Investigating the effect of hospital information system on the establishment of clinical governance (Case Study: Valiasr Regional Hospital)

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Abstract

The aim of this study was to investigating the effects of hospital information systems on the establishment of clinical governance in the Valiasr regional hospital. The research method was descriptive survey and statistical population was all staff of the Valiasr regional hospital. The number of population was 290 people, which use of the Jersey and Morgan table were selected 166 people as a sample. The sample was selected using stratified random from different parts of the hospital. The data collection tool was a researcher made questionnaire for each of the variables of hospital information systems and the establishment of clinical governance. The results of Cronbach’s alpha were showing the good reliability of questionnaires. The data were analyzed by both descriptive and inferential level by using of indices of mean, standard deviation and linear regression. The results have show of the positive impact of the deployment of clinical governance from level of use of hospital information system. Also survey conducted in different parts of the hospital, such as (admission, outpatient, parts of the hospital, pharmacy, laboratory, radiology, operating room, medical records, registration, accounting and nutrition), as well as have show of positive impact of the use of hospital information system in these sectors on the amount of establishment of clinical governance in Valiasr regional hospital.

Keywords: Hospital Information System, Establishment of Clinical Governance, Valiasr Regional Hospital.
Introduction
Today, with the development and diversification of products and organizations service, as well as the intense competition between them, the organization has been subject to transformation, the ultimate success and even survival of the organization depends on the organization's ability to absorb and use information and knowledge of new technologies to create an advantage for in organization. Therefore, the organization has sought to establish appropriate management information systems have released a timely business information and knowledge of new technologies and use it optimally. (Ramezanian and Bosaghzadeh, 2011). Information system is the organized system that the initial data and information puts in decision makers in the organization and provides able to better make decisions for them. Since, the two concepts of management and decision-making in the office of an organization are inseparable from one another, the existence of and access to information of right, accurate, relevant, timely and adequate that is the information characteristic in the management information system and is a significant factor in management decisions. (Mirkamali et al., 2014). Achieving effective performance in every economic entity is required to identify activities and how to operate it, which it realization, is possible to analyze the flow of information and the structure of activities and management style of institute managers. Success in this area requires to knowledge of science "information", introduction to "management information systems" and understanding of "computer technology" and "the design and implementation of information systems". Another determinant of market globalization is the loss of borders and happens the astonishing speed to assist the application of information technology in the exchange of business information in the world. Therefore, any institution that stays open from information exchange current also will remain from growth and progress. Managers in order to deal with the environment and achieve your organizational goals taking into account environmental variables necessarily have to analyze the environment, identify variables and adopt appropriate measures in dealing with them. This is required having timely information inside and outside the organization, as well as the possibility of utilization of them. (Mirkamali et al., 2014).

