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Developing Standardized Terminologies to Support Nursing Practice

Nicholas Hardiker

Objectives

1. -Explore the need for consistent terminology in nursing.
2. -Describe the different approaches to terminology development.
3. -Assess initiatives seeking to exploit commonalities among terminologies and to ensure appropriate implementation and consistent use.

INTRODUCTION

Agreement on the consistent use of a term, such as impaired physical mobility, allows that term to be used for a number of purposes: to provide continuity of care from care provider to care provider, to assure care quality by facilitating comparisons between care providers or to identify trends through data aggregation. Since the early 1970's, there has been a concerted effort to promote consistency in nursing terminology. Work continues, driven by the following increasing demands placed on health-related information and knowledge:

- **Accessibility:** It should be easy to access the information and knowledge needed to deliver care or manage a health service.

- Ubiquity: With changing models of healthcare delivery, information and knowledge should be available anywhere.
- Longevity: Information should be usable beyond the immediate clinical encounter.
- Reusability: Information should be useful for a range of purposes.

Without consistent terminology, nursing runs the risk of becoming invisible; it will remain difficult to quantify nursing, the unique contribution and impact of nursing will go unrecognized, and the nursing component of electronic health record systems will remain at best rudimentary. Not least, without consistent terminology the nursing knowledge base will suffer, both in terms of development and in terms of access, thereby delaying the integration of evidence-based health care into nursing practice. External pressures compound the problem. For example, in the USA, the Health Information Technology for Economic and Clinical Health (HITECH) Act, signed in January 2009, provides a financial incentive for the use of electronic health records; similar steps are being taken in other regions. The HITECH Act mandates that electronic health records are used in a meaningful way – this would be problematic without consistent terminology. Finally, the current and future landscape of information and communication technologies (e.g., connection anywhere, borderless communication, Web-based applications, collaborative working, disintermediation and reintermediation, consumerization, ubiquitous advanced digital content, etc. [van Eecke, da Fonseca Pinto, & Egyedi, 2007]) and their inevitable infiltration into health care will only serve to reinforce the need for consistent nursing terminology while providing an additional sense of urgency. This

chapter explains what is meant by a standardized nursing terminology and lists several examples. It describes in detail the different approaches taken in the development of two example terminologies. It presents, in the form of an international technical standard, a means of ensuring consistency among the plethora of contemporary standardized nursing terminologies, with a view to harmonization and possible convergence. Finally, it provides a rationale for the shared development of models of terminology use; models that embody both clinical and pragmatic knowledge in order to ensure that contemporary nursing record systems reflect the best available evidence and fit comfortably with routine practice.

STANDARDIZED NURSING TERMINOLOGIES

A term at its simplest level is a word or phrase used to describe something concrete, e.g., leg, or abstract, e.g., plan. A nursing terminology is a body of the terms used in nursing. There are many nursing terminologies, formal and informal. Nursing terminologies allow us consistently to capture, represent, access, and communicate nursing data, information, and knowledge. A standardized nursing terminology is a nursing terminology that is in some way approved by an appropriate authority (de jure standardization) or by general consent (de facto standardization).

In North America, one such authority is the American Nurses Association (ANA), which operates a process of de jure standardization through its committee for nursing practice information infrastructure (CNPII) (<http://www.nursingworld.org/npii/>). While at the time there were obviously many more nursing terminologies in use around the world, in 2010, CNPII had recognized

the following seven active (i.e., not retired) nursing terminologies (so-called interface terminologies):

1. Clinical care classification (CCC) (<http://www.sabacare.com>)—The clinical care classification (CCC) system consists of two interrelated terminologies that cover nursing diagnoses, nursing outcomes, nursing interventions, and nursing actions. The two terminologies are linked by a common framework of care components.

2. International classification of nursing practice (ICNP) (<http://www.icn.ch/pillarsprograms/international-classification-for-nursing-practicer/>)—ICNP is a compositional nursing terminology developed by the International Council of Nurses that covers nursing phenomena (i.e., diagnoses), nursing actions, and nursing outcomes. ICNP seeks to support the development of local terminologies and facilitate cross-mapping among terminologies.

3. North American Nursing Diagnosis Association International (NANDA-I) (<http://www.nanda.org>)—NANDA International maintains an agreed set of nursing diagnoses organized as a multiaxial taxonomy of domains and classes.

