

# Coding Nursing Assessments Using SNOMED CT® and LOINC®

Susan Matney, MSN, RNC, PhD(c), FAAN  
3M Health Information Systems

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## Objectives

- ▶ Describe the drivers for standardization of healthcare data (including nursing)
- ▶ Overview of SNOMED CT® and LOINC®
- ▶ Illustrate how SNOMED CT® and LOINC® can be used to bridge disparate nursing terminologies
- ▶ Discuss the current status of nursing assessments included in LOINC®

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## Key National Standards

## National Standards



A Blueprint  
for the  
CMS Measures Management System

Version 10.0 September 2013  
Volume 1 Measure Development  
Volume 2 Measure Maintenance



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## ONC Mandated Vocabulary Standards

Table 5: ONC HIT Standards Committee Recommended Vocabulary Standards Summary

Clinical Vocabulary Standards:	Others:
SNOMED CT	CVX
LOINC	CDC-PHIN/VADS
RxNorm	UCUM
	ISO-639

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## Nursing Alignment

Table 8: Quality Data Model Categories with ONC HIT Standards Committee Recommended Vocabularies

General Clinical Concept	Quality Data Model Category	Clinical Vocabulary Standards	Nursing Alignment
Condition/ Diagnosis/ Problem	Condition/ Diagnosis/ Problem	SNOMED CT	Nursing Diagnosis
Symptom	Symptom	SNOMED CT	Nursing Diagnosis
Physical exam finding	Physical Exam	SNOMED CT	Nursing Assessment Finding
Intervention	Intervention	SNOMED CT	Nursing Intervention
Procedure	Procedure	SNOMED CT	Nursing Intervention
Assessment Questions	Individual Characteristic	LOINC	Nursing Assessment Question

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## Vocabulary-Related Nursing Meaningful Use Requirements

### Problem list of current and active diagnoses based SNOMED CT

- ▶ The SNOMED CT® nursing problem subset
  - Contains SNOMED CT® codes that have a mapping in UMLS to other nursing terminologies
  - Distributed through the US National Library of Medicine Unified Medical Language System (UMLS)
  - Supports Meaningful Use problem list criteria

## IHTSDO News Release

IHTSDO delivering SNOMED CT® the global clinical terminology  
 February 2014  
 THE INTERNATIONAL HEALTH TERMINOLOGY STANDARDS DEVELOPMENT ORGANIZATION  
 www.ihtsdo.org

### SNOMED CT – Supporting Meaningful Use

**Introduction**  
 SNOMED CT® is a comprehensive clinical terminology that is freely available for use in the U.S. through the National Library of Medicine (NLM).

**Meaningful Use Stage 2 Rules**  
 The Office of the National Coordinator for Health Information Technology (ONC) and CMS have adopted SNOMED CT as one of the key vocabularies for Meaningful Use Stage 2, ICD certification, and health information exchange.

**SNOMED CT has been specified in the federal regulations published in September 2012 (see Federal Register Vol. 77, No. 171), in which it is recommended for documenting patient problems, encounter diagnosis, procedures, family health history, and smoking status.**

**Meaningful Use Objectives Supported**

1. Maintain an up-to-date problem list of current and active diagnoses
2. Record patient family health history as structure data
3. Identify and report cancer cases to a State cancer registry
4. Record and chart changes in vital signs
5. Record smoking status
6. Provide a summary care record for each transition of care

**Resources for Implementation of SNOMED CT – encoded problem lists**  
 There is no need to fret at the size and comprehensiveness of the entire terminology – but you should know about some key resources that are designed to help with implementation. These include subsets that identify the most commonly used codes and terms, mappings to ICD-9-CM and ICD-10-CM, and browsers that assist in finding other codes for local customization.

**Subsets**  
 Several subsets are available:  
 CORE Problem List of SNOMED CT: A subset developed by the CORE project (CORE stands for Clinical Observations Recording and Encoding), identifies codes most useful for documentation and encoding of clinical information at a summary level, such as problem list, discharge diagnosis or reason for encounter. Terms in the subset were selected based on their actual frequency of usage in clinical documentation.

**Nursing Problem List Subset**  
 Nursing Problem List Subset of SNOMED CT intended to facilitate the use of SNOMED CT as the primary coding terminology for nursing problems used in care planning, problem lists or other summary level clinical documentation.

