

Research Paper

The Effect of Six Sigma Lean Strategy Management on Improving the Quality of Information Therapy Services at Pediatric Medical Center

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Abstract

Purpose: In the last decade, Six Sigma has emerged as a systematic and powerful approach to improving the quality of health care and controlling costs. The purpose of this article is to determine the effect of Six Sigma strategy management on improving the quality of information services in the Children's Medical Center Hospital. **Method:** The methodology of the present study, which is an applied study in terms of purpose, is a descriptive correlational survey. The statistical population of this study consists of all managers, supervisors and experts of the Children's Medical Center Hospital, whose number is 149 people. Cochran's formula has been used to determine the sample size, which according to the statistical population, is 94 people. The method of selecting statistical samples is simple random sampling according to the subject and nature of the research. The required data were collected using a standard questionnaire and the data were analyzed using regression analysis through SPSS 23 software. **Findings:** Research findings showed that fact-based management can account for 26% of changes in the quality of information services, management of resource providers can account for 38% of changes in the quality of information services and management based on facts and information Predict 39% of changes in the quality of information services. **Conclusion:** Six Sigma is a systematic and statistical approach that aims to identify the shortcomings of process performance and reduce the error of those work and clinical processes that are performed with long time, high cost and poor outcome.

Keywords: Pure Six Sigma strategy, service quality, information therapy, hospital

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Introduction

Factors such as poor management and reduced productivity of hospitals, increased medical costs, shortage of manpower, budget deficit, reduced quality of health services and dissatisfaction of patients and staff in the field of health are among the challenges that hospitals in the country, especially public hospitals. They are involved and this is an alarm in recent years in the macro area of hospital management and planning of the country and the Ministry of Health and Medical Education. In recent years, many private hospitals and a small number of public hospitals have changed their management attitudes and increased the quality of their medical services to increase their tariffs and receipts from patients and by choosing this method have achieved significant profitability. But most government hospitals, which are funded by the government and appointed directors of medical universities, have always seen losses and loss of medical resources and reduced quality of services, and inevitably, the government has reimbursed costs from the public budget (Afraz, 2018; Rabbani and Hemmati, 2018). Having health information also gives people a sense of power and better control over their illness. Today, the increasing demand for health information by patients and their caregivers has made a vital shift in patient-centered health care services to the patient-centered medical decision-making center. Health information is useful for people, especially patients, if it is available at the right time and has sufficient quality and credibility (Ahmadi and Izadkhah, 2017; Stamatis, 2011). The problem with this is that the information that people get about health is often inaccurate. In these cases, the information is very harmful rather than helpful. This misinformation may have been made available to the patient through an incorrect search or as a result of an incorrect research or the use of outdated information, or information that is very complex for the patient to understand. Sometimes information may only be available to patients for a considerable fee, in which case there must be a guarantee of their quality and credibility. Sometimes patients just do not receive information, for example, health care providers forget to tell them some facts and instructions. This may be due to the very busy schedule of health care providers or their assumption that the patient knows these facts (Asadi, 2007). One of the methods and services of informing patients is information therapy,

which appeared in the United States in the 1990s. This idea, information therapy, is a combination of information and treatment, librarianship and information, health care and medicine. The term deals with issues such as patient adherence to instructions, satisfaction, and patient health literacy. Information therapy is sometimes used to assist in treatment decisions such as continuing chemotherapy. Therefore, hospitals and treatment centers have to use different approaches and techniques in order to overcome the challenges of providing services and information therapy, improving the quality of service, and reducing costs. Management such as quality assurance, continuous quality assurance and total quality management are ... (Atashgar and khosravi , 2013). Today, many methods have been designed to improve the quality and efficiency of processes. The lean approach emphasizes the reduction of useless and value-added measures in a process, and the Six Sigma method reduces process changes through the use of statistical methods. In many improvement projects, different tools are complementary, leading to their integration into a single strategy. One such approach is Six Sigma Pure. Six Sigma is a combination of a lean manufacturing program and Six Sigma, both of which are quality improvement programs that stem from weakness. Six Sigma and Lean are largely complementary. Six Sigma is a coherent developmental approach that reduces quality by reducing diversity, defects and costs. Lean has added tools that speed up the input process by reducing waste. In health services, the word faster means immediate access and no waiting time, while reducing shortcomings means less complexity. Increasing speed and reducing defects both lead to lower costs. Hence, Six Sigma is an excellent tool for meeting the challenges of current health services (Cima and et.al , 2011). In this regard, various researches have been done inside and outside the country. In a study, Mohammad Ismail and Yari Zanganeh examined the level of observance of the components of Six Sigma in the libraries of Tehran, Shiraz and Isfahan Universities of Medical Sciences from the perspective of their librarians. Their findings showed that there is a significant difference between the average of the community and the average of the scale at the level of one percent in the study of the executive principles of Six Sigma in the studied libraries. This means that all the variables of Six Sigma in the studied libraries are significantly higher than the desired level (above 3 average scales) in the studied libraries(Fairbanks,2007).