Also in the health sector, the use of efficient information systems for achieving efficiency, effectiveness and service quality and patients satisfaction, it is an undeniable necessity. Many countries including European countries from the early 1980s have moved to automated hospital information systems. This system has now evolved and improved, so that from system lacks internal coherence has become an integrated system. Thus, in Iran, the use of hospital information system was introduced in 1998. (Mokhtaripour and Siadat, 2008). Hospital information systems are a key component in health systems. This system provides the possibility of data collection, processing, analysis and reporting of health information and that led to the creation of appropriate indicators for monitoring and evaluation of health system performance. (Matshidze & Hanmer, 2009). This system provides the required information for each level of management at the appropriate time and place, as appropriate to adopt decisions of effective, efficiently and efficient. This system has a vital role in planning, setting up, organizing, monitoring and controlling these hospital systems. (Kavian and Riazinia, 2005). On the other hand, the quality of clinical services is one of the main concerns around the world. (Show, 2002). Many countries improve the quality of hospital performance is considered as the main policy
agenda for the health system. (Who, 2009). The rule of clinical services is a framework in which the service provider organizations responded to the constant improvement of quality and to create an environment in which excellence flourishes clinical services deals with the preservation of high standards of service. In different countries to this day, they have used a variety of methods and tools to improve the quality of health care. Among these, the rule of clinical services for the first time in the UK health system offered as a strategy by the government and to enhance the quality of clinical care was introduced in 1998. The term of clinical governance rooted in the experience of the business world and the failure of some renowned institutions and the loss of substantial assets of their investment. The use of this term in the case of hospitals was older and dates back to 1660. In our country, this concept was recognized in 2006, and finally, in November 2007 by order of the Ministry of the Interior was chosen as the framework accepted to improve the quality of in the Ministry of Health and Medical Education and during the directive was communicated to the heads of the universities. According to the evidence of clinical governance and patient safety second festival, which was announced by the Ministry of Health and Medical Education in 2013 with attention to the leadership were introduced seven cases as the latest seven axes of clinical governance: 1. Clinical Audit, 2. Risk Management and Patient Safety, 3. The training and personnel management, 4. Clinical effectiveness, 5. Use of Information, 6. Interaction with the patient and the community, 7. Leadership Management. (Heydarpour et al., 2013). Several factors have affecting in the implementation of clinical governance including, be referred to hospital information systems. Therefore, in this study we investigated to evaluate the hospital information system in the Valiasr regional hospital of Ghaemshahr and we evaluate its impact on the implementation of clinical governance.

**Literature**

**System Concepts**

The system is a group of elements that due to the demands of common purpose combined together. For example, in data centers, human resources, computer and information to achieve a common goal, which is the same as provision of information to employees or directors of the institution, is combined together. In each system, there are five elements of input, output, conversion, control mechanism and finally purposes. So that, moving system is such that the input is converted to the output. Among these control mechanisms are puts under the conversion process to ensure that the goals of the system. Control mechanism by a feedback loop connected to the sources. So that the feedback loops gain the information from the system output and puts it available to the control mechanism. Control mechanism, the feedback signals implementation with purposes and leads to symptoms of output element, so when, necessary system change its operations. When our system is a data center such as the library, the inputs are books, magazines, electronic resources, and the process of technical services converts mentioned library resources to the output, which is the same material available to provide better and more efficient service to clients and users. Control mechanism, in this case, is the chairman or the person who is responsible for the communication between these centers, technical services and acquisitions and public services, and feedback loops in here, is communication and relationships that party boss is associated with different parts of the library. (McLeod, 1998; quoted Arefnejad et al., 2012).
Information
To really understand the meaning of information and lack of mixing it with the data, at first, we present our definition of these two: data are includes facts and figures that are meaningless to the user. When we were processing this data converted to information. Then information is processed data or meaningful data. Turning data into information is performed by processor information. Data processor is one of the key elements of the perceptual system. Information processor may include computer components, non-computer elements or a combination of those two. (Momeni, 1993). Information complex organizational systems of man and machine fed from the following sources: 1. achieve environmental data of management performance, 2. the information storage methods for performance operating systems, 3- way transmission of information, and communication, and storage and retrieval.

Success factors of information systems
Several studies have been conducted to investigate the factors influencing on the success of information systems, which most important one is Delone and McLean study. These authors acknowledge many studies have been conducted over the past decade about affecting factors on the success of information systems; thus, various researchers are considered different aspects of success, which in turn, made it difficult to compare. These two researchers for the organization of numerous studies and provide a comprehensive view of the concept of success of information systems have provided comprehensive classification. This classification recognizes six dimensions involved in the success of information systems, which include: system quality, information quality, use, user satisfaction, individual impact and organizational impact. Then, these two researchers considering the aspects examined 180 empirical and conceptual researches and organized them according to of this classification scale, and in this way, provided a comprehensive model. In the proposed model of these two researchers, quality of system and quality of information, each one separately and together, affecting on the use and satisfaction of users. Moreover, the amount of use can affect positively or negatively on the level of satisfaction, which is also true vice versa. Use and user satisfaction are the direct antecedents of one's work and finally, this impact on individual performance should ultimately have the organizational impact. Figure1 shows DeLone and McLean model. (DeLone and McLean, 1992; quoted in Mystic race et al., 2012).

