Chapter 8.8
Documents and Topic Maps:
An Original Way to Manage Medical Records

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ABSTRACT

Medical records have been used for a long time with different forms, aims, and usages. This heterogeneity is the result of different professions, ways of working, and needs. It is but prejudicial to querying and sharing data and documents. Moreover, we consider that the system must be as close as possible to a more classical, noncomputerized way of working, such as paper-based medical record, and should thus manage documents. Medical records are often loosely or semistructured documents, impeding easy retrieval. In our approach, a medical record is considered as a set of documents and a set of data. In this article, we propose a software system useful for extracting data from loosely-structured documents coming from different sources and for querying them in a hybrid way. Querying can be done in a navigation space which represents extracted data or entire documents. Two main parts are described: the extraction of data in loosely-structured documents and the navigation in a unified view of documents and data.

INTRODUCTION

Computerized medical information systems have been developed for a long time. One can find two main types of such systems. Each system of the first type has been defined for one specific medical service. It is highly suited to its organization, but it misses openness and generalization. Communication with other systems is difficult, and adaptation to other services or specialties is not trivial. Systems of the second type have been defined for a broad use (many services and many specialties). Some contain common storage for selected critical data, but most of the time they do not adapt to the specific needs of each specialty. Others have tried to offer everything that any

specialty requires and have become unusable spaghetti dishes.

But the communication of medical information to each practitioner has become compulsory for quality of care and costs management. As the medical record of a person is dispatched in many places, and as legacy systems have provided very heterogeneous data formats, structures, and ways of working, the gathering of the whole is a big challenge today. Exchange platforms have been proposed. They base their exchange on semistructured data (e.g., XML documents) empowering e-mail concepts by proposing joining documents (letters, images, reports, etc.). Consulting such an exchange platform is easy and convenient for daily care. But it is not sufficient for a profound patient care analysis or even for inter-patient studies. Data are not structured and multiviews on data are not provided.

Such platforms have brought a pleasant way of working. Care practitioners use electronic documents to store and exchange information, strict forms are not provided. This can be viewed as a step backward to the paper-based patient record. But we believe this is rather a new way of imagining computerization, offering a user interface as close as possible to the noncomputerized way of working. We have to couple such systems with new engines that allow for the retrieval of data inside documents, for the gathering of distributed information, for its processing, and for navigation purposes. This is the subject of this article. We present here our ideas and prototypes for the extraction of relevant data in documents, for the gathering of data coming from heterogeneous sources, and for the hybrid navigation among extracted data and documents. Our objective is to make a presentation of the medical record based on user's needs, rather than in a chronological or thematic way.

COMPUTERIZING THE MEDICAL RECORD

Characteristics of the Medical Record

Degoulet and Fieschi (1991) provide a globally agreed definition of the medical record:

The medical record is not limited to doctor's written observations neither to nurses notes. It encompasses all that can be stored about a patient, from demographical data to electro-physiological data or to images. According to this role, the patient record is and remains the main tool for the centralization and the coordination of medical activities.

Another concept is interesting: the encounter concept permits knowing all actions on a patient. At each encounter, the care practitioner builds a document. Encounter documents allow following the temporal rhythm of the patient care. Each document has a factual nature. Contained information concerns a fact and describes this fact. Documents are independent the ones from the others; they are solely understandable. Each new document can be seen as a transaction (using the databases sense of this term) as it has the same ACID (atomicity, coherence, isolation, and durability) characteristics.

Documents may be of different types, according to the encounter type (surgery report, biopsy results, and clinical examination notes). Each document becomes a new piece of the medical record. One can thus provide a new definition for the medical record:

The medical record is a collection of documents, each document providing information about an event in the medical history of the patient.

The medical record has specific characteristics that make it a complex element to study. Among them, the two following elements interest

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