sensitive outcome' (see 3.6.1) needs to consider contributing factors [outcome causation (see 3.6.2)] that are outside the control of nurses or midwives but have a semantic link.

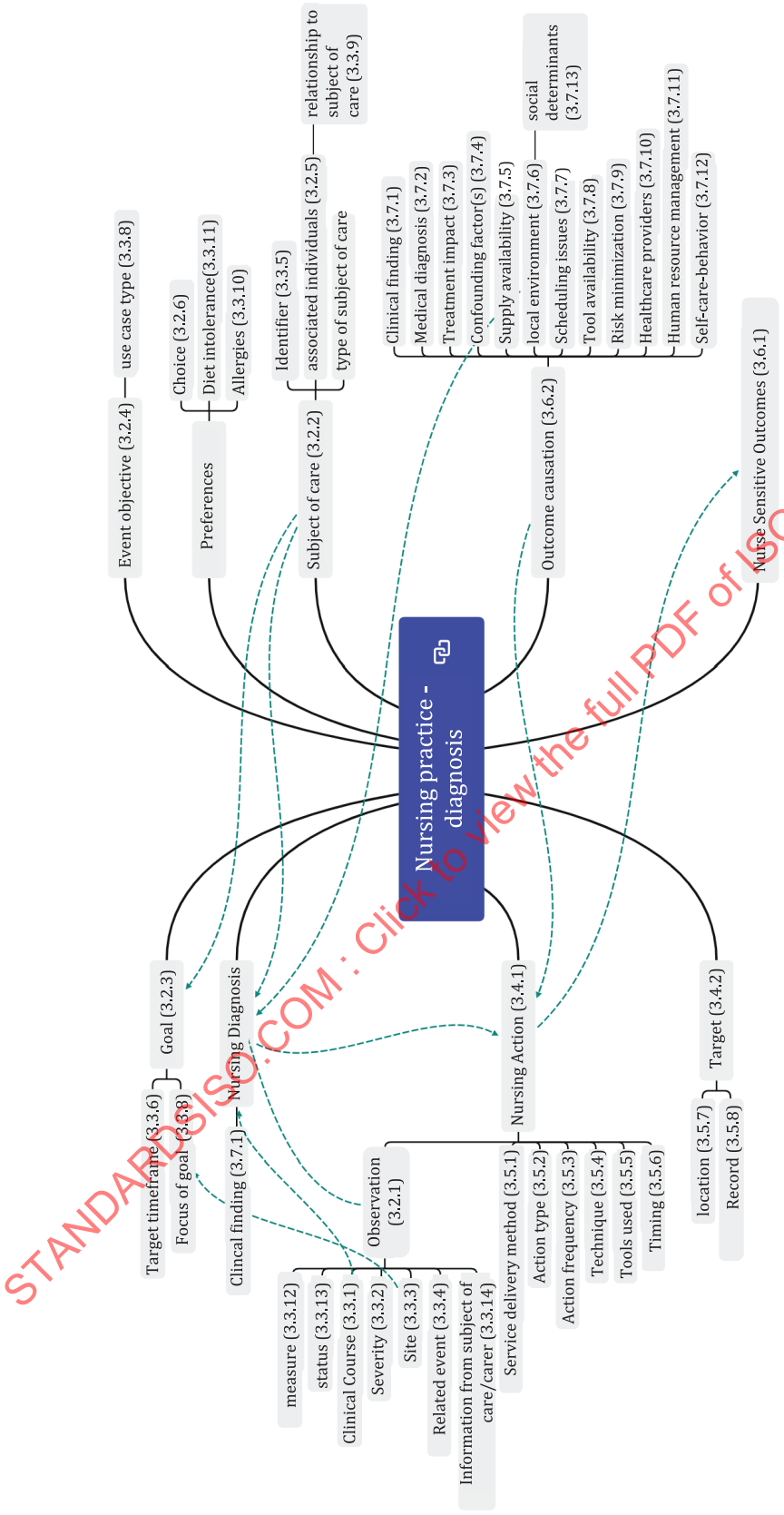


Figure 1 — Mindmap representing the relations for nursing diagnosis, including its sub-categories and their attributes

NOTE Inverse representation relation for 'hasX' is 'isXFor' unless otherwise noted.

4.2 'Representation relation' to 'nursing action'

4.2.1 Nursing Action

Another component of the nursing process that represents nursing practice.

It expresses the semantic links between 'nursing action' (see 3.4.1), its 'subject of care' (see 3.2.2), 'target' (see 3.5.2) and 'nurse sensitive outcome' (see 3.6.1) as shown in Figure 2.

Note 1 to entry The nursing action indicates if its target is referenced or acted on.

EXAMPLE 1 Documentation of 'observation' (see 3.2.1) result into the 'record' (see 3.5.8). — action documentation actsOn record.

EXAMPLE 2 Removal of wound dressing — action removal actsOn wound dressing.

EXAMPLE 3 Parent education about weaning diet — action education actsOn weaning diet for 'subject of care' (see 3.2.2).

Note 2 to entry isTargetOf is the inverse 'representation relation' (see 3.1.7) of actsOn.

4.2.2 ActsOn Subject ofCare

'domain constraint' (see 3.1.5) between the 'nursing action' (see 3.4.1) and the 'subject of care' (see 3.2.2) category.

