

Health Care Smart Cards: a Critical Review

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ABSTRACT

Smart cards provide an easy and safe medical information way of storage. More analytically, they provide direct access at the medical information, they preserve medical privacy, furthermore, smart cards provide controlled access in its data and also they are compatible with all Medical Information Systems, networks and applications. In case of loss they are deactivated and replaced at once. In addition they support quittance services and provide data for the people with special health care needs.

Aim of present bibliographic review is the study of prospect for development of smart cards in the field of health.

For this aim became bibliographic review which was supported in the international bibliography at the time interval 1990 -2008, that concerns smart cards of health and their application in Greece.

There were sought studies published in international scientific periodicals, initially written in the English language as well as Greek studies. As main tool of retraction of bibliography was used the Internet and particularly Internet websites as databases and libraries: Pubmed, Medline, Google. The words keys that were placed to search were: Notebook of health, smart card, smart card of Health, European card of Health, Society of Information (e.t.c.]). Moreover became research into magazines and books, lecture notes and diplomatic work.

Smart cards provide an easy and sure way of storage medical information. Greece observes international developments and as member of European Union participates in the efforts for developing the applications of smart cards of health and social insurance with very good results.

Preface

During the last decade the technologies of the Smart Cards are used internationally for the approach and resolution of problems of access, management and circulation of information in all the sectors of the economy and society.

One of the most important functions of the smart cards is the security and integrity of the stored information, which are provided, with the encryption of the data (Karapetsis et al., 1994).

The use of the smart cards for the storage of the management and medical information of the patient, provides the potentiality of information transfer to all the units of medical care provision, independently from the electronic system that they are using but also from the distance that such units are located from the place where the card was updated and/or the file of the patient is kept at. It also

provides the ability of card updating from all the units of medical services provision, with the utilization of the encryption the privacy of the stored information is ensured, and finally the potentiality of approach and update of the various information teams, only from health care professionals who have such a right (Kagelaris, 1990).

Aim of work is to study the growth of smart cards of health in international level.

The work is constituted by two parts: in the first part are analyzed the profile of smart cards and particularly are presented their general characteristics, their applications, advantages and disadvantages and the classification of cards that is used in the space of health and social insurance. In the second part is presented the application of smart cards of health in international level and in Greece.

Smart cards

The smart Card is a plastic card in the size of credit cards, which has incorporated, in the surface integrated circuit that can store and check information. Besides, the smart Cards contain also a microprocessor which can make calculating work. The management of information becomes with sure ways and multiple possibilities of use of cards.

Today smart cards are used in a lot of sectors of our daily life.

In the public telephone appliances of SC are used instead of currency. In the sector of health, they give the possibility in the patient to have, wherever can be, all his medical historic, stored in one smart card. Also smart cards can contain a pecuniary sum for small, daily pecuniary transactions. All these different and independent

applications can coexist in one smart card making one essential element of our daily life (McElroy 1998, Smart Technology 2005).

Smart cards store personal information of the holder of the card in a small, particularly safe silicon chip.

The growth of intelligent cards began mainly in the decade of 1990. The reasons that led to their growth are their smaller cost and the fact that the magnetic cards could not have provided the essential protection in chance of violation of their code of safety. Particularly, the smart cards via the microprocessor are able to process data reacting in a situation, they are small, interact with computers and other automated systems, while the elements that they bring can change and renewed continuously (Rinaldo 1997, Apostolakis 2002).

Applications of smart cards in health services

We can say that the smart card of health provides direct access in the medical information, safeguards the medical secrecy, provides checked access in elements, is compatible with the all medical information systems, the networks and the applications, in the event of loss deactivated and is replaced immediately, supports services of settlement, contains elements for individuals which needed special care of health.

Their applications in the space of health can be categorized in six categories depending on the press and the total of information that is stored:

- Insurance Cards: they contain information with regard to the identity securing.
- Emergency Medical Cards: they contain medical information adapted in the needs of personal Department of Urgent Incidents.
- Hospital Admission Cards: are included demographic elements and elements of actuarial institution.
- Follow up Cards: store medical elements for special cases as cardiologic problems, sugary diabetes, haemodialysis, maternity, oncology and pharmaceutical.
- Universal Health Cards: they contain information of insurance, demographic data and interconnection with the medical background of patients.
- Health Passport Cards: they contain medical information of social insurance (Health card technology, 2003).

Operations of smart cards of health

Exist a lot of operations which it can incorporate a smart card of health, with mainly the below:

- Recognition of elements: the cards are used in order to simplify the process of determination of elements, which becomes optically or with the utilisation of electronic readable elements. These elements can be the name of patient, his number of identity etc.
- Control of access: the cards can play a role in the access of elements with regard to the local systems, the found connections systems of information or in a other card.
- Transport of elements: the elements can be imported in a card and be read in different places. With this way the same information can be given in the organisations that otherwise cannot exchange the elements because the lack of connections, technical incompatibility or different organisational structures of submission of reports. Such elements are administrative, emergency, medical bases of data of speciality, recipes on allergies, background of immunisation, etc.
- Transport of information: the information on the card is transported in the groups of computers or is transported in the essential files of document. The information is transported in the document mechanically or electronic with the reading of information of cards and their printing.
- Validation: the cards can bring the keys and the certificates that are used for the encryption and the digital signatures. The private key of individual is used in order to create a digital signature for a document. The electronic systems of communications use the digital signatures in order to ratify the sender and they show the integrity of messages. The electronic keys that are brought in smart cards are considered safer than keys such as diskettes (Rinaldo, 1998).

