Systematic Review on the Impact of Management and Decision Support Systems in Health System of Iran

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**ABSTRACT**

Management and decision support system can increase the efficiency of services and effectiveness of health systems by rising potency and realism in the decision making. The purpose of this article is systematic review on the impact of management and decision support systems in the health system of Iran. In all stages of decision making, data are needed. Comprehensive system of health information is applied for decision-making in the health area. Many decisions must be taken within a certain time limit; even in ordinary times it is not feasible to process required data manually as straight off, fast enough and forcefully. These trends are causing problems for decision making, but computer analysis can be of great help. In the past two decades, the use of new technologies and software knowledge in the field of medicine has many developments. With development of these technologies, generation of computer systems was introduced that have found many applications in the field of health. Nowadays, the use of health information technology as a result of these progresses in reducing the time, costs and improvement of accuracy of diagnosis has become an essential and undeniable matter.

**INTRODUCTION**

In organizations, many decisions are being taken by members every day, but major organizational decisions are taken by managers. Data are needed in all stages of decision making. Without credible and relevant information, making good decisions is very difficult; even in ordinary times it is not feasible to process required data manually as straight off, fast enough and forcefully. Decision makers and data may be in different places and bring them together quickly and cheaply is hard. These trends are causing problems for decision making, but computer analysis can be of great help. As for reasons, information technology enables managers to make better and faster decisions. DSS is an approach that can enhance the effectiveness of decision-making, require less training, improve management control, facilitate communication, reduce costs and increase the realism of the decision [1].

Good management is a prerequisite for increasing the efficiency of health services. It is important to achieve maximum results with minimum resources, because the health sector is facing growing needs; however, the amount of resources is static or declining. Information is critical at all levels of the health management system from the environment to the center. Information is critical for the management of patients or clients, for the management of health units and the same amount for the planning and management of health systems. This means that not only policymakers and managers are required to use the information in making decisions, but also service providers such as doctors, specialists and health personnel are also required [2].

In the area of health, information technology has special place. One way that we can expect more gains with the resources available in the health system is the use of these new technologies. For this reason, use of information technology in the health area is growing every day. In applications such as easy and secure transaction of information for services rendered as to the international standards, facilitation of serving and required preparation for presenting services commensurate with changing population patterns and disease along with knowledge of modern technologies are associated with greater accuracy and speed and in many ways, is impossible without the use of modern information technology [15].
In the past two decades, the use of new technologies and software knowledge in the field of medicine has many developments. With development of these technologies, generation of computer systems was introduced that have found many applications in the field of healthcare. Nowadays, the use of management and decision support systems as a result of these progresses in reducing the time of diagnosis and improvement of accuracy of diagnosis has become an essential and undeniable matter [9].

Prior to reviewing the impact of management and decision support systems in Iran's health system, related definitions and concepts are briefly presented.

Definitions and Concepts:

What is DSS? Highly flexible and interactive computer systems used to support all stages of the decision-making process.

Components of Management and DSS:
1. Data Management: Storage and maintenance of data that user analysis on them via the system. Components: database, database management, data directory, query facilities
2. Model Management: Models stored in a base and software model as a management system models. Components: the base model, the base management system model, user model.
3. User Interface: Allows the user to combine his knowledge with processing capabilities and system storage. Components: software, hardware

What is medical decision support system? Computer software is an analyst tool that has been designed to aid clinical diagnosis. By using medical knowledge, these systems diagnose various complications and prescribe medical advice to the patients and can help practitioners to make better decisions about patients [16].

![Fig. 1: Structure of one DSS.](image)

### Table 1: Various Operations in CDSS.

<table>
<thead>
<tr>
<th>Various Operations</th>
<th>Definitions</th>
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<tr>
<td>Diagnose</td>
<td>Diagnosis based on history, physical examination and results of evaluation</td>
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<tr>
<td>Notice</td>
<td>Declaration of non-compliance, risks and abnormal incidents of care periods</td>
</tr>
<tr>
<td>Recommendation</td>
<td>Declaration of adaptations of new drugs based on laboratory values, new trends and drug levels</td>
</tr>
<tr>
<td>Interpretation</td>
<td>Viewing the guidelines applicable to the current situation, create a schedule of tests and protocols</td>
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**MATERIALS AND METHODS**

This study is a systematic review of research. To review the literature with related keywords such as Management and DSS, Management and CDSS, Management and MDSS in valid databases such as Civilica, Pub Med and EBSCO host research and Yahoo and Google Scholar search engine were used to seek for articles and 56 related articles and also books were used as initial sources.

