

Information and Communication Technologies in Healthcare: Still Innovation or Reality? Innovative and Entrepreneurial Value-creating Approach in Healthcare Management

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Abstract

While developed countries have never been healthier, healthcare systems are facing challenges never witnessed before. An increasing demand for healthcare services resulting from a longer life expectancy associated with a widespread occurrence of civilization diseases and those which incidence increases with age escalates the total cost of health care provision and the health system maintenance. The potential of information and communication technologies as means to support the organization of the healthcare system, promising harmonization of processes, promptness and increased service quality, all this accompanied by a reduction of the global expenditure has been consistently considered and eventually adopted by governments worldwide.

Information and communication technologies represent, indeed, a potential for the system, as well as they carry a number of risks accompanying their implementation. This article analyzes the issues that electronic revolution brings into the provision of health services, both, from the point of view of a provider and a patient. Specifically, it focuses on Electronic Health Record and Personal Health Record, bringing reflections on experiences from their application in the United States and the United Kingdom to, finally, discusses the situation in Poland.

We used an extensive literature review as a starting point for this study, which scanned and searched for publications in CINAHL, Web of Science and Scopus databases. This led us to the conclusion that, typically, scientific publications could not fully depict the real picture and the current contribution of information and communication technologies to the development of the healthcare services system. Thus, the literature review was extended and included grey literature, technical reports from government agencies, working papers, white papers, and papers not published but presented in public presentations.

Key words: social innovation, entrepreneurial approach in healthcare management, information and communication technologies, Electronic Health Record, Personal Health Record, value-creation innovation.

JEL Classification: O31, L26, O35, Q55

1 Introduction

An effect of rating changes on the variation in value of companies is well known (Uzik and Soltes 2009, Michalski 2009). Improvement of rating results usually in only a milder effect on increase in value and the same effect is observed in healthcare entities (Gavurová 2012, Michalski 2014a), where the opinion of patients has an equivalent role. That is associated with an innovative approach in healthcare which has also built on real options (Šoltés 2010). It is crucial to understand an innovative line and value creating processes, where the value of healthcare organization constitutes a benefit for its patients as final beneficiaries (Michalski 2014b). The methodology of the present paper is realized by the presentation of the state of eHealth systems in various economic environments and the discussion of solutions as the best or near-best proposals.

A progress in development of information and communication technologies (ICT), especially rapid in last decades, has affected several aspects of human life and spheres of the economy, inevitably changing the organization of services, including healthcare services. The presence of innovation is noticed in the field of healthcare due to equipment and devices, both medical and supporting the functioning of the entity, measured by a level of computerization of the organization of care services delivery process. Deriving from this logic, a concept of eHealth arose as a term of medical practice supported by electronic processes including electronic communication. Some authors (Eysenbach 2001, Šoltés and Gavurová 2013) note significant differences in the application of the term, as it ranges from using only the internet to the general use of computers in healthcare. Oh and colleagues (Oh et al. 2005, Tóth et al. 2014, Gavurová et al. 2014) conducted a systematic literature review seeking the scope of the eHealth term usage in the scientific community and the general audience and came to the conclusion that there was no clear consensus but a fairly tacit understanding about its meaning. Taking into account a quantity of definitions they retrieved and analyzed, eHealth could be embedded in a variety of concepts, including health, technology and trade. From literature springs a general understanding of eHealth as a set of technology issues in contemporary healthcare, encompassing different places, stakeholders and attitudes, and real or potential benefits that can be expected. Eysenbach (Eysenbach 2001) emphasizes additionally the meaning of ‘e’ in the term in question as not solely concerning electronic activity. It brings together an additional ‘e’, such as efficiency, enhancing quality of care, evidence based care, patients empowerment, encouragement for a new, different relation between a patient and a healthcare professional toward real partnership, continuous education of health professionals, education of patients, enabling of communication and information exchange as a normalized practice between healthcare entities, extending the scope of healthcare beyond its borders, ethics and equity (Eysenbach 2001). It is generally accepted that eHealth includes Electronic Health Record, telemedicine, information systems, knowledge management in health and eHealth. Ebell and Frame (Ebell and Frame 2001) divide it into four functional categories comprising medical records, communication, and decision support and knowledge management.

