Categorical structure analysis of ISO 18104 standard in nursing documentation

Análise da estrutura categorial da Norma ISO 18104 na documentação em Enfermagem

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Abstract

Objective: To verify whether categorical structure of the ISO 18104 standard is adequate to support electronic documentation of nursing actions and nursing diagnoses and to facilitate the development of nursing diagnoses and nursing actions expressions.

Methods: A cross-sectional design with two use cases in electronic records from two teaching hospitals that employ different nursing terminologies.

Result: Case A included 40 diagnostic expressions and 97 interventions. All records for nursing diagnoses included focus, judgment, or clinical finding. All interventions were recorded using action verbs and targets. Few other qualifiers were used. Case B provided two diagnoses and 371 expressions for nursing actions. Diagnoses included focus and judgment. All interventions, except one, were documented using action verbs and targets.

Conclusion: ISO 18104 was adequate to support documentation of nursing actions and diagnoses expressions.

Resumo

Objetivo: Verificar se a estrutura categorial da Norma ISO 18104 é adequada para apoiar a documentação eletrônica de diagnósticos e ações de enfermagem e auxiliar na formação de expressões diagnósticas e ações de enfermagem.

Métodos: Desenho transversal com dois casos de uso nos registros eletrônicos de dois hospitais universitários que utilizam diferentes terminologias de Enfermagem.

Resultado: O caso de uso A forneceu 40 expressões diagnósticas e 97 intervenções. Todos os registros para diagnósticos de enfermagem continham foco, julgamento ou achado clínico. As intervenções foram registradas usando verbo de ação e alvo. Os demais qualificadores foram pouco empregados. O caso de uso B forneceu dois diagnósticos e 371 expressões para ações de enfermagem. Os diagnósticos possuíam foco e julgamento. Todas as intervenções, exceto uma, foram documentadas usando verbos de ação e alvo.

Conclusão: A Norma ISO18104 mostrou-se adequada para apoiar a documentação de expressões diagnósticas e de ação de enfermagem.

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Introduction

In 1999, under the leadership of Virginia Saba, then president of the International Medical Informatics Nursing Informatics – Special Interest Group (IIMIANI SIG), along with the International Council of Nurses (ICN), the development of the ISO (International Standard Organization) standards was begun to cover several terminologies of nursing documentation, supporting the mapping and recording of nursing data. This standard was presented to the Technical Committee–ISO/TC 215–health informatics and was approved as ISO 18104:2003–Health Informatics: Integration of a Reference Terminology Model for Nursing.[1,2]

The aim of this international standard was to establish a reference terminology model for nursing aligned with the goals and objectives of other health-specific terminology models to provide a more unified terminology reference model. It included the development of terminology reference models for diagnosis and nursing actions, relevant terminologies, and definitions for implementation.[1]

The goal was to coordinate several terminologies used by nurses to document patient data. In this way, a terminology of reference would assist in mapping nursing terms along with other health terminologies and, as a result, enable integration of health information system and nursing records. It is important to emphasize that the development of nursing terminologies was motivated by the need to obtain a record format compatible with the informatics process, thereby enabling comparative research and analysis of results for continuous improvement in care and enhancing nursing knowledge.[3]

At ISO 18104:2003 standard, a nursing diagnosis was considered a focused judgment or a focused judgment of particular dimension (e.g., ability and knowledge). A keyword for focus and for judgment was mandatory to define a nursing diagnostic. In special situations, a single keyword (e.g., pain) would serve both purposes: focus and judgment. The structure of nursing action, which is understood as a process in which an intended service is applied to a care recepient that was expressed by verbs and verbal expressions and could be qualified by time.[3]

The ISO 18104 is considered an international standard in 90-92 stage (i.e., it should be reviewed periodically). In 2009 the review process was initiated and the standard, in a draft version for analysis of the ISO/TC215 committee was shared renamed as ISO/DIS18104 – Health Informatics: categorical structures for representation of nursing diagnoses and nursing actions in terminological system.[4]

The document in the current format is recorded as a final draft information standards (FDIS), which is expected to be approved in 2014 as an international standard, currently in the 40.60 stage, which means it is closed for voting according to protocols established by ISO.[5]

This review considered recommendations and commentaries made by several health professionals, representatives of member countries of the ISO/TC215 committee, and representatives of industry and nursing organizations. It was reviewed not only terms , objectives, definitions, and the general content of the standard as well as the impact evaluation of the standard published in 2003. The current proposal states that two categorical structures and minimal restrictions are required to be in conformity and to address general principles of interoperability to exchange information between electronic systems. Nursing documentation is limited in two main phases of the nursing process: diagnoses and actions.[5]

Considering all existing health terminologies, all documentation patterns, and the need for semantic interoperability, some studies have been developed to seek solutions or proposals. The categorical structure is a way to organize concepts that represent subjects of interest in specific area of knowledge; it can also be understood as way to enable harmonization of existing clinical terminology and continuous maintenance and review.[6]

The current ISO 18104 provides the following two structures, similar to the previous one from 2003: (a) categorical structure for nursing diagnoses and (b) categorical structure for nursing actions. However, the current structure comprises changes, as showed in figure 1.

