

# The effect of Health System Reform Plan on the performance indicators of hospitals affiliated with Mazandaran University of medical sciences

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## ABSTRACT

**Background:** The Hospital indicators are the most important factor in the performance of the hospital, which should be monitored regularly and at specific timescales. The purpose of this study was to evaluate and compare the performance indicators before and after implementing the Health System Reform Plan. **Materials:** This descriptive - analytic study was conducted in hospitals affiliated to Mazandaran University of Medical Sciences (23 hospital). The data was collected from 2013 to 2015 (Before and after the Health System Reform Plan). Data were analyzed using Wilcoxon test and spss software. **Results:** The findings indicate that the health reform plan has led to an increase in bed occupancy rate (%4.41), average length of stay (0.23), bed turnover rate (0.35) and The proportion of surgical operations to the bed (52.78), and reduction of cesarean section rate (0.1) and bed turnover intervals (0.09). In educational therapeutic hospitals, the significant difference was between the average occupancy rate and in therapeutic hospitals was the significant difference between the bed occupancy rate, the average length of stay and the proportion of cesarean before and after the implementation of the health reform plan ( $p < 0.05$ ). **Conclusion:** According to the findings of the research, performance indicators have improved after implementation of the health reform plan. Therefore, continuing, monitoring and evaluation and, if necessary, the modification of this plan can lead to improved hospital performance..

**Keywords:** Health system reform plan, performance indicators, hospital, Mazandaran university of medical sciences

## Introduction

The main mission of the health system is to raise the level of health and respond to the needs of the people and society. These needs change continuously under the influence of economic, social and political conditions. Responsiveness to these changes was the most important argument based on which the issue of development and promotion in the health system of Iran was raised and finally the health system reform plan

(HSRP) began in 2013 <sup>[1]</sup>. The plan consists of seven main pillars of reducing patient payments, the survival of physicians in deprived areas, the presence of physicians residing in the hospital, improving the quality of care services, improving hotel accommodation, protecting the costs and financial risks of patients in need, and promoting normal delivery <sup>[2]</sup>.

The health system of Iran, with the implementation of the plan, faces the challenge of rising costs <sup>[3]</sup>. Hospitals, which are the main focal point for implementing this plan, are one of the costly sectors of the economy. The nature of the activities of these organizations, because of dealing with the lives and health of humans, has determined the product of their actions as an undeniable basic necessity and the provision of efficient and effective services has always been the concern of the people and the attention of the authorities <sup>[4]</sup>. According to the World Bank's extensive studies, hospitals spend about 50-80 percent of the total cost of the healthcare sector and have a large share of educated staff <sup>[5]</sup>, which this will double the need for hospital performance assessment. Each country has standards and

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criteria that characterize these criteria from one country to another and even different from region to region. The healthcare system, anyway (whether with the participation of the public sector or the private sector) should have clear and comprehensive standards for assessing the performance of health services. Therefore, for the assessment of hospitals, we need to develop and apply appropriate indicators<sup>[6]</sup>. Indicators reflect the effectiveness of organizational units; therefore, they create an environment for the control and evaluation of activities<sup>[7]</sup>. Hospital indicators are the most important factor in the performance of the hospital, which should be monitored regularly and at specific timescales<sup>[8]</sup>. Since the HSRP focuses more on hospitals and treatment centers, and given the crucial role of hospital indicators in evaluating the performance of hospitals, it seems that a study on the impact of HSRP on hospital indicators needed. So far, studies have been done on the impact of HSRP on hospital indicators<sup>[9-14]</sup>.

Health system performance measurement can provide timely and relevant information about the performance of the health system to decision makers, which informs managers and planners and policymakers, and provides conditions that can move towards national goals. It evaluated the monitoring and related policies. Monitoring and evaluating timely reforms can provide evidence for (redirecting) reform implementation<sup>[15]</sup>. Along with the HSRP, it should monitor and evaluate its various aspects and programs, to be revised as needed<sup>[16]</sup>. Therefore, the purpose of this study was to evaluate the effect of HSRP on the performance indicators of hospitals affiliated to Mazandaran University of Medical Sciences.