**RESULTS AND DISCUSSION**

Medication errors may occur in each stage of treatment process. The main cause of medical errors is prescribing the wrong drug or drug interactions and CDSS including alarm and reminder systems and some other computer-based systems can effectively reduce such errors. However, the view of the medical staff regarding the applicability of such strategies to reduce the errors is important in the admission of their application in treatment system. In research of [18] view of physicians and occupied nurses in teaching hospitals of Kerman was assessed and indicated that medical errors are the main reasons of death and drugs adverse effect that impose significant physical and emotional burden for patients and their families. By using computer-based
technologies and medical informatics especially support systems in clinical decision making including alarm and reminder systems or computer record of commands, these errors could be largely avoided.

Performance indicators in clinical decision support systems based on artificial neural network, that was designed with the aim of helping professionals in the diagnosis and classification of prostate neoplasia diseases [9] was 97.6% in feature index and 92.11% in sensitivity index. The results of the decision support system for diagnosis and classification of diseases of prostate neoplasia, suggesting high potential for neural networks-based systems as a powerful tool in the classification of prostate abnormalities. Therefore, medical intelligence system based on artificial intelligence and specially neural networks can assist physicians in accurate diagnosis of prostate cancer and its benign. Using these systems, unnecessary biopsies and diagnostic cost are reduced. In addition, these systems can be effective in minimizing the processing time of diagnosis.

Research of [12] has indicated that DSS in the healthcare are applied in 5 areas of disease management (15.15%), treatment (27.27%), drug prescription (27.27%), assessment (27.27%) and prevention (12.12%) and may impact on improving health care and enhancing the performance of practitioners. Generally, its impacts on three groups of quality enhancement, care and increase patient safety can be expressed as increasing the cost of effectiveness and improvement of the level of knowledge of practitioners.

Tele medicine and its subset tele monitoring will lead to development of general health network to all parts of country and consequently, equity in health. Furthermore, decrease of transportation cost of physician and patient and remarkable decrease of cost of treatment resulting from development of specialized treatment network is of advantage of this technology [18]. Jahanbaksh and Mohammadi 2011 stated that nowadays, DDSs as sample of IT could create decision models in crisis; as computer means interacting with human use models that improve decision processes and outcomes in unexpected events. Using this technology in risk identification and prevention, decision makers are able to make timely and appropriate decisions.

Due to the high costs and lack of success in the design of appropriate management information system in Iran, this tool has not been fully utilized unlike the developed countries and this is too big obstacle in the way of good decision support information system in hospitals. This subject was assessed by Manouchehri 2002. [11] have stated in their research that to implement the electronic health records of country; we need an internet with high penetration coefficient and proper bandwidth. Moreover, providing adequate privacy laws of citizens and transparent business framework for data sharing is requirements of electronic health records implementation.

[17], electronic health development can be considered as a proper strategy for reducing the public share of health costs. Certainly, making ICT infrastructure and intersectoral collaboration for the benefit of the results of this strategy is necessary.

It is shown in study of [10] that applying DSS model and its outputs using the techniques of operations research, mathematical models and other models will be converted to the results which will support the hospital’s director’s board in its decision making.

In this paper, management and decision support systems were defined and components and types of that were recognized. Because users undertake the most important role in understanding their needs and expectations from the systems; so, general knowledge of various models of DSS helps users to select appropriate system for their operations in order to make better decisions.

The studies demonstrated that although applications of information systems in the healthcare sector have increased dramatically, it must strength and support the management in supply of healthcare services under management and decision support systems [14]. DSS use in five areas, namely disease management, care and treatment, drug prescription, evaluation, and prevention has a major impact on improvement of care and enhancing the performance of practitioners [12].

This study showed that application of management and decision support systems can largely prevent the occurrence of medical errors. Unnecessary biopsies and the costs of diagnosis and treatment, thereby reduces the share of public from health expenditure and minimizes the processing time of diagnosis, rises care quality, increases patient safety, increases the cost of effectiveness, enhances the knowledge of practitioners, extends public health network to all parts of the country and thus equity in health, reduces transportation costs of patient and physician, risk identification, prevention of accidents and may support managers in their decision making.

So, we can conclude that the application of management and decision support systems in powerful, with extensive ties, disciplined and strong healthcare network and health care (hospital) in the second and third levels by the Ministry of Health and several organizations including Social Security, Petroleum, Military and Police Corps, the Private Sector and Charities [2] will affect on reduction of the burden of disease, health promotion and increased life expectancy of people.

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