This structure shows that nursing diagnoses can be expressed both as focused judgment and as clinical findings. It could also be associated with poten-
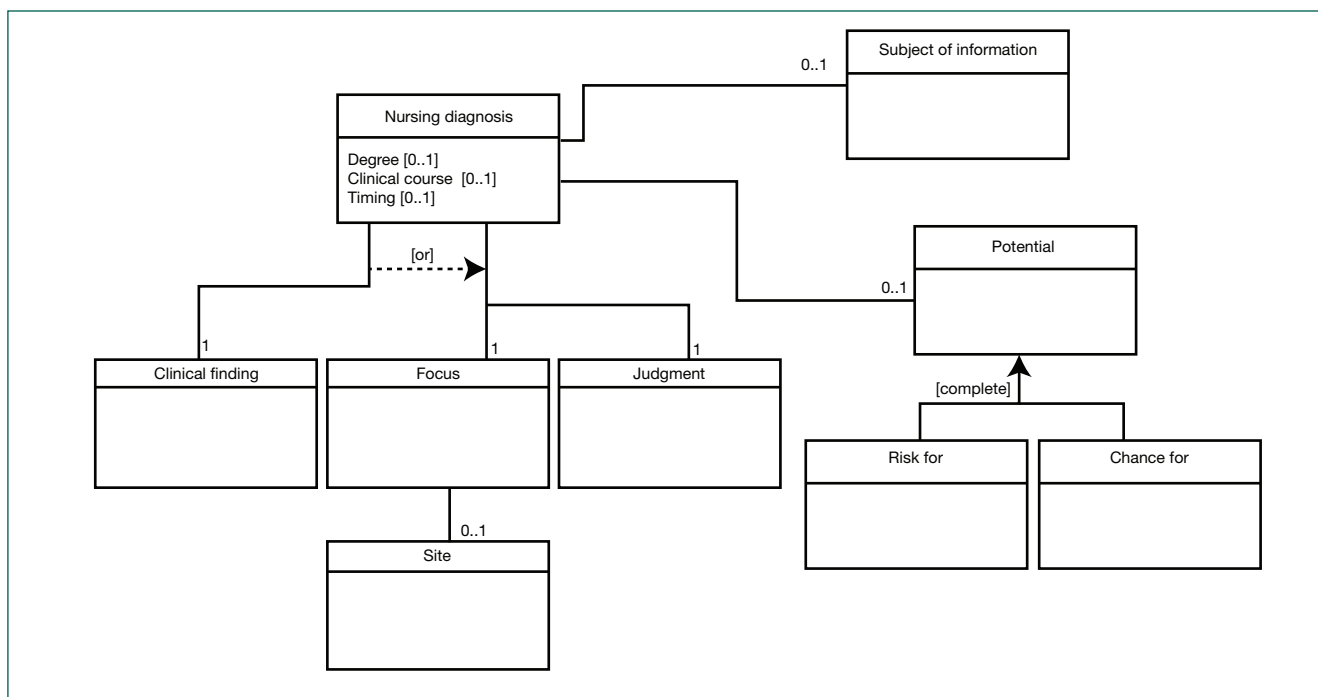
Source – Adapted from: ISO: Health Informatics: Categorical structures for representation of nursing diagnoses and nursing actions in terminological systems, FDIS 18104.
Figure 1. Categorical Structure for Nursing Diagnosis

tial diagnoses, expressed as risk or chance, that affect nursing practice regarding prevention. In other words, a patient could have risk for infection but not necessarily develop any infection disease; when potentiality is identified, preventive measures might be establish to avoid a positive diagnosis.

The standard was based on and is consistent with other several ISO standards already published, such as definition of clinical findings reported in ISO/TS 22789:2010 – Health Informatics: conceptual framework for patients findings and problems in terminologies.[7] It represent an advance for nursing and shows how nursing data could be even more present and be represented in health electronic records focused on the patient/customer, integrated into patient-centered general clinical data.

