

# Sustainable Health Care Systems

## Findings from the Section on Sustainable Health Care Systems

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### Summary

**Objectives:** To summarize major current trends and research in the field of sustainable health care systems.

**Method:** Synopsis of the articles selected for the IMIA Yearbook 2007.

**Results:** Four excellent articles, four nations and four international peer-reviewed journals representing some important aspects of the research in this field have been selected for the IMIA Yearbook 2007. The first paper focuses on health care spending and use of information technologies in OECD countries; the second paper presents an original model and framework to describe and evaluate the risks and safety of e-health systems; the third paper, a two-part paper, reviews several models to support lifetime personal health records and proposes some original approach to this problem. Finally, the last paper presents the evaluation of feasibility, potential, problems and risks of an Internet-based telemedicine network in developing countries of Africa and challenges and opportunities that IT can bring to developing countries.

**Conclusions:** Sustainability in health care and information technologies is a young but fast growing domain. This new section of the yearbook is promised to a rich future as illustrated in the variety and the importance of the challenges addressed by this 2007 selection.

### Keywords

Medical informatics; International Medical Informatics Association; yearbook; sustainability; health care systems

Geissbuhler A, Haux R, Kulikowski C, editors. *IMIA Yearbook of Medical Informatics 2007. Methods Inf Med 2007; 46 Suppl 1: 19-21*

### Introduction

The concept of “sustainable” is born about fifteen years ago, in 1992, when it as been brought to a large public during the Rio Janeiro’s conference of the United Nations on environment and development (UNCED) [1]. Fifteen years later, it is the major topic of the 2007 Medinfo Conference in Brisbane, Australia [2] and becoming an important field in medical informatics. Getting back to the sources, there are two major aspects emerging out of the UNCED conference: the first aspect relies on the recommendation to balance economy and industry with social and environmental components. The second aspect is the proposition of a new partnership between citizens and leaders, resulting to a reinforced capacity of citizens to understand and exert their rights. The first one is described as *sustainability* and the latter is known as *empowerment*. These two components are tightly related and are now recognized as major concerns for almost all sectors of the society. In health care systems, these two aspects are influencing and reshaping all activities, such as infrastructures and systems, privacy, interoperability, efficiency of care to quote only some of them. So, for example, infrastructures and software are becoming critical in the way they run, but also how long they last and their turn-over time. Changing all computers in a company or a nation

with a lifecycle of 4 years is no longer affordable, or thinkable. New models will have to emerge, at all levels. This includes knowledge management for example, but also economical models in the healthcare environment. Moving from the politically acceptable discourse: all about sustainable energies, sustainable economies, sustainable industries or sustainable societal models; to real and applicable solutions is a major challenge. It is no more a choice. Sustainability is a mandatory and needed way to consider information technologies in healthcare [3]. The second pillar, around human aspects, is also strongly engaged towards the individual empowerment and the more specific aspect of *patient empowerment* [4]. In the context of sustainable development, the personal empowerment, which is tightly linked to autonomy, must fit into a broader understanding, including solidarity and the interdependence of individuals, of local communities, of national regulations and of the global environment [5, 6]. This cannot be achieved without education and valuable and validated sources of information [7, 8]. There is a lasting effect of these concepts on all aspects of society, including the information society. Considering that both sustainability and empowerment have their cornerstones anchored in communication, information and knowledge, it is not surprising that this evolution is deeply reshaping the landscape of medical informatics.

**Table 1** Best paper selection for the IMIA Yearbook of Medical Informatics 2007 in the section 'Sustainable Health Care Systems'. The articles are listed in alphabetical order of the first author's surname.

Section
<b>Sustainable Health Care Systems</b>
<ul style="list-style-type: none"> <li>▪ Anderson GF, Frogner BK, Johns RA, Reinhardt UE. Health care spending and use of information technology in OECD countries. <i>Health Aff (Millwood)</i>. 2006 May-Jun;25(3):819-31.</li> <li>▪ Croll PR, Croll J. Investigating risk exposure in e-health systems. <i>Int J Med Inform</i> 2007;76(5-6):460-5.</li> <li>▪ Shabo A. A global socio-economic-medico-legal model for the sustainability of longitudinal electronic health records. Part 1. <i>Methods Inf Med</i> 2006;45(3):240-5.</li> <li>▪ Shabo A. A global socio-economic-medico-legal model for the sustainability of longitudinal electronic health records. Part 2. <i>Methods Inf Med</i> 2006;45(5):498-505.</li> <li>▪ Bagayoko CO, Muller H, Geissbuhler A. Assessment of Internet-based tele-medicine in Africa (the RAFT project). <i>Comput Med Imaging Graph</i> 2006;30(6-7):407-16.</li> </ul>

## Best Paper Selection

There is a growing literature covering several aspects of sustainability and empowerment. However, considering the intersection of healthcare and information technologies, this remains a young field [9]. Beside economical sustainability and healthcare costs [10-12], which are major aspects covered in the literature, the selected papers focus on safety issues [13] and the use of information technologies as new tools to promote developing countries [14]. Table 1 presents the selected articles. A brief content summary of the selected papers can be found in the appendix of this report.