[http://ihtsdo.org/fileadmin/user\\_upload/Docs\\_01/Publications/SNOMED\\_CT/SnomedCT\\_MeaningfulUse\\_20140219.pdf](http://ihtsdo.org/fileadmin/user_upload/Docs_01/Publications/SNOMED_CT/SnomedCT_MeaningfulUse_20140219.pdf)

U.S. National Library of Medicine  
National Institutes of Health

Unified Medical Language System® (UMLS®)

### Nursing Problem List Subset of SNOMED CT

Nursing Problem List Subset File	Derived from SNOMED CT International Release version	Derived from UMLS Metathesaurus version	Number of Concepts
NursingProblemListSubset_201206.zip	January 2012	2012AA	417
NursingProblemListSubset_20120606.zip	July 2010	2010AR	364

**Introduction**  
The SNOMED CT® encoded Nursing Problem List Subset, intended for use in patients' problem lists, is an output of the Unified Medical Language System® (UMLS®) Metathesaurus® that is based on nursing diagnosis concepts found within the Metathesaurus.

**Purpose and use of subset**  
The main purpose of the Nursing Problem List Subset of SNOMED CT is to facilitate the use of SNOMED CT as the primary coding terminology for nursing problems used in care planning, problem lists or other summary level clinical documentation.

The use of a common list of SNOMED CT concepts will maximize data interoperability among institutions. Local problem list vocabularies often need to expand to satisfy specific user needs. Institutions that are using their own nursing problem list vocabularies are encouraged to map them to SNOMED CT with a focus on those nursing diagnosis concepts to facilitate data interoperability. The UMLS Factbook (SNOMED) includes a SNOMED CT browser that may be used for this purpose. The SNOMED CT Browser is available through the SNOMED CT menu of the UMLS.

**Choice of SNOMED CT concepts**  
To find the most appropriate SNOMED CT concepts for each problem list term, the following guidelines are used:

- Only current SNOMED CT concepts are included (concept status = 0).
- Concepts belonging to the non-human Subset are excluded.
- Most concepts are chosen from the SNOMED CT clinical finding hierarchy.

[www.nlm.nih.gov/research/umls/Snomed/nursing\\_problist\\_subset.html](http://www.nlm.nih.gov/research/umls/Snomed/nursing_problist_subset.html)

# Overview of LOINC® and SNOMED CT®

» [www.LOINC.org](http://www.LOINC.org)  
[www.ihtsdo.org](http://www.ihtsdo.org)

[www.LOINC.org](http://www.LOINC.org)  
[www.ihtsdo.org](http://www.ihtsdo.org)

**LOINC®**  
*From Regentrief*

Downloads Documentation New

A universal code system for tests, measurements, and observations.

*How do you say glucose?*

More than 32,000 people in 162 countries use LOINC to make bridges across their islands of health data.

**It's free, but invaluable.**

[www.LOINC.org](http://www.LOINC.org)

## LOINC®

- Logical Observation Identifiers Names and Codes (LOINC®)
  - Provides a standard set of universal names and codes for identifying individual laboratory and clinical results (observations made on specimens)
  - Also facilitates standardization of observations (other than lab) made on patients such as entries for vital signs, intake/output, EKG, and scales (e.g., Glasgow Coma Scale)

(Regentrief Institute, 2011)

## General Form of Clinical LOINC® Names

LOINC® codes are created systematically using a six axis model

<component> : <property> :  
<timing> : <system> :  
<scale> : <method>

8331-1 Body Temperature :TEMP :PT :MOUTH :QN

The first 5 parts are mandatory, but *method* is optional. Subparts of the six axes are created as needed in specific subject areas.

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## Summary of the six primary axes (clinical)

- ▶ **Component**
  - Substance or entity that is measured, evaluated, or observed
- ▶ **Kind of property**
  - Characteristic or attribute of the component that is measured, evaluated, or observed
- ▶ **Timing**
  - Interval of time over which the observation or measurement was made
- ▶ **System**
  - System (context) or body part about which the observation was made
- ▶ **Scale**
  - Quantitative, ordinal, nominal (coded), narrative
- ▶ **Method**
  - Procedure used to make the measurement or observation. Only used when it makes an important distinction in sensitivity or specificity

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## Examples of the six axes

- ▶ **Component**
  - Ejection fraction, heart beats, cardiac output, circumference
- ▶ **Kind of property**
  - Angle, area, length, mass, pressure, temperature
- ▶ **Timing**
  - Point in time, study minimum, maximum in 8 hours
- ▶ **System**
  - Head of fetus, tricuspid valve, ventilator setting, patient, family, community
- ▶ **Scale**
  - Quantitative, ordinal, nominal (coded), narrative
- ▶ **Method**
  - Stated, measured, estimated, ultrasound, spirometry

