

# Toward Electronic Oral Health Records System

Ioan Călugăr<sup>1</sup>, Corneliu Amariei<sup>2</sup>

<sup>1</sup>Bucharest, <sup>2</sup>Constanta, Romania

## Summary

**In the context of the globalization process, Health Care Services (HCS) in the European Community are facing with high quality requirements. The communication and particularly the interoperability between health systems associating cultural, economical, social and other differentiation, raise major problems.**

**The Solution can be foreseen in speeding up the endorsement of new informational technology, starting with the American experience.**

**Oral Health Care Services (OHCS) cannot and should not be considered completely apart from HCS. Therefore solutions adopted for HCS should be similar for OHCS.**

**In this paper we are focusing on the projections of the Electronic Health Record (EHR) concept over the Electronic Oral Health Record (EOHR).**

**Key words:** Health Care System, Oral Health Care, Electronic Oral Health Record.

## Introduction

The health of the European citizen represents a major objective of the European Community. This fact is assumed by law:

*Every European citizen may request health care services in any place of the Community.*

As much as natural, to implement such a requirement is a highly difficult task.

According to Severs and Pearson [2], *delivery of effective healthcare in the 21st century will be dependent on the availability, quality and accuracy of information; on the ability of healthcare professionals to produce, access, use and manage information about individuals; on access to, and use of, information management tools for*

*Evidence-Based Care; on effective systems for communication and good communication skills; and on ensuring safe, secure, ethical and confidential handling of data and information.*

Starting with these premises and adopting the accepted term of Electronic Health Record (EHR), we logically conclude that:

*The EHR of any European citizen must be available, accessible and protected.*

In the spirit of Lisbon Declaration [1] with contribution of the European Institute for Electronic Records EuroRec ([www.eurorec.org](http://www.eurorec.org)) the last decade has witnessed more projects meant to establish the EHR concept. We mention ProRec project ([www.prorec.com](http://www.prorec.com)) which has a strong support in the Informational Society Department of the

<sup>1</sup> MS, MBA, Ph.D., senior IT professional, Director of NTP Group Consulting, strategic management and e-health solutions provider, Bucharest, Romania

<sup>2</sup> Professor, DMD, PhD, Department of Oral Health and Dental Management, Faculty of Dental Medicine, Constanta, Romania

European Commission. Currently there is a European ProRec network including Romania ([www.ProRec.ro](http://www.ProRec.ro)).

EC authorized in 2004 "An action plan for a European e-Health Area" ([http://europa.eu.int/information\\_society/policy/health-sites/eh\\_action\\_plan/index\\_en.htm](http://europa.eu.int/information_society/policy/health-sites/eh_action_plan/index_en.htm)) followed by a report entitled "Connected Health: Quality and Safety for European Citizens" [http://europa.eu.int/information\\_society/activities/health/docs/policy/connected-health\\_final-covers18092006.pdf](http://europa.eu.int/information_society/activities/health/docs/policy/connected-health_final-covers18092006.pdf).

EHR (Electronic Health Record) was initially called "computer-based patient record", meaning a patient database with information originating in different health care service providers. Subsequently "computer-based" was replaced by *electronic* and "patient" by *health*, considered to better describing the management of patient's records.

### The EOHR concept

EOHR is a derivative of the EHR concept that appeared in the 90's in the USA. A closer look at EOHR inside the dental practice can be found in [4]. The associated discipline is called Dental Informatics in the same literature [3].

Furthermore we sketch conditions resulting for EOHR as projections of EHR according to the Lisbon Declaration [1].

EOHR is the relational nucleus between *patient*, *oral health care system* and the *professionals' community*, in the *external factors* environment.

This definition clearly differentiates EOHR from the image of a simple database.

The EOHR main objective is to improve the quality of oral health care by delivering records and associated information to the oral health professionals when needed at the point of care.

Let us have a closer look upon EOHR components in *Figure 1*.

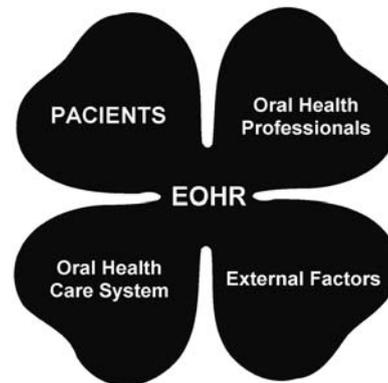


Figure 1. EOHR (Electronic Oral Health Record) concept representation

### 1. Patients

There are several criteria for grouping patients: demographic, social, cultural, economic, age, health status etc.