4. Nursing intervention classification (NIC) (http://www.nursing.uiowa.edu/excellence/nursing_knowledge/clinical_effectiveness/nic.htm)—The nursing interventions classification (NIC) is terminology that covers interventions performed by nurses and other providers. In common with NANDA, NIC interventions are organized into classes and domains.

5. Nursing outcomes classification (NOC) (http://www.nursing.uiowa.edu/excellence/nursing_knowledge/clinical_effectiveness

s/noc.htm)—The nursing outcomes classification (NOC) is a terminology that covers patient/client outcomes, presented as an alphabetical list.

6. Omaha Home Health Care system (<http://www.omahasystem.org>)—The Omaha system has three components: the problem classification scheme, the intervention scheme, and the problem rating scale for outcomes. These components provide both a terminology and a framework for documentation.

7. Perioperative nursing data set (PNDS) (<http://www.aorn.org/PracticeResources/PNDSAndStandardizedPerioperativeRecord/>)—In contrast to the other terminologies listed here, which are intended for use in any setting and for any specialty, the perioperative nursing data set (PNDS) is a terminology that covers specifically the perioperative patient experience in terms of nursing diagnoses, nursing interventions, and nurse-sensitive patient outcomes.

In 2010 the CNPII had also recognized the retired nursing terminology patient care data set along with three multidisciplinary terminologies:

1. Alternative billing codes (ABC) (<http://www.alternativelink.com>)
2. -Logical observation identifiers names and codes (LOINC) (<http://loinc.org/>)
3. -Systematic nomenclature of medicine clinical terms (SNOMED CT) (<http://www.ihtsdo.org/snomed-ct/>)

Finally, CNPII recognized two data element sets: nursing minimum data set (NMDS) and nursing management minimum data set (NMMDS). Work on a standardized data element set for nursing, which in the United States began in the 1980s with the NMDS (Werley & Lang, 1988), provided an additional catalyst for the development of many of the aforementioned nursing terminologies that could

provide values (e.g., chronic pain) for particular data elements in the NMDS (e.g., nursing diagnosis). The data element sets provide a framework for the uniform collection and management of nursing data; the use of a standardized nursing terminology to represent that data serves to further enhance consistency.

APPROACHES TO NURSING TERMINOLOGY

From relatively humble beginnings, nursing terminologies have evolved significantly over the past several decades in line with best practices in terminology work, from simple lists of words or phrases to large, complex so-called ontologies (descriptions of entities within a domain and the relationships between them). This evolution has been facilitated by advances in knowledge representation, e.g., the refinement of the description logic that underpins many contemporary ontologies, and in their accompanying technologies, e.g., automated reasoners that can check consistency and identify equivalence and subsumption (i.e., subclass–superclass) relationships within those ontologies. The following section expands on two of the terminologies listed previously: NANDA and ICNP. These terminologies have been selected as examples to demonstrate the relative extremes of the terminological evolutionary path. No assumption should be made that either of the example terminologies is better than or worse than the other. Nor should any assumption be made that either of these terminologies is better than or worse than any other terminology. The examples merely represent different approaches that serve to complement one another, affording an opportunity for synergism.

Enumerative Approach

With the enumerative approach, words or phrases are represented in a list or a simple hierarchy. In NANDA, a nursing diagnosis has an associated name or label and a textual definition (NANDA International, 2008). Each nursing diagnosis may have a set of defining characteristics and related or risk factors. These additional features do not constitute part of the core terminology. Instead, they are intended to be used as an aid to diagnosis. As mentioned previously, NANDA's multiaxial taxonomy (i.e., Taxonomy II) organizes nursing diagnoses into classes and domains. While Taxonomy II provides an organizational framework for NANDA nursing diagnoses, it makes no attempt to organize nursing diagnoses among themselves; i.e., there are no hierarchical relationships among NANDA nursing diagnoses. Furthermore, there are no associative relationships apart from the implicit and global sibling relationship; i.e., every nursing diagnosis appears at the same level of indentation in the list, and there is no means to identify equivalent nursing diagnoses. However, what NANDA may lack in terms of hierarchical sophistication, it makes up for in terms of simplicity and potential ease of implementation and use.

