Chapter 7.7 Security in E-Health Applications

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ABSTRACT

This chapter presents security solutions in integrated patient-centric Web-based health-care information systems, also known as electronic healthcare record (EHCR). Security solutions in several projects have been presented and in particular a solution for EHCR integration from scratch. Implementations of Public key infrastructure, privilege management infrastructure, role based access control and rule based access control in EHCR have been presented. Regarding EHCR integration from scratch architecture and security have been proposed and discussed. This integration is particularly suitable for developing countries with wide spread Internet while at the same time the integration of heterogeneous systems is not needed. The chapter aims at contributing to initiatives for implementation of national and transnational EHCR in security aspect.

INTRODUCTION

E-health has become the preferred term for healthcare services available through the Internet. While the first generation of e-health applications comprises educational and informational Web sites, at present e-health has grown into national and transnational patient centric healthcare record processing. A patient centric healthcare record, also called electronic healthcare record (EHCR) and electronic patient record (EPR), enables a physician to access a patient record from any place with Internet connection and give a new face to integration of patient data. Such integration can improve healthcare treatment and reduce the cost of services to a large extent. Benefits are based on extended possibilities for collaboration through sharing data between a physician and a patient and between physicians. In such large scale information systems, which spread over different

domains, standardization is highly required. The second paragraph describes the main issues in ehealth security as well as the results of EU projects EUROMED and TRUSTHEALTH, while the third paragraph presents MEDIS prototype of national healthcare electronic record suitable especially for developing countries where the Internet is widespread and healthcare information systems are not developed to large extent and therefore integration from scratch is proposed.

EXISTING SOLUTIONS

In general, the following lines of development for healthcare information system were considered as important (Reichertz, 2006): (1) the shift from paper-based to computer-based processing and storage, as well as the increase of data in health care settings; (2) the shift from institution-centered departmental and, later, hospital information systems towards regional and global HIS; (3) the inclusion of patients and health consumers as HIS users, besides health care professionals and administrators; (4) the use of HIS data not only for patient care and administrative purposes, but also for health care planning as well as clinical and epidemiological research; (5) the shift from focusing mainly on technical HIS problems to those of change management as well as of strategic information management; (6) the shift from mainly alpha-numeric data in HIS to images and now also to data on the molecular level; (7) the steady increase of new technologies to be included, now starting to include ubiquitous computing environments and sensor-based technologies for health monitoring.

As consequences for HIS in the future, the need for institutional, national, and international HIS-strategies is first seen; second, the need to explore new (transinstitutional) HIS architectural styles is needed; third, the need for education in

Figure 1. Degree of sophistication in healthcare information systems. Note. From Information Systems, Sao Paolo University Technical Report, 2006)

Cumulative Levels of Healthcare Services Information Systems 6. Advanced multimedia and telematics Continuous and remote clinical monitoring Diagnostic images shared remotely for diagnosis and review Single complete patient record instantly available Improved access to remote expert diagnosis			Illustrative Improvements in Quality of Care Immediate alerts to problems Easier access to expert opinion Previous history always available Reduced travelling time and journeys for patients Remote but more frequent, home-care monitoring Images recorded for progress reviews	
		s and le		
 5. Specialty specific support (shared care diabetes, asthma and children, pathway automated rules-based alerts and promelectronic images) 4. Clinical knowledge and decision support (salerts and prompts, on-line access to know alerts and prompts, on-line acc	system for s with pts, imple /ledge	Ext pra Fas For con Gre Alerts to	ensive and detailed pathways set out best ctice ter and more accurate diagnosis malized, rapid, and comprehensive mnunications water patient participation in care ate access to expert knowledge o possible drug interactions	
bases, muiti-oiscipiinary care planning)		Care pl	and more accurate diagnosis anning more consistent and complete	
 Clinical activities support (ICU, renal, cardiology services, order-communications systems, electronic prescribing) 	F N V	ewer pres ore consi varnings c	spital stay scribing errors stent care of variations from agreed care plans	
 Integrated clinical diagnostic and treatment support (Pathology & Radiology Systems) 	Rapio repor Fewe	d access t ts er lost case waiting fo	o previous diagnostic results and e notes r new test results	
Clinical administrative support (Patient Administration System)	Less repetition of personal details Less patient waiting			

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