

***e*-Health Portal and SNOMED for a more personalized integrated EHR**

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1. Changes and challenges

The healthcare industry has gone and is still going through profound changes. Those changes raise new challenges and to address them, the technological approach to the electronic health record (EHR) must be reviewed accordingly.

1.1 Ambulatory care

One of the most profound change seen in many countries around the world is a shift from an hospital based healthcare system to a more ambulatory system with home care, day care clinics, same day surgery,... We are now treating patients in ways that were thought impossible a few years ago. It is now possible for a patient to come to the hospital in the morning, have his coronarography and be home at night! You can also have your intravenous antibiotics at home or have adjustment to your anticoagulation regimen on an out patient basis.

With those changes we saw the advent of collaborative care and the challenge of assuming the continuity of care in a now very distributed environment with a multidisciplinary approach and more mobile health professionals. As a result, access to information, efficient communications and knowledge transmission are more important than ever so the care team can work together in a coordinated fashion.

1.2 Chronic diseases management

The incidence of chronic diseases is rising in part due to the aging of the population and more efficient treatment. They are also more complex with multi-organ involvement. With chronic diseases, our management aims at stabilizing the patient and keeping him in that state but also slowing/stopping more functional deterioration and preventing more complications. To achieve those goals it is mandatory to have a high level of coordination in the care team but also to actively involve the patient himself.

The challenges are the same one of the ambulatory care setting but this time the patient must also be an active part of the care team. As such, he must be able to enter information in his own medical record (ex: blood pressure 3 times a day, daily weight, fluid intake,...) but also access information tailored for his clinical condition or communicate with the care team.

1.3 Knowledge management

The healthcare sector is one of the most information driven industry and the amount of information that must be dealt with on a regular basis is growing every day. Also with

the advent of the Internet, access to information is more and more easy. It is now usual to have a patient coming to his appointment with printed documents that he found on the Internet.

The challenges secondary to the explosion of information and their easy access are mainly related to quality of this information and information overload prevention.

1.4 Classical EHR approach

Most of the EHR that are available on the market today are not patient-centered but rather 'hospital-centered'. As such they were not design to address easily the challenges raised by the new paradigms found in the healthcare sector those days. One of the consequences is that the care activities delivered outside the hospital walls are difficult to integrate or not at all. Another major consequence is that no tools or functionalities are available to integrate the patient as an active member of the care team or care team members that are not hospital based.

So to address those new cognitive needs, workflow and knowledge/information life cycle, a new approach must be considered.

2. e-Health Portal: a technological approach tailored for a personalized HER

2.1 Architecture

An e-Health Portal is a composite application that can integrate multiple different clinical applications and make them look as one integrated EHR with one single sign-on (Fig.1). It is a very modular and scalable solution. The architecture is very versatile and personalization is one of its strengths.

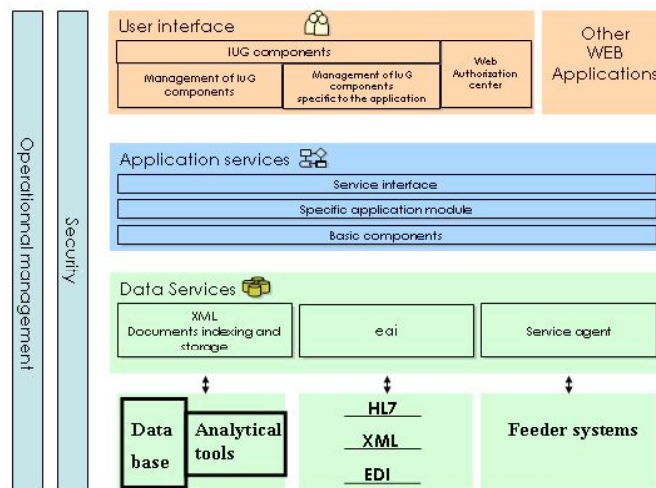


Fig. 1 e-Health Portal Architecture

2.2 Patient and community integration

It is now possible to find on the market e-Health Portal that integrates a community and a patient portal. This holistic approach makes it possible to actively involve them more actively in the healthcare system. Having their own space, it is possible to integrate tools and information that are tailored for their particular needs. Most of the products find on the market today make it possible for the patient to enter clinical information in his own record that are sent to a data base and with rules integration, have alerts send to a health professional based on his care management plan (fig.2). Communication tools are also integrated to support multidirectional messaging between them and the care team. That way, patients can have their own personalised EHR. Community portal are more generic or can be tailored for a specific disease.