Atashgar et al. Taleghani performed using Six Sigma. The results showed that a 60% reduction in the cost of targeting showed that Six Sigma was implemented effectively at Taleghani Hospital and that quality costs were expected to be reduced by an average of 600 million rials per month (mohammadesmaeil and Yarizanganeh,2015).In a study, Valipour and Arghayesh investigated the effect of implementing the Six Sigma approach on the quality of services of the staff of Shahid Beheshti Hospital in Yasouj(mohammadesmaeil and Pahlavanzadeh,2020) The results of this study showed that at a confidence level of 0.95 Six Sigma and its components on the quality of staff services. In another study, Mohammadesmaeil S., Pahlavanzadeh M. ,investigated The effect of Six Sigma process management on improving the quality of information therapy services and reducing treatment costs (Case study: one of the non-governmental hospitals located in Tehran), the methodology was descriptive survey of the type of correlation. The statistical population of this study consists of all managers, supervisors and experts of Farhikhtegan Hospital, which is 125 people, the required data were collected using standard questionnaire tools, results showed that the management of the six Sigma process through the mediating variable of the quality of health information services has an impact on cost reduction. Therefore, the mediating role of quality of health information services is confirmed (Zinali and Riahnia , 2014)

Conceptual model of research

After reviewing authoritative international articles and dissertations and some domestic researches, the following model was used.

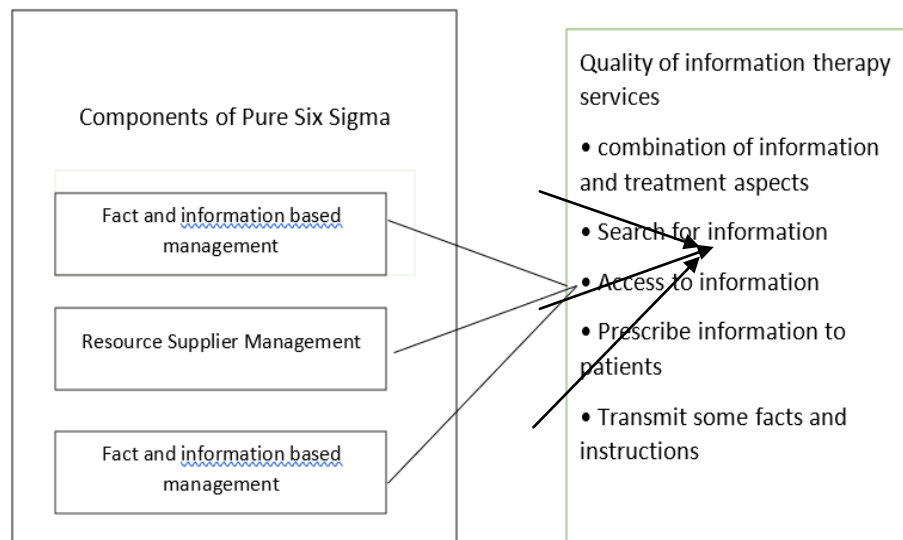


Figure 1: Conceptual model of research

Research Hypotheses

- Fact-based management has a significant effect on the quality of information therapy services.
- The management of resource providers has a significant impact on the quality of information therapy services.
- Fact-based management has a significant effect on the quality of information therapy services.

