Development of the nursing problem list subset of SNOMED CT®

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ABSTRACT

Objective: To create an interoperable set of nursing diagnoses for use in the patient problem list in the EHR to support interoperability.
Design: Queries for nursing diagnostic concepts were executed against the UMLS Metathesaurus to retrieve all nursing diagnoses across four nursing terminologies where the concept was also represented in SNOMED CT. A candidate data set was retrieved and included the nursing diagnoses and corresponding SNOMED CT concepts from the UMLS Metathesaurus. The team members identified the concepts that met the semantic selection criteria for inclusion in the nursing problem list.
Results: 1320 concepts were returned in the initial UMLS Metathesaurus query of nursing diagnostic concepts. Further analysis was conducted to identify those nursing diagnostic concepts mapped to SNOMED CT and duplicate concepts were removed resulting in 591 unique UMLS Metathesaurus concepts. The query extracted all concepts from two of the nursing terminologies that contained interventions and outcomes. After cleaning the dataset, the final count of SNOMED CT concepts in the nursing problem list subset is 369.
Conclusions: The problem list is a key component of the patient care and has been acknowledged as critical by the EHR Meaningful Use criteria. Nursing diagnoses on the problem list are foundational for constructing a nursing care plan. A multidisciplinary patient problem list will facilitate communication and evaluation of the contribution of nursing care to the patient's clinical care experiences and outcomes.

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1. Introduction

As nurses care for patients, they develop individualized plans of care to guide assessments, evaluate nursing diagnoses, specify interventions, and identify outcomes. Nursing diagnoses are clinical judgments made by nurses within their scope of practice. The diagnoses communicate nurses' judgment to other clinicians. There are six nursing terminologies, recognized by the American Nurses Association (ANA) [1], that contain nursing diagnoses. These terminologies have standardized codes that provide the ability to code the data for entry and retrieval in electronic health records (EHRs). Unfortunately, this means that six different nursing terminologies can be used for documenting nursing diagnostic concepts. When a different terminology is used, the nursing diagnosis may appear to be different as the words, or terms used to

represent the diagnostic concept, and practice context are different; however the concept remains the same. When a patient is transferred to another facility or care setting, the care plan may or may not accompany the patient. In addition, nurses in the new care setting may or may not use the same nursing terminology as the sending facility to represent the concepts in the patient's nursing plan of care. This variability of nursing terminologies across settings raises the issue of consistency, interoperability, and accuracy of a patient's nursing diagnoses across the care continuum.

This study addressed the variability in representation of nursing diagnoses (problems) across nursing terminologies resulting in diminished interoperability. A nursing problem list subset was developed using the Systemized Nomenclature of Medicine – Clinical Terms® (SNOMED CT®). The selection of SNOMED CT as the source for codes for the nursing problem list subset was based on two precedents. First, the National Committee on Vital and Health Statistics (NCVHS) published recommendations for terminologies to facilitate interoperability and they recommended the

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use of SNOMED CT as the core clinical terminology [23]. Second, the US National Library of Medicine (NLM) is the US Member of the International Health Terminology Standards Development Organisation (IHTSDO), the organization that owns and distributes SNOMED CT. As the US Member, NLM is the US distributor of SNOMED CT and pays the annual license fee thus supporting its free use in clinical applications in the United States; hence there is no fee for use in clinical agencies. SNOMED CT is distributed through the Unified Medical Language System (UMLS®) and is easily available. The aim of this study was to create an interoperable set of nursing diagnoses for use in the patient problem list in the EHR to support interoperability of nursing diagnoses between care settings and information systems. The subset will be distributed through NLM's UMLS Metathesaurus [21].

2. Background

There is a critical need for standardization in nursing documentation to support the ability to share comparable data with other healthcare organizations or settings. Sharing data without the need for translation is the definition of interoperability [18]. Standardized clinical terminologies must be implemented within the EHR to achieve interoperability [7]. The ANA strongly supports interoperability, as evidenced by the work of the Committee for Nursing Practice Information Infrastructure (CNPII). The CNPII recognizes terminologies appropriate for use by nursing [32]. To gain approval, the terminologies must meet defined criteria, for example, supporting the nursing process. A nursing diagnosis is one of the data elements of the nursing process. The ANA has recognized six nursing terminologies that include nursing problems or diagnoses: Clinical Care Classification System (CCC), Omaha System, NANDA International (NANDA-I), Perioperative Nursing Data Set, the International Classification for Nursing Practice (ICNP) and SNOMED CT.