Ontological Approach

The ontological approach is compositional in nature and a partial representation of the entities within a domain and the relationships that hold between them. ICNP takes the ontological approach—a different approach than NANDA. ICNP is described as a unified nursing language system. It seeks to provide a resource that can be used to develop local terminologies and to facilitate cross-mapping between terminologies in order to compare and combine data from different sources—the

existence of a number of overlapping but inconsistent standardized nursing terminologies is problematic in terms of data comparison and aggregation

ICNP version 2 is an example of an ontology. The core of ICNP is represented in the Web ontology language (OWL), a recommendation of the World Wide Web Consortium (W3C) and a de facto standard language for representing ontologies (McGuinness & van Harmelen, 2004). The ICNP ontology comprises OWL classes and OWL properties. Classes are organized into a taxonomy. Properties link individuals (i.e., members of classes) together. A simplified graphical representation of chronic confusion showing the hasOnset property and the relationship that holds between individuals in the confusion and chronic classes is shown in Figure 7-1.

As it is underpinned by description logic, OWL permits the use of automated reasoners that can check consistency, identify equivalence, and support classification within the ICNP ontology. The result is a rigorously and predictably defined multiple hierarchy. The compositional nature of the ICNP ontology makes it well suited to support the development of local terminologies; the rich hierarchy (and the opportunity for automated reasoning) makes it well suited to support cross-mapping between terminologies. However, ICNP is computer-based—it may be more powerful than NANDA, but in its raw form it may also be more difficult to implement and use.

EXPLOITING COMMONALITY AMONG NURSING TERMINOLOGIES

There are many differences between NANDA and ICNP. However, they both purport at least to represent nursing diagnoses (ICNP also represents nursing actions

and nursing outcomes); and they are both recognized by ANA (through CNPII) as interface terminologies that support nursing practice.

Indeed there are many differences between the broader set of standardized nursing terminologies in terms of scale, scope, structure, and intended use. But as with NANDA and ICNP there are many similarities, particularly concerning content. These similarities have been exploited in the development of an international technical standard: ISO 18104:2003 health informatics—integration of a reference terminology model for nursing (International Organization for Standardization, 2003). ISO 18104:2003, in routine revision at the time of writing, was developed through a consensus process that considered a number of standardized nursing terminologies in order to determine a model or schema that could outline the basic form of nursing statements (i.e., a reference terminology model for nursing).

At the heart of the standard are in fact two models—a model for nursing diagnosis and a model for nursing action. A graphical representation of the model for statements that describe nursing diagnoses is presented in Figure 7-2. According to this model, for a statement to be considered a valid nursing diagnosis, its decomposition must at minimum comprise both a focus and a judgment. For example, impaired physical mobility would be considered a valid nursing diagnosis as its decomposition would comprise the focus physical mobility and the judgment impaired.

A graphical representation of the model for statements that describe nursing actions is presented in Figure 7-3. As in the previous model, according to this model, for a statement to be considered a valid nursing action, its decomposition

must as a minimum comprise both an action (e.g., monitoring) and a target (e.g., blood glucose, as in the case of monitoring blood glucose).

One of the main purposes cited by ISO 18104:2003 is to facilitate the systematic evaluation and refinement of existing terminologies—discovering anomalies within nursing terminologies through noncompliant decompositions. Another purpose is to support the generation, in regular form, of composite nursing statements—ensuring consistency in emerging terminologies. It is hoped that the standard will facilitate the harmonization or convergence of standardized nursing terminologies across the world.

UTILIZING NURSING TERMINOLOGIES

The discussion thus far has focused predominantly on the developmental aspects of standardized nursing terminologies. However, if these terminologies are to fulfill their various roles, they must of course be used. But as standardized nursing terminologies increase in complexity, they become more difficult to implement; they may be computer-based but they are far from plug-and-play.

This final section describes attempts to ease the burden of implementation through the development of models of terminology use. Terminologies help us to convey our understanding of the world. Models of terminology use help us to structure information for particular purposes. For example, a restaurant menu lists all of the dishes we might wish to order—this represents the terminology. The menu organizes the dishes in a way that encourages us to select dishes, and allows us to select dishes according to our shared view of the world (e.g., appetizer, followed by main course, followed by dessert)—this represents the model of terminology use.

The menu encourages us to make use of the terminology while delivering it in a way that fits with the task at hand.

A terminology or ontology describes how general entities (i.e., classes such as leg) are represented and how those representations relate to each other. In contrast, a model of terminology use describes how particular entities (i.e., individual entities such as John's leg) are represented and how those representations relate to each other. A model of terminology use may have an informational facet (e.g., relating to a record structure, message, etc.) and/or an operational facet (e.g., relating to a pick list for data entry, query reports, etc.).