The European citizen becomes more mindful of his health status and of his proximal environment. Individual expenses for health care are increasing continuously year by year. The patient's expectation horizon is hinting to quality guarantee of the health care services he benefits at his level. And last but not least, the free circulation right offers patients the opportunity to decide upon alternative local, regional or national health care services. In this view the new members of the European Community enlarge the market of health care services and, on the other hand they have to improve their medical system in order to face the strong competitive environment.

Eliminating borders between the countries of the European Community inaugurated a great mobility of the patients followed by a real "medical tourism". It is a known fact that at the borderline between Austria and Hungary some villages have been transformed by dentists from Budapest into real practice units used specially in weekend for treatment of German or Austrian patients.

This situation led to the modification of the German law, which allows and covers

the treatments made in other countries, following the reduced costs. Therefore during last time many German dentists are facing with extra cost re-treatments because the treatments made abroad could not offer any kind of guarantee or money back procedure.

We should not forget that there are a lot of freaky patients that the Romanian professionals call *denunciators*. The lack of standard oro-dental health records at the point of care makes that over 80% of the Romanian professionals return the money back unconditionally to such patients.

Without getting into details, we underline that the EC strategy in the health domain concerns the whole population of the European countries. A huge market of health care services is getting borne, that will need suitable policies. The health care concept receives new and exciting connotations in this environment.

## 2. Oro-dental health care system

The system includes all institutions providing oral health care services. They can be grouped as private, public or mixed, depending on the financing source. The term system is accepted here with the sense of totality, more or less functional, in contrast to the system referred in EOHR, which is understood in a cybernetic sense and then highly reliable.

For twenty years Romania has been trying to create an information system for health care. Even though the World Bank financed an international project, which should finally allow the connection through public health directives of any health unit to the national network, managed by the Health Ministry, the results were deplorable.

Trying to save the situation, the experiment was limited to the Neamt district and, after years of struggling, during the inauguration of the program, the conclusion was drawn that the program cannot function.

There was also an attempt to create a national information system through the National Health Insurance Organization (CNAS); the delay of the release and the weak capacity of the system resulting in dismissing the president of the organization. In the same period we were trying to adopt a law settling "one doctor-one computer" but without a clear implementation horizon. We have to remark also a positive fact: the individual health insurance card released by CNAS in 2007 is a reality, without considering the event as being a completed work.

At European level, during the International Conference of Medical Orders [7] (called in other countries *colleges, chambers* or *boards*) a discussion was raised upon 2005/36EC directives, providing to record and transmit data in the *patient's medical file* (a different name for the EOHR). It is intended that all information of this kind be easily accessed from any part of the world, by any professional, chemist, insurer or by the patient himself in a secure and confidential manner. Professionals will access data using a code. France recognized the intention to release and implement during 2007 a system capable to ensure the security of the medical data to be a very difficult task. Others are estimating that such system could be in function after ten to twenty years. However, though twelve countries in the European Community are using electronic medical files, there is a lack of standard at the European level. The conclusion of the above meeting is that every country should analyze its stage, improve the relation with the patient, which is the only one to decide on the access to data in his own medical file.

The electronic medical file becomes essential to epidemiological follow up of the chronic diseases by:

- Ensuring regular follow up of activities;
- Identify and define patient's requirements;
- Initiate new actions and facilitate options;

Emphasize therapeutical and social effects (effectiveness);

Quantitative and qualitative measures of undertaking actions (adequacy);

Correlating adequacy with employed resources (efficiency)

Using diverse information: clinical-therapeutical, technical, epidemiological, sociological, administrative etc.

Failure of such facilities will conclude in spending resources in useless and demagogic actions.

The American model becomes a goal for all countries in the world. For example they consider a dentist–diabetologist team. Actually there is an obviously different approach. The US approach concerns the integral management of information from two perspectives: patient's care and then resources management. In Romania we are at a stage of considering programs foreseeing only the management of different types of resources. Despite a high potential, the use of IT resources in Romanian dentistry is obviously at a low level. Romanian dentists are often showing a strong adversity against statistical reporting – considered as „a communist defect” or as a source of information for the fiscal authority [9]. A fact is that even Americans crossed a period during 1960-1970 when they talked about *constellations of information*, different vocabularies or categories a.s.o.

