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Evaluation methods used on health information systems (HISs) in Iran and the effects of HISs on Iranian healthcare: A systematic review

Leila Ahmadian^{a,d}, Simin Salehi Nejad^b, Reza Khajouei^{c,d,*}

^a Medical Informatics Research Center, Institute for Futures Studies in Health, Kerman University of Medical Sciences, Kerman, Iran

^b Research Center for Social Determinants of Health, Institute for Futures Studies in Health, Kerman University of Medical Sciences, Kerman, Iran

^c Research Center for Health Services Management, Institute for Futures Studies in Health, Kerman University of Medical Sciences, Kerman, Iran

^d Department of Health Information Management and Technology, Faculty of Management and Health Information Sciences, Kerman University of Medical Sciences, Kerman, Iran

ARTICLE INFO

Article history:

Received 19 July 2014

Received in revised form

6 February 2015

Accepted 8 February 2015

Keywords:

Health information systems
Hospital information systems
Evaluation
Medical informatics
Qualitative research
Performance

ABSTRACT

Objectives: The most important goal of a health information system (HIS) is improvement of quality, effectiveness and efficiency of health services. To achieve this goal, health care systems should be evaluated continuously. The aim of this paper was to study the impacts of HISs in Iran and the methods used for their evaluation.

Methods: We systematically searched all English and Persian papers evaluating health information systems in Iran that were indexed in SID, Magiran, Iran medex, PubMed and Embase databases until June 2013. A data collection form was designed to extract required data such as types of systems evaluated, evaluation methods and tools.

Results: In this study, 53 out of 1103 retrieved articles were selected as relevant and reviewed by the authors. This study indicated that 28 studies used questionnaires to evaluate the system and in 27 studies the study instruments were distributed within a research population. In 26 papers the researchers collected the information by means of interviews, observations, heuristic evaluation and the review of documents and records. The main effects of the evaluated systems in health care settings were improving quality of services, reducing time, increasing accessibility to information, reducing costs and decreasing medical errors. **Conclusion:** Evaluation of health information systems is central to their development and enhancement, and to understanding their effect on health and health services. Despite numerous evaluation methods available, the reviewed studies used a limited number of methods to evaluate HIS. Additionally, the studies mainly discussed the positive effects of HIS on health care services.

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* Corresponding author at: Medical Informatics Research Center, Institute for Futures Studies in Health, Kerman University of Medical Sciences, Haftbagh Highway, 7616911313 Kerman, Iran. Tel.: +98 0341 3205406; fax: +98 0341 3205406.

E-mail addresses: ahmadianle@yahoo.com (L. Ahmadian), s.salehinejad@yahoo.com (S. Salehi Nejad), r.khajouei@yahoo.com, r.khajouei@kmu.ac.ir (R. Khajouei).

<http://dx.doi.org/10.1016/j.ijmedinf.2015.02.002>

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1. Introduction

Today, information is considered as power, because it has a great role in timely and appropriate decision making [1]. To this end, introduction of Information Technology (IT) in many fields, including healthcare has resulted in fundamental changes. Some argue we are near the tipping point where one can expect a steady rise in the number of health information system implemented and in their intensity of use in different settings, especially by healthcare providers at the point of care [2].

Healthcare organizations globally invest in information technologies to improve the quality of healthcare services and to reduce their costs [3]. Different studies [4–7] indicated that implementation of health information systems results in increasing the quality of patient care and safety through reducing medication errors, improving providers' performance and effectiveness of service, reducing treatment costs, and saving resources in health and medical organizations. Moreover, these systems can increase the legibility of recorded data, reduce medical errors and finally lead to users' satisfaction [8–11].

The continual evaluation of health information systems is necessary in order to ensure the overall goals of the system, such as conducting epidemiological research, managing health information, avoiding repeated activities, promoting care quality, and reducing costs, are met [12]. The evaluation of information systems helps to determine user's satisfaction level, systems effectiveness and efficiency, systems' usability level, and to identify weaknesses and strengths of these systems for system improvement [13]. Worldwide, many health information systems have been evaluated using different evaluation methods. Reviewing each of these studies solely, does not provide a complete picture of the state of system development and implementation in different geographic areas.

Systematic reviews, by aggregating the findings of these studies, provide researchers a better understanding of health information systems and their impact on health care systems. Current systematic reviews, such as those on information system evaluation methods [14,15] and on the effect of evaluated health information systems on health and health services [4,9,16] mostly have reviewed English language papers. Meanwhile, many healthcare information systems are developed and evaluated in non-English-speaking countries, including developing countries, where the results of those studies are mostly published in their own languages. Likewise, the results of most studies evaluating healthcare information systems in Iran are published in Persian and a few in English. Therefore, information revealed and knowledge gained by most of these studies cannot be shared worldwide. Hence, a systematic review of all studies evaluating health information systems in Iran is essential to share the gained knowledge with international audiences. The objective of this study is to systematically review evaluation studies of healthcare information systems in Iran whether they are published in English or in Persian. This study specifically focuses on different evaluation methods used to evaluate these systems and the effects of evaluated information systems in healthcare domain.

2. Methods

This study is a systematic review on evaluation studies of health information systems in Iran from January 2003 till June 2013. We searched PubMed and EMBASE for relevant papers in English and Magiran, Iranmedex and SID (Scientific Information Database) for relevant papers in Persian. In searching these databases, three groups of key terms were used: (A) key terms denoting evaluation of systems (B) key terms describing different types of health information systems, and (C) key terms indicating that study was done in Iran. Fig. 1 shows the key words of each group.

We used two different strategies to extract relevant articles in these databases and the results of the two strategies were combined. To search PubMed and EMBASE, the advanced search functions were used as follows: first, we used "OR" to combine terms in each group A, B and C separately, then, we combined results from three groups using "AND" operator to accumulate all the Iranian evaluation studies of health information systems. Persian databases (Magiran, SID and Iranmedex) were searched in the following steps: 1) the terms in groups A and B were combined separately using operator "OR" 2) We used "AND" to combine group A with group B.

Once the titles and abstracts of the identified citations were obtained, two evaluators (LA and SSN) independently reviewed and assessed the retrieved publications against the following pre-defined inclusion and exclusion criteria. Any discrepancy to include a paper was resolved through discussion between these two evaluators. Remaining disagreements were discussed with the third evaluator (RK) and final decision was reached through consensus.

The inclusion criteria were:

- (1) The paper must report on an original study.
- (2) The study should have evaluated any aspect of health information systems.
- (3) The evaluated systems must be used in Iranian health care facilities.

Review studies, editorials, commentaries, letters and studies carried out on systems that are not used in Iran were excluded. Studies proposing or validating information system models, not functional systems, were excluded.

For all the evaluation studies the authors' names, year of publication, type of evaluated system, and evaluation methods and tools were extracted (Tables 1 and 2). Besides aforementioned information, the effects of evaluated systems on medical and administrative procedures were also extracted, if they had been evaluated and reported in the papers (Table 2).

3. Results

The online databases search retrieved 1103 papers (Fig. 2). After removing duplications and irrelevant papers, 53 relevant papers (Tables 2 and 3) about the evaluation of health information systems remained (eight English language papers and 45 Persian language papers), of which 20 papers reported on the

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