



SYSTEMATIC REVIEW PROTOCOL

Applied Criteria of Hospital Information Systems in Organizational Evaluation: A Systematic Review Protocol

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ABSTRACT

Introduction: Through new and expanding technologies, the development of health information technology in today's society is indisputable, and the use of this technology has led to the production of various products with a variety of capabilities. One of these products is the Hospital Information System. Regarding the impact of organizational factors on the successful implementation of hospital information systems and the lack of comprehensive criteria for assessing them, the purpose of this study was to determine the criteria of hospital information systems involved in organizational evaluation. **Methods:** Data sources included the following databases: pubmed, scopus and cochrane library. In addition, other sources were searched for ongoing studies and grey literature. Studies were independently screened for eligibility by 2 reviewers and data extraction was done by 2 people. The language limitations for article wasn't considered, the reference of the articles that selected, review and related articles were selected. After completing the search, all the articles were entered in to EndNote, and duplicates were deleted. The Prisma protocol was used to report. **Results and Dissemination:** A specific and precise checklist was being prepared and developed, which is an appropriate guide to assess hospital information system from an organizational dimension in health technology assessment. The results of the study were published in a peer-reviewed journal and presented at relevant conferences. Policy makers and healthcare decision-makers can use these results.

INTRODUCTION

Target

The purpose of this study is to determine the criteria of hospital information systems (HIS) to be considered in organizational evaluation.

Question Framework

The structured question components (PICOD) are as follows.

Population: The target population is all groups using the hospital information system, such as system users, including physicians, nurses, patients, etc.

Intervention: All kinds of health information systems that are a subset of HIS such as Electronic Health Record (HER)

HIS for electronic prescription system (CPOE), systems for storing and retrieving images (PACS, etc. Are).

Through new and expanding technologies, the development of health information technology in today's society is indisputable, and the use of this technology has led to the production of various products with a variety of capabilities. The selection and use of products in the country for decision-makers in the field of health is usually time-consuming and expensive, and on the other hand, there are not enough standards to evaluate such products. One of these products is the Hospital Information System.

HIS is an element of health informatics that focuses mainly on the administrative needs of hospitals. In many implementations, a HIS is a comprehensive, integrated in-

formation system designed to manage all the aspects of a hospital's operation, such as medical, administrative, financial, and legal issues and the corresponding processing of services (1). In regard to organizational aspects, social and technical systems plays a key role in the successful implementation (2). Given the scale, complexity and importance of health care, policy-makers in both the private and public sectors need to have an analytical tool for assessing health information systems. As these systems become more complex and diversified, the complexity of the skills needed to evaluate them becomes even more complex. An accurate assessment is needed to further benefit the health information systems (3).

Regarding the impact of organizational factors on the successful implementation and continuity of hospital information systems and the existing gaps between what we expect from hospital information systems and what is actually being achieved, on the one hand, and the lack of specific and comprehensive criteria for assessing this. On the other hand, it seems that it is necessary, using the studies, to examine the criteria and parameters that affect the assessment of the organization that is considered in these studies, so that we can provide a comprehensive guide for the organizational evaluation of these systems.

Outcome

The final result involves extraction of organizational aspects used in the evaluation of hospital information systems, classified according to the objectives of the project in four groups: organizational structure, management dimension, organizational culture and service delivery process.

Study design: A systematic review study

Reasons and aspects of research innovation:

The field of health technology assessment is a new discipline and the methods used to do this type of study are more limited to drug and equipment technologies, and there is a limited methodology for conducting Health technology assessment (HTA) studies in all areas of health technology, especially in the field of health information technology. For example, there is a definite methodology for assessing the seven dimensions of the HTA for measuring the telemedicine technology called the Model for Assessment of Telemedicine (MAST) model, which outlines the criteria for evaluating this technology. It is hoped that after this project, we will be able to provide a specific methodological model for assessing hospital information systems from an organizational perspective to provide guidance for future evaluations of these systems.

METHODS

Evidence will be collected in the following way.

- 1- The exact definition of the subject and research question PICOD at the population level, intervention, comparison, outcome, and design)
- 2- Search for studies related to the research question
- 3- The application of entry and exit criteria for the selection of studies in the first stage (based on the title and

abstract) and in the second stage (based on full text)

- 4- Extracting data related to organizational aspects.

Search

- 1- Search the related electronic databases to identify articles related to the organizational aspects of hospital information system.
- 2- Manual review of related specialized sites will be conducted in different countries. Also, in order to avoid overlapping possible related studies, gray sources, including reports, standards, educational guides, and online guides, communities, and internationally accredited institutions, will be searched using the Google search engine.
- 3- The sources of key articles related to the electronic prescription will be reviewed.
- 4- Finally, if necessary, the authors of the articles will be contacted.

Search Strategy

In order to increase the search sensitivity and ensure the majority of studies, the search terms will be chosen to include enough free text words and mesh terms to include all the components of the question. For this purpose, by studying relevant studies, identifying a wide range of synonyms with different spellings, thus providing free text words for searching, and eventually generating relevant keywords. Also, Persian keywords are equivalent to health information systems. Such as: Hospital Information System, Health Information Technology, Clinical Information System, etc., will also be used to search for internal databases.