4.2.3 ActsOn Nurse Sensitive Outcome

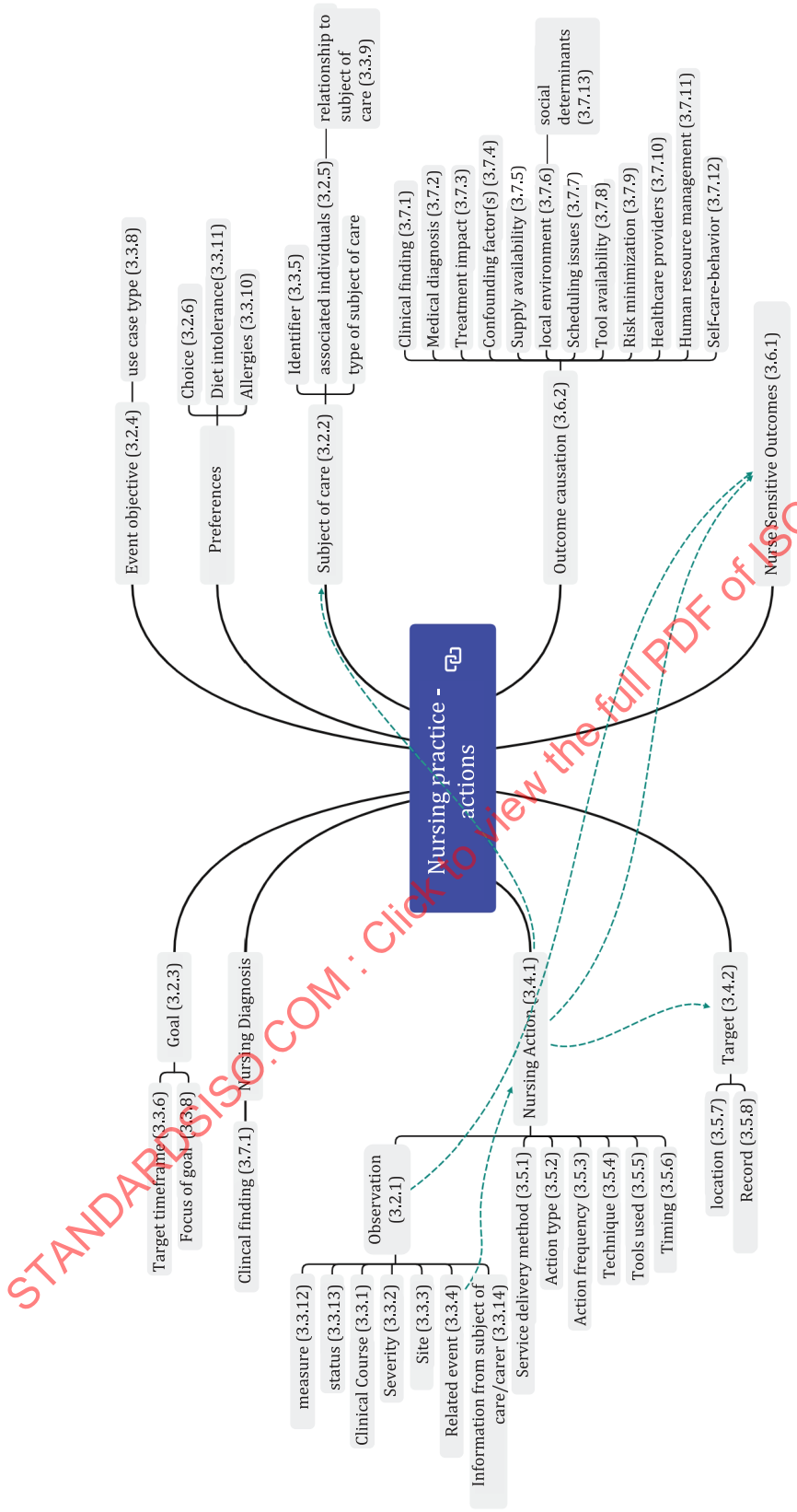
'domain constraint' (see 3.1.5) between the 'nursing action' (see 3.4.1) and the 'nurse sensitive outcome' (see 3.6.1) category and one or more of its sub-categories.

4.2.4 ActsOn Site

'domain constraint' (see 3.1.5) between the 'nursing action' (see 3.4.1) and 'Site' (see 3.3.3) sub-category of the 'Target' (see 3.4.2) category.