## Methods

This descriptive study was conducted on a cross-sectional and retrospective basis using data from 2012-2015 years (2 years before and 2 years after the implementation of HSRP) in 23 hospitals affiliated with Mazandaran University of Medical Sciences using the census method was carried out. Considering that the HSRP has been implemented in hospitals since 2014, the data for the years 2012 and 2013 was considered as before of HSRP and data for the years 2014 and 2015 as after the implementation of the HSRP. The indicators in this study included bed occupancy rate, bed turnover rate, average length of stay, bed turnover interval, operation ratio to operation bed and proportion of cesarean section to total delivery.

After obtaining a license from the university's deputy of medical treatment and referring to the hospitals and using the data extraction form that is validity was confirmed using the opinions of the hospital experts and health management, the required data were collected. These forms are completed on a monthly basis in hospitals and, after verifying them, are sent by the hospital managers to the department of medical statistics and medical information of the university's treatment department.

After data collection, using the SPSS software version 21 and the Wilcoxon statistical test, the effect of HSRP on performance indicators was analyzed.

## Findings

This research was conducted in all hospitals affiliated to Mazandaran University of Medical Sciences. Information about hospitals, such as educational therapeutic or therapeutic, general or specialized, inpatient bed count and licensed bed are shown in Table 1.

**Table 1. descriptive information of hospitals affiliated to Mazandaran university of medical sciences**

Hospital	Type of Activity (General, specialized)	Type of hospital (Educational Therapeutic, Therapeutic)	Licensed bed	Inpatient bed count
Imam Ali Hospital, Amol	general	Therapeutic	134	140
Imam Reza Hospital, Amol	general	Therapeutic	205	197
17 Shahrivar Hospital, Amol	general	Therapeutic	140	105
Hazrat zeinab Hospital, Babolsar	specialized	Therapeutic	20	18
Imam Khomeini Hospital, Behshahr	general	Therapeutic	170	152
Shohada Hospital, Behshahr	specialized	Therapeutic	50	48
Shahid Rajaei Hospital, Tonekabon	general	Therapeutic	200	165
Haj Azizi Hospital, Jouybar	general	Therapeutic	50	54
Ayatollah Taleghani Hospital, Chalous	general	Therapeutic	180	172
Ghaem Hospital, Krlardasht	general	Therapeutic	32	12
Imam Sajjad Hospital, Ramsar	general	Therapeutic	200	180
Imam Khomeini Hospital, Sari	general	Educational Therapeutic	382	376
Bu-Ali Sina Hospital, Sari	general	Educational Therapeutic	250	244
Fatemeh Zahra Hospital, Sari	specialized	Educational Therapeutic	200	162
Zare Hospital, Sari	specialized	Educational Therapeutic	200	200
Shohada Hospital, Zirab	general	Therapeutic	64	56
Imam Khomeini Hospital, Fereydunkenar	general	Therapeutic	150	134
Razi Hospital, Ghaemshahr	general	Educational Therapeutic	234	202
Samen Alaemah Hospital, Galugah	general	Therapeutic	32	24

Shohada Hospital, Mahmudabad	general	Therapeutic	56	52
Imam Hossein Hospital, Neka	general	Therapeutic	64	40
Imam Khomeini Hospital, Noor	general	Therapeutic	135	99
Shahid Beheshti Hospital, Nowshahr	general	Therapeutic	89	75

Table 2 shows the mean and standard deviation of the indicators studied two years before and two years after implementation of HSRP. As it can be seen, the HSRP has led to an increase in bed occupancy rate, average length of stay, bed turnover rate and the ratio of surgical operations to the bed, and a decrease in the ratio of cesarean section to total delivery and bed turnover interval. The difference between the mean of bed occupancy rate, average length of stay, bed turnover interval and cesarean section to total delivery was significant ( $P < 0.05$ ). Other indicators had not significant difference ( $P > 0.05$ ).

