

# Health Information Systems

## Toward Evidence-based Health Information Systems?

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### Summary

**Objectives:** Summarize excellent current research in the field of Health Information Systems.

**Method:** Synopsis of the articles selected for the IMIA Yearbook 2013.

**Results:** Five papers from international peer reviewed journals have been selected for the section on health information systems.

**Conclusions:** The selected articles illustrate current research regarding health IT impacts and evaluation and the latest developments in health information exchange.

### Keywords

Medical informatics, International Medical Informatics Association, health information systems, hospital information systems

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## Introduction

One objective of the IMIA Yearbook is to review research articles of the last year to identify research trends and excellent research papers in the different fields of medical informatics and reflects a broad spectrum of topics. Health information systems (HIS) section has his own wide spectrum of research topics: Methodical aspects, their analysis, design, and evolution, HIS evaluation and technology assessment concern HIS section.

The aim of health information systems is to contribute to a high quality, efficient health care, for patients, and medical research. With the growing deployment of IT in healthcare, the question of effectiveness is still topical, as reflected by this year's theme for the Yearbook 'Evidence based health informatics'.

## About the Paper Selection

Like last years the best paper selection for the section 'health information systems' in the IMIA Yearbook 2013 presents examples of excellent research in the field of health information systems. A comprehensive literature search was performed, using two bibliographic databases, Pubmed/Medline (from NCBI, National Center for Biotechnology Information) and Web of Science® (from Thomson Reuters). The search, targeted to HIS, yielded a total of 1 619 references from which a set of

299 references from 40 international peer reviewed journals as been pre-selected. These references were blindly reviewed by the two section editors and classified in three categories: accepted, rejected, or pending. In the review process, papers were considered according to their contribution to one of these themes: originality of the application domain, description of a new method, evaluation, or review on their impact. Then, the two reviews were merged, yielding 20 references that were accepted by both reviewers. The two section editors reviewed these references again for reaching a consensual list of 15 candidate papers. Following the IMIA Yearbook process, these 15 papers were evaluated by editors and external reviewers (at least three reviewers per paper).

Five papers were selected from international peer reviewed journals in the fields of medicine and medical informatics. Table 1 lists the selected papers. A content summary of the selected papers can be found in the appendix of this synopsis.

## Conclusion and Outlook

This year papers highlight the multidimensional aspects involved in the deployment of a HIS system. These can be analyzed from large corpuses of published studies. The paper selection tries to fit this year's yearbook theme: 'Evidence-based health informatics'.

The first paper presented in this selection describes the transition from an older and

locally developed EHR to a more advanced and sophisticated EHR with clinical decision support for e-prescribing. The transition from older to new advanced EHR was extremely difficult, despite intensive effort by the HIS team in charge of the deployment. This kind of study might help to better design system and deployment, taking into account the user preferences. In the second selected paper, authors propose a new approach to a context-based EHR, that employs biomedical ontologies and graphical disease models to identify the more relevant patient data to display. The secondary use for Public health purpose of patient data coming from EHR is a promising challenge explored by the third paper. This paper describes such platform (EHR for Public Health) designed for automatic surveillance. The fourth paper reports a new approach based on fuzzy logic to prioritize and contextualize the access of patient data in the EHR. The last and fifth paper reports the results of a retrospective cohort study to demonstrate that a frequent and important use of clinical services is correlated to a better usage of electronic medical records.

HIS implementation and use increase at a steady pace therefore building some evidence that information technology has a legitimate place in the transformation of health care and the improvement of patient outcomes. Indeed, it appears that organizational and human challenges are more difficult to master than technical aspects. This clearly demonstrates that within HIS projects and implementations, the focus is now between pure technical and organizational issues.

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**Table 1** Best paper selection of articles for the IMIA Yearbook of Medical Informatics 2010 in the sections 'Health Information Systems'. The articles are listed in alphabetical order of the first author's surname.

#### Section

#### Health Information Systems

- Abramson E L, Patel V, Malhotra S, Pfoh E R, Osorio S N, Cheriff A, Cole C L, Bunce A, Ash J, Kaushal R. Physician experiences transitioning between an older versus newer electronic health record for electronic prescribing. *Int J Med Inform* 2012;81(8):539-48.
- Hsu W, Taira R K, El-Saden S, Kangarloo H, Bui A. A T Context-Based Electronic Health Record: Toward Patient Specific Healthcare. *IEEE Trans Inf Technol Biomed* 2012;16(2):228-34.
- Klompas M, McVetta J, Lazarus R, Eggleston E, Haney G, Kruskal B A, Yih W K, Daly P, Oppedisano P, Beagan B, Lee M, Kirby C, Heisey-Grove D, DeMaria A Jr, Platt R. Integrating Clinical Practice and Public Health Surveillance Using Electronic Medical Record Systems. *Am J Prev Med* 2012;102:S325-S332.
- Palen T E, Ross C, Powers J D, Xu S Association of Online Patient Access to Clinicians and Medical Records With Use of Clinical Services. *JAMA* 2012;308(19):2012-9.
- Prados-Suárez B, Molina C, Peña Yañez C, Prados de Reyes M Contextualized Access to Electronical Health Records in Cardiology. *IEEE Trans Inf Technol Biomed* 2012;16(3):401-12.