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## LOINC® – Putting it all together

Code	Component	Prop	TIME	System	Scale	Method
8302-2	BODY HGHT	LEN	PT	^PATIENT	QN	
8301-4	BODY HGHT	LEN	PT	^PATIENT	QN	EST
3138-5	BODY HGHT	LEN	PT	^PATIENT	QN	STATED
8331-1	BODY TEMP	TEMP	PT	MOUTH	QN	
21611-9	AGE	TIME	PT	^PATIENT	QN	EST
21612-7	AGE	TIME	PT	^PATIENT	QN	REPORT
9279-1	BREATHS	NRAT	PT	RESP SYS	QN	
28432-3	GRIEF.STAT	FIND	PT	^FAMILY	ORD	OMAHA
39126-8	LENGTH	LEN	PT	WOUND	QN	

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**SNOMED CT®**

INTERNATIONAL HEALTH TERMINOLOGY  
STANDARDS DEVELOPMENT ORGANISATION

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**Conference Presentations**  
Showcase Presentations  
Conference October 2013  
Introducing SNOMED CT  
Conference Archive  
Conference Photographs

**Introducing SNOMED CT**

SNOMED Clinical Terms Overview 2008 (August, 2008)  
PowerPoint Presentation by the IHTSDO Chief Terminologist, Kent Spackman.

SNOMED Clinical Terms Basics 2008 (August, 2008)  
PowerPoint Presentation by the IHTSDO Chief Terminologist, Kent Spackman.

SNOMED Clinical Terms Fundamentals (December 14, 2007)  
This presentation gives an introduction to SNOMED CT. What is SNOMED CT, what is it for, how is it organized, etc.

SNOMED CT Browsers  
A list of SNOMED CT browsers that allow you to look at the content of SNOMED CT.

**SNOMED CT Training Videos**

www.ihtsdo.org 17

## SNOMED CT

- **Systemized Nomenclature of Medicine Clinical Terms**
  - Extensive multi-hierarchical concept-oriented clinical terminology
  - College of American Pathologists (CAP) developed systems to meet coding needs of US pathologists
    - Began in 1965 – SNOP (Systemized Nomenclature of Pathology)
  - Current version developed by CAP and NHS UK by a merger of SNOMED RT (CAP) and CTv3 (NHS)

## Rich Clinical Content

- Finding/disorder (Diseases)
- Procedure/intervention
- Body structure
- Organism
- Specimens
- Pharmaceuticals
- Substances
- Physical objects
- Observable entity
- Staging/scales
- Events
- Social/administrative concepts
- Environment/geographic locations

## SNOMED CT® Structure

- **Hierarchies**
- **Parent child relationships**
  - Vertical structure
  - Concept may have multiple parents
- **Relationships between concepts**
  - Using attributes, concepts may be linked to each other
  - Horizontal relationships

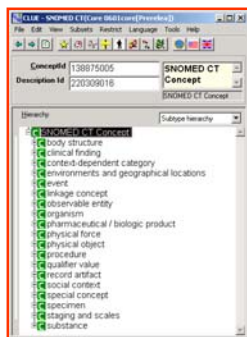
## Concept

- ▶ Basic unit of SNOMED CT®
- ▶ Single clinical meaning identified by a unique numeric identifier (ConceptID) that never changes, with a unique human readable name (Fully Specified Name)
- ▶ Associated with each concept is a set of relationships to other concepts (the “logical definition”) and a set of names or terms
- ▶ Any clinical concept to which a unique Concept Identifier has been assigned
- ▶ Concept IDs are permanent

## Gastric ulcer 397825006

- ▶ **Terms:**
  - Gastric ulcer (disorder)
  - Gastric ulcer
  - Stomach ulcer
  - GU - Gastric ulcer
  - Gastric ulceration
- ▶ **Relationships:**
  - Is\_a → Disease of stomach
  - Is\_a → Gastrointestinal ulcer
  - Associated morphology → Ulcer
  - Finding site → Stomach

## Hierarchies



- 19 upper level hierarchies
- Each hierarchy has sub-hierarchies
- A code in SNOMED CT® can reside in more than on sub-hierarchy of a top-level hierarchy

