Analysis and Mapping of Nurse Charting Terms within the EHR to Achieve Continuity of Care

Rachael A. Seeley, RN, BSN; Tiffany L. Harman, RN;
3M Health Information Systems, Inc., Murray, Utah, U.S.A.

Introduction

- A project was initiated by the Department of Defense (DoD) to map nursing concepts from an Electronic Health Record (EHR) into the 3M Healthcare Data Dictionary (HDD).
- The HDD is a terminology server that holds multiple standard terminologies such as Systemized Nomenclature of Medicine - Clinical Terms (SNOMED CT®) and Logical Observations Identifiers Names and Code (LOINC®).

Objectives

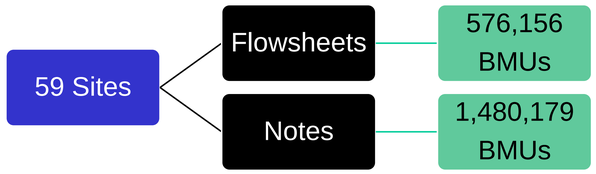
- Analyze and evaluate clinical concepts within nursing flowsheets and note templates.
- Determine variability between different hospitals using the same EHR system.
- Map nursing concepts into the HDD to SNOMED CT and LOINC concepts whenever possible.
- Determine future requirements to achieve interoperability within the system.

Methodology

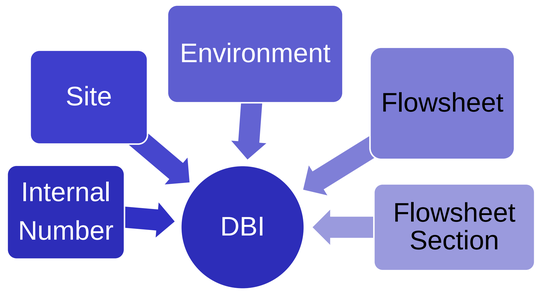
- Database Items (DBIs) from the EHR were analyzed and mapped to determine usage and variability for Flowsheets and Notes within the EHR.
- Meaning of DBIs were derived from surrounding data fields in addition to the DBI's name (label). The Basic Mapping Unit (BMU) was created using the necessary information to determine concept meaning.
  - The flowsheet BMU contained the internal number (IT) of the DBI, hospital site, nursing environment, flowsheet, and flowsheet section.
  - The notes BMU contained the IT of the DBI, nursing note template identifier (ID), tag ID, logical row number, and nursing note template version ID.
- Analysis was preformed to evaluate the proportion of mapped concepts that have SNOMED CT and/or LOINC codes.
- After the analysis was performed, these DBIs were mapped into the HDD.

Mapping Process

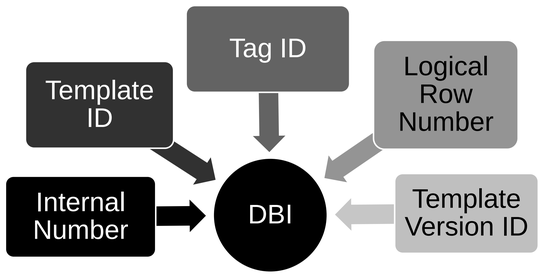
Site to Basic Mapping Unit (BMU) Distribution



Flowsheet Basic Mapping Unit



Notes Basic Mapping Unit



Results

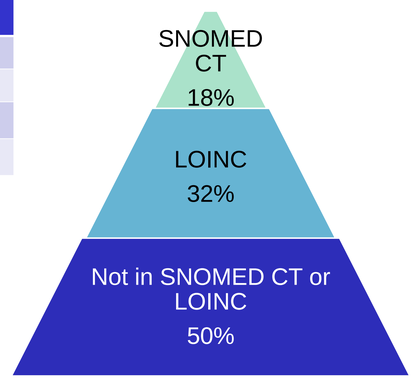
Basic Mapping Unit (BMU) Mapping Results

Mapping Results	Note BMUs	Flowsheet BMUs
Unable to Map	4,522 (0.3 %)	5.052 (1%)
Mapped with Question	2,820 (0.2%)	5,474 (1%)
Mapped	1,463,882 (98.9%)	565,572 (95%)
No Work Required	8,955 (0.6%)	18,246 (3%)

Variability in NCID to Internal Number (IT) Mapping

Mapping Results	Notes	Flowsheets
IT Mapped to >1 NCID	1562	618
IT Mapped to 1 NCID	2741	3595

LOINC and SNOMED CT Mapping Results



Example: Change in Database Item (DBI) Name

IT	Site	Environ-ment	Flowsheet (FS)	FS Section	DBI Name	Meaning
7338	Site 5	Newborn	Medication	NBN Pain Assessment	Vital Signs	Vital Signs NBN pain assessment
7338	Site 5	Newborn	Vitals	NBN Pain Assessment	Breathing Pattern	(NIPS): Breathing Pattern

Results

- The system allowed end users to change the intended concept meaning by displaying different names for the same Database Item (DBI).
  - This change occurred system wide between hospital sites as well as within nursing environments at the same hospital site.
- The change in concept meaning required analysis of each use case for a given DBI.
- 2% of the Basic Mapping Units (BMUs) were not mapped into the HDD due to insufficient information.
- Approximately 50% of the nursing concepts could be found in either SNOMED CT or LOINC.

Conclusion

- The use of encoded data using a controlled medical vocabulary is necessary to decrease semantic shift or drift in the metadata.
- Sites need to have policies and procedures in place that are practical and easily implemented.
- Software needs to have constraints in place that can support the policies and prohibit users from changing concept meaning.
- Using standard terminologies and information models in nurse charting will aid in achieving interoperability.
- More work needs to occur with SNOMED CT and LOINC to determine how the gap in nursing terms can be closed for these two terminologies.
- This analysis and mapping project illustrated the importance of a data governance control policy and information modeling in nurse charting to achieve continuity of care.
- Implementation of these policies will improve patient safety and provide interoperability within the EHR. It also will improve continuity of care for patients.

Contact Information

Rachael Seeley: rseeley@mmm.com

Tiffany Harman: tharman@mmm.com