Method

The present research is in the category of applied research and if the types of research are classified based on the nature and method, the method of the present research is descriptive-survey in terms of nature. The statistical population of this study consists of hospital managers and staff. A total of 125 hospital staff, including hospital supervisors and experts, were considered as the statistical population. Cochran's formula has been used to determine the sample size, which according to the statistical population is 94 people. The method of selecting statistical samples is simple random sampling according to the subject and nature of the research. The required data were

collected using a standard questionnaire and the data were analyzed using regression analysis through SPSS 23 software. Data were collected through a survey using a standard questionnaire. A questionnaire was used to assess the components of Six Sigma Lean and information therapy services. There are several ways to gather evidence for the validity of research tools, which are: content validity, face validity and structural validity (convergent, divergent evidence and internal consistency and factor validity). In the first stage of the research, to check the face validity, a questionnaire was provided to university professors and other available experts and it was emphasized that in qualitative evaluation of content validity, such things as: grammar, use of appropriate words, importance of questions, placement of questions in their proper place and when to complete the designed tool. Finally, their opinions were applied with minor changes in the questionnaire. In the second stage, the validity study was used to evaluate the content validity from the experts' point of view on the degree of coordination of the content of the measurement tool with the research goal. After evaluating the validity, the internal consistency method (Cronbach's alpha method) was used to evaluate the reliability of the questionnaire; After the pilot study in a sample of 20 people and the return of the questionnaires, the collected data were entered into Spss 23 software and their Cronbach's alpha was calculated. Finally, after completing the steps: 1. Content validation, 2. Two halves, 3. Cronbach's alpha (reliability) and 4. retest, research tool was prepared.

Findings

The demographic information of the study participants was as follows: In terms of gender, the highest number were women and most of the samples were in the age group of 30 to 40 years. 70% of respondents had a bachelor's degree or higher. Most of the samples had 15 years or more of work experience. Kolmogorov-Smirnov test was used to check the normality of the variables. As can be seen in the table below, the significance level of all variables is higher than the alpha level of 0.05 ($P < 0.05$). Therefore, it can be said with 95% confidence that the variables have a normal distribution (Table 1).

Table 1. Kolmogorov - Smirnov test

| Quality of information therapy services | Quality of information therapy services | Six Sigma Pure |
|------------------------------------------------|------------------------------------------------|-----------------------|
| No developmental number | 94 | 94 |
| Average | 47.4574 | 77.0425 |
| Standard deviation | 7.78289 | 13.75660 |
| Kologorov-Smirnov Statistics | 1,083 | 1,768 |
| Significant level | .191 | .054 |

According to the results of the table from Table (1), parametric regression test was used to test the hypotheses. Regression analysis is one of the best analytical methods that evaluates the common and separate effects of independent variables on dependent variables. In order to explain the structures affecting the dependent variable, multiple regression analysis using simultaneous method (Enter) has been used. Multiple regression is a useful tool in modeling effective parameters. Regression can well examine and display the statistical aspects of the pattern. The pathology of the regression model (residual analysis), which is performed by calculating various statistics and related tests, confirms the final acceptance (non-rejection) of the model. The power of regression is determined by its coefficient of determination (R^2). This coefficient determines the share of fluctuations of the dependent variable by independent variables. The results of testing the research hypotheses showed that: Management based on facts and information has a significant effect on the quality of information therapy services (Table 2).

Table 2 . Results of regression analysis for the first hypothesis

| Variable | B | Beta | T | P |
|---------------------------------------------------------------------------|--------|------|-------|------|
| Constant | 27.780 | | 8.084 | .000 |
| Fact and information based management | 1.243 | .520 | 5.845 | .000 |
| F = 168.34 Sig = / R2 Adjust = 263.0 R2 = 271.0 R=520.0 | | | | |

According to the results obtained in Table 2, it can be seen that regression is significant (sig = 0.000) and management based on facts and information have a significant effect on the quality of information therapy services because its significance level is less than 0.05 and Given that Adjusted R Square is 0.263, it can be concluded that management based on facts and information can predict 26% of changes in the quality of information services (26% on the quality of information services). Affect). The management of resource providers has a significant effect on the quality of information therapy services (Table 3).