2 Electronic Health Record

Medical records are means of storing, organizing and sharing information about patients’ health status. Electronic Health Record (EHR) is a mechanism for a systematic storage of information of an individual or a population (Gunter and Terry 2005). EHR is a record that, by its digital format,

is capable to reach different areas and healthcare entities through of a network of information systems. The premise of EHR is accessibility, integration of information relative to an individual patient and convenience. Its basic elements are separate electronic records, which include (National Institute of Health Committee on Data Standards for Patient Safety 2003):

- collection of electronic information on health status of an individual and healthcare services, including medical exams an individual has performed;
- instant access to information regarding an individual or a population by authorized, and only authorized users of the system;
- providing knowledge to decision-making support, what improves the quality of information safety and efficiency of patient care; and
- promoting the efficient provision of healthcare processes.

Electronic Health Records provide medical information and data, deemed secure, and can prove to be of a valuable utility in a clinical decision-making process by allowing access to information about the current health state and the patient's past health episodes relevant for further proceeding at a point of care, which may require an immediate action. It is expected that EHR will improve quality of health services, reduce duplication of medical procedures, including appointments and exams, reducing, consequently, costs, and, in overall, revitalize healthcare (Walsh 2004, Serenčič et al. 2014).

3 Personal Health Record

The greatest challenge of today's modern health systems regarding medical records is Integrated Electronic Health Record, especially taking into account a number and variety of institutions and medical processes a patient has contact with in a lifespan. These numbers are and will be increasing due to demographic, social and epidemiological factors. On the other hand, patient empowerment, involvement in the management process of own health condition leads to discussion on Personal Health Record (PHR) and its digital distribution capacity. The terms EHR and PHR and frequently used interchangeably, while differences between them persist. Electronic Health Record is a registry generated and maintained by and within healthcare institutions, providing access to healthcare professionals, patients and insurers. Personal Health Record differs from the above by a possibility of interaction with a proper patient, who can update relevant information. PHR is thus EHR initiated and maintained by a patient.

In an ideal system, a patient has their own personal medical record and controls an access to it. However, "the first step toward an electronic health register for the whole life depends on having a basic electronic register at the primary healthcare level and in the social care" (Harris and Boaden 2004) and, therefore, it is believed the integration of the two registers through interconnection may bring, in a long-term, a much greater benefit than a single register. Subsequently, and despite an ongoing debate over cost-effectiveness and security of EHR (Hersh 2004), its implementation seems unavoidable and current evidence confirms nationwide efforts to implement (Gray et al. 2011) or running EHR (Schoen et al. 2009), especially in primary care. In contrast, there is also evidence on pertinent obstacles hampering implementation of patient-accessible electronic medical records (Schoen et al. 2012).

As delivery of healthcare services takes place in different moments of time, in different health entities located geographically more or less from each other, the challenge lies in creating a

system for coordinated updating the record by all providers. Up to date, two models have been taken in consideration. One proposes creation of a central server to handle all the registers, the other, through files synchronization, allows for their directory by concurrent requirement of standardization of data presentation. Any of these, brings a chance to integrate databases of healthcare systems, particularly in cases when such databases already exist.

4 Insights Into Applications of ICT: the United States

One of the assumptions of the Health Information Technology Plan, Promoting Innovation and Competitiveness from 2004 was guaranteeing an access to interoperable Electronic Health Record to all citizens before 2014. It acknowledged primary benefits of this technology for the healthcare system, such as early detection of disease outbreaks within the country, improved management of chronic diseases and ability to collect identifiable information for research purposes. For the health system users, EHR benefits suggested higher quality of services, less bureaucracy, lower costs, reducing medical errors, permanent access to information and increased access to healthcare services for the population. The promoted prognoses were optimistic and assumed that a common use of EHR in the US would allow the system savings of USD 77.8 billion per year, equivalent to 5% of the total annual expenditure for health in the country (The Center for Information Technology Leadership 2005). Skeptical evidence from academy also existed. Jha and colleagues' high quality data indicated that slightly less than 25% of private physicians used EHR (Jha, et al. 2006). The use was even lower in hospitals. An extensive survey carried out in 2008 (DesRoches et al. 2008) revealed that 83% of all physicians, 80% of primary care doctors and 86% of doctors practicing outside primary care did not use EHR. Among all physicians, 16% had access to the EHR system but did not implement it yet. Multifactorial analysis pointed out that primary care doctors practicing in larger groups, health centers or hospitals, or in western regions of the United States were more likely to use Electronic Health Record. The results showed a positive impact of the EHR system on different dimensions of quality of care and level of satisfaction. These results coincided with a study of Ford, Menachemi and Phillips suggesting it was unlikely to spread the EHR system fully in accordance with the assumptions, especially among small medical practices constituting a critical segment of the market (Ford et al. 2006).