4.2.5 InfluencesNursing Action

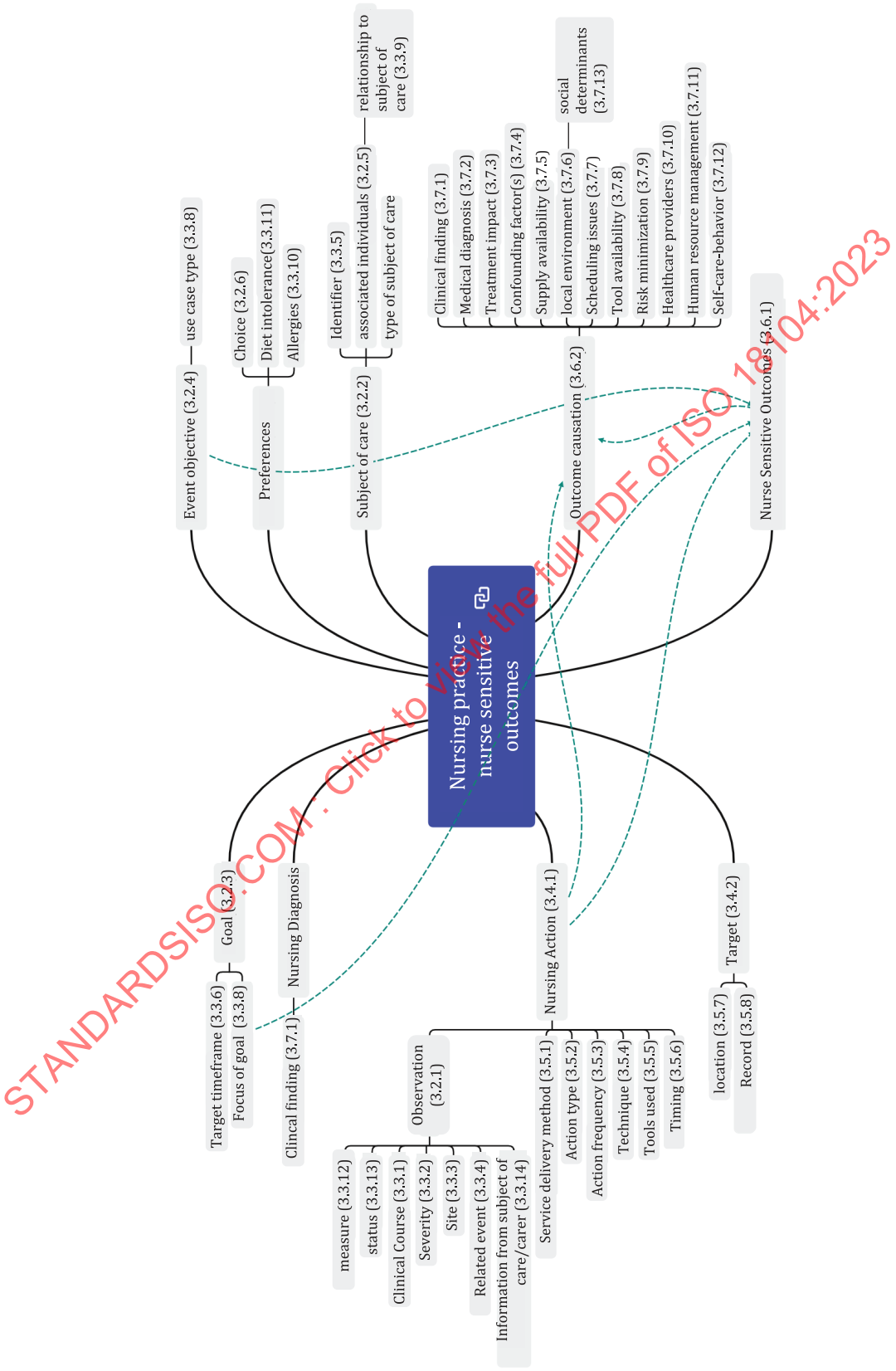
'domain constraint' (3.1.5) between the 'subject of care' (3.2.2) and action categories, one or more of its sub-categories and/or one or more of outcome causation sub-categories.



NOTE Inverse representation relation for 'hasX' is 'isXFor' unless otherwise noted.

Figure 2 — Mindmap representing relations for NursingActions, including its sub-categories and their attributes

4.3 List of domain constraints for nurse sensitive outcome, including its sub-categories and their attributes



NOTE Inverse representation relation for 'hasX' is 'isXFor' unless otherwise noted.

Figure 3 — Mindmap representing relations for the nurse sensitive outcomes category and its

sub-categories

4.3.1 isaNurse Sensitive Outcome

'domain constraint' (see 3.1.5) between the 'nursing diagnosis (see 3.2.7) and 'nursing action' (see 3.4.1).

EXAMPLE Sub-category Clinical Course: Risk for infection — hasNurse SensitiveOutcome infection.

4.3.2 hasFocus

'domain constraint' (see 3.1.5) between the 'nursing diagnosis' (see 3.2.7) and the 'goal' (see 3.2.3).

EXAMPLE Excessive calorie intake — hasFocus calorie intake, hasMeasure weight loss.

4.3.3 hasGoal

'domain constraint (see 3.1.5) between the 'nursing diagnosis' (see 3.2.7) and one sub-category of 'goal' (see 3.2.3).

4.3.4 hasClinicalCourse

'domain constraint' (see 3.1.5) between the 'nursing diagnosis' (see 3.2.7) and the sub-category 'clinical course' (see 3.3.1).

EXAMPLE In the expression sudden reduction in body weight, the nursing diagnosis reduction in body weight hasClinicalCourse sudden onset.

4.3.5 hasSeverity

'domain constraint' (see 3.1.5) between the nursing diagnosis and the sub-category 'severity' (see 3.3.2).

EXAMPLE Severe pain — hasClinical Finding pain, hasSeverity severe.

4.3.6 hasSite

'domain constraint' (see 3.1.5) referring to the anatomical structure that further specifies the position of a focus.

EXAMPLE 1 Reduced movement of arm — hasFocus of 'goal' (see 3.2.3) movement, hasSite arm, hasMeasure reduced.

'domain constraint' (see 3.1.5) between the categories 'target' (see 3.4.2) and 'site' (see 3.3.3).

EXAMPLE 2 Removal of wound dressing — action removal actsOn dressing hasSite wound.

NOTE In the categorial structure for 'nursing action' (see 3.4.1), 'site' (see 3.3.3) is used to further specify the 'position of a target' (see 3.4.2).

4.3.7 hasRelated event

'domain constraint' (see 3.1.5) between the categories 'subject of care' (see 3.2.2) and 'related event' (see 3.3.4), a sub-category of 'nursing diagnosis' (see 3.2.7).

4.3.8 hasSubjectOfCare

'domain constraint' (see 3.1.5) between the 'nursing diagnosis' (see 3.2.7) and the category 'subject of care' (see 3.2.2) to which the 'nursing diagnosis' (see 3.2.7) refers.

4.3.9 hasLocalEnvironment

'domain constraint' (see 3.1.5) between the categories 'nursing diagnosis' (see 3.2.7) and the sub-category 'local environment' (see 3.7.6), of the category 'subject of care' (see 3.2.2).

4.3.10 hasTypeofSubject of Care

'domain constraint (see 3.1.5) between the categories 'nursing diagnosis' (see 3.2.7) and the type of subject of care, a sub-category of the category 'subject of care' (see 3.2.2).

