Managing non-Compliance in Guideline-based Careflow Systems

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Introduction. This work deals with the integration of clinical practice guidelines (GLs) in the clinical routine, i.e. with the GL/user interface, the link to the patient record, the resource allocation, and the communication among operators. Crucial in this context is the healthcare organization model. We propose to apply the Workflow Management Systems (WfMS) technology to the healthcare environment, and we refer to the system as a Careflow Management System (CfMS). Recent literature has outlined the management of exceptions as a major challenge for a new generation of WfMSs. This is particularly true in healthcare: although GLs provide recommendations for several situations, on the field it may happen either that a new, unpredictable situation occurs, or the physician is not compliant with the GL. To be accepted, GL implementations must be flexible enough to tackle sudden modifications of the pre-defined plan. The focus of this work is: “how to design a CfMS in order to handle non compliances of the healthcare professionals versus GLs?” As a bench-test we developed a CfMS based on a GL for the stroke management, developed and published by the American Hearth Association. We used Oracle Workflow (OW) as the software platform. 

Guidelines and non compliances. It is very important to keep track of the non compliances, for at least two reasons: 1) some trends may highlight either bugs in the GL itself, or a systematic difficulty in following some suggestions and 2) it is impossible to evaluate a GL benefit on health or costs, without knowing the real degree of its implementation. Non compliance management is complex: not only it causes skipping or replacing the planned tasks, but also may change the roles involved and the future plans.

Classification of non compliances. Deviations from the standard behaviour may be classified according to different criteria. First of all expected and unexpected exceptions may occur. Here we deal with the former, that may be handled at the workflow model level by suitable design specifications, while the latter would require a model revision. Another criterion is synchronicity: there is a synchronous exception when the operator does not accept the actual suggestion (i.e. X-ray), and decides to change the management plan at that moment (i.e. she prefers a CT scan). There is an asynchronous exception when the physician decides to perform an action that has no relation with the current guideline tasks. Our system is able to manage a couple of situations: 1) the current task is “mandatory”, no reason exists for bypassing it, and thus no exception may be accepted; 2) the task is not mandatory, and the healthcare operator may either decide to replace it with another one, to delay it or to skip it. When replacing a task, two cases are handled: a) the operator executes a task belonging to the GL (e.g. a task defined by the GL for a situation different from the actual one); b) the operator executes a task that does not belong to the GL. In addition we face asynchronous exceptions, by exploiting the concept of trigger. The user asks for the execution of an action independently from the current careflow state. His request is stored into a relational table monitored by a trigger that generates an exception handler. This will provide for the task execution, according to parameters such as urgency, resource recruitment, etc.

The system functionality. When building the model, the roles in the healthcare organization must be specified, together with users, that belong to a role, and tasks, that require a set of resources, either human, with a specific role, or not. Using this information, the OW Notification Mailer sends to users E-mail notifications of tasks awaiting their attention, and then acts based on their E-mail responses, e.g. if a physician accepts to acquire the patient personal history, the specific data input form appears automatically on her workstation. OW is a web-based tool; thus the user interacts through a web browser. Information about the performed activities are stored into the careflow database, in such a way that statistics can be performed on times, costs, workloads, and exceptions. The Notification Mailer allows accepting/ re-directing/ delaying /replacing a task. This page is different according to the different users and tasks, because a task could be, for example, mandatory, and a user could not have enough authority to reject a task execution. When a GL recommendation is not accepted, the operator must justify her behaviour. For replacing a task, one may either choose among other tasks belonging to the GL, or choose a generic task from the SNOMED-based terminology server, that we embedded into our system. In the latter case, the terminology server shows, at first, tasks that are “close” to the GL recommendation, in order to push the user to follow the GL intention. If this is not definitely the case, the SNOMED hierarchy may be fully browsed, also through keywords. 

Conclusions. CfMS allow healthcare organizations to efficiently implement an evidence-based clinical practice, and evaluate quantitatively the GL impact on health outcomes and costs. The rational management and subsequent analysis of non compliance allow organizations to learn about both their bottlenecks and GL site-specification need.