**Table 2, Mean and standard deviation of functional indicators of hospitals**

Indicators	Mean		Deviation		p-value
	2 years before	2 years after	2 years before	2 years after	
Bed occupancy rate	67.10	71.51	20.45	20.38	0.001
Bed turnover rate	87.34	87.69	31.04	33.13	0.706
Average length of stay	2.99	3.22	2.59	2.67	0.004
Proportion of operation to bed	926.68	979.46	670.80	673.08	0.660
Bed turnover interval	1.56	1.47	2.96	1.41	0.001
Proportion of cesarean section to total delivery	0.53	0.53	0.30	0.26	0.0009

In Table 3, the performance indicators of hospitals based on educational therapeutic and therapeutic before and after implementation of HSRP have been studied. As can be seen, among the educational therapeutic hospitals, the difference of bed occupancy rate before and after the implementation of HSRP was significant ( $P < 0.05$ ). Among the therapeutic hospitals, the difference of bed occupancy rate, the average length of stay and the ratio of cesarean section to total delivery before and after the implementation of HSRP were significant ( $P < 0.05$ ).

**Table 3. Mean difference of performance indicators before and after the implementation of the health system development plan in educational therapeutic and therapeutic hospitals**

Indicators	Type of hospital	Number	Mean	Deviation	Wilcoxon statistic	p-value	Result
Bed occupancy rate	Educational	before 10	75.62	7.96	-1.989	0.047	The difference is significant.
	therapeutic	after 10	80.74	7.47			
Average length of stay	therapeutic	before 36	64.73	22.24	-2.742	0.006	The difference is significant.
		after 36	68.94	22.10			

Bed turnover rate	Educational	before 10	64.68	29.88	0.153- 0.878	The difference is not significant.
		therapeutic after 10	64.48	25.87		
Average length of stay	therapeutic	before 36	93.64	28.66	0.377- 0.706	The difference is not significant.
		therapeutic after 36	94.14	32.29		
Proportion of operation to bed	Educational	before 10	1299.9	607.08	1.487- 0.139	The difference is not significant.
		therapeutic after 10	1323.9	587.49		
Bed turnover interval	therapeutic	before 36	890.44	670.99	1.196- 0.232	The difference is not significant.
		therapeutic after 36	816.44	657.40		
Proportion of cesarean section to total delivery	Educational	before 10	0.32	4.77	0.889- 0.374	The difference is not significant.
		therapeutic after 10	1.72	2.02		
Average length of stay	therapeutic	before 36	1.90	2.21	1.318- 0.187	The difference is not significant.
		therapeutic after 36	1.40	1.22		
Proportion of cesarean section to total delivery	Educational	before 10	0.27	0.34	1.604- 0.109	The difference is not significant.
		therapeutic after 10	0.23	0.30		
Average length of stay	therapeutic	before 36	0.61	0.24	4.823- 0.0009	The difference is significant.
		therapeutic after 36	0.49	0.22		

## Discuss and Conclusion

The findings of the study indicate that HSRP has made positive changes in most of the indicators. Findings of the bed occupancy rate showed that this indicator increased by 4.41%, and the difference was significant. Rezaei reported the increase in this indicator in Hamedan hospitals [10]. The study of Dadgar showed that after implementation of HSRP the bed occupancy rate in Lorestan hospitals increased [11]. In the study of Zarei and Anissi in hospitals affiliated to Shahid Beheshti University of Medical Sciences, bed occupancy rate has increased significantly [14]. Also, Hashemian showed that use of beds in public hospitals of Isfahan has significantly increased after the implementation of

HSRP <sup>[17]</sup>. Implementation of HSRP and reducing the contribution of patients and improving the quality of visiting services in hospitals has led to an increase in the referral of patients to public hospitals so resulting in an increase in bed occupancy rate.