3. SNOMED: the key for tailored information and knowledge management

3.1 Unstructured Information

One of the major problems in the healthcare sector is that the majority of important information is still in the form of free text (medical history, nurse notes, ...). In this format, this information is extremely difficult to manage on a large scale and cannot be considered in a clinical decision support system (CDSS)

Invoice Date	Service	Invoice #	Amount	Status
05/06/2003	Chest X-ray	01659718	\$200.00	U
06/20/2001	Office Visit	58791182	\$10.00	U
03/06/2001	Annual Visit	3364975608	\$10.00	U

Date	Time	Appointment	Location
Fri 7/2/2004	9:00am	Prenatal Checkup	PCH Women Clinic
Mon 7/12/2004	02:00pm	Dental	Peter

Originator	Subject	Date Received
Peter Wise, DDS	Reminder: Dental Cleaning	7/12/2004 4:30:47 PM
Steven Bass, MD	Sonogram Pictures	6/27/2004 4:30:47 PM
PCH Lab	LAB RESULT: Clark, Sarah CREATININE CLEARANCE	6/26/2004 04:03:00PM
PCH Lab	LAB RESULT: Clark, Sarah HEMATOLOGY	6/26/2004 03:42:12

Fig. 2 Patient Personalised HER

3.2 SNOMED driven personalized knowledge/information management and decision support systems

SNOMED is a systematized nomenclature of medical terminology and concepts. With it, it is possible to encode medical information in free text and have this information in a standardized format for exchange and processing by machines. We can find on the market at least one automatic encoder that is integrated in a word processing software (Fig.3).

With the incorporation of this tool in a portal, it is now possible to think that we can encode medical information found in free text and have them used by CDSS or to trig-

ger a search for information tailored for a particular patient. By extension, the same can be applied for patient and also the triggering of guidelines and protocols can also be programmed based on the input from the encoder.

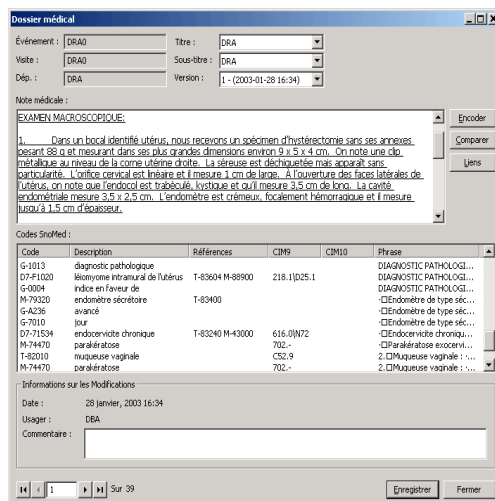


Fig. 3 SNOMED Automatic Text Encoding

4. Research integration: accelerating the knowledge turnover

Another problem found in healthcare is the time it takes for the positive results of a research study to be used by the care team for actual patient care. To address this specific problem, we will test next autumn a new approach by incorporating general practitioners in the research team. Through a portal, they will be informed about actual and potential projects, enroll their patients and enter the research information. In exchange, they will be able to access continuous medical education tailored for their needs and access/communicate with a specialist to help them in the management of their patients. Since they will be involved from the beginning in the research project, it will be easy for them to transfer the research results in their own practice in a very rapid and efficient way.

5. Conclusions

Major changes in the healthcare sector have raised some interesting challenges. To address them, one of the best tools available in the market today is e-Health Portal. e-Health Portal has the technology to integrate disparate systems and give synergy to information coming from various sources. They can also integrate the community and the patients in a more active and personalized way.