In the next step, the keywords associated with the hospital information systems will be OR together, and then with the words related to the organizational evaluation will be AND together. In search of any database, search strategy related to the intervention will be prepared individually. To find the related articles, we will search the pubmed, cochrane library and scopus databases. Also for gray literature, relevant databases such as open sigle and open gray will be used. The language and time limitations for article will not be considered. Next, the reference of the articles that selected, review and related articles are selected. At the end of the search process, email will be sent to the authors until if perform related article send us.

An example of the search Strategy developed for the PubMed database, dated 12/26/2016, is given in Table 1.

PubMed Search Strategy 2016/26/12

Selection of Studies

The search and review process will be done by at least two people independently and In case of disagreement, the judgment will be made by the third person. After completing the search, all the articles found will be enter in to EndNote, and duplicates will be deleted. Then the titles and abstracts of the articles according to inclusion and exclusion criteria by review by two person and if the title and abstract are not clear, the full

Table 1. The search strategy developed for the Pubmed database

Query	Items found
((((((“hospital Information System*” OR “health information technology” OR “Management Information systems” OR “health information system* “ OR “Integrated Advanced Information Management Systems” OR “Computerized Medical Records systems” OR “clinical information System*” OR “Clinical decision support system*” OR “technology assessment in health care” OR “health technology assessment” OR “medical informatics” OR “Computerize decision support system” OR “Picture And Archiving computerized System” OR “PACS” OR “Computerized Physician Order Entry” OR “Pharmacy information system*” OR “Laboratory information system” OR “Radiology information system” OR “Nursing information system” OR “Electronic health record” OR “Electronic medical record” OR “Respiratory management information system” OR “Operating room information system” OR “Health services research”)))) AND (((((((((((((((((((organizational/organisational evaluation) OR (organizational/organisational aspect)) OR (Organizational/organisational structure)) OR ((Administration[Title/Abstract]) AND structure[Title/Abstract])) OR (Organizational/organisational culture)) OR ((managerial[Title/Abstract]) AND structure[Title/Abstract])) OR “Service delivery process”) OR (organizational/organisational readiness)) OR (Organizational/organisational acceptance)) OR work flow) OR organisational domain[Title/Abstract]) OR organisational analysis[Title/Abstract]) OR centralization) OR decentralization) OR organisational elements[Title/Abstract]) OR organisational dimensions) OR ((administration[Title/Abstract]) AND organisation[Title/Abstract])) OR Structuring of Organizations[Title/Abstract]) OR organisational change[Title/Abstract])) AND (hasabstract[text] AND humans[Mesh]))	1807

text will be extracted. The inclusion and exclusion criteria in first stage based on the title and abstract, and in the second stage according to the full text of the study, it is as follows:

Inclusion and Exclusion Criteria

All types of studies that evaluate the health information systems and each of its subsystems, such as hospital information systems, electronic prescription and electronic health records from an organizational aspect are included in the study. Studies that have not addressed the organization’s assessment of hospital information systems and have considered unrelated outcomes are excluded from the study. Studies that use hospital information systems as a collection tool, education and research are also not considered. Also, studies conducted in the period 1995-2016 will be included in any language.

Data extraction

The criteria used in the studies to evaluate the organizational aspects of health information systems are extracted and classified into four groups include: organizational structure, management dimension, organizational culture and service delivery process, and based on which a specific and precise checklist is developed, which is used to evaluate the HIS In a variety of areas, especially in the field of health technology assessment, is an appropriate guide.

Data Synthesis

Selected criteria will be categorized into four categories of organizational culture, management dimension, organizational structure, and service delivery process.

Dealing with Missing Data

It is possible articles are not included in the study for various reasons, such as the inaccessibility of full text. Data for

missing items are not considered (for primary or secondary outcomes) and have no effect on the results of this study.

Study Quality Assessment

Considering that the purpose of this study is to extract the organizational criteria used in the evaluation of hospital information systems, therefore, the statistical results of the studies are not considered and there is no significant relationship between the organizational criteria and the information system discussed in this study. Also, the findings ultimately. The checklist will be provided and the meta-analysis will not be performed, therefore, the quality assessment of studies is ignored and all types of studies that are relevant to the title, abstract and full text, and the conditions for entry into the study are included in the study.

RESULTS

Primary Search Results

According to the primary search seem that initial studies are available on the introduction of the technology, but in the field of other aspects, especially in the organizational, social and economic aspects, no initial studies is not available.

- Although many articles refer to the assessment of the hospital information system, its criteria and outcomes, most of these studies have focused on reducing costs and improving quality. Some have also highlighted the technical and social aspects and considered some aspects of financial and patient satisfaction and user feedback (4).