4.3.11 ActsOnNursing Diagnosis

'domain constraint' (see 3.1.5) between the categories 'nursing diagnosis' (see 3.2.7) and the 'nursing action' (see 3.4.1) sub-category 'observation' (see 3.2.1).

5 Categorial structures — Requirements

A categorial structure for representation of 'nursing diagnoses' (see 3.2.7), 'nursing actions' (see 3.4.1) and 'nurse sensitive outcome' (see 3.6.1) in a terminological system shall conform with the requirements specified in EN 12264 and ISO 17115 and shall provide the following information:

a) categories that organize the healthcare entities for representation of nursing diagnoses, actions and nurse sensitive outcomes relative to specific use cases, in the terminology and subdividing their representation in the domain;

b) a list of the representation relations authorized by domain constraints;

c) the goal (purpose and scope) of the terminology for which the categorial structure is set;

d) a list of minimal domain constraints required by the goal of the categorial structure.

The categories that organize the healthcare entities and the representation relations for representation of nursing diagnoses, nursing actions and nurse sensitive outcomes in terminological systems are specified in 3.2 to 3.7.

Nursing categories shall relate to a subject of care which may be qualified by its sub-categories type, local environment and/or identifier.

6 Categorial structure for representing nursing diagnoses

'Observation' (see 3.2.1) is a sub-category of 'nursing action' (see 3.4.1). This action leads to an expression related to 'clinical course' (see 3.3.1) using reflective thinking to identify potential issues and opportunities to synthesize 'subject of care' (see 3.2.2) information expressed as a 'nursing diagnosis' (see 3.2.7).

For the first type of expression, a descriptor for observation and a descriptor for focus shall be included. Focus may be qualified by the observation attributes, other nursing diagnosis sub-categories, 'goal' (see 3.2.3), 'event objective' (see 3.2.4), and preferences.

Observations may be qualified by information received from the 'subject of care' (see 3.2.2), other associated individuals, and by preferences, including mandatory requirements as determined by allergies or diet intolerances.

Associated individuals may be qualified by their relationship to the subject of care.

A nursing diagnosis may be expressed as a nurse sensitive outcome which may be qualified by its sub-category, 'clinical finding' (see 3.7.1), and/or event objective and one or many 'outcome causation' (see 3.6.2) represented by the following additional sub-categories:

— Medical diagnosis; (see 3.7.2);

— Treatment impact; (see 3.7.3);

— Confounding factor(s); (see 3.7.4);

— Supply availability; (see 3.7.5);

— Local environment; (see 3.7.6);

— Scheduling issues; (see 3.7.7);

— Tool availability; (see 3.7.8);

— Risk minimization; (see 3.7.9);

— Healthcare providers;(see 3.7.10);

— Human resource management; (see 3.7.11);

— Self-care behaviour. (see 3.7.12);

— Social determinant (see 3.7.13).

Examples of this second type of expression (i.e. a clinical finding) include an altered clinical course (state).

Clinical findings shall be represented as specified in ISO/TS 22789.

A nursing diagnosis expression may have an associated potential which indicates that there is a risk for or opportunity for a nursing diagnosis. Risk of is sometimes used instead of risk for. For example, risk of depression, risk for pressure ulcer; opportunity for weight reduction, opportunity for improved social interaction. Associated risk or potential is considered to be a component of the observation (assessment) action that provides the foundation for such focused judgements to be made. Neither risk for nor potential for are considered to be recognized as independent categories.

A nursing diagnosis expression is a nurse sensitive outcome and vice versa, that may also be associated with a specified use case.

A nursing diagnosis expression may be qualified by any of its sub-categories and their attributes.

The categorial structure for nursing diagnoses, including its semantic links, is shown in Figure 1.

7 Categorial structure for representing nursing actions

For the purposes of this document, a nursing action is considered to be an intentional act applied to one or more targets through an action. A nursing action represents a response to a nursing diagnosis and may be influenced by the type of subject of care or local environment. Every nursing action shall be related to a subject of care and shall have at least one target. A nursing action expression shall have a descriptor for action and at least one descriptor for target, except where the target is implied in the expression.

Nursing actions may be qualified by its sub-categories method, service delivery method (team nursing, subject of care allocation, task allocation, community, public health), type (supporting activities of daily living, implementation of treatment or care plan), frequency, technique (as instructed, independent, collaborative), tools used (e.g. lifting machine, electronic device, screening tool), time interval and timing. The category target may be qualified by its sub-categories site, location and record.

Actions are frequently represented in compositional expressions as verbs or verb phrases. Past tense verbal forms and order/instruction forms shall not be used in expressions of nursing actions. For example, observation shall be used rather than observed or observe (see Annex B).

Some nursing actions are expressed at an abstract level, for example: mouth care. Others are at a more detailed level, for example, removal of sutures. This document applies to nursing action concepts at all levels of abstraction where these are included in terminological systems. The relationship between the high-level expression and the detail of what is actually done to, for or with the subject of care is not in scope for this document. Such relationships are specified in evidence-based guidelines/resources and are managed, if required, within the information model of healthcare systems (see Annex B).

A graphical representation of the categorial structure for nursing actions, including its semantic links, is shown in Figure 2.

8 Categorial structure for representing nurse sensitive outcomes

Nurse sensitive outcomes may be expressed as a nursing diagnosis at a subsequent point in time. These outcomes are not the exclusive result of nursing actions as described previously relative to nursing diagnosis.

Nurse sensitive outcomes are expressed in accordance with the event objective which may be qualified by the use case, including the generation of new knowledge regarding clinical practice, operational effectiveness and health status. This new knowledge category is outside the scope of this document.

A graphical representation of the categorial structure for nurse sensitive outcomes, including its semantic links, is shown in Figure 3.