## Conclusion and Outlook

Sustainability covers a large spectrum of facets, ranging from economical viability to software engineering, from individual autonomy to self determination and privacy. Safe, robust, affordable and ethical systems and models are at stake. Not surprisingly, the major challenge is related to the cost of healthcare. In face of recurrent increases in costs, information technology appears as an important answer to cost containment and quality of care [15]. It is also a source for new

economical models and new ways to share information. Sharing and exploiting knowledge are major goals in healthcare since several years. Among the many challenges around these goals, the ability to leverage the potential of developing countries using IT while respecting their needs and cultures is of growing importance. This aspect is discussed around the problem of development and maintenance of locally and culturally adapted medical content in order to best serve the local needs. With the rising presence of information technologies at all levels of the healthcare system, pervasive computing can become intrusive and lead to new levels of problems around safety. This is the last aspect presented in this selection. These three different perspectives, economical aspects, safety and regional protection in a global world are all important for the future.

### Acknowledgment

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## Appendix: Content Summaries of Selected Best Papers for the IMIA Yearbook 2007, Section Sustainable Health Care Systems\*

Anderson GF, Frogner BK, Johns RA, Reinhardt UE

Health care spending and use of information technology in OECD countries

Health Aff (Millwood). 2006 May-Jun;25(3):819-31

Information technologies are increasingly perceived as a key factor to support cost containment while improving quality and efficiency in the healthcare sector. The need has become more acute with the observation of the transitory effect of the managed care introduction or other reimbursements models, such as diagnosis related groups (DRG's) in the United States. The authors discuss the fact the US have fewer hospital beds, active physicians and uses fewer inpatient hospital days than the median OECD country, yet, at least in 2003, are paying much higher prices for physician visits, hospital stays, and pharmaceuticals [16]. In their review, "Health Care Spending and Use of Information Technology in OECD Countries", Gerard Anderson and his colleagues provide a great overview of trends in IT expenditure in various countries. An interesting figure is related to the *per capita* costs and investments needed to build national health information networks, which ranges from \$0.43 for the United States to almost \$130 for United Kingdom. Most other countries quoted, such as Germany, Norway and Canada, have per capita investments between \$10 and \$50. These are important figures to target for governments, policy makers and industries, as they give an idea of the value and the

size of this market in the coming years. Noticeably, the United Kingdom has established a National Programme for IT which is considered as the most comprehensive national health information system in development worldwide, with provisions for integrated care record services, electronic appointments, and electronic prescriptions as well as an infrastructure that will be accessible to all major health care providers by 2014.

Croll PR, Croll J

Investigating risk exposure in e-health systems

Int J Med Inform 2007;76(5-6):460-5

The hindrances to the adoption of information technologies include traditionally cultural aspects and resistance to changes and innovation, but also costs and threats for privacy. On the technical aspect, interoperability and maturity are also usual causes discussed. The original approach of Peter and Jasmine Croll, in their paper entitled "Investigating risk exposure in e-health systems", is therefore of particular interest, as they propose an integrated model aiming at providing a framework to help building trustworthy solutions. The method proposed focuses on the identification of pertinent issues that determine the risk exposure of a given system. An important result of their work relates to the interdependency of factors influencing the safety of a system. The QUIPS (*Quality, Usability, Privacy and Safety*) model provides a framework that helps the identification of the causes that could lead to a safety incident and demonstrates their interdependencies [17]. A valuable point of their work is the practical outcomes that have been validated on two large Australian projects.

Shabo A

A global socio-economic-medico-legal model for the sustainability of longitudinal electronic health records

Part 1. Methods Inf Med 2006;45(3):240-5

Part 2. Methods Inf Med 2006;45(5):498-505

This excellent review from Amnon Shabo describes several existing ap-

proaches and models for the management of a persistent and longitudinal view of clinical information pertaining to the patient and the citizen's life and presents an original model to help this idea. In a vision that could be compared to the one in finance and banks, the author argues for the separation of responsibilities between information producers, among them all care providers but also the patient's and the information's users on one side, and the long-term record keepers on the other side. Taken into account technical, legal and ethical considerations amongst others, the author envisions the establishment of independent entities that allow a non-centric and movable model of EHR sustainability, based on a comprehensive socio-economic-medico-legal framework. This model focuses on the interests of all parties and would achieve most challenges of healthcare systems, quality and efficiency of care to patients; strong support for privacy; high accessibility and interoperability. For many aspects, this model could be seen as disruptive; however, it is carefully defended by solid arguments and a deep understanding of existing systems.

Bagayoko CO, Muller H, Geissbuhler A

Assessment of Internet-based tele-medicine in Africa (the RAFT project)

Comput Med Imaging Graph 2006;30(6-7):407-16

The RAFT project is an impressive proof of a successful achievement in the domain of an Internet-based tele-medicine network in developing countries of Africa. While describing their project, the authors provide an unusual insight into feasibility, potentials, problems and risks associated to the use of information technologies in developing countries. Using incredibly modest infrastructure, and reversing the prevailing north-south paternalistic approach, they achieved to build a self-sustained model by fostering South-South collaboration channels using satellite-based Internet connectivity in remote areas and leveraging the appreciation of local knowledge and its publication on-line.

\* The complete papers can be accessed in the Yearbook's full electronic version, provided that permission has been granted by the copyright holder(s)