Title: Feasibility and gap analysis of using Controlled Vocabularies for coding ICU Flowsheets

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Introduction: In order to improve the care of critically ill patients and assisting the development of machine learning algorithms and predictive analytics, large, standardized multinational and multi-institutional data sets are required.

Methods: Paper based ICU flowsheets from several hospitals in Canada, US and India were examined as well as the electronic ICU flowsheet. Flowsheet Data fields were transferred to an Excel spreadsheet and mapped where possible using the SNOMED CT browser, (https://browser.ihtsdotools.org/), LOINC (Logical Observation Identifiers Names and Codes) browser (https://loinc.org/search/?) or ISO/IEEE 11073-10101 (https://rtm.prometheuscomputing.com) as of the August 2022. Attempts to map data fields were done using both precoordinated and post coordinated terms. For pre-coordinated, multiple concepts are brought together in one term, for example, "69833005 |Structure of right femoral artery (body structure)|". Post coordination, would describe it as IntersectionOf(62175007 |Structure of right lower limb (body structure)|:7657000 |Structure of femoral artery (body structure):272741003 |Laterality (attribute)|:24028007 |Right (qualifier value)| using SNOMED CT.

Results: Clinical Laboratory test terms were easily mapped to LOINC, although some terms required knowledge of the method and specimen type. Although the name of several scores were available in SNOMED CT, the individual items that make up the scores, such as the Glasgow Coma Scale (GCS), Braden Scale and Visual Infusion Phlebitis score were impossible to code. Terms related to vital signs were easily coded. Recently, common ventilation modes and terms from ISO 19223 Lung Ventilators vocabulary and semantics were added to SNOMED CT. Gaps were discussed with the SNOMED Anesthesia clinical reference group, and physical finding terms were submitted to SNOMED CT to code the GCS findings. SNOMED terminologists suggested that an ICU flowsheet project be initiated with interested parties to fill further identified gaps. The Society of Critical Care Medicine and other professional organizations will be contacted because of this work.

Conclusions: Although terms in currently available controlled vocabularies can be used to code many of the fields that are in an ICU flowsheet, further work is required to identify and fill the gaps. Cooperation between ICU professional and the controlled vocabulary organizations would be of value.