Hospital Information System
Files information will have a significant impact on the quality of patient care and timely and appropriate decisions. To meet the goals of the healthcare system, it is necessary existence of networks information to be exchanged patients information in hospitals and used it for the benefit of patient care, reduce costs, and increase quality of care, teaching, research and information communicated to other centers. (Moradi, 2002). Paper files, because of restrictions on the movement of information, illegible, tears, missing, incomplete, high costs, (only 25% of care costs for pulp and paper) and spend time (with 30% of physician time to study the case) should be replaced by electronic records. (Monjar, 2001; Dalandr, 1997).
The definition of clinical governance
In the definition of clinical governance, there is an integrated approach from clinical and non-clinical care, which covers the total quality. Such integration leads to organizational integration, coordination, cooperation and communication between units in the organization and is associated with high-quality care. Clinical governance is the integration of all activities that integration of patient cares in a single strategy. This strategy, which includes improving the quality of data, improve collaboration, improve team spirit and participation, reducing variation, and functional instability, and the implementation of evidence-based practice. (Clinical Governance Policy, 2008 quoted Heydarpour et al., 2011).

The purpose of the establishment of clinical governance
The purpose of clinical governance is to determine clear and practical standards, monitoring the performance of clinical service provider and the publication of results of the assessment period. Clinical governance to accomplish any action that is necessary to maximize the quality and is relation with finding ways, which that way, can be develop clinical effectiveness and create culturally appropriate to support it. (Campbell and Sweeney, 2002; quoted in Heydarpour et al., 2011). The main purpose of clinical governance is continuous quality improvement of services and provides a framework that in terms of health care provider organizations can move towards growth, development and quality assurance of clinical services for patients. The framework proposed in relation to the key areas, which are referred to below. (Campbell and Sweeney, 2002; quoted in Heydarpour et al., 2011).

Research History
- Farzandipour and colleagues (2015), in his research conducted to evaluate the rate of hospital information systems based on the requirements in Iran. The results showed that in the overall ranking of hospital information systems, "Rayavaran" was the highest rank with 72.7%, and "Boo-Ali designer", was the lowest rank with 47.1%. Only three software in the functional requirements ranking had a good performance. Most systems in the technical requirements, usability and capabilities of the system vendor have good efficiency and most hospital information systems to improve the quality of patient care have poor performance.
- Fanousi and colleagues (2015), in his research conducted to evaluate the clinical governance climate in selected hospitals of Shiraz University of Medical Sciences. The results of this study show that all six components of clinical governance were higher than the basis average. Between age and work experience with clinical governance, there is no statistically significant relationship. The results of t-test showed that there is a statistically significant relationship between genders with clinical governance. So the mean score of clinical governance in women was higher than men. Conclusion: The hospitals in Shiraz have a good preparation for the establishment of clinical governance and to increase this rate, it is recommended that all hospital staff received the necessary training in this field and hospital administrators provide an appropriate basis for this position in the hospital.
- Nasiripour et al. (2015), conducted to evaluate the effect of using three-axis system of clinical governance on clinical performance: a quasi-experimental study. The results showed that factors related to the interaction between the patient and the studied hospital, before and after the
implementation of clinical governance systems, statistically have a positive and significant relationship. Indicators related to axis use of information before and after the intervention have statistically significant relationship.

- Mehrian and colleagues (2014) in their study conducted to evaluate the hospital information system in selected hospitals of Iran. In our study, if in many parts of the enterprise groups is setup and use server components of hospital information system, but the pharmacy information systems, decision support systems, communication services and telemedicine are not launched completely. Currently, most sub-components of organizational and components of the hospital information system server, completely in software design and according to all areas were observed in 5 hospitals.

**Conceptual framework**

In the context of this study has been use of standard components of hospital information systems, which provided by the Office of Statistics and Information Technology Ministry of Health in 2013. Also components of clinical governance are also derived from Article of Mirkamali and colleagues. (2014).