The Health Information Technology for Economic and Clinical Health Act (HITECH) from 2009 established the adoption and use of the EHR system in healthcare as a fundamental objective on a national scale (Blumenthal 2010). Following it, the American Recovery and Reinvestment Act (ARRA) constituted a stimulus for every aspect of the economy. In healthcare, the law supplied USD 19 billion specifically for promotion of implementation and use of health information technology, particularly Electronic Health Record. A recent study (Schoen et al. 2012) compared the situation from 2009 to 2012 and found an increase from 46% to 69% of American primary care physicians who admitted to be using Electronic Health Record in their daily practice. While still lagging behind some other countries, the increase was noteworthy. The authors reported also purposes EHR could be used for, specifying four domains (generation of patient information, generation of patient registry and panel information, order entry management, and decision support), and setting up a cut point of performing at least two to be named 'multifunctional' EHR. Comparing to some other countries, the US represented a low level of 'multifunctional' EHR numbers (27%), while the UK reached 68%, Australia 60% and New Zealand 59%. On the

other hand, the study pointed out countries that, and with no surprise, achieved a low level in this aspect, such as France (6%), Germany (7%) or Switzerland (2%).

5 Insights into Applications of ICT: the United Kingdom

The National Health Service (NHS) in the United Kingdom may refer to four, entirely independent healthcare systems of countries constituting the UK, England, Scotland, Wales and Northern Ireland. While all the others may be referred as ‘NHS’, only the English NHS is officially called the National Health Service. Notably, independently in which of the countries of the United Kingdom a medical incident occurs, a resident of one of the countries of them will receive the same treatment as a citizen of the country where the incident occurred. Moreover, a patient is not personally involved in further organizational and financial arrangements between the organizations regarding payments and administrative issues.

The United Kingdom began the work on creation of Electronic Health Record in 2005, with a planned assumption of the effective system implementation until 2010. An enhanced version of a basic concept of Electronic Health Record was Integrated Care Record Service (ICRS), assumed the main driving force for the primary care improvement. Based on a ‘spine record’ concept, ICRS would allow the exchange of information between healthcare providers and patients, and was to be converted into a basic tool of all healthcare providers and institutions. Despite a success in some elements, a plan suffered consequences, due to delays in its implementation (Greenhalgh et al., 2010; Serenčič et al. 2010, Gavurová and Hyránek 2013, Kozáková et al. 2014). Further efforts led to creation of the National Health System Care Records Service under the responsibility of the NHS Connecting for Health as an element of modernization of the British healthcare system with a core on healthcare services intended to be focused on the patient’s individual needs from the first moment of the contact with the point of use. Meanwhile, the system at that level was subject of several alterations, discontinuing the activity of the NHS Connecting for Health and transferring its responsibilities to the Health and Social Care Information Centre, which one of the responsibilities was bringing into life the NHS National Programme for IT (NPfIT). Not only was it to move toward a centralized electronic record, connecting information from primary care and hospitals, but planned to allow patients accessing their health information using online service called Health Space. With time, the program started, however, raising public concerns and questions, mostly basing on costly implementation and managerial failures. A report from 2009 revealed some areas to be implemented well, and some components delayed by couple of years (The Public Accounts Committee 2009). Interestingly, a study conducted in 2010 concluded that the UK market was, among the included in the investigation, the most frequently identified (68%) as a space for profitable opportunity for investment (Accenture 2010, Bem et. al. 2014a, Bem et al. 2014b). In 2011, the government announced the end of the program justifying it “did not fit to provide the modern IT services that the NHS needs”. A struggle for Electronic Health Records in the UK, however, has continued.