## Multiple Levels of Granularity

Malignant neoplastic disease (disorder)

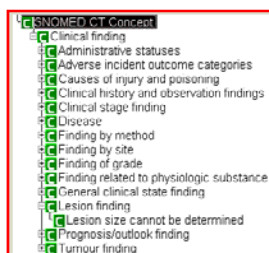
↑ Is\_a

Malignant neoplasm of omentum (disorder)

↑ Is\_a

of Primary malignant neoplasm the omentum (disorder)

## Clinical Finding Hierarchy



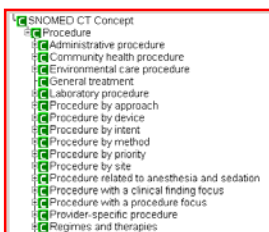
The result of a clinical observation, assessment or judgment

The sub-hierarchy of "Disease" represents those concepts that are necessarily abnormal

## Example Nursing Findings

- ▶ Constipation (disorder) ID 14760008
- ▶ Acute confusion (finding) ID 130987000
- ▶ Fatigue (finding) ID 84229001
- ▶ Social isolation (finding) ID 422650009
- ▶ Activity intolerance (finding) ID 77427003
- ▶ Dirty living conditions (finding) ID 424415008
- ▶ Feeling powerless (finding) ID 33300005
- ▶ Fever (finding) ID 386661006

## Procedure



Represent actions performed in the provision of health care; includes administrative, invasive, diagnostic, and education procedures

## Example Nursing Procedures

- ▶ Removal of catheter (procedure) ID 103715008
- ▶ Intramuscular injection (procedure) ID 76601001
- ▶ Irrigation of oral wound (procedure) ID 234932007
- ▶ Gait evaluation (regime/therapy) ID 39609006
- ▶ Breastfeeding education (procedure) ID 243094003
- ▶ Cardiac monitoring (regime/therapy) ID 23852006

## SCT – Putting it all together

Code	Concept	Semantic Type	Nursing Use
267038008	edema	finding	Nursing Dx
423666004	edema	observable entity	Assmt Measure
<b>79654002</b>	<b>edema</b>	<b>morphologic abn</b>	<b>None</b>
8420001	abrasion	procedure	?? APRN doing
399963005	abrasion	disorder	Finding
400061001	abrasion	morphologic abn	None
297952003	skin normal color	finding	Assmt finding
225549006	skin color yellow	finding	Assmt finding
386339009	intravenous insertion	procedure	Nursing action

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## Aligning with Nursing

- ▶ LOINC®
  - Orders (as Panels)
  - Assessment observations
  - Assessment Scales
  - Scale assessment values (LOINC® answers)
  - Nursing Outcomes
- ▶ SNOMED CT®
  - Assessment findings
  - Nursing diagnosis (and medical)
  - Nursing interventions (procedures)

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## Morse LOINC® Panel

59453-1 Morse Fall Scale panel

**PANEL HIERARCHY**

LOINC#	LOINC Name	R/O/C	Cardinality	Data Type	Ex. UCCM Units
59453-1	Morse Fall Scale panel				
59454-9	History of falling, immediate or within 3 months [Morse Fall Scale]				
59455-6	Secondary diagnosis [Morse Fall Scale]				
59456-4	Antibulky aid [Morse Fall Scale]				
59457-2	Intravenous apparatus [Morse Fall Scale]				
59458-0	Gait [Morse Fall Scale]				
59459-8	Mental status [Morse Fall Scale]				
59460-6	Morse Fall risk total # [Morse Fall Scale]				[#]
59461-4	Morse Fall risk level [Morse Fall Scale]				

**NAME**

Fully-Specified Name:	Component	Property	Time	System	Scale	Method
Morse Fall Scale panel		Find	Pt	^Patient	Ord	

**TERM DEFINITION-DESCRIPTION(S)**

The Morse Fall Scale (MFS) is a rapid and simple method of determining a patient's likelihood of falling. A large majority of nurses (82.9%) rate the scale as "quick and easy to use," and 54% estimated that it took less than 1 minute to rate a patient. The MFS consists of six variables that are quick and easy to score, and it has been shown to have predictive validity and interrater reliability. The MFS is used widely in acute care, hospital, rehabilitation and nursing homes.

Scoring and Risk Level: The MFS score is tallied and recorded on the patient's chart. Risk level and appropriate interventions are then identified.