![Conceptual model for research based on studies of Mirkamali et al. (2014)](image)
Research methodology
Research hypotheses
Main hypothesis:
Hospital information systems are effective on the establishment of clinical governance in the Valiasr regional hospital of Ghaemshahr.
Sub hypotheses:
1. Admission information system is effective on the establishment of clinical governance in the Valiasr regional hospital of Ghaemshahr.
2. Outpatient information system is effective on the establishment of clinical governance in the Valiasr regional hospital of Ghaemshahr.
3. Hospital department information system is effective on the establishment of clinical governance in the Valiasr regional hospital of Ghaemshahr.
4. Pharmacy information system is effective on the establishment of clinical governance in the Valiasr regional hospital of Ghaemshahr.
5. Laboratory information system is effective on the establishment of clinical governance in the Valiasr regional hospital of Ghaemshahr.
6. Radiology information system is effective on the establishment of clinical governance in the Valiasr regional hospital of Ghaemshahr.
7. Operating room information system is effective on the establishment of clinical governance in the Valiasr regional hospital of Ghaemshahr.
8. Medical records information system is effective on the establishment of clinical governance in the Valiasr regional hospital of Ghaemshahr.
9. Discharge information system is effective on the establishment of clinical governance in the Valiasr regional hospital of Ghaemshahr.
10. Accounting information system is effective on the establishment of clinical governance in the Valiasr regional hospital of Ghaemshahr.
11. Nutrition information system is effective on the establishment of clinical governance in the Valiasr regional hospital of Ghaemshahr.

Statistical Society
The population of this research was to all employees in different parts of the Valiasr regional hospital to 290 people, which are served in 2014, and for the selection of the sample size referred to Krejcie and Morgan table and obtained 166 samples.

Methods and tools for data collection
In this study, the main tool for data collection was a questionnaire, which has been contained three questions, demographic (age-gender and educational level) and 141 questions in relation to aspects of information systems, and 44 questions on the establishment of the clinical governance. According to the study divided questions in a Likert scale of five options.

Validity and reliability
As in this study, the primary means of data collection and measurement of variables is a questionnaire; validity of the questionnaire is of particular importance. (Hafeznia, 2004). In this
study with the standardized questionnaire and its frequent use by researchers and the use of their teachers was approved validity of the questionnaire. In this study, using the SPSS software showed the reliability of the questionnaire, which was to show that the questionnaire is given of high reliability, which in this study, the reliability is equal to 0.81.

Data analysis
For processing and analyzing the results of the questionnaire used in statistical analysis SPSS16 software, which is comprised descriptive and inferential statistics. Tests used are:
- Kolmogorov-Smirnov test, to study the distribution uniformity data.
- Regression analysis to examine the research hypotheses.

Results and findings
Society statistical descriptions
Of the 166 respondents, 94 people were women and 72 people were men, 15 people were diploma and under diploma, 23 people were associate degree, 98 people were graduate and 30 people were master and above, 34 people were between 20 to 29 years of age, 59 people were between 30 to 39 years of age, 46 people were between 40 to 49 years of age, and 27 people were 50 years and older of age, and of these, 38 people have less than 10 years of work experience, 87 people have between 10 to 20 years of work experience, 41 people have over 20 years of work experience.

Kolmogorov-Smirnov test: testing the normality of variables
In the statistics, used of parametric tests, when the data distribution is normal and used of non-parametric tests, when data distribution is not normal. So, at first, we have to pay to examine the data normality with the Kolmogorov-Smirnov test. Normality test results related to the components of the study are shown in Table1.

\[
\begin{align*}
H_0 & : \text{Data distribution is normal. } \quad \text{Sig. } \geq 0.05 \\
H_1 & : \text{Data distribution is not normal. } \quad \text{Sig. } < 0.05
\end{align*}
\]