Table 3. Results of regression analysis for the second hypothesis

| Variable | B | Beta | T | P |
|---------------------------------------------------------------------------|--------|------|-------|------|
| Constant | 24.044 | | 7.765 | .000 |
| Resource Supplier Management | 1.645 | .627 | 7.723 | .000 |
| F = 59.640 Sig = / R2 Adjust = 387.0 R2 = 393.0 R=627.0 | | | | |

According to the results obtained in Table (3), it can be seen that regression is significant (sig = 0.000) and the management of resource providers has a significant impact on the quality of information therapy services because its significance level is less than 0.05 and As Adjusted R Square is 0.387, it can be concluded that resource providers' management can predict 38% of changes in the quality of information services (38% affect the quality of information services). Fact-based and information-based management has a significant effect on the quality of information therapy services (Table 4).

Table 4. Results of regression analysis for the third hypothesis

| Variable | B | Beta | T | P |
|---------------------------------------------------------------------------|--------|------|-------|------|
| The amount of fixed | 24.359 | | 8.019 | .000 |
| Fact and information based management | 3.285 | .630 | 7.771 | .000 |
| F = 60.390 Sig = / R2 Adjust = 390.0 R2 = 396.0 R=630.0 | | | | |

According to the results obtained in Table (4), it can be seen that regression is significant (sig = 0.000) and management based on facts and information have a significant effect on the quality of information therapy services because its significance level is less than 0.05 and Given that Adjusted R Square is 0.390, it can be concluded that management based on facts and information can predict 39% of changes in the quality of information services (39% impact on the quality of information services Lays). As Table (5) shows, the dimensions of the independent variable are: 1) fact-based and information-based management 2) resource supplier management 3) fact-based and information-based management.

Table 5. Results of multiple regression analysis for all dimensions of the independent variable

| Variable | B | Beta | T | P |
|------------------------------------------------------------------------------|--------|-------|-------|------|
| constant number | 15.854 | - | 5.330 | .000 |
| Fact and information based management | -.038 | -.016 | -.150 | .881 |
| Resource Supplier Management | 1.253 | .495 | 4.098 | .000 |
| Fact and information based management | .812 | .295 | 3.640 | .000 |
| 524.25 F= 00 0Sig = / R2 Adjust = 613.0 R2 = 638.0 R=799.0 | | | | |

The value of F calculated at the level of 99% (sig = 0.000) indicates the significance of the regression model. This means that the regression model can appropriately predict the changes of the dependent variable. In this model, out of six dimensions of independent variables, only the dimensions (management of resource providers and management based on facts and information) have a significant effect on predicting the quality of information therapy services. Of these, resource management (has a larger beta) has a greater share in predicting the quality of information therapy services. Also, the results of number (5) show that the predictor variables predict 61% (R2 = 0.613) of the fluctuations of the criterion variable (quality of information services).

Discussion and conclusion

The aim of this study was to investigate the effect of Six Sigma Lean Strategy Management on improving the quality of information therapy services. The health care network is one of the most fundamental and important organizations in the world today and most people are directly and indirectly related to this organization and this indicates the key and vital role of the health care network in the complex lives of human beings. Patient and community participation in health leads

to increased satisfaction and gaining more client trust, reducing patients' anxiety and excitement, better understanding of individual needs, positive and better communication between professionals, and lasting and positive effects on health. The present study concluded that the six variables of Six Sigma have a positive and significant effect on the quality of information therapy services. The Six Sigma methodology relies on data to provide a systematic approach to improving business processes based on customer needs and actual analysis of ongoing processes in each organization. This is the boundary between Six Sigma and other methods and the main reason for implementing this approach in health care institutions. The results of research in different countries show the impact of the Six Sigma approach in health care institutions, including issues such as improving the time cycle and patient cycle in the emergency department; Reducing the percentage of cancellation of surgery, improving the cycle of radiology services; Supply management; Antibiotic management; Reduce medical errors; Reduce hospital costs and so on. Comparing the results of the research, it can be stated that fact-based and information-based management can account for 26% of changes in the quality of information services, resource providers can account for 38% of changes in the quality of information services and facts and information-based management. It can predict 39% of changes in the quality of information services. The results obtained from this research are in line with the results of the researches of Mohammad Ismail and Yari Zanganeh, Rabbani and Hemmati, Valipour, Arghish, Atashgar and colleagues. Finally, it is suggested that in order to directly support the establishment of Six Sigma Lean, an environment with special structural conditions of Six Sigma Lean and allocation of necessary resources, along with cultural factors affecting it, be created by employing appropriate human resources under the direct supervision of the hospital.

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