

Information Requisition for Computer-Supported Medical Care

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Abstract — *One indispensable precondition for designing a functional software product for the modeling and execution of a computerized clinical practice guideline (CPG) is the comprehensive investigation of the different user groups involved and the issues they encounter. This led us to conduct a comprehensive literature study about the tasks involved in modeling a CPG into a formal representation as well as about the information needs of caregivers, i.e., physicians and nurses, and last but not least the information needs of patients. We have assessed and categorized the above mentioned information in order to create a reliable starting point for the development of a functional software tool.*

I. INTRODUCTION

CPGs [1] are powerful tools to improve the quality of healthcare [2, 3]. In recent years different software systems have been developed to support the design and execution of CPGs [4, 5]. However, from the creation of a computer-executable model of a CPG to its actual implementation in clinical care a variety of tasks emerge, such as translating the medical knowledge of a textual CPG, i.e., recommendations, into a computer-interpretable model, applying a recommended therapy on a patient, or answering clinical questions.

Unfortunately, there is a lack of comprehensive information on (1) the different user groups of a software tool to support all of these tasks, (2) what tasks these users want to perform, and (3) what information is required for it. However, this information is mandatory to make valid decisions on the design of such a software product [6].

In this paper we give a short outline of our results; for a detailed representation of investigated studies and derived findings we refer to [7].

II. INFORMATION NEEDS OF MODELERS

The main task of a guideline modeler is to create a formal guideline representation model of the original narrative guideline. There are two basic types of formalization: a *model-centric* approach and a *document-centric* approach.

In any case, the modeler needs to know of which **components** the target representation format is composed (e.g., actions, decisions, states, subplans, and branches) and in which way **scheduling constraints** are to be modeled. Moreover, the modeler needs to **identify the rel-**

evant guideline knowledge and to **disambiguate this knowledge**.

For *model-centric* formalization the modeler formulates a conceptual model of a guideline without a direct relationship between the original text and the model. This modeling process involves steps like **generating detailed data models** of clinical concepts and fundamental parameters, **specifying a logical and process structure** of the CPG, and **modeling** the guideline knowledge by means of a **flowchart-like graph**.

When modeling the guideline knowledge in an *document-centric* way, the original text of the document serves as a starting point which is **systematically marked up**, whereupon the marked-up text parts are structured into a – usually XML-based – model. This includes **making knowledge elements independent** from the surrounding text, **modeling clinical actions**, and **determining temporal constraints**.

III. CLINICAL INFORMATION NEEDS

In addition, we have investigated user expectations and requirements that have to be considered in creating a clinically useful software environment. An outline of basic categories of clinical information needs derived from diverse studies is given in Figure 1.

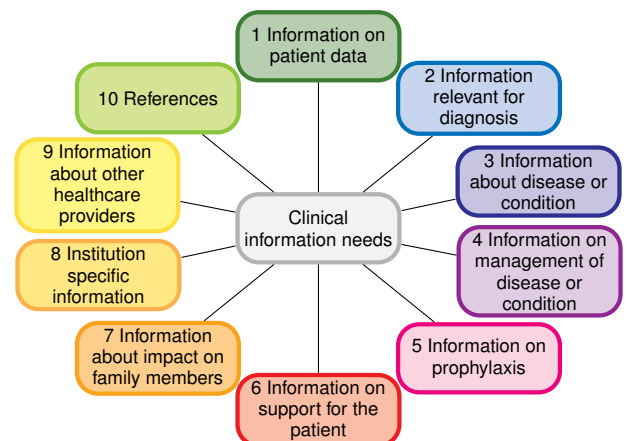


Figure 1: Basic categories of clinical information needs.

A. PHYSICIANS

As regards the information sought by physicians, a number of studies has been conducted, mainly in the form of retrospective questionnaires, interviews, self-reports, and observation.

According to these studies, the majority of questions posed by physicians deals with **therapy** and especially with all sorts of aspects associated with **medication**. Physicians seem to have a great need for information about the correct drug, its effectiveness, its side effects, its dosage, and how long it should be taken. **Diagnostic questions** also appear quite frequently as do questions about **patient data** and questions about **other health-care providers**. In contrast, questions concerning the prognosis, the etiology of disease, etc. seem to be of comparatively little concern, if we are to believe the findings of the investigated studies.

B. NURSES AND NURSE PRACTITIONERS

When focusing on the information needs of nursing staff, it is interesting to note that there is little difference between the questions posed by nurses and what the physicians want to know. The only real difference seems to result from their different relationships to patients: nurses are interested in **psycho-social support of patients** whereas physicians have not formulated such questions in the studies investigated in this paper.

The main difference between nurses and nurse practitioners is that the latter are more concerned with **diagnostic issues** than nurses. In accordance with the results for physicians, nurses and nurse practitioners need most information about **treatment** and **diagnosis**, in which they require **information about institution specific procedures** and **medication** quite frequently.

C. PATIENTS

The information desired by patients is more voluminous and differ qualitatively from either the questions formulated by physicians or those formulated by nurses. Since they are not only worried about **illness itself** but also about the **effects this illness has on family members**, precise information on circumstances they are likely to expect when visiting other **medical facilities**, and, last but not least, detailed information about **available support**, such as **psycho-social support**, is required.

In particular, patients require much more detailed information on **emotional effects** of their treatment and its **effects on their quality of life**. As is to be expected, **prognosis** and **chances of recovery** are also of major interest for patients.

IV. CONCLUSION

By providing categorized information from several studies and publications, we establish an information basis necessary for the design of a useful software tool facilitating the modeling process and the execution of a CPG. Depending on the potential and purpose of the individual tool, it may not be necessary (nor always possible) to include all of these tasks and information needs, but the decision as to which points to include and which to leave out can only be made on the basis of such an all-comprising list. We recommend that developers carefully consider every single aspect presented in [7], as all of these aspects have been formulated as modeling tasks or as actual information needs in clinical praxis.

ACKNOWLEDGMENTS

The research leading to these results has received funding from the European Community's Seventh Framework Programme (FP7/2007-2013) under grant agreement no. 216134.

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