According to the findings of this study, the length of stay after the implementation of the HSRP was 0.23 increase in mean and was statistically significant. The results of Dadgar study showed that the implementation of the HSRP led to a 0.5 increase in the length of stay of patients, but this difference was not statistically significant <sup>[11]</sup>. In the Mousavi study, this indicator has also been increasing <sup>[12]</sup>. However, Rezaei's study showed that the implementation of HSRP led to a decrease in the average length of stay of the patient <sup>[10]</sup>. In the study of Sajadi in Isfahan, this indicator has also decreased <sup>[9]</sup>. The length of hospitalization reflects the medical decision to stay in the hospital <sup>[18]</sup>. Obviously, all efforts of the medical staff are to reduce the length of the patient's stay, and the longer the patient's admission is, the more favorable it is <sup>[19]</sup>. The increase in the length of hospitalization for patients in the hospital, on the one hand, entails a large financial burden on the health system and, on the other hand, lags behind other patients <sup>[20]</sup>. Therefore, accelerating and facilitating the process of admission and discharge, paying more attention to outpatient services and leveling services can reduce the length of hospitalization and prevent a significant part of the costs imposed on the hospital <sup>[21]</sup>.

The results of this study showed that the total number of surgical procedures to the operation bed increased, but was not statistically significant. The results of Bastani's study showed that the amount of surgical operations after the implementation of the HSRP has increased <sup>[22]</sup>. The Rezaei's study showed that implementation of HSRP has led to an increase in elective and emergency procedures <sup>[10]</sup>. The efficiency of the operating rooms is an important factor in determining the cost of the hospital <sup>[23]</sup>. The capacity of the hospital can be increased by maximizing the power of this sector, along with preserving its quality <sup>[24]</sup>. With the implementation of HSRP and the increase in the number of hospitalized patients, the number of surgeries is expected to increase, but in this study, this indicator has increased slightly. Mathematically, one reason for this can be the enlargement of the denominator by increasing the number of bed in the operating rooms after the implementation of the HSRP in some hospitals.

The results of this study showed that bed turnover rate increased after the HSRP, but the difference was not significant. Sajadi reported an increase in bed turnover rate in Isfahan hospitals <sup>[9]</sup>. Bed turnover rate is the number of times a patient uses a hospital bed in a given time period. This represents the number of occupied and vacant beds in a given period, indicating the average number of patients who use a given bed over a given interval <sup>[25]</sup>. According to the findings of this study, it can be said that by implementing the HSRP and increasing the patients' referral to the hospital, the bed occupancy rate and as a result of the workflow of public hospitals have increased.

The results of this study showed that the implementation of HSRP has led to a reduction in bed turnover interval, and the difference was statistically significant. In Rezaei's study this indicator has reduced in Hamedan hospitals <sup>[10]</sup>. Dadgar reported that bed turnover interval was reduced by 84% <sup>[11]</sup>. The bed turnover interval indicates how much the patient returns to the hospital, indicating that the hospital's function in the treatment and quality of the services <sup>[26]</sup>. This indicator should be reduced to make optimum use of resources <sup>[25]</sup>. By implementing the HSRP and increasing the bed occupancy rate, the interval between the beds has decreased.

Based on the findings of this study, the ratio of cesarean section to delivery in hospitals in Mazandaran hospitals before and after the implementation of the plan was significantly decreased. The study of Piroozi in Kurdistan province showed that the rate of cesarean in this province in one year after the implementation of the HSRP was lower than its base in the year 2013 <sup>[16]</sup>. Seidali reported that implementation of HSRP was effective in reducing cesarean indices and overall cesarean section statistic <sup>[27]</sup>. But Goudarzi's study confirmed that the free birth of the normal delivery in hospitals did not lead to a significant increase in normal delivery, and more planning should be done by the Ministry of Health <sup>[28]</sup>.

