An Overview and a Future Perspective in Health Information Systems in Portugal

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INTRODUCTION

The activity of providing health care is a complex task, which stems from several factors, among which it can be highlighted the complexity of the information flow, particularly in clinical processes, the wide variety and different clinical data formats, the ambiguity of the concepts used, the inherent uncertainty in medical diagnosis, the large structural variability of medical records and the organizational and clinical practice cultures of the different institutions (Rouse & Serban 2014). There are growing needs for information at point of care, intended to be complete, homogeneous, accurate, current and of interest to clinical decision (Bath, 2008). Several studies show that information systems can cause a positive effect on quality of care (Lenz & Reichert, 2007), as well as being presently unquestionable their potential economic benefits (Uslu & Stausberg, 2008). One of the main advantages of using computational systems in the health care activity comes from their ability to provide useful information for decision making to health professionals. Thus, their main purpose is to increment the quality and efficiency of health care delivery. In order to achieve these purposes, Health Information Systems (HIS) must fulfil interoperability standards, quality, security, scalability, reliability and timeliness in data storage and processing terms. One of the main problems in this area is that, the large amounts of data produced by health care organizations (which can be of different types, shapes and nature) are stored in several databases with different management platforms and often differ in the architectural levels, which have been developed over the years, in order to support specific needs of certain services or sectors coexisting in the same organization, which may have a large number of heterogeneous and spread systems (Kitsiou, Matopoulos, Manthou & Vlachopoulou, 2007). On the other hand, a large number of health informatics applications do not share information, and when they do, they do it at a very basic level. When communication between different HIS exists, it is mainly achieved through proprietary integration solutions.

In Portugal, several projects were developed in an effort to implement an Electronic Medical Record (EMR) based on the many repositories of information available, but limitations in the existing HIS have prevented this goal to become a reality in a significant extent. To allow a health professional to view the entire medical history of a patient, he must have access to a significant number of documents, which may be spread over many different systems. To make this practical and useful, the user would view all the information from a single system (EMR) that previously received all the information from several other systems (centralized architecture). Alternatively, a more distributed solution may exist, where the user would access other systems besides the EMR. This EMR would contain a set of pointers

to remote systems, which store and present the information related with the patient in the study. This is the solution implemented in Portugal through the *Plataforma de Dados da Saúde* – PDS (Health Data Platform) (Saude, 2014d).

Regardless of the EMR scenario using centralized information, decentralized or even a mixed solution, there are certain minimum assumptions in information format and communication that must be met so that an EMR can arise with reliable and accessible information that can be maintained over time. One of the major difficulties is the lack of good and standardized interoperability among information systems. One of the most important might be the lack of a common unique identifier for each patient. In Portugal there is a project, named *Registo Nacional de Utentes* – RNU (Patient National Registry) (Saude, 2010), to overcome this problem, but it currently only solves the problem for the applications developed by the Health Ministry. This solution does not present integration mechanisms regarding patient's identification numbers for non-Government applications. Without a precise relationship in patient's identification through the different health care systems and their information, it won't be possible to effectively gather all the existing information of a single patient. One of the ways to overcome this difficulty would be the adoption of already developed standards for the patient information cross reference like the Integrating the Healthcare Enterprise (IHE) Patient Information Cross-referencing and Patient Demographics Query (PIX/PDQ) (Enterprise, 2010; Trotter & Uhlman, 2011) profiles and the adherence of current systems to those standards. This would require the creation of a system that can manage all the identifiers for a single patient in different systems (domains) playing a central role in the query and distribution of updated patient identifiers. Assume there can be only one unique identifier common to all health care systems is infeasible, as there will always be restrictions on the patient identifiers in the applications, legacy systems with older identifiers and the will to broaden health care information to bigger enterprises, regions or even countries that surely have their own identifiers already.

This paper aims to present the state of art in interoperability among Portuguese HIS and to propose an approach to overcome the inexistence of some structural systems that would promote interoperability and therefore an increase in the information available to an EMR.

HEALTH INFORMATION SYSTEMS

Progress in information technology is a real and unavoidable fact, it plays an important role in the health care sector regarding its final goal – treating patients more effectively. In this sector, his scope of action covers various areas such as the HIS, Telemedicine, Biological Signal Processing (in which is included the Medical Image Processing), Health Informatics Security, etc..

Information and Communication Technologies (ICT) increased use in health care organizations presents a pattern that is similar to what happened in major companies that rely in a well developed Information Technologies (IT) infrastructure. The use of web technologies, database systems, and network infrastructures are some initiatives that affect both the practice and management of health care market (Jardim, 2013).

Regarding the evolution of information and communication technologies in health care organizations, there is a strong resistance to the adoption of e-health systems - the use of the so-called Electronic Medical Records (EMR). With the use of patient data information systems, information goes from a paper record to electronic format in the form of files, thus allowing easier and more effective management.

The concept of HIS emerges from Health Information and Communication Technologies (HICT), constituting one of the three main lines along which they are organized (Saude, 2012). HIS are frequently

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