3. Problem lists

The idea of a problem list is credited to Lawrence Weed, with the goal of creating a problem oriented patient record that would reveal the critical thinking of the clinician [34]. Each problem is documented with supporting signs and symptoms and corresponding orders. Each succeeding note evaluates the care documented in the previous note. This makes it easy to determine past and present problems, interventions for each problem, and the patient outcome(s) for each problem. The problem list is used to organize the patient's problems so that clinicians can view, at a glance, all patient problems from a multidisciplinary perspective. Using problem lists ensures clinical treatment given by one provider does not adversely interact with those given by another provider. Problem list management should be the responsibility of healthcare team members according to their respective scopes of practice, i.e., physicians manage the medical diagnoses, nurses manage the nursing diagnoses and so on.

Nursing has adopted the problem list in a limited fashion; however, there are reports of its successful use [5]. Electronic health records are beginning to adopt the functionality of a patient problem list. Yet, there is still a need to develop a standardized, encoded terminology to populate the list. In the US, SNOMED CT has been acknowledged as the best candidate for populating a patient problem list [13,14].

4. Nursing diagnosis terminologies

As noted previously, there are multiple nursing terminologies representing nursing diagnosis [1]. The terminologies have both commonalities and differences. For example, the diagnostic concepts of PNDS (a classification to provide coverage for a specialty area of nursing) are identical to the NANDA-I [2], certain CCC nursing diagnostic concepts were adapted from NANDA-I [28], and ICNP aims to support cross mapping across nursing terminologies [19].

The way in which a nursing diagnosis is defined and classified in ICNP is different from the conceptual schemas employed in the other nursing terminologies. The ICNP is designed using Web Ontology Language (OWL) in the Protégé ontology development environment. Each concept in ICNP is formally defined using description logic and is classified automatically by a reasoner according to its formal properties [19]. As the science of both nursing and knowledge representation evolves, so to do healthcare terminologies. This study can contribute to these ongoing developments to promote interoperability among unique and shared content within the nursing domain and across the domains of other health professionals.

5. SNOMED CT

SNOMED CT is an internationally recognized healthcare vocabulary that provides a common language for health information systems. SNOMED CT is considered one of the most comprehensive clinical terminologies in the world, covering nursing, medicine, and allied health [17]. SNOMED CT enables a consistent way of capturing, sharing, and aggregating health data across specialties and sites of care. The use of SNOMED CT provides interoperable coded data that leverages the implementation of evidence-based practice, facilitates decision support rules, and ultimately contributes towards improving the quality of patient care. SNOMED CT contains 19 top-level hierarchies; examples of those hierarchies include Procedures, Clinical Finding, Body Structure and Observable Entity.

In 1998, the College of American Pathologists (CAP) and SNOMED Editorial Board began collaborations with the developers of the ANA recognized terminologies to integrate their content into SNOMED Reference Terminology (SNOMED RT). Subsequently, Bakken et al. evaluated the usefulness of integrating nursing diagnosis concepts into SNOMED CT [3,4]. Their findings supported the integration of nursing diagnoses into SNOMED CT. Currently, the diagnostic concept content of CCC, Omaha System, NANDA-I, and PNDS has been integrated into SNOMED CT. Only the concepts have been integrated, the classification structures, definitions, and other information captured in the terminologies are not integrated into SNOMED CT. The integration work was done in collaboration with the SNOMED CT Nursing Work Group and the nursing terminology developers [33].

In 2007, the International Health Terminology Standards Development Organisation (IHTSDO) a not-for-profit association in Denmark was created to obtain the intellectual property rights to SNOMED CT and ensure the ongoing development and distribution of SNOMED CT on an international level (www.ihtsdo.org). The Nursing Work Group transitioned from the previous CAP governance to the new IHTSDO organization and became the Nursing Special Interest Group (SIG). The ISO 18104 standard for the composition of a nursing diagnosis, previously guiding the work at CAP, was adopted by IHTSDO as the standard for representing nursing diagnoses in SNOMED CT [20]. The model calls for a focus, judgment, dimension, site, and subject of information. IHTSDO, in adherence to ISO 18104, uses the focus and judgment as a minimum requirement for nursing diagnoses. The subject of information is assumed to be the individual (patient) unless otherwise specified. Furthermore, IHTSDO specified that the semantic location for nursing diagnostic concept is the Clinical Finding hierarchy. Integration of ICNP concept content into SNOMED CT is currently under development, guided by a Collaborative Agreement between ICN and IHTSDO [16]. The close collaboration between the two organizations is designed to reduce gaps and overlaps in these standardized terminologies in order to foster interoperability in health information systems.