Advantages of intelligent cards of health

- They protect the secrecy of data that concerns the patients.
- They even allow the access in the data of patients when they are off of a Communication network.
- It is adapted in the platform of any PC.
- It provides vital importance information in case of emergency of health.
- They accelerate the processes in the hospitals and clinics.
- It is confirmed the identity of patients.
- It is checked the actuarial cover.
- It is ensured the payment for the provided sanitary services (Apostolakis 2002, Health card technology 2003).

Interoperability of intelligent cards of health

Important accent is given in the growth of technical interoperability, so all cards can be read from all participating manufacturers in different countries (G-8 Healthcard Data Card project 2000, Blobel et al.2001).

The interoperability between the systems of smart cards of health is the possibility of a reading system, of

using and of informing the elements of smart cards of health that are published by other system. The interoperability is considered as one of the more important conditions for the widespread use of smart cards of health (Gritzalis, 1998).

Advantages of functional interoperability

The advantages of the functional interoperability that concern the health care, the economics of Health Care and in particular are the following:

A. Sanitary Care

Administratively

- Simplified the administrative processes for the patient (eg operation [E]III)
- Determination of health professional that is person

in charge for the care of sick, so as to it provides information when is asked in order to help in the treatment.

- The use of smart card of health allows the accessibility in the files of the patient via network.

Clinically

- Access in the urgent and other clinical data, which are found in the card of health, when and where they are asked (and not only in the system that it publishes the card).

- Reduction of delay of treatment of patients because of delayed access in his clinical elements.

B. Economically of health

- More efficient administrative processes at the care of one patient, which is covered by other system.

- Simplification of pricing for the provided services in patients that participate in other system.
- Similar systems can facilitate the mobility of personnel between different hospitals or organisms (G-8 Healthcard Data Card project 2000, Blobel et al.2001).

The growth of intelligent cards of health in Greece

Greece has participated in the program Ishtar. Objective of program is to study the problem of protection of data in the information systems of health and it mainly proposes solutions through horizontal action. The program will use for this aim the results of inquiring program Seismed (Cordis, 2003).

The summertime 1996 was realised in the Hospital Red Cross in Athens a trial of Diabcard. The pilot program aimed in the possibility of communication with the use of card, which contained information for the patient, between medical and paramedic personnel and personnel of laboratories.

The evaluation of system showed that the software needs improvement and a further trial with regard to the speed and functionalism. The professionals of health are willing to accept the card of health as a alternative method of registration of patients and exchange of information, but they require a system according to their needs

and they are not willing at the present moment to abandon the written files. The attitude of patients to the system was very positive (Karapetsis 1994, Diabedcart 1995).

In Greece was realised also the program Cardlink 2 from the National Technical university From Metsovo. The program wanted to strengthen the results of action of Cardlink I and it promotes the program Eurocards. The proposal was created a card of health for 6.500 roughly students that were covered by concrete actuarial form.

The services of health that were provided or by academic clinic or by departments of urgent incidents that were found in hospitals. Moreover, the drawing included also the application of card of health for children, as well as the card of health for individuals of age over the 65 years in collaboration with the Municipality Amaroysoy. The program published 100.000 cards and produced a in detail evaluation for the users and suppliers of service (e business Forum, 2002).

Primary health care

In the legislation for the organisation and operation of the Primary Health Care General System, the Health Electronic Card System is included. The individuals and their family members that are insured by insurance organisations which fall under the requirements of the present legislation, the national and private institutions that belong to the Primary Health Care General System and the medical services, tests and medicine and the protocol of the medical acts and medicine with the authorised payments and prices are entered with a particular code in the Health Electronic Card System.

To each insured individual and protected family member of insurance organisation, an electronic Health Card is given, with yearly expenses, which is pre-authorised and credited in the beginning of every calendar year, by the related insurance organisation.

Every provision of medical service/examination and medicine purchase is entered by the providers of these services, to the Payment System of the Primary Health Care General System, entering the code numbers of the insured person, the providing Institution, the medical service/examination that was provided and the medicine that was prescribed. After this entry, the provider in which the cost of such provided services or a medicine is included issues a receipt. This amount of money is automatically debited from the credit total for each particular expense category of the electronic system. At the end of each calendar year any remaining credit amount in the Payment System of the Primary Health Care General System is zeroed and the new limit is recruited. (Legislation blueprint for the organization and function of the Primary Health Care System, 2008).

Epilogue

The smart cards is a new and cutting edge technology which is rapidly developing throughout the world and they offer accessibility to the health services, the electronic payments, the public transportation etc.

In the health area, the smart cards are used for the identification of the patient, the entry of the medical record, to the prepaid solutions etc. One of the most important functions of the smart cards is the security and integrity of the stored information that is provided with the encryption of the data.

For the European Union, the Smart Cards consist one

of the priorities of the Action Plan of eEurope within the frame of development of secure and quick networks and empowerment of the eBusiness. The European Commission promotes the issue with the organization of a Summit for the Smart Cards and the identification of the required activities for the achievement of the goals of eEurope.

Our country, following the international developments as a member of the European Union, contributes to the efforts for the development of applications of the Health Smart Cards. Until today, the indications from the application of the programs of the Health Smart Cards are positive.

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