Clinical Knowledge Modeling using Detailed Clinical Models

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Abstract

Clinical knowledge modeling is vital for the management and preservation of Electronic Health Records (EHR). It provides common data elements and terminology binding with the mechanism of capturing clinical information independent from technology over time. Any EHR data exchange without an agreed clinical knowledge modeling will potentially result in loss of information. Many attempts from the past to model clinical knowledge for the benefits of semantic interoperability using standardized data representation and common terminologies. Many experts from different clinical knowledge modeling and standardization organizations participating in the 2007 workshop expressed the need of standardization for clinical knowledge modeling. On-going clinical knowledge modeling development efforts include OpenEHR (Beale, 2003), Intermountain Healthcare (Huff et all, 2004), the Netherlands (Kooij et al, 2006), and South Korea (CiEHR, 2010), among others. The objective of each project is similar with respect to consistent representation of clinical data, using standardized terminologies, and an overall logical approach. Each development creates and applies tools for the clinical modeling for model creation, model validation, model repositories and model implementations using EHR and messages. Tool sets usually deploy using Archetype Definition Language (ADL), Unified Modeling Language (UML) and/or eXtended Markup Language (XML). In addition, tools for interactions with clinicians were also developed and deployed, allowing online and time independent participation. However, the conceptual and the technical expressions are quite different from one clinical knowledge modeling than the others. Due to interoperability issues among various models of clinical knowledge already deployed with the significant investments in clinical knowledge representation, there currently are synergies under the Clinical Information Modeling Initiative (CIMI) in order to create a harmonized reference model for clinical knowledge models using ADL and UML formalisms to express and test the models, and transformations that ensure uptake of existing models and technical expressions in useful formats for all participants. The goal for the CIMI is to create a reference model and formalisms based on the Detailed Clinical Models (DCM, ISO DTS 13972) which can enable EHR repository using different technical formats including ADL, UML and XML. A global repository of DCM may potentially be established in the future. This paper will present an overview of the developmental effort in harmonizing clinical knowledge modeling using the Detailed Clinical Models.

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