**BASIC ATTRIBUTES**

Class Type:	PANEL SURVEY MFS Survey
Last Updated:	2010-04-19
Status:	Active

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## Morse LOINC® Answers

59458-0 Gait [Morse Fall Scale]

NAME	Fully-Specified Name	Component	Property	Time	System	Scale	Method
	Gait		Find	Pt	^Patient	Ord	Morse Fall Scale

**BASIC ATTRIBUTES**

Class Type:	SURVEY MFS Survey
Last Updated:	2010-04-19
Status:	Active

**NORMATIVE ANSWER LIST (L1303-6)**

SEQ#	Answer	Code	Score	Answer ID
1	Normal bedrest immobile	0	0	LA13033-8
2	Weak	10	10	LA13034-6
3	Impaired	20	20	LA13035-3

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Generated from LOINC version 2.45

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## Mapping to ANA Nursing Terminologies

## Nursing Assessment Examples

Assessment Measure	SNOMED CT®	LOINC®	Assessment Value
Oxygen saturation	<b>Fully Specified Name:</b> Peripheral oxygen saturation (observable entity) <b>Concept Code:</b> 431314004	<b>Name:</b> Oxygen saturation in capillary blood <b>Code:</b> 2709-4 <b>Fully Specified Name:</b>	<b>Numeric value = 85</b> <b>Units of measure = Percent</b>
Temperature	<b>Fully Specified Name:</b> Body temperature (observable entity) <b>Concept Code:</b> 386725007	<b>Name:</b> Body temperature <b>Code:</b> 8310-5	<b>Numeric value = 85</b> <b>Units of measure = Degrees Fahrenheit</b>
Skin moisture	<b>Fully Specified Name:</b> Moistness of skin (observable entity) <b>Concept Code:</b> 364532007	<b>Name:</b> Moisture of Skin <b>Code:</b> 39129-2 <b>Fully Specified Name:</b> Moisture:Type:PT:Skin :Nom::	<b>Coded Value</b> <b>SNOMED-CT Code =</b> <b>Fully Specified Name:</b> Clammy skin (finding) <b>Concept Code:</b> 102598000

Matney, S., & Lundberg, C. (2012). The role of standardized terminology and language in informatics. In T. Hebda & P. Czar (Eds.), *Handbook of Informatics for Nurses & health care professionals* (5th ed.). Upper Saddle

## Nursing Diagnosis Examples

Diagnosis/Problem	SNOMED CT®	ICNP	CCC
Impaired mobility	impaired mobility (finding) <b>Concept Code:</b> 82971005	Impaired mobility <b>Concept Code:</b> 10001219	Physical mobility impairment <b>Concept Code:</b> A01.5
Impaired gas exchange	impaired gas exchange (finding) <b>Concept Code:</b> 70944005	Impaired gas exchange <b>Concept Code:</b> 10001177	Gas exchange Impairment <b>Concept Code:</b> L26.3
Hyperthermia	body temperature above reference range (finding) <b>Concept Code:</b> 50177009	Hyperthermia <b>Concept Code:</b> 10000757	Hyperthermia <b>Concept Code:</b> K25.2

Matney, S., & Lundberg, C. (2012). The role of standardized terminology and language in informatics. In T. Hebda & P. Czar (Eds.), *Handbook of Informatics for Nurses & health care professionals* (5th ed.). Upper Saddle

## Process

1. Ask standard terminology developer for the cross map
2. Use UMLS queries to find cross-maps
3. If using non-standardized terminology
  1. Map to the appropriate standard terminology
  2. Healthcare terminologist doing the mapping requires skills in terminology mapping
  3. Validate the mapping

## LOINC® and Nursing Content

- ▶ Many areas incomplete
- ▶ Current work happening to determine gaps
- ▶ Nurses needed in the work

## LOINC® Nursing Gap Analysis



Westra, B.L., Matney, S.A. (2014). LOINC® and Nursing Assessments. Presentation at Big Data Conference, Minneapolis, MN.

## Conclusion

- ▶ Multiple terminologies are required to transmit nursing care data
  - SNOMED CT® - Problems, Observation Values
  - LOINC® - Clinical Observations, Scales, Scale Answers, Document Names and Headings
  - OMB - Race and Ethnicity
  - RxNorm - Medications
  - and more...
- ▶ Understanding the structure and how to map to the terminologies takes skill and expertise
- ▶ Mappings to the other terminologies can be found within the UMLS
- ▶ Not all of the content required to support nursing exists

## Questions

Susan Matney  
samatney@mmm.com