Annex A
(informative)

Nursing diagnosis, nursing actions and nurse sensitive outcomes in context

A.1 General

A.1.1 The scope of nursing practice

Nursing encompasses autonomous and collaborative care of individuals of all ages, families, groups and communities, sick or well and in all settings. Nursing includes the promotion of health, prevention of illness, and the care of ill, disabled and dying people. Advocacy, promotion of a safe environment, research, participation in shaping health policy and in subject of care and health systems management, and education are also key nursing roles.[23] Most definitions of nursing reflect the broad scope conveyed in this statement from the International Council of Nurses (ICN) and adopted by the World Health Organization. Although most often an individual, the subject of nursing care, can also be a family, group or community, for example, community health assessment is a nursing role in some countries. The primary focus of nursing is people's responses to actual or potential health problems/life events.[24][25] Several definitions emphasize the clinical decision-making and diagnostic reasoning skills required for nursing practice[25][26].

Although based on definitions of nursing from regulatory or professional bodies, the scope of nursing practice in each country is governed by laws, practice acts and professional regulations. Within the boundaries set by these rules, practice will vary depending on clinical need, service setting, local policies, service delivery practices, the availability of resources, contributions made by the subject of care and/or others and the individual educational level and competence of the nurse. Irrespective of these variations, nurses are accountable to their subject of cares and to regulatory bodies for the judgements and decisions they make and the actions they take or delegate to others. It is these judgements, decisions and actions which make up nursing practice and which are at the core of the care process.

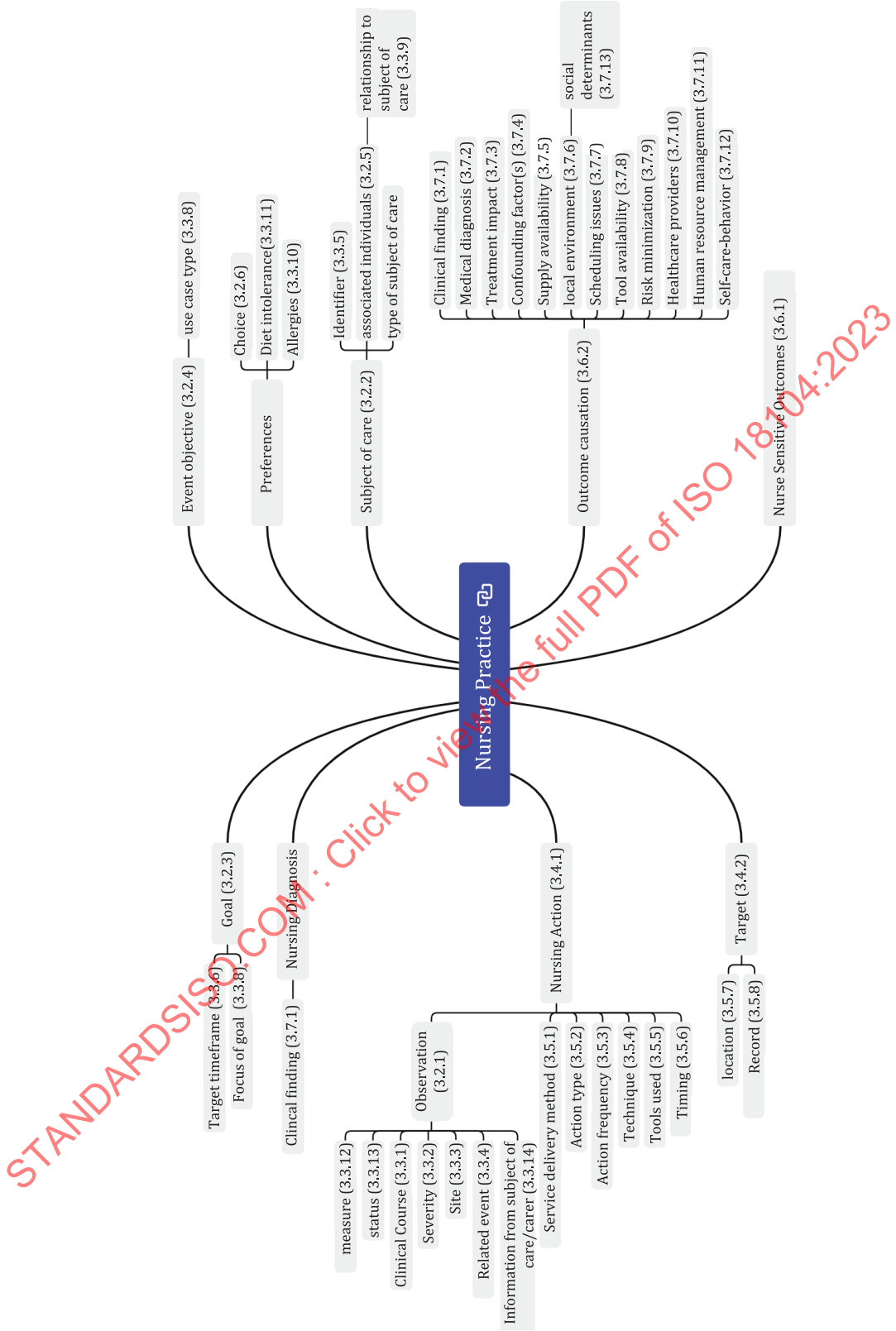


Figure A.1 — Mindmap representing the many categories that comprise nursing practice

A.1.2 The care process

Nurses generally work as part of a multidisciplinary team which in some cases will include the person or group receiving healthcare (and those who support them) as equal partners. All healthcare professionals

follow a similar process of data collection, interpretation of findings, deciding on actions, acting and then evaluating the effects of what has been done. A nursing assessment, whether it is comprehensive and holistic or rapid and focused, provides the information needed to agree with the subject of care and caregivers on what must be done, when and by whom. Clinical reasoning is used to interpret assessment data and identify appropriate actions, using evidence-based guidelines where these exist. Evaluation of care, prevention of adverse events and subject of care safety maintenance are important and ongoing parts of the care process, finishing with overall outcome evaluation. Nurse sensitive outcomes inform the development of evidence-based guidelines and should enable the identification of possible internal and external outcome causations.

