Dynamic Adaptation of EHR Structure for Automated Compliance Evaluation

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Introduction

Integration of Clinical Practice Guidelines (CPGs) within Electronic Health Record (EHR) systems improves dissemination, implementation, and effective enactment of CPGs in the organizational workflow, but requires that some inherent contrasts be faced. On the one hand, tailoring the EHR structure so as to fit a restricted set of CPGs induces a bias towards specific pathologies. On the other hand, representation of all medical concepts that may become relevant for any applicable CPGs definitely impairs practical feasibility and usability.

1. Methods

We propose an approach to the integration of CPGs into an EHR system that combines bias avoidance, usability, and completeness through a two-step dynamic adaptation of the EHR structure. Clinical information is first collected within an unbiased general structure. After the formulation of a diagnostic hypothesis, CPGs applicable to the case are automatically identified and the EHR structure is adapted so as to focus on concepts relevant for clinician’s compliance to CPGs recommendations.

To achieve this adaptability, CPGs data and logic are represented using a two-level modeling methodology and a production rule-based approach, respectively. The concept is concretely implemented by separating information and knowledge in a reflective SW architecture based on the Observations & Measurements pattern.

2. Results & Discussion

An implementation of the described EHR system, focused on CPGs for valvular heart disease management, is presently on trial in various Cardiology clinics at the Azienda Ospedaliero-Universitaria Careggi (AOUC), the main hospital in Florence.

Preliminary experimentation shows the feasibility of the proposed approach and the benefits of dynamic adaptation of the EHR structure according to diagnostic hypotheses so as to support clinician’s compliance evaluation. Ongoing activity is directed to exploit the system in the automation of retrospective analyses of compliance.