The second structure is related to nursing actions, as shown in figure 2.

In this proposal, nursing actions, also considered as intentional acts applied to one or more targets, must have a descriptor for action and at least one target keyword, which is expected when the target is its own record subject. Thus, an action term is mandatory and this term could be qualified by timing (time or period in which an action occurs).

Another highlight is related to the change from "information subject" to "record subject" (i.e., here the patient/customer is mentioned, not the one who provided the information [e.g., a relative]).

In the categorical structure, a nursing diagnosis must be expressed both by judgment at a specific care focus (e.g., lack of knowledge, decreased tissue perfusion) and clinical finding representing a changed status, changed function, or even behavioral modification (e.g., pain, depression, or coma).

According to FDIS document presented for approval, when documentation is chosen using a focus (area of attention), it is mandatory to provide a judgment descriptor (reduced, efficient, compromised) and a focus term that still can be qualified by a local structure (anatomical structure). In case of documentation by clinical finding, the expression presented atn ISO/TS 22789:2010 must be followed; this standard states the structural concept for clinical findings and problems.[5]

In addition, a nursing diagnosis could be associated with a potential, as exemplified before; in such case, it indicates risk or chance of occurrence. The difference is that risk must be used for negative diagnosis (e.g., risk of infection) and chance for positive
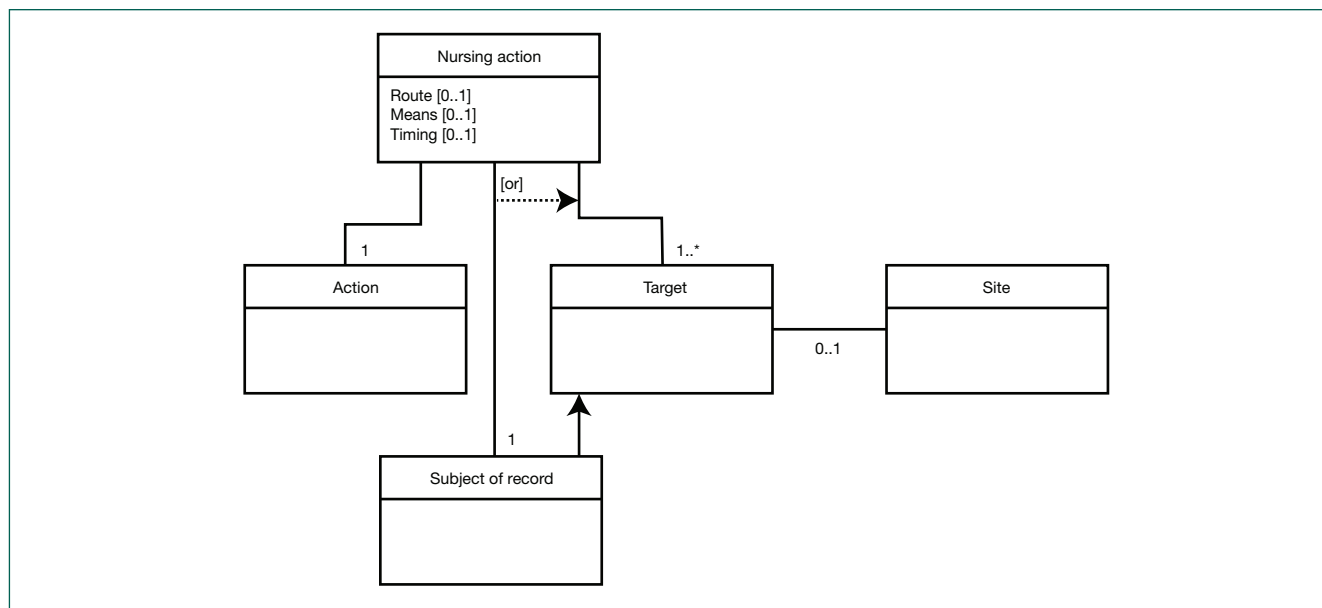
Source – Adapted from: ISO. Health Informatics: Categorical structures for representation of nursing diagnoses and nursing actions in terminological systems, FDIS 18104.

Figure 2. Categorical Structure for Nursing Actions

diagnosis, opportunities (e.g., chance for weight reduction). Therefore, the diagnostic expression could also be associated with degrees (severity, intensity), clinical course (acute, chronic), and at the same time, period or moment of occurrence (after meals).

