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Towards Interoperability: A new resource to support nursing terminology standards

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Keywords

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With the advent of the Health Information Technology for Economic and Clinical Health (HITECH) Act and the Affordable Care Act (ACA) there have been profound changes in the use of standardized terminologies in healthcare in the United States (US).^{1, 2} Together these legislative acts mandate five terminologies for use in electronic health records (EHRs) to support interoperability of healthcare data and the Learning Health System. These include: SNOMED CT, Logical Observations Identifiers Names and Codes (LOINC), RxNorm, Current Procedure Terminology (CPT-4), and the International Classification of Diseases Ninth Revision, Clinical Modification (ICD-9-CM). To assist with the adoption of the legislation, the Medicare and Medicaid EHR Incentive Program provides financial incentives for the “meaningful use” (MU) of certified EHR technology.

The US National Library of Medicine (NLM) is the central coordinating body for clinical terminology standards within the Department of Health and Human Services (HHS). Working closely with the Office of the National Coordinator for Health Information Technology (ONC), NLM supports the use of healthcare terminologies through a number of resources and services, including the Unified Medical Language System (UMLS) Terminology Services (UTS).³ NLM also supports the free access and maintenance of SNOMED CT, LOINC, and RxNorm.³

NLM developed and maintains the UMLS Metathesaurus, a compendium of more than 150 controlled biomedical vocabularies including terminologies mandated by the HITECH Act and the American Nurses Association (ANA) recognized nursing terminologies.^{3, 4, 5} A major benefit of the Metathesaurus is the ability to obtain synonymous links between terms from two or more terminologies.⁶ With this in mind, and in response to the numerous requests received by nurses for maps between the ANA recognized nursing terminologies

and the HITECH Act mandated terminologies, the NLM developed a new web resource describing use of the Metathesaurus to respond to these requests.^{5, 7} The purpose of this paper is to present this new webpage - “Nursing Resources for Standards and Interoperability”.⁸

Background

Nursing terminologies are terms specific to the nursing profession that facilitate standardized documentation of nursing care. These terminologies allow documentation of nursing assessments, diagnoses, interventions, and outcomes. They identify, define, and code concepts used to represent nursing knowledge. The ANA began recognizing standard terminologies in 1989.^{5, 7} Ten terminologies are recognized, of which nine are used within an electronic health record (EHR) to encode nursing data. The ANA recognized nursing terminologies included in the UMLS Metathesaurus are listed in Table 1, including the healthcare area(s) primarily covered for each.^{4, 5}

In March 2015, the ANA published a position paper to promote the integration of recognized nursing terminologies with national requirements for standardization of data and information exchange.⁹ Achieving this goal requires synonymous links (cross-maps) between the recognized ANA nursing terminologies and the HITECH Act mandated terminologies. For many years the College of American Pathologists (CAP) maintained and published cross-maps between several nursing terminologies and SNOMED CT for this very purpose.^{7, 10, 11} With the sale of the intellectual property rights of SNOMED CT to the International Health Terminology Standards Development Organisation (IHTSDO) in 2007, and the decision by CAP to close their informatics consulting business in 2013, these maps are no longer available in a prepackaged format. However, the maps can be derived from the UMLS Metathesaurus. In fact, one-to-one linkages between all these terminologies can be achieved through the Metathesaurus.⁶ The new nursing page is designed to assist with this task and to provide a comprehensive resource for those interested in nursing terminologies and standards.⁸

SNOMED CT

SNOMED CT, a vocabulary mandated for MU, is a clinical terminology covering a broad spectrum of clinical specialties and disciplines. The IHTSDO owns, maintains, and distributes the International Release of SNOMED CT. NLM, the US National Release Center, provides free access to SNOMED CT (both the International Release and the US Edition) to anyone in the US with a Metathesaurus License.¹² NLM also maintains SNOMED CT subsets (e.g. the Clinical Observations Recording and Encoding (CORE) Problem List Subset and the Nursing Problem List Subset) to facilitate adherence to MU and encourage interoperability between terminologies.^{13, 14} In the case of nursing terminologies, the variety of nursing terminologies available is not necessarily conducive to the exchange of health information through EHRs. Recognizing this, the IHTSDO formed a Special Interest Group (SIG) for Nursing and a collaborative agreement with the International Council of Nurses (ICN) to support the representation of nursing terms in SNOMED CT.^{15, 16}