Table 1. Kolmogorov-Smirnov test table for examine the normality of variables

<table>
<thead>
<tr>
<th></th>
<th>Hospital Information System</th>
<th>Establishment of clinical governance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of data</td>
<td>166</td>
<td>166</td>
</tr>
<tr>
<td>Normal parameters</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean</td>
<td>3.084</td>
<td>3.246</td>
</tr>
<tr>
<td>Standard deviation</td>
<td>0.571</td>
<td>0.459</td>
</tr>
<tr>
<td>Z statistics of Kolmogorov - Smirnov</td>
<td>1.263</td>
<td>1.197</td>
</tr>
<tr>
<td>Significant amount</td>
<td>0.082</td>
<td>0.114</td>
</tr>
</tbody>
</table>

Table1, and the values obtained (P>0.05 = level of significance), show that the H0 hypothesis is confirmed. So, with confidence interval of 95%, it can be argued that the both variables follow a normal distribution, therefore, to answer the research questions can be used a parametric linear regression test.
Hypothesis testing

Main hypothesis: Hospital information systems are effective on the establishment of clinical governance in the Valiasr regional hospital of Ghaemshahr.

To test this hypothesis, we used linear regression test. Table 2 shows the results of ANOVA for main research hypothesis.

Table 2. ANOVA test to the effect of "hospital information system" on the "establishment of clinical governance"

<table>
<thead>
<tr>
<th>Significant</th>
<th>F statistics</th>
<th>Mean square</th>
<th>Degrees of freedom</th>
<th>Mean square</th>
<th>Mean square</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.000</td>
<td>4.924E3</td>
<td>1726.773</td>
<td>1</td>
<td>1726.773</td>
<td>Regression</td>
</tr>
<tr>
<td></td>
<td></td>
<td>0.351</td>
<td>165</td>
<td>57.864</td>
<td>Error</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>166</td>
<td>1784.637</td>
<td>Total</td>
</tr>
</tbody>
</table>

In the variance analysis table, regression items are to investigate the relationship between certain. Because a significant amount calculated is 0.000 less than 0.05 with 95% confidence level, the null hypothesis is rejected and confirmed the research hypothesis. I.e., there is a regression relationship between "Hospital Information System" and "Establishment of clinical governance".

Results Table 3 shows the effect of "Hospital Information System" on the "Establishment of clinical governance".

Table 3. Regression coefficients effect of "Hospital Information System" on the "Establishment of clinical governance"

<table>
<thead>
<tr>
<th>Model</th>
<th>Non-standardized coefficients</th>
<th>Standardized coefficients</th>
<th>t statistics</th>
<th>Significant</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Coefficient</td>
<td>Standard deviation</td>
<td>Beta</td>
<td></td>
</tr>
<tr>
<td>Hospital Information System</td>
<td>1.028</td>
<td>0.015</td>
<td>0.984</td>
<td>70.171</td>
</tr>
</tbody>
</table>

According to Table 3, the coefficient variable influences “Hospital Information System” on the “Establishment of clinical governance” are 1.028. Goodness of fit criteria for this regression model shown in Table 4.

Table 4. Evaluation Criteria regression model

<table>
<thead>
<tr>
<th>Value</th>
<th>Criterion</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.968</td>
<td>R²</td>
</tr>
<tr>
<td>1.545</td>
<td>Durbin Watson</td>
</tr>
</tbody>
</table>

Secondary hypotheses: Admission information system, outpatient information system, hospital department information system, pharmacy information system, laboratory information system, radiology information system, operating room information, medical records information system,
discharge information system, accounting information system and nutrition information system are effective on the establishment of clinical governance in the Valiasr regional hospital of Ghaemshahr.