Standards for nursing stipulate that accurate documentation of the care process is critical to subject of care safety, for continuity and to support the provision of quality care. The purpose of this annex is to describe the main elements of nursing practice, providing a basis for the requirement to have terminologies that support electronic recording of nursing diagnoses, nursing actions and nurse sensitive outcome and their qualifiers representing known confounding variables. Professional terms (rather than technical) are provided for these concepts and the relationships between them are described.

A.1.3 Information models and terminologies

An example of an information model is the HL7®[1)] Reference Information Model[47] or ISO 13606-2.

The interface between the information model for a particular application, such as an electronic health record system, and the terminology used to populate the content of the system shall be carefully managed to minimize the risk of inaccurate communication. For example, if the information model for a system includes the field name “family history”, populating that field with the term “diabetes” means: the subject of care has a family history of diabetes. However, if this relationship between the information model and the terminology is not carried through when data are retrieved, for example, to populate a message, the meaning could be changed to the subject of care has diabetes.

A number of standards organisations worked together to develop a general approach to resolving issues related to the interface between information models and terminologies or code systems— see the TermInfo project on the HL7® website:

This group has been archived since 2015. This work has been replaced by the development of a guide on use of SNOMED Clinical Terms (SNOMED CT®[2)]) concepts in the HL7® Version 3 communication standards[48].

In many instances, it is clear which classes, attributes, relationships and states do not belong in the terminology, for example, the names of individual subject of cares and staff, dates when data are entered into a system, or the link between a nursing diagnosis and all possible causes of that diagnosis. This includes links between assessment findings and other information supporting a nursing diagnosis for an individual subject of care, for example, the link between a weight measurement and a diagnosis of overweight; or the link between a family history of a diagnosis and the subject of care's risk for that diagnosis. In other instances, it is less clear — presence, absence, negation, certainty, past or present occurrence etc., are examples of where the information model and the terminology often overlap when representing nursing diagnoses and nursing actions.

Another example of an information model is the openEHR Reference Information Model which provides a direct interface with an electronic health record repository structure where terminology is used to populate the content of a data repository. For example, this information model enables terminology to be selected to meet the needs of a specific use case. This example does not enable an overlap between its information model and the terminology.

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1) HL7 is the registered trademark of Health Level Seven International. This information is given for the convenience of users of this document and does not constitute an endorsement by ISO of the product named.

2) SNOMED CT is the registered trademark of the International Health Terminology Standards Development Organisation (IHTSDO). This information is given for the convenience of users of this document and does not constitute an endorsement by ISO of the product named.

A.1.4 Pre and post coordinated expressions

NANDA-International[27] and other terminologies include diagnostic labels such as “Sleep pattern disturbance” that have already been “composed” as nursing diagnoses in order to support the clinical application of the terminology. This kind of composed expression in a terminology is referred to as “pre co-ordinated”. Terminologies may also provide opportunities for post co-ordination - allowing greater detail but with fewer expressions. For example, the nursing interventions scheme of the Clinical Care Classification[31] includes elementary expressions for concepts, for example, subcategories such as “Dressing Change” and action types such as “Teach/Instruct”. Users can combine these elementary expressions to compose a nursing intervention. These composed expressions are often referred to as post coordinated expressions[48].

Similarly, the International Classification of Nursing Practice (ICNP) makes use of numerous pre and post coordinated expressions, as does SNOMED CT®. Both the Clinical Care Classification and the ICNP terminologies have or are being incorporated into the SNOMED CT® terminology.

A.2 Assessment and nursing diagnosis

Assessment is a process during which data are collected about the subject of care's health state and their responses to actual or potential health problems/life events. Assessment actions such as listening, observing and measuring are used to collect data. Frameworks and tools are often used to structure nursing assessments. For example, a holistic, generalized framework would be used for a first home visit; a validated scale or tool appropriate to the clinical context would be used to assess level of consciousness or pain. Representation of assessment findings is part of the subject of ISO/TS 22789. The Assessment concept is a Nursing action and is represented as the Observation, a sub-category in the updated version of this document.

Nurses may undertake diagnostic assessments related, for example, to growth and development, behaviour, parenting capacity, family functioning etc., often in collaboration with mental health or social care professionals. In assessing the subject of care's responses to health problems and as part of their collaborative role with doctors, nurses often address aspects of illness or injury management in their assessments. This is informed by the medical diagnosis and chosen treatment option determined by the doctor, where possible in consultation with the subject of care or significant other. Examples include: assessing risks for complications of treatment; monitoring treatment progress; assessing the person's ability to carry out treatment plans. With appropriate education, nurses in some countries perform assessments and investigations for the specific purpose of diagnosing and treating “medical” disorders. Representation of such diagnoses is not in scope for this document.

Assessment data are interpreted by the nurse, usually in discussion with the subject of care, and a conclusion is reached, i.e. a clinical judgement is made. In many countries, this judgement is called a nursing diagnosis. In others, it is referred to as a nursing problem or nursing need. In this document, these latter terms are regarded as synonyms for nursing diagnosis.