LOINC

LOINC, produced by the Regenstrief Institute, is a standard terminology for laboratory and clinical observations and document types. In addition to being a standard mandated for MU, the National Committee on Vital and Health Statistics recommended the use of LOINC in assessment forms for functional status and questionnaires.^{17, 18} Specific to nursing, clinical LOINC contains assessment observations, scales (e.g. Braden and Glasgow coma score), and outcomes.¹⁹ The Regenstrief Institute recently developed the Clinical LOINC Nursing Subcommittee to provide LOINC codes for observations at key stages of the nursing process, including assessments, goals, and outcomes, and to meet the needs for administrative and regulatory data related to nursing care.¹⁷

Nursing Position Statements

The March 2015 ANA position paper recommended that “when exchanging Consolidated Continuity of Care Documents (C-CDA) with another setting for problems and care plans, SNOMED CT and LOINC should be used for exchange.”⁹ Additionally, in March 2015 at the Health Information Management Systems Society (HIMSS) conference, the Chief Nursing Officer/Chief Nursing Information Officer (CNO-CNIO) Vendor Roundtable recommended 10 *Guiding Principles for Big Data in Nursing*, of which, four endorse standards and interoperability.²⁰ The recommendation promotes standard terminologies and suggests that all care settings create a plan for mapping ANA recognized nursing terminologies to national standards such as SNOMED CT or LOINC.

Website Development

These driving forces, and high demand from stakeholders, highlighted the need for a new resource to facilitate the exchange of health data specific for nursing. The authors of this paper collaborated to create a new webpage, “Nursing Resources for Standards and Interoperability.” The results of the project are depicted in Figure 1.

To start, the project team created a scope document to guide the development of the project. The team then developed and identified content and resources specific for nursing, for inclusion on the webpage. With the ANA and HIMSS position statements and MU in mind, the decision was made to focus on use of SNOMED CT and LOINC in nursing and nursing care documentation. It was anticipated that the primary users of the webpage would be nurses, nursing students, nursing informaticists, and those exploring nursing terminologies for systems development and/or integration purposes. The webpage was thus designed to assist with accessing information about the relevant mandated terminologies, the ANA recognized nursing terminologies, and other terminologies of interest.

The webpage includes tabs to access descriptions of SNOMED CT, LOINC, and ‘Other Nursing Terminologies’. The ‘Other Nursing Terminologies’ listed include the ANA recognized nursing terminologies included in the UMLS. The highlight of the webpage is a video tutorial demonstrating use of the Metathesaurus to extract synonymy between nursing terminologies - the method originally used to create the Nursing Problem List Subset of SNOMED CT.²¹ The tutorial shows how to use the UMLS Metathesaurus Browser to quickly and effectively discover terms in SNOMED CT that are synonymous to terms in

other nursing terminologies. This is beneficial for nurses familiar with the different nursing terminologies but wanting to utilize SNOMED CT as per MU and the ANA recommendations.⁸

The remainder of the webpage lists hyperlinks to additional resources of interest. 'NLM Resources' links to the UMLS Video Learning Resources, NLM Tools for EHR Certification and MU, LOINC, RxNorm, and the Value Set Authority Center (VSAC) webpages. 'Related Links' includes links to the IHTSDO, the IHTSDO Nursing Special Interest Group, LOINC, the Clinical LOINC Nursing Subcommittee, and the ANA.

Conclusion

The "Nursing Resources for Standards and Interoperability" webpage is a valuable resource for the nursing community. In addition to highlighting valuable resources from NLM and beyond, the webpage provides detailed information about why particular standards are pertinent and necessary for use in nursing and nursing care documentation.

