Sistine Ann Barretto PhD thesis abstract

Sistine Ann Barretto. *Designing Guideline-based Workflow-integrated Electronic Health Records*. PhD thesis submitted to the department of Information Technology (Research), University of South Australia. June 2005. Full thesis[1] (zipped PDF - warning 12Mb).

The recent trend in health care has been on the development and implementation of clinical guidelines to support and comply with evidence-based care. Evidence-based care is established with a view to improve the overall quality of care for patients, reduce costs, and address medico-legal issues. One of the main questions addressed by this thesis is how to support guideline-based care. It is recognised that this is better achieved by taking into consideration the provider workflow. However, workflow support remains a challenging (and hence rarely seen) accomplishment in practice, particularly in the context of chronic disease management (CDM).

Our view is that guidelines can be knowledge-engineered into four main artefacts: electronic health record (EHR) content, computer-interpretable guideline (CiG), workflow and hypermedia. The next question is then how to coordinate and make use of these artefacts in a health information system (HIS). We leverage the EHR since we view this as the core component to any HIS.

We use the openEHR architecture, which allows extension of a core Reference Model via Archetypes, to refine the detailed information recording options for specific points in the healthcare process, to represent decision support information needs, and to represent the composite instruction that is the workflow itself. We present an
Instruction Reference Model from which composite instructions can be defined and is an extension to the current openEHR's Instruction model (revision 4.3). We define constructs for the rationale of the decisions made to be recorded explicitly within the record – including the specific guideline step, didacticism, and links to relevant EHR data items that were used to arrive at a decision.

We develop a prototype system that makes use of two key components: the Breeze workflow architecture, and our implementation of the EHR Persistence Layer – both of which interact in the initiation and execution of instructions. We illustrate our approach on two distinct but common CDM scenarios: Early Supported Discharge and associated Post-stroke Rehabilitation, which is process-oriented and less clinical in nature; and Hypertension in Diabetes which is of a highly clinical nature, and decision-based.

We found that there is a real distinction between the roles that guideline-based recommendations provided by CiGs, workflow and EHR play in supporting and managing patient care: (1) CiGs model decision-making steps and recommended actions; (2) workflows model the work to be done for that recommended action, by whom, when and how, and help ensure that it gets done; (3) archetypes help ensure that the appropriate information is collected within the EHR for the workflow. Moreover, the extent to which each of these components can be used in supporting CDM, particularly CiGs and workflow, is dependent on the clinical context in which it is applied.

Our research has implications on various stakeholders. The extended EHR architecture allows the application designer to choose a usable balance of compliance
encouragement and human judgment. The ability to track healthcare process steps within the EHR content is also of medico-legal significance. It is envisioned that
extensible EHR recording allows the EHR to serve as the basis for care coordination, and potentially improve communication amongst providers and even improve patient health outcomes. Our open framework can be used to further explore the problem of effective support for CDM (such as presentation of hypermedia), and can inform a range of standards bodies (such as HL7), researchers (such as clinical guideline representation and workflow) and vendors about specific requirements for

1. http://www.openehr.org/publications/workflow/Barretto_PhD_Thesis_2005.zip

integrating EHR, workflow and guideline-based decision support.