Another change regarding a subject of information should be emphasized, which could be another individual who is not the patient (e.g., the caregivers or a patient's family member). In this case, the subject of information must be clearly expressed to avoid ambiguity between record subject (patient) and information subject (sibling, parent, caregiver).[5]

For nursing actions, the proposal indicates that expression should have a keyword for action and at least one keyword for target, except when the target is the patient himself or herself (subject of record). In addition, nursing actions should be qualified by means, routes and timing. The site must be used to specify target position.[5]

In general, nursing actions are represented by verbs in infinitive form, such as "to remove," "to observe," "to change," and "to teach." Target is an individual or something affected by the action (e.g., wound: dressing for surgical wound) or that provide the content of an action (e.g., vital signs: to control vital signs). When it is the patient himself or herself

has suffered the action, the target can be removed from the expression (e.g., eat every 2 hours). Means comprises instruments and techniques used by nurses for care delivery, and routes are selected via, such as oral, subcutaneous, and intradermal.[5]

This study verified whether the categorical structure of ISO 18104 standards is adequate to support electronic documentation of nursing actions and nursing diagnoses and to facilitate the development of nursing diagnoses and nursing actions expressions.

Methods

This is a cross-sectional study using two different electronic nursing record systems that cover expressions used in documents concerning nursing actions and nursing diagnoses for comparative structural analysis.

Data were collected in two teaching hospitals. Case 1 was a federal public hospital located in Florianopolis, South region of Brazil, and case 2 was a hospital located in São Paulo, Southeast region of Brazil. The hospitals used different nursing terminologies for nursing diagnoses documentation and nursing actions or interventions.

From the institutions' database, we randomly selected expressions for nursing diagnoses documentation and nursing interventions, without considering other electronic records or accessing the records' identity.

Terms exported from the electronic records were verified to avoid repetitions because there was no interest in the frequency with which expressions were used. Rather, we focused on the adequacy of the categorical structure stated in the proposed document. These data are presented as use cases, highlighting relevance and adequacy of good practices in nursing documentation.

Results

Use Case A
We gathered data from de-identified medical charts for analysis of categorical structure. These data were limited by documentation of nursing diagnoses and actions After extraction of identity expression, we collected a total of 40 phrases for nursing diagnoses and 37 phrases for nursing actions. Expressions were recorded using the terminology of the International Classification for Nursing Practice (ICNP), which enabled use to systematically record nursing activities using diagnostics, interventions, and results.[8,9]

The exported phrases described urgent and emergency situations, as well as care in the intensive care unit (case A), that displayed the three levels of care as characterized by *Sistema Único de Saúde* (SUS). Basic, secondary, and tertiary levels of care were also references for medical or surgical treatment of complex diseases. The intensive care unit opened in March 1983 and has 20 beds.[10,11] The system of informatics was launched in early 1999and is used for registering nursing process based on ICNP.[12]

Of 40 nursing diagnostics expression, all included terms to express judgment. The most used terms were "inadequate" (eight), "normal" (eight). and "changed" (six). Other terms were "compromised," "increased," "decreased," and "controlled." Focus was used in most expressions;

i.e., 30 expressions were used in clinical findings, such as "coma," "hypertension," "septic shock," and "infection." These terms are consistent with ISO/TS 22789:2010.

Because terms were recorded for patients in the intensive care unit, we assumed that the subject of information was the patient himself or herself, since theforty records did not mention any group or physical environment, which also are valid categories to indicate the information subject.

Among the 40 expressions used in this case, one used the potential risk for document nursing diagnosis, in this case negative, using the expression "risk for infection." However, another expression used the term "potential" to describe the patient's risk. The documented diagnostic was "potential for malnutrition." No expression for chance or opportunity was found.

Regarding degrees of qualifiers, clinical course, and time, only terms related to the degree were used in expressions, such as "increased," "severe," and "decreased." No other qualifiers were found in any diagnosis expression.

We selected 97 expressions that documented nursing actions. These expressions had 114 action verbs, and 16 of them used two verbs simultaneously, such as "to evaluate and to record" and "to observe and to record." A remarkable finding was that all expressions had verbs of actions in infinitive form. The most used verbs were "to evaluate," "to record," "to monitor," "to keep," and "to observe." In all expressions, the target, which affects or provides content for action, was reported following an action verb.

Related to the qualifiers means, route, and time, we observed that route records were present in expressions; the time record was seen in 30 of 97 interventions. The most used terms were "every 2 hours", "before or after meals," "six times per day," and "always."

Means are instruments and techniques used by nurses to deliver care and were present in two expression indicating techniques and protocols used by the providers (e.g., "to change dressing two times a day, according to the protocol").

