

Chapter 33

A System for the Semi-Automatic Evaluation of Clinical Practice Guideline Indicators

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ABSTRACT

This paper presents EXEMED v2, a system that allows the evaluation of clinical practice guideline indicators. EXEMED v2 includes a knowledge base that supports the definition of executable rules applied over Electronic Health Records (EHR) in order to measure its compliance with a specific clinical guideline. Taking into account that an EHR may include structured attributes and narrative text attributes, EXEMED v2 analyzes both types. The process of evaluation in EXEMED v2 is to define the rules; once the rules are defined EXEMED v2 extracts from the EHR the facts that allow evaluating whether each one of them was accomplished or not. This evaluation includes different levels of certainty, allowing in some cases the interaction of a human evaluator to confirm (or not) automatic evaluation decisions. The functionality of EXEMED v2 was validated applying it in a case study of Acute Myocardial Infarction.

INTRODUCTION

In order to assure high quality in the provision of health services, the use of clinical practice guidelines is very important. Such guidelines

are defined as a set of “systematically developed statements to assist practitioner and patient decisions about appropriate health care for clinical circumstances” (Field & Lohr, 1990, p.8). Clinical practice guidelines are primarily used to increase

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the quality of patient care, to promote the efficient use of resources (Jovell, 1999), and to generate systematic recommendations for doctors. The definition of clinical practice guidelines can be done either by health regulatory agencies (Ministerio de Salud y Protección Social, 2012) or hospitals (Bassand et al., 2007), often based on NICE and SIGN type descriptions (Dunkley & Cross, 2006). This means that the use of clinical practice guidelines may be adapted according to circumstances or different environmental conditions. (Álvarez et al., 2010).

The evaluation of compliance with a clinical practice guideline is performed by evaluating a set of indicators related to hospital follow-up, interventions and behaviors, training, background, and diagnostic criteria, among others. These indicators allow health professionals to compare the quality of health care services with the parameters given in the guidelines, in order to take appropriate actions towards providing a better service to users.

The definition of clinical practice guidelines generally includes information related to: objectives, disease indicators, general considerations, interpretations, recommendations, methodology, implementations and development guide (Ministerio de Salud y Protección Social, 2012). These guides include many variables and relevant information for the proper tracing of the process. However, current guideline documents are very long and do not allow the extraction of this information in a concise and simple way, making it difficult to assess adherence to these guidelines by medical and administrative staff. As a consequence, there has been some research aimed at structuring these guidelines. For example, there are proposals for frameworks that are used to achieve interoperability of content between the Health Level Seven (HL7) and Semantic Web technologies in order to develop clinical guidelines (Casteleiro et al., 2009). Another project proposes a methodology and a software tool to mark-up clinical guidelines using a tree structure and a language called OCML (Svátek & Růžicka, 2003). Similarly, languages

like PROforma are specifically designed to capture clinical practice guidelines (Sutton, Taylor, & Earle, 2006) and certain conditionals are explained to select a specific language (Shalom et al., 2009). Furthermore, Open Clinical© shows some methods for the computerization of clinical practice guidelines (OpenClinical 2002-2011). Although these proposals are very relevant for the definition of a clinical guideline, they have not been aimed at representing rules that can be executed or validated in an automatic way on a set of electronic health records. Although there are frameworks for the compliance evaluation of a set of rules versus specific medical records, they are focused on specific diseases (Toussi et al., 2008) or only evaluate a particular type of conditional (Rao, Krishnan & Niculescu, 2006).

The purpose of this paper is to present EXEMED v2, a system that allows structuring the rules related to clinical guidelines and evaluating them over a set of EHR; EXEMED v2 is an interactive system able to evaluate structured attributes of EHR as well as narrative text attributes. This paper is organized as follows: Section 2 presents some previous research. Section 3, describes the components of EXEMED v2. Section 4 presents the elements used to describe a clinical practice guideline. Section 5, shows the application of the proposal considering a particular disease taken as a case study. Finally, Section 6 describes conclusions and future work.

BACKGROUND

Clinical practice guidelines research has been primarily oriented to: the methodology for defining a guideline, the extraction of narrative text found in a guideline, and indicator assessment of adherence to the guideline (extracted from electronic medical records). This section analyzes the main research initiatives related to the definition of languages or models to express rules and indicators for evaluating the adherence to clinical guidelines.

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