The financing body of the OHCS is so important that it practically defines the rules and limits of the system. The public health insurer in Romania (CNAS) covers the costs of certain dental treatments. In exchange CNAS imposes certain rules as a contract, a pack of granted dental services, administrative forms and financial settlement procedures.

We mention an interesting method of financing OHCS for the employees of some private companies. This method is based on an agreement signed between the company

and an OHCS provider. This kind of financing OHCS close by other private sources tends to spread on the market of OHCS in countries heaving weak financing potential. We also mention in Romania the presence of mixed HCS packages including OHCS.

Generally as long as the OHCS costs covering percentage is closer to 100% the financing body is more interested to impose a reliable system. Therefore the financing bodies become the first interested in employing EOHR of high quality. In countries heaving a weak potential to subsidize OHCS the professional organizations should be interested in EOHR regulation.

We mention here that some non-EU member countries like Ukraine, Turkey and Russia are very attentive to the EU health care system requirements. They offer alternative HCS at attractive costs.

### 3. Professionals

This category includes the totality of accredited medical staff in dental medicine. The term *professional* will be used along this paper. The practicing competition and the freedom of circulation conduct to important distinctions between OHC professionals.

Modern materials with associated procedures, implementation of new technology in the dental clinic and the tendency of market towards OHCS of quality are seriously affecting the mentality of professionals. The separation of prevention, periodontal, therapy and surgery practice inside the same dental clinic will conduct to a new profession of Clinical Engineer. The profile of the clinical engineer will be a mix, technical and medical. He will be responsible with the equipment, information, data and associated procedures, including confidentiality. The management of EOHR should also be among his duties.

The free migration of the work force inside European Community can also lead,

from dental practice point of view, to significant changes. Actually western countries like Great Britain are asking for dental professionals from eastern countries. Meanwhile there is a reverse process: professionals from western countries open dental clinics in east-European countries. In Romania there is already lack of personnel among different professions thanks to work force migration to other countries. That is why in these terms, limiting the number of dental medicine graduates by reintroducing a "numerus clausus" rule could be a hazardous gesture.

### **External factors**

These factors are the following:

- INDUSTRY
- RESEARCH
- EDUCATION
- PROFESSIONAL ORGANIZATIONS
- PRIVATE OR STATE ORGANIZATIONS

The industry provides for OHCS:

- Equipment
- Instruments
- Materials
- Medicines
- Services and supplies

The industry's offer often gathers complex packages: a digital Roentgen device comes with a suitable software, an image processing application is attached to an intraoral digital camera, a personal computer comes with specific external devices (scanner for negative films, intraoral camera, video recorder, digital camera etc.) and an administrative or clinical software. Certain materials are irrevocably related to the specific equipment and procedures. Practice procedures are frequently related to several equipment or products.

The industry is the main promoter of advanced technology including IT. The strong companies hold own research centers, co-operate with universities or take part directly to the development of national or international projects and work out of local, national or international standards.

Industry is the most interested and involved factor for promoting EOHR.

The medical research and education contribute to form and post-form medical professionals in the system.

Public or private institutions such as ministries, health administrative structures, health care providers, insurance companies, professional organizations or NGO, interact and influence in many ways the delivery of oral health care services.

### **The role of EOHR**

The use of EOHR should lead to direct benefits for the professionals by making their work more efficient.

When talking about dental software in a dental clinic, an administrative or clinical application is understood including patients' evidence, scheduling, invoicing, treatment plans, dental status registration etc., it is far to talk about a system. A system is supposed to have a certain level of standardization at local, regional or national level so that information can be exchanged in a reliable, effective and secure manner. Developing standards is a bottom-up process supposing contribution of professionals in adequate structures. For example in the USA there is a Standards Committee for Dental Informatics (SCDI) belonging to ADA ([www.ada.org](http://www.ada.org)) and being in the same time member of HISB (Health Informatics Standards Board) and of ANSI (American National Standards Institute).

Within health care systems either at local, regional, national or European level, the use of appropriate EOHR will also con-

tribute to adequate planning and resource management, facilitation of the continuity of care, registration of healthcare interventions, improvement of epidemiological and morbidity information, and hence, a more cost-effective care process [1].

The European citizen shall by means of any EOHR have:

- guaranteed right of access to the HC he is entitled for;
- right of access to his individual data and related services;
- the effective protection of his right of free circulation with respect to the confidentiality of his individual data.