The record entry of a nursing diagnosis may include, in addition to the diagnostic statement, the causes / contributing factors and the assessment data that support the judgement. NANDA-International refers to these as “related factors” and “defining characteristics” respectively.[27] The complete statement informs decisions about what action to take, for example, “pain in the arm related to the splint rubbing” would require different action than “pain in arm related to fracture”.

Given the wide variety of possible causes of each diagnosis, terminologies supporting representation of nursing diagnoses would not generally include pre-coordinated expressions for these related factors and defining characteristics — representation of these relationships are handled in the information model of applications. Decision support tools that aid practitioners in making clinical judgements may use the coded representation of the nursing diagnosis to create links between the diagnosis in the electronic record and the knowledge support function.

A.3 Goals / expected outcomes

The nursing diagnosis is used as the basis for agreement of goals or expected outcomes with the subject of care when this is appropriate. Explicit goal statements enable a shared understanding of what can be expected by all parties. Expressions of goals can be seen as future findings or diagnoses, for example, "body temperature less than 38°"; "no pain"; "able to manage stairs". The Nursing Outcome Classification uses the notion of "target outcome rating"[28]. As for actual outcomes, an expected outcome/goal can be expressed as a (future) assessment finding or a (future) nursing diagnosis

In the electronic record, the goals (future findings or diagnoses) shall not be confused with current or past findings and diagnoses. Differentiating these is normally managed in the information model, for example, using the HL7® mood code. In the openEHR information model goals are represented as a Section, an organising class usually contained within a composition. Compositions correspond to the headings that one can find on a blank piece of paper and to commonly used clinical documents or events, for example admission assessment, care plan, antenatal visit, operative notes, prescription, discharge summary.

A.4 Care planning and nursing actions

A.4.1 Care planning

Nursing care planning is a process of decision making that results in an agreed schedule of actions to be taken to address the subject of care's nursing diagnoses. As with other elements of the care process, planning is often collaborative and frequently involves the subject of care and those who support them. Decisions about nursing actions are based on evidence-based guidelines (where these exist), as well as on knowledge of what is effective for these diagnoses and what has been effective for the subject of care in the past. It should be noted that assessment, planning and action may be virtually instantaneous in an emergency situation so there may not be an explicit plan. The actual performance of nursing actions may differ from those planned to accommodate one of a number of external circumstances, including resource availability such as lifting machine, special supplies, staff allocation methods, staff skills/ scope of practice or operational protocols, local environmental factors.

The term "care plan" usually refers to the written record of the schedule of actions to be taken. The nursing care plan is a communication tool that is used to make clear to all concerned who will be doing what, when and how. It can be as simple as a checklist or as complex as a step-by-step statement of a procedure with timed goals and expected outcomes: the detail and complexity of the plan depends on the communication need. Care plans may be based on standard plans or pathways of care - these set out detailed steps for the management of subject of cares with a particular problem or who are undergoing a specific procedure to reflect an agreed protocol. These can be imported into the record (instantiated) and may be adapted to the specific needs of the subject of care.

A format for recording care plans will vary depending on professional regulations, practice standards and clinical settings. Among the elements that may be found in a recorded care plan are:

— Goals/expected outcomes;

— Conditional actions (If…..then….);

— A review date;

— Names of individuals responsible for carrying out specific actions;

— Identification of equipment/products required by the service user;

— Locations for actions.

Where there is a requirement for coded nursing actions, action expressions from an appropriate terminology may be used to populate the relevant parts of the plan.

A.4.2 Nursing actions

The schedule of actions to be taken will include different kinds of actions such as investigations, assessments, care, treatment, education and referral. It may include explicit statements about "no action" and "actions not to be done. The context model in SNOMED Clinical Terms (SNOMED CT®)[29] includes aspects of negation and this is another area where the relationship between the terminology and the information model shall be made clear.

The record may contain actions that happened in the past, are currently in progress, were stopped before completion, are planned for the future etc. Differentiating these "action statuses" shall be managed either in the terminology or in the concept (DCM/Archetype) or information model. To support use in all these contexts, past tense verbal forms should not be used, nor should order/instruction forms of words such as monitor and remove. Examples: performance rather than performed or perform; assessment rather than assessed or assess.

"Nursing intervention" is sometimes used as a synonym for nursing action. For example, in Version 1 of the International Classification for Nursing Practice (ICNP), a nursing intervention was specified as an action taken in response to a nursing diagnosis in order to produce a nursing outcome.[30] Saba specifies a nursing intervention as a single nursing action — treatment, procedure or activity - designed to achieve an outcome to a diagnosis.[31] The definition from the Nursing Interventions Classification[32] is a treatment, based upon clinical judgment and knowledge that a nurse performs to enhance subject of care/client outcomes. These examples do not explicitly include assessment or evaluation actions which are key components of nursing practice and are included in nursing records. Nor do they include care planning and other care co-ordination activities. It is for this reason that the "Nursing Action" is used in this document to include assessment, evaluation and planning actions as well as those more direct interventions, for example, those that include the actions of "caring for", "administration", "removal", "teaching", "feeding", "performance".

This document, i.e. the third edition of ISO 18104, includes a number of qualifiers associated with the Nursing Action category as these are known to impact nurse sensitive outcomes. For example, the use of a lifting machine vs a team of people, is dependent upon equipment availability when required or service delivery methods or techniques adopted to undertake the activity. Nurse staffing numbers and skill mix also have an impact on caring capacity and outcomes.

The International Council of Nurses (ICN) notes that the scope of nursing practice includes "promotion of a safe environment, research, participation in shaping health policy and in subject of care and health systems management"[23]. These are broader nursing activities that would not normally be recorded in the health record and are therefore out of scope for this document. This document enables the necessary data to be made available to support these and more out of scope nursing practice activities, including the ability to demonstrate the value of nursing.