Table 5. Regression coefficients effect of "Hospital Information System" on the "Establishment of clinical governance"

<table>
<thead>
<tr>
<th>Model</th>
<th>Coefficient</th>
<th>Standard deviation</th>
<th>Beta</th>
<th>t statistics</th>
<th>Significant Coefficient</th>
</tr>
</thead>
<tbody>
<tr>
<td>Admission information system</td>
<td>1.084</td>
<td>0.034</td>
<td>0.996</td>
<td>32.258</td>
<td>0.000</td>
</tr>
<tr>
<td>Outpatient information system</td>
<td>1.089</td>
<td>0.051</td>
<td>0.983</td>
<td>21.414</td>
<td>0.000</td>
</tr>
<tr>
<td>Hospital department information system</td>
<td>1.002</td>
<td>0.021</td>
<td>0.990</td>
<td>48.857</td>
<td>0.000</td>
</tr>
<tr>
<td>Pharmacy information system</td>
<td>1.018</td>
<td>0.043</td>
<td>0.993</td>
<td>23.647</td>
<td>0.000</td>
</tr>
<tr>
<td>Laboratory information system</td>
<td>0.837</td>
<td>0.059</td>
<td>0.969</td>
<td>14.107</td>
<td>0.000</td>
</tr>
<tr>
<td>Radiology information system</td>
<td>1.278</td>
<td>0.130</td>
<td>0.957</td>
<td>9.847</td>
<td>0.000</td>
</tr>
<tr>
<td>Operating room information</td>
<td>1.058</td>
<td>0.025</td>
<td>0.992</td>
<td>42.084</td>
<td>0.000</td>
</tr>
<tr>
<td>Medical records information system</td>
<td>1.126</td>
<td>0.050</td>
<td>0.996</td>
<td>22.551</td>
<td>0.000</td>
</tr>
<tr>
<td>Discharge information system</td>
<td>1.128</td>
<td>0.034</td>
<td>0.998</td>
<td>33.103</td>
<td>0.000</td>
</tr>
<tr>
<td>Accounting information system</td>
<td>0.965</td>
<td>0.061</td>
<td>0.984</td>
<td>15.762</td>
<td>0.000</td>
</tr>
<tr>
<td>Nutrition information system</td>
<td>1.141</td>
<td>0.031</td>
<td>0.997</td>
<td>36.636</td>
<td>0.000</td>
</tr>
</tbody>
</table>

According to the results of table 5, we see that the variable impact factor of "admission information system" on the "establishment of clinical governance" is 1.084, variable impact factor of "outpatient information system" on the "establishment of clinical governance" is 1.089, variable impact factor of "hospital department information system" on the "establishment of clinical governance" is 1.002, variable impact factor of "pharmacy information system" on the "establishment of clinical governance" is 1.018, variable impact factor of "laboratory information system" on the "establishment of clinical governance" is 0.837, variable impact factor of "radiology information system" on the "establishment of clinical governance" is 1.278, variable impact factor of "operating room information system" on the "establishment of clinical governance" is 1.058, variable impact factor of "medical records information system" on the "establishment of clinical governance" is 1.126, variable impact factor of "Discharge information system" on the "establishment of clinical governance", is 1.128, variable impact factor of
"accounting information systems" on the "establishment of clinical governance" is 0.965, and variable impact factor of "nutrition information system" on the "establishment of clinical governance" is 1.141.

**Conclusion**

The main objective of this study is to evaluate the impact of hospital information system on the establishment of clinical governance in the Valiasr Regional Hospital. The results have shown the positive impact of establishment of clinical governance from the level of use of hospital information system. The results showed that the hospital information system with impact factor of 1.028 is effective on the establishment of clinical governance. Also check out the different parts of the hospital, such as (admission, outpatient, hospital department, pharmacy, laboratory, radiology, operating room, medical records, registration, accounting and nutrition), as well as to show from the positive impact of the use of information systems hospital in this part on the establishment of clinical governance in the Valiasr regional hospital. According to the results, whatever the level of application and use of hospital information system is higher in different wards of hospitals, will be higher the amount of establishment of clinical governance in that section and generally in the hospital. Perhaps because of this influence know in speed up and accuracy up information systems on how to perform common tasks in the hospital. For example, use of hospital information system in pharmacy can help to staff in review and update medical information and never sick have not a problem to get the drug.
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