The new webpage supports synonymous mappings between SNOMED CT, LOINC, and other ANA recognized terminologies thus providing a valuable resource for nurses, nursing students, nursing informaticists, and those exploring nursing terminologies for systems development or integration purposes. Leveraging structured terminologies such as LOINC and SNOMED CT within clinical documentation contributes to care collaboration, automated communication between nurses and other health care providers, the determination of effective nursing interventions, and identification of evidence based practice. Sharable encoded patient data is the key to the development and evolution of nursing knowledge. Please join us in using this valuable new nursing resource.⁸

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Key points

- Unified Medical Language System Terminology Services Metathesaurus
- Synonymous links between 10 ANA-recognized standardized terminologies and five HITECH-mandated terminologies
- NLM-developed Web page as information resource for nurses' use of UMLS

The screenshot shows the 'Nursing Resources for Standards and Interoperability' page on the NIH website. The page is divided into several sections:

- Target Audience:** nurses, nursing students, nursing informatics, and those exploring nursing terminologies for systems development or integration purposes. Discover:
 - The role of SNOMED CT and LOINC in implementing Meaningful Use (MU) in the United States (US).
 - International collaboration to harmonize nursing terminologies and facilitate interoperability.
 - How to find Concept Unique Identifiers (CUIs) and extract synonymy from the Unified Medical Language System (UMLS) Metathesaurus between SNOMED CT and other nursing terminologies such as CCC, ICNP, NANDA-I, NIC, NOC, The Omaha System, and PNDs (see 'Other Nursing Terminologies' tab below).
 - Additional resources for nursing clinical documentation purposes.
- About SNOMED CT:** SNOMED Clinical Terms (SNOMED CT) is a standardized terminology used for clinical documentation in electronic health information systems. The International Health Terminology Standards Development Organization (IHTSDO) owns, maintains, and distributes SNOMED CT. The National Library of Medicine, the United States National Release Center for the IHTSDO, provides access to SNOMED at no cost for use within the US. SNOMED CT is the most comprehensive, multilingual clinical healthcare terminology in the world. The terminology covers a wide range of clinical specialties, disciplines and requirements. This range of coverage allows for wider sharing and reuse of structured clinical information. With over 2 million components in SNOMED CT, domains such as nursing are generally well-covered with concepts specific for nursing diagnoses, interventions, and patient outcomes.
- Related Sites:**
 - IHTSDO home page
 - IHTSDO Nursing Special Interest Group
 - LOINC from Regenstrief
 - Clinical LOINC Nursing Subcommittee
 - American Nurses Association (ANA) webpage

On the right side, there is a video player titled 'Leveraging UMLS Synonymy to Extract Nursing Terms from SNOMED CT' with a description: 'The video below demonstrates how to use the UMLS Metathesaurus to find CUIs and extract concept-level synonyms between SNOMED CT and other nursing terminologies.' Below the video player is a list of 'NLM Resources' including 'UMLS Video Learning Resources', 'NLM Tools for EHR Certification and Meaningful Use', 'SNOMED CT', 'LOINC', 'RxNorm', and 'Value Set Authority Center'.

Figure 1.
Nursing Resources for Standards and Interoperability Web page.

Table 1

ANA Recognized Nursing Terminologies for use in EHRs

Terminology	Diagnosis/Problem	Intervention	Outcome	Assessment	Version in UMLS version 2015AA
Clinical Care Classification (CCC)	X	X	X		Version 2.5
International Classification of Nursing Practice (ICNP)	X	X	X	X	ICNP_2013
Logical Identifiers Names and Codes (LOINC)			X	X	LOINC, 2.52
North American Nursing Diagnosis International (NANDA-I)	X				2004
Nursing Intervention Classification (NIC)		X			2005
Nursing Outcomes Classification (NOC)			X		3 rd Edition
Omaha System (OMS)	X	X	X		2005
Peri-operative Nursing Data Set (PNDS)	X	X	X		2011
SNOMED CT	X	X	X	X	2015_03_01