## Appendix: Content Summaries of Selected Best Papers for the IMIA Yearbook 2013, Section 'Health Information Systems'<sup>1</sup>

**Abramson E L, Patel V, Malhotra S, Pfoh E R, Osorio S N, Cheriff A, Cole C L, Bunce A, Ash J, Kaushal R**

**Physician experiences transitioning between an older versus newer electronic health record for electronic prescribing**  
*Int J Med Inform* 2012;81(8):539-48

Adoption of certified EHR is now under incentive actions. The aim of this paper is to describe the transition from an older and locally developed EHR to a more advanced and sophisticated EHR with clinical decision support for e-prescribing.

Methods: The study is oriented to the end users perspective. It consisted of analyzing with a grounded theory approach observations and semi-structured interviews of

<sup>1</sup> The complete papers can be accessed in the Yearbook's full electronic version, provided that the article is freely accessible of that your institution has access to the respective journal.

the internal medicine members (n=19) of an academic hospital between January and November 2009.

Results: The transition from older to new advanced EHR was extremely difficult, despite the intensive effort by the HIS team in charge of the deployment. More over the new system was not perceived to bring an added value or improve medication safety mainly because it was too complex.

Conclusion: This is one of the first studies examining physician experiences about the transition from an older system to a new generation one with more robust Clinical Decision Support for prescriptions. This kind of study might help to better design system and deployment, taking into account user preferences.

**Hsu W, Taira R K, El-Saden S, Kangarloo H, Bui A**

**A T Context-Based Electronic Health Record: Toward Patient Specific Healthcare**  
*IEEE Tran Inf Technol Biomed* 2012;16(2):228-34

With the development of Hospital Information Systems and Electronic Health Records, physicians have to face more and more detailed patient data coming from a multitude of sources and domains. Filtering this information for a specific patient case

or problem is still challenging. One key issue is how to visualize this information, to avoid to be overwhelmed by non-relevant data. This paper describes a new approach to a context-based EHR, that employs biomedical ontologies and graphical disease models to identify the more relevant patient data to display. The method consists in annotating patient data and contextualizing information from the patient record. Authors describe a framework that aggregates and extracts relevant information from free-text clinical reports, and then maps this information to knowledge sources (ontologies) and eventually generate adaptive view in the EHR. This framework has been tested on the neuro-oncology domain.

**Klompas M, McVetta J, Lazarus R, Eggleston E, Haney G, Kruskal B A, Yih W K, Daly P, Oppedisano P, Beagan B, Lee M, Kirby C, Heisey-Grove D, DeMaria A Jr, Platt R**

**Integrating Clinical Practice and Public Health Surveillance Using Electronic Medical Record Systems**

**Am J Prev Med 2012;102:S325-S332**

Secondary use of patient data coming from EHR for Public health purpose is a promising challenge. EHR now makes it possible, without changing existing workflow. New surveillance systems extract relevant information from raw data, aggregate and automatically communicate this information to public health centers.

This paper describes such a platform (EHR for Public Health (ESP)) designed for the automatic surveillance of notifiable diseases (Influenza, and diabetes).

**Palen T E, Ross C, Powers J D, Xu S**  
**Association of Online Patient Access to Clinicians and Medical Records With Use of Clinical Services**

**JAMA 2012;308(19):2012-9**

This paper evaluates the impact of the utilization of an online patient access system (called MyHealthManager – MHM) in Colorado. Method: retrospective cohort study. Users were enrolled for at least 24 months during the study period (March 2005 to June 2010). Utilization rates were calculated for both NHM users and nonusers.

The study evaluated the following variables (between MHM users and non users): rates of office visits, telephone encounters, after-hours clinic visits, emergency department encounters, and hospitalizations for members with and without online access. For all of these variables, the study shows that having an online access to medical records and clinicians was associated with an increased use of clinical services.

**Prados-Suárez B, Molina C, Peña Yañez C, Prados de Reyes M**

**Contextualized Access to Electronical Health Records in Cardiology**

**IEEE Trans Inf Technol Biomed 2012;16(3):401-12**

This paper describes a new approach to prioritize and contextualize the access of patient data in the EHR. The aims of this approach is to provide the user with the most relevant information in specific contexts. The method is based on fuzzy logic and can be used with new devices, which have some limitations in the interfaces (such as tablet, PC or PDAs).