The systemic perspective of EOHR in the EC implies the interoperability capability within a heterogeneous environment from either medical institution, cultural, linguis-

tic, economic or social point of view. Therefore measures and future development of EOHR must be based on standards and consensus assuring interoperability and allow EOHR issued from different sources to be reliable, communicable, recognizable and comparable.

To approach oro-dental health care through the EOHR perspective constitutes a challenge for the 3-rd millennium industry, based on development of the IT. To comply with users' requirements on a huge market should be possible by using existing artifacts: multimedia, 3D images, interchange formats, content messages, user interfaces and so on. On such basis becomes operable the specific concept of *archetype* in scope of solving interoperability problems in EHR systems.

**Table 1.** EOHR/Electronic file - Interoperability

Sense	Source	Type of information	Destination	Scope
→	Current oro-dental healthcare provider	Patient's complete oral health records, or selected parts	Oral healthcare Specialist	Consultation
→	Current oro-dental healthcare provider	Patient's complete oral health records	New oral healthcare provider	Patient's move
→ ←	Oro-dental healthcare provider	Patient radiographic and photographic images	Oro-dental healthcare provider	Consultations, third party pre-authorization and adjudication functions
←	Oro-dental healthcare provider	Medical test reports	Medical laboratories	
→ ←	Oro-dental healthcare provider	Critical medical and dental information	Oral healthcare provider	Improve the safety and accuracy of patient care
→	Oro-dental healthcare provider	Claims	OHC Insurance Company	Financing OHC
→	Oral healthcare provider	Medical Data	Public Health Ministry	Run book of the chronic transmissible disease
→	Health Services Supplier	Medical Data	Judiciary Authorities	Avoiding Process Errors
→	Health Services Supplier	Medical Data	Research Institutes	Agent

A large co-operation will be necessary between all factors interested to build European EOHR at a European level and leading us to patient-centered oro-dental healthcare systems.

## Conclusions

Prospecting uniform delivery of health care services into the EC, to create and exploit EHR systems is a challenge for all member countries. In this context the quality of EOHR, as part of EHR, and the certification of OHCS become current objectives. They should identify themselves at the institutional level in administrative structures and professional organizations as well as local, regional or global.

Recognizing strictness of consequences, dental practitioners will follow the next steps necessary to fulfill confidentiality rules [10]:

1) Fully aware of EOHR requirements for the practice.

2) Full assessment of information security systems, policies and procedures.

3) Draw up an action plan according to programs and term limits. A comprehensive plan should include:

- Development of new policies, procedures for accessing information in health services;
- Create chain-of-trust agreements for conformity assurance with paid-up services;
- Plan an informational technical infrastructure suitable for the practice unit;
- Adopt or adapt information systems as is the case;
- Develop new internal communication strategies to avoid violation of patient's privacy;
- Training the staff;

## References

1. Lisbon Declaration, MIE Congress, Lisbon, Portugal 1994
2. Severs M, Pearson S. Learning to Manage Health Information: a theme for clinical education. Bristol: NHS Executive (South and West); 1999.
3. Schleyer T, Spallek H, Dental Informatics. A cornerstone of dental practice. JADA, Vol.132, May 2001.
4. Heid DW, Chasteen J, Forrey AW. The Electronic Oral Health Record. J Contemp Dent Pract 2002 Feb; (3)1: 43-54.
5. EuroRec 2006 Annual Conference. Electronic Health Record systems (EHRs) and Certification. 10th of October 2006, Geneva, Geneva Palexpo.

6. Calugar I, Teodorescu M. Calculatorul personal in cabinetul stomatologic. Ed. DaneRom, Bucuresti 2005
7. Vidican M. Conferinta europeana a ordinelor medicilor (COM). Viata Medicala, Nr 52 (886), An XVIII, 29.12.2006, p. 5.
8. Ionescu T. Epidemiologia bolilor cronice. Viata Medicala, Nr 52(886), An XVIII, 29.12.2006, p.1
9. Amariei C. Introducere in managementul stomatologic. Editura Viata medicala romaneasca, Bucuresti, 1997.
10. Chasteen JE, Murphy G, Forrey A, et. al. The Health Insurance Portability & Accountability Act: Practice of dentistry in the United States: Privacy and Confidentiality. J Contempt Dent Pract 2003 February; (4)1: 059-070.

Correspondence to: Ioan Calugar, MS, MBA, Ph.D., senior IT professional, Director of NTP Group Consulting, strategic management and e-health solutions provider.  
E-mail: ioan.calugar@ntp.ro