A.5 Evaluation and outcomes

Evaluation of progress and of the effectiveness of care is an ongoing part of the care process. Monitoring the subject of care's responses to nursing actions enables these to be changed or discontinued if they are ineffective or no longer needed. In nursing, outcome evaluation is a process that involves re-assessing the relevant aspects of the subject of care's state, behaviour, knowledge, etc. and comparing the findings with previous findings or goals/targets. The person's own evaluation of progress and outcomes is an essential consideration for nurses. Differentiating outcomes that are the result of nursing actions from those that result from actions by others (including by the person) is a complex issue included in this document.

In the Nursing Outcomes Classification (NOC)[28], an outcome is specified as a variable concept representing a subject of care or family caregiver state, behaviour, or perception that is measurable along a continuum and responsive to nursing interventions. Indicators and rating scales relevant to the outcome are used to evaluate positive or negative changes or no change in status as a result of nursing interventions. A similar approach is used in the Omaha System[33] where a problem rating scale for outcomes is specified. The International Classification of Functioning, Disability and Health (ICF) uses qualifier scales to support measurement at individual and population levels, including for outcome

evaluation.[34] In the ICNP and Clinical Care Classification, outcomes are specified in relation to nursing diagnoses i.e. a nursing outcome is the "measure or status of a nursing diagnosis at points of time after a nursing intervention"[35].

Analysis of NOC and Omaha System outcome expressions according to the models in this document and ISO/TS 22789 indicate that they comprise a focus (for example, Knowledge: treatment regimen) and a measurement result (for example, extensive). In SNOMED CT® these would be identified as "observable entity" and "value" concepts.[22] Completing the outcome evaluation requires a comparison to be made with previous ratings to evaluate change / no change in status. Expressions for recording this status evaluation are not described in the literature but can be assumed to be general outcome statements such as improved, no change, worsened. For example, Knowledge: treatment regimen — improved.

The need to differentiate nursing actions from those that are result of actions by others, is a critical requirement as this meets information needs that might be required to:

— resolve medico-legal or subject of care complaint issues;

— enable the identification of best practice protocols;

— support organisational quality assurance, operational effectiveness and efficiency evaluations;

— supports group, community and population health outcome evaluations;

— demonstrate the value of nursing services.

Activities impacting on the capacity of nurses to provide their services are identified as a separate category – Outcome Causation that includes a number of qualifiers. A variety of terminologies exist and are in use to represent these such as ICD, Nursing workload measures, (e.g. Subject of care Acuity Score, Nursing Hours Per Subject of care Day) and various Catalogues. There is a need for the nursing profession to agree on suitable sets of data standards to be adopted for this purpose to enable the collection of comparable evidence of nursing services provided.

Several patterns for expressions of outcomes of nursing can therefore be identified:

1. Change/no change in a finding measured or observed before and after nursing action

EXAMPLE 1

Finding 1: sleeps 2 h to 3 h per night;

Finding 2: sleeps 6 h per night

Outcome = improved sleep pattern

EXAMPLE 2 (based on "scale" models)

Initial rating: knowledge: treatment regimen – limited (e.g. scale score 2)

Subsequent rating: knowledge: treatment regimen – extensive (e.g. scale score 5)

Outcome = improved knowledge about treatment regimen

2. A measure of status in a nursing diagnosis at a point in time after a nursing intervention

EXAMPLE

Diagnosis 1: extremely disturbed sleep

Diagnosis 2: mildly disturbed sleep

Outcome = improved sleep pattern

3. Achievement of, or progress towards, a goal/expected outcome. This will be identified by change/no change in a finding measured or observed before and after action.

EXAMPLE

Goal: to sleep at least 5 h per night.

Finding after intervention: sleeping 6 h per night.

Outcome = goal achieved.

These patterns mean that the categorial structure for nursing diagnosis (including clinical findings) is sufficient to guide representation of outcomes and expected outcomes of nursing in health informatics terminological systems; therefore a separate categorial structure is not required. There may be a need for general expressions in terminologies supporting recording of achievement of or progress towards goals/expected outcomes e.g. “goal achieved”, “goal partially achieved”.

A.6 Relationships among diagnoses, actions and outcomes

A.6.1 In practice

Types of concepts that are important for representing nursing practice in electronic health records and communications (and therefore for inclusion in terminologies) are listed below with their relationships noted:

— **Assessment findings**: data that result from nursing assessment actions.

— **Nursing diagnoses**: judgements about assessment data; they form the basis for setting goals and deciding on nursing actions

— **Goals** (expected outcomes): findings or nursing diagnoses that are anticipated as future results of assessments; Goals are based on diagnoses and assessment data and help inform decisions about actions

— **Nursing actions** that are planned and carried out (or abandoned, partially completed etc.). They are based on nursing diagnoses and goals.

— **Outcomes:** judgements about changes in findings or nursing diagnoses or achievement of goals/outcomes identified through assessment following nursing actions.

A.6.2 In terminologies

Subject of care record systems and decision support functionality may require linkages between: findings and diagnoses; diagnoses, goals and outcomes; diagnoses, actions and outcomes; etc. For example, nurses may want to be prompted to consider specific evidence-based actions for a particular diagnosis. Researchers may wish to investigate the relationship between one nursing action and different outcomes. These kinds of linkages are specified in knowledge resources such as practice guidelines and relationship specifications[36]. Linkages among these different elements in electronic applications are managed in the information model, not in terminological systems.

In summary:

— Representation of nursing diagnoses, nursing actions and nurse sensitive outcomes is the subject of this document.

— Representation of findings is the subject of ISO/TS 22789.

— Designation or labelling of findings or nursing diagnoses as goals or outcomes are normally managed through the information model e.g. HL7® mood code or openEHR Archetypes.

— There shall be implementation guidance for managing any overlaps.