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Epistemological Issues in Information Organization Instruments: Ontologies and Health Information Models

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Abstract. This paper describes the research for a methodology to represent health information in medical records, using realist ontologies and information models.

Keywords: Realist ontologies, information model, electronic health record

1 Introduction

Full use and sharing of medical data contained in health records depends on the capacity to semantically represent messages, store messages, receive queries and answer them. Ontologies are an alternative, since they rigorously define basic properties of the entities and necessary criteria required to instantiate a type. Particularly, the Ontological Realism seems capable of promoting consensus and internal coherence by representing reality according to a philosophical realist perspective, using science to get closer to the truth [1, 2]. However, medical records contain many terms and expressions that lack a referent in reality, but are nevertheless important for medical communication and information use [3, 4]. On other hand, information models create a language based information structure that allows complete information representation, though lacking consistency, capability to make inferences and internal coherence.

2 Objectives

We aim to propose and practically validate a methodology for information representation of health information present in real medical records, through the complementary use of ontologies and information models.

3 Methodology

The methodology is divided in two parts: methodology proposition; methodology validation. The proposition will be made as follows:

1. Requirement analysis: We will evaluate technical and logical requirements for medical information representation;
2. Selection of real medical records: We will select persistent documents contained in medical records (physician notes, discharge and admission reports, lab test results) written in natural language and de-identify the records;
3. Create OpenEHR records: We will create new records according to the OpenEHR model, transforming the natural language text into structured information. E.g. "Patient complains of crushing left chest pain" → Cluster – Pain Symptom; Name of location: "Precordial area";
4. Analysis and classification of information: We will try to map the OpenEHR information items to Realist Ontologies, such as those contained or candidate to OBO Foundry inclusion. E.g. Name of location: "Precordial area" → FMA.Precordium;
5. Those terms that can't be mapped will be used as parameter to identify boundaries between ontologies and information models, and to propose a to represent information which is not suitable to the realist approach while retaining the capacity to classify and manipulate information. Particularly, we will explore the use of information ontologies to represent the information models [5].
6. Formulate competency questions: We will create queries that must be answered by

information created using the methodology, in order to validate it.

The validation phase will be made by:

1. Random real records selection: Some records will be randomly selected – the exact number is yet to be determined.
2. Record representation using the proposed methodology coupled with ontological realist representation;
3. Critical evaluation using competency questions: We will evaluate the methodology according to some objective criteria, to demonstrate or suggest its efficacy.

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