Use Case B
At this teaching hospital, nursing documentation is registered in an electronic system that can be used

to support decisions on patient data assessment at medical and surgical care units. Diagnosis and intervention definition were structured from the classification proposed by NANDA-International (NANDA-I) and Nursing Intervention Classification (NIC). The nursing process is used in general care practice, and units of medical and surgical clinical were chosen as a pilot to initiate the implementation of the electronic system documentation in order to facilitate replication of obtained results; these units also provided broad coverage and general characteristics. [13,14]

The 10 most frequent nursing diagnoses were extracted. From them, we selected two diagnoses with which to analyze nursing interventions and nursing orders. The system structure and terminology used had unique proprieties for documenting the two selected diagnoses; thus, after extraction of equal expressions, we collected a total of 39 nursing interventions and 371 orders.

As described, the NANDA terminology allows recording of nursing diagnosis at a high level of abstraction. The two diagnosis expressions used were "acute pain" and "inefficient protection." In the categorical structure, both used focus and judgment; pain is also a clinical finding presented in ISO/TS 22789:2010. The term "acute" is a qualifier presented in the clinical course.

The 39 interventions documented expressed the dimension of directed care, the action itself. This is a domain in which one or more actions must happen, such as pain control and assistance for self-care; it also uses qualifiers and terms that define target, site, means, and route of action. Focusing the conformity analysis of the ISO standard chosen for this study with 317 nursing prescription, we observed that only one expression had no action verb. In the others, the most commonly used verbs included "to observe" (n = 69), "to monitor" (n = 40), "to keep" (n = 39), "to offer" (n = 21), "to perform" (n = 23), and "to verify" (n = 18). In four cases, two verbs used the same expression and one expression lacked action verbs. Time was seen in 35 expressions, and all expressions used target description. The site was used in 62 expressions, and subject of record was highlighted in 23 interventions, which suggested that action was related to patient or family. The means and the route were presented in one expression.

Discussion

Limitations of this study are related with the cross-sectional design, which does not enable us to establish the relationship of cause and effect. In addition, the standard in this study was developed to serve as a structure to record nursing documentation in all sectors where it is delivered. Our analysis was limited for concordance with hospital records. Records of information in electronic medical charts and paper-based medical charts were the main tool of formal communication between members of the health care team. Using these records, nurses, physicians, and other professionals involved with patient care may share information to guarantee continuity of care. [15]

The use of patterns for electronic records is fundamental to recovery analysis of information but still represents a great challenge, mainly for professionals who document at the bedside; considering that it is a vocabulary that standardizes clinical terms for daily practice use, it must address criteria such as validity, specificity, retrival of data, and communication feasibility.[16] Because of the multiple vocabularies used in nursing and health care, it becomes necessary to develop a structure that enable integration and interoperability in computerized information systems.

The proposed structure and the study findings showed that all records for nursing diagnoses had focus, judgment, or clinical finding. This finding indicates that nurses recognize the importance of giving a name to the phenomena they observe and of representing the care domain in which they are responsible. A few uses of terms for potential risk or chance were also observed; it could be inferred that the study sample considered this observation, because data derived from inpatient units, in other words, an environment that is supposed to be controlled and which has the aim of managing all risks or threats to patient safety.

Two different terminologies used could be mapped in the categorical proposal, showing that

the record does not need an exclusive terminology: the structure and form used for describing the phenomenon are important and must have a communication potential among all members of health team.

In categorical structure for nursing actions, expressions included action verbs in the beginning of the sentence; only one expression did not have a verb. This is expressive and shows the concern of nurses to deliver correct orders and to show how actions are performed by health care members. Therefore, verb and target were present to show clearly what should be done. The other qualifiers of structure were not often used in expressions. The limited use of qualifiers of time in expressions is notable because the nursing action is expected to happen in specific period of time in order to allow evaluation of the result of the action.

Terminology used in use case B used more keywords of categorical structure. The site and subject of records were more frequently used compared to the expressions documented in use case A.

It is important to emphasize that independently the terminology chosen by a team, the most important consideration is to guarantee that all data and information supporting and describing nursing practice are presented in databases. In addition, terminology must represent the real nursing activity available to provide the best quality of life and health to the population.

Conclusion

Analysis of two cases with records using different standardized nursing terminologies showed that categorical structure of ISO 18104 is adequate to support documentation and to facilitate the development of nursing diagnoses and nursing actions expressions, regardless the terminology used.

Acknowledgments

Collaborations
Marin HF collaborated with drafting of the manuscript, data analysis, critical review relevant for intellectual content and approval of proofs. Peres HHC and Dal Sasso GTM contributed with data analysis, interpretation and critical review relevant for intellectual content.

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