In a particular context of use and at a particular point in time, it may not be natural for users to view particular data items in the form of a terminology or ontology—indeed this would rarely be the case. A model of terminology use seeks to organize data items in a way that fits with that context at that time.

Previously the onus had been on the developers of end-user applications to determine their own models of terminology use. The nursing terminologies were standardized, but the models of terminology use were not. These were often embedded within applications, and it would not be possible to share the valuable clinical and pragmatic knowledge they contained. There had been much duplication of effort, with the developers of end-user applications and their prospective users working towards the same goal, but in parallel streams. This situation provided a major motivation for further standards development—standards that might support the shared development of shareable models of terminology use. Examples of a shareable model of terminology use include archetypes, care information models,

clinical statements, templates, clinical elements, detailed clinical models, etc. Archetypes will be used as an example to illustrate the common principles that underpin many of these initiatives.

An archetype is “a computable expression of a domain content model in the form of structured constraint statements, based on a reference (information) model” (Beale & Heard, 2007, p. 8). In routine general clinical practice, a blood pressure observation usually comprises, at a minimum, a systolic blood pressure and a diastolic blood pressure. Without an explicit model of terminology use, these would either remain as separate terms in a terminology or ontology, or they would need to be linked together within individual end-user applications. Archetypes capture this knowledge along with appropriate terminological bindings and other non-terminological details such as associated units (e.g., mm Hg, minimum value = 0, etc.). Thus archetypes provide a means of defining explicitly clinical and pragmatic knowledge apart from the applications that might use it.

SUMMARY

This chapter has described the need for and motivation behind the development of standardized terminologies for nursing. It has described different approaches to terminology development and introduced initiatives that seek to exploit commonalities among today's terminologies and to ensure their appropriate implementation and consistent use. The results of contemporary terminology work are encouraging. However, further work is needed to harmonise standardized nursing terminologies and to scale up and mainstream the development and implementation of models of terminology use.

In an ideal world, I'd like to see standardized nursing terminologies and the structures and systems that support their implementation and use merely as means to an end; as tools to support good nursing practice and good patient care. Standardized nursing terminologies are important. However, they do not obviate the need to think and work creatively, to do right by the people in our care and to continue to advance nursing.

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Key Terms

Accessibility

Archetypes

Enumerative approach

Longevity

Model of terminology use

Nursing terminology

Ontological approach

Ontology

Reusability

Standardized nursing terminology

Term

Terminology

Ubiquity

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Standardized Nursing Terminologies | | **CHAPTER 7 Developing Standardized Terminologies in Nursing Informatics**

APPROACHES TO NURSING TERMINOLOGY | FIGURE 7-1

-Simplified OWL representation of chronic confusion. Squares represent classes, while circles represent individuals with classes. The arrow represents a relationship along the hasOnset property.

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EXPLOITING COMMONALITY AMONG NURSING

TERMINOLOGIES | FIGURE 7-2

Model for nursing diagnosis.

SOURCE: THE TERMS AND DEFINITIONS TAKEN FROM ISO 18104:2003 HEALTH INFORMATICS—INTEGRATION OF A REFERENCE TERMINOLOGY MODEL FOR NURSING ARE REPRODUCED WITH THE PERMISSION OF THE INTERNATIONAL ORGANIZATION OF STANDARDIZATION (ISO). THE STANDARD CAN BE OBTAINED FROM ANY ISO MEMBER AND FROM THE WEB SITE OF THE ISO CENTRAL SECRETARIAT AT THE FOLLOWING ADDRESS: [HTTP://WWW.ISO.ORG](http://www.iso.org). COPYRIGHT REMAINS WITH ISO.

FIGURE 7-3

Model for nursing action.

SOURCE: The terms and definitions taken from ISO 18104:2003 health informatics—integration of a reference terminology model for nursing are reproduced with the permission of the International Organization of Standardization (ISO). The standard can be obtained from any ISO member and from the Web site of the ISO central secretariat at the following address: <http://www.iso.org>. Copyright remains with ISO.

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SUMMARY | THOUGHT-PROVOKING QUESTIONS

1. -What do you believe are the advantages and disadvantages of having a single shared consensus-driven model of terminology use?
2. -How can a single agreed-upon model of terminology use (with linkages to a single terminology) help to integrate knowledge into routine clinical practice?

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