The most recent information from the UK zone varies. From the government have come more optimistic predictions: to adopt soon paperless referrals, to get online access to the own health record held by the GP by March 2015, and to make digital information across NHS and social care services fully available by April 2018. A proper NHS promises a review of incentives and sanctions at present in use to improve quality of care, focusing on patients and promoting their

empowerment, and guaranteeing safety of personal data so that health professionals involved in a patient's treatments over time could share information securely (NHS 2013, Gavurová and Hyránek 2013, Qineti et al. 2011). Nonetheless, there are voices estimating the national EHR system final cost to be of GBP 10 billion.

6 Insights into Applications of ICT: Poland

In Poland, norms and standards for eHealth systems have started to be positively adopted since 1999. The eHealth policy strategies are embedded in a larger vision of development of the information society in the country. The Ministry of Health launched the Healthcare Digitalization Program, aiming at implementation of IT projects nationwide mostly financed from the EU structural funds.

The efforts toward eHealth started in Poland in 2004, with unofficial discussion resulting in internal documents. As a consequence, eHealth was included in the National Plan of Development in 2005. The same year, the strategy of information infrastructure enhancement in healthcare and introduction of the European Health Insurance Card was formulated. In practice, however, and in contrary to other countries, the efforts did not focus on a concrete action, such as establishing EHR, but a set of programs, in this case: (a) medical insurance verification system (eWUS); (b) Integrated Patient Register (ZIP); and (c) health insurance card (KUZ). The medical insurance verification system is based on information exchange between the National Health Fund and the Social Security. It runs from the beginning of 2013 and abolished the obligation of proving own medical insurance status. Integrated Patient Register was launched in 2013 and allows an access to a patient's medical history between 2008 and 2013 (medical records, prescriptions and treatments). Meanwhile, electronic health insurance card was implemented in the Silesia voivodeship as a pilot in order to facilitate and accelerate verification of the insurance status of the card holder and was tested to be eventually implemented across the country, still in the phase of implementation. The eHealth Plan for the years 2010-2015 is the next legislative proof of governmental involvement for enhancing the eHealth system in Poland as, unquestionably, in adoption of eHealth it still lags behind some other European countries.

A recent legal framework adopted to fully transform the healthcare system assumes severe modifications in the system that patient's data are stowed and exchanged between providers, promising telemedicine solutions as well. All information regarding the patient's health condition, health incidents, services that have been provided, performed exams and financial records is pledged to be handled between authorized entities. Probably the most expecting concept of the reform is a promise of all healthcare providers implementing Electronic Health Record before 1 August 2014, after which date continuing the use of health records on paper will not be possible. Interestingly, the latest data indicate that patient data are stored in an electronic format in around 15% of GP practices (Pędzinski et al. 2013) and 8% of hospitals (Najwyższa Izba Kontroli 2013).

7 Conclusions

The major challenge for an ageing and a more information-oriented society is understanding that healthcare systems in the modern world have a potential to use technology to create and allow an access to the general health system, at any point of care. Since healthcare is moving toward patient-centered and individualized practice, targeting high standards and quality of service, adopting information and communication technologies in healthcare is seen as a sort of panacea for accumulating costs of the healthcare system maintenance that recurrent governing parties have been struggling with. This is one of the premises to believe that information and communication technologies will become increasingly common in the nearest future.

Electronic Health Record as a tool for a rapid online verification of a patient's health state details by a healthcare professional seems to be the first step to integration of healthcare system services and has demonstrated a growing interest of care providers, patients, payers and policy makers. The level of attention of these stakeholders has varied among countries. The main issue remains the scale of interest and willingness to participate of a patient, as it may eventually bring adoption of Personal Health Record.

International experiences of implementation of information and communication technologies in healthcare and adoption of instruments of eHealth are an interesting starting point to a deep debate on lessons learnt from them, although bearing in mind their country specific context. Evidence from the evaluation of implementation and use in a daily medical practice is generally mixed (Kripalani et al. 2007).

In Poland, it has become evident that in order to make a genuine step toward the eHealth adoption, a considerable investment in technology and infrastructure is vital. Currently, existing legislative framework and governmental programs can already be considered strong points and an obvious advantage for the future, when financial support remains an uncertain factor and infrastructure is to be tested in the field.

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