- Qualitative study was conducted in 2013 by Cline and colleagues on health information systems in developing countries. The data were collected using a structured questionnaire by interview method from 94 users of information systems from three groups of physicians, nurses and hospital managers. The results of this study established the attitude of investing in health information systems and Showed that

organizational factors are effective in the success of these systems, and this success will continue if the implementation of information systems is associated with change management (5).

A review study titled “Organizational, Social, and Structural Features of Decision Support Systems for Insulin Therapy”, conducted by Thomas and colleagues in 2009, revealed that studies that assessed the organizational and social aspects of information systems showed that implementation Decision support systems require major organizational changes and create unwanted complexities (6).

An interpretative review study titled “Organizational issues in the implementation and adoption of health information technology innovations” conducted by Cresswell and his colleague in 2013. From a total body of 121 systematic reviews, identified 13 systematic reviews encompassing organizational issues surrounding health information technology implementations. By and large, the evidence indicates that there are a range of technical, social and organizational considerations that need to be deliberated when attempting to ensure that technological innovations are useful for both individuals and organizational processes. However, these dimensions are inter-related, requiring a careful balancing act of strategic implementation decisions in order to ensure that unintended consequences resulting from technology introduction do not pose a threat to patients (7).

The review conducted by Rippen, titled “Organizational framework for health information technology” in 2013, suggested that the provision of an institutional framework is an essential step to ensure consistency and increase people’s understanding of the implementation of the health information system, and a proposed institutional framework could include five important aspects: user, environment, technology, outcome and timing (8).

A systematic review of Maria Lluch’s study aimed at identifying and categorizing organizational barriers to the implementation of HIT, published studies from 2009 to 2010, and out of a total of 3745 articles, 79 papers were reviewed. They are five organizational dimensions including organizational change, motivation, commitment and accountability issues, end users and their skills, and structure and work process issues have been identified as one of the most important organizational dimensions that must be addressed in the context of addressing hospital information systems. To be considered (9).

- The results of the qualitative study conducted by Snyder-Halpern in 2001, entitled “Organizational readiness criteria for the implementation of hospital information systems,” showed that the organizational criteria that are important in the implementation of hospital information systems are knowledge, employees and their skills, technology, activities, goals and values of the organization, resources and organizational processes. The results of this study showed the importance of these dimensions in the organizational evaluation by providing an innovative model of organizational information systems (10).

In a qualitative study of Zarei and his colleagues with the aim of determining the evaluation indicators of the hospital information systems conducted by the Delphi method,

91 evaluation indicators were presented from eight main groups. The eight groups are the technical dimension, software quality, construction architecture, seller, after-sales service, support workflow, output quality of support and the cost of hospital information systems (4).

A systematic review study was conducted in 2015 by Ley Ahmadian and his colleagues entitled “Assessment Methods Used in Hospital Information Systems in Iran and Assessing the Impact of HIS on Iranian Health”. The results of this study showed that although evaluation is a pivotal element For the development and implementation of any system, and despite the existence of multiple evaluation methods, researchers have used a few of these methods to evaluate hospital information systems in Iran, and there are few studies that examine the effects of multiple factors on these systems (11).

The results of a case study conducted by MaryatiMohd and colleagues in 2007 entitled “An evaluation framework for Health Information Systems: human, organization and technology-fit factors” showed that factors such as the positive attitude of employees towards hospital information systems, Staff skills, proper staffing relationships and ease of use, along with appropriate communication can have a positive effect on the successful adoption and implementation of hospital information systems (3).

The results of a 14-year longitudinal study by BrahimH-adjji and colleagues in 2015 entitled “14 Years longitudinal evaluation of clinical information systems acceptance” revealed that clinical information systems should be adapted to the individual characteristics of end-users. The gradual decrease in the positive relationship between the implementation of clinical information systems and end-user satisfaction can be considered as an indicator of the maturity of clinical information systems deployment (12).

A systematic review study titled “A systematic investigation on barriers and critical success factors for Clinical Information Systems in integrated care settings” was conducted by Hoerbst and his colleague in 2015. The results of this study showed that most of the problems of clinical information systems related to users and the most important success factors of these systems are a distribution of organizational, technical and user factors (13).

The results of a systematic review study conducted by Khalil Kimayfar and colleagues in 2013 entitled “Determining the Factors Affecting the Success and Failure of Hospital Information Systems and Their Evaluation Methods” revealed that the evaluation of hospital information systems from Technical issues move toward human and organizational issues, and objective goals replace mental goals, so evaluating these types of systems requires familiarization with qualitative methods (14).

Report

The Prisma protocol will be used to report (Table 2).

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There is no funding source.

Table 2. The specifications and criteria used in the above studies are presented in the Gantt Chart

	Description of each of the executive activities of the research separately	Duration	Implementation time			
			1month	2m	3m	4m
1	Provide implementation protocol Search articles	1 month	■			
2	Critical appraisal	1 month		■		
3	Data analysis	1 month			■	
4	Preparing a study report	1 month				■

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CONFLICT OF INTEREST

The authors declare that there are no conflicts of interest.

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