One of the ultimate goals of a health system development plan is to increase natural delivery in the framework of the "Promoting Natural Delivery" program. According to the plan, all hospitals affiliated with the Ministry of Health required a 10% reduction in cesarean section during the one year after the implementation of the plan compared to its base at the beginning of the plan. In order to encourage mothers to carry out normal delivery and reduce their pocket payment, normal delivery was free in university hospitals. After the implementation of HSRP to increase the incentive for doctors to have normal delivery, natural labor tariffs increased. The provision of painless delivery, pleasing maternal delivery, and optimizing the physical environment of the delivery sector are among other measures to increase the natural delivery rate and reduce cesarean section <sup>[16]</sup>. According to the results obtained in this study and similar studies <sup>[29, 30]</sup>, the implementation of HSRP has been effective in decreasing the rate of cesarean section.

Based on the results of the research, the HSRP has a positive effect on the hospital indicators, but in some cases there was no significant difference. Considering that the development of health system as one of the new fundamental changes in the health system has been able to improve the performance indicators in the studied hospitals, appropriate policies and monitoring of its implementation can have a significant impact on reaching goals for the health system.

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## References

- Hashemi B, Baratloo A, Forouzafar MM, Motamedi M, Tarkhorani M. Patient satisfaction before and after executing health sector evolution plan. *Iran J Emerg Med.* 2015;2(3):127-33.
- Research NloH. The report of evaluation of health reform in treatment section [Onlin]. [cited 2014 Oct] Available from: <http://nihr.tums.ac.ir/wp-content/uploads/2015/04/file3>.
- Haghdoust A, Mehrolhassani MH, Khajehkazemi R, Fallah MS, Dehnavieh R. Monitoring Indicators of Iranian Health System Reform Plan. *Hakim Research Journal* 2013;16(3):171-81.
- Nabilou B, Salem Safi P, Yusefzadeh H. Performance Assessment Of Health System Reform Plan In The Hospitals Affiliated With Urmia University Of Medical Sciences. *The J Urmia Nurs Midwifery Fac* 2017;14(11):896-905.
- Ebadifard Azar F, Ansari H, Rezapur A. Survey of hospital bed-day cost and performance indicators in selected hospitals of Iran University of Medical Sciences. *Management and Medical Information.* 2004;7(18):37-44.
- Jabbari Beyrami H, Gholamzadeh Nikjoo R, Jannati A, Asghari Jafarabadi M, Dadgar E. Prioritizing of performance indicators of quality - effectiveness areas of general hospitals using Analytic Hierarchy Process (AHP). *scientific magazine yafte* 2014;16(1):99-106.
- Raadabadi M, Mobaraki H, Nazari A, Bakhtiyari M. Investigations the functional indicators change due to implementation information system in Sina hospital. *J Shahrekord Uuniv Med Sci.* 2013;15(5):90-6.
- Aghayi Hashjin A. The Study of Hospital Indicator In Overall Hospital. The Faculty Of Medical Informatics And Management. M.S Degree of Healthcare Administration Tehran: Iran Medical University; 2000.
- Sajadi HS, Sajadi ZS, Sajadi FA, Hadi M, Zahmatkesh M. The comparison of hospitals' performance indicators before and after the Iran's hospital care transformations plan. *Journal of Education and Health Promotion.* 2017;6:89.
- Rezaei S, Rahimi foroushani A, Arab M, Jaafaripooyan E. Effects of the New Health Reform Plan on the Performance Indicators of Hamedan University Hospitals. *Journal of School of Public Health and Institute of Public Health Research.* 2016;14(2):51-60.
- Dadgar R, Jahani MA, Mahmoudi G. The impact of health system reform plan on the hospital's performance indicators of Lorestan University of Medical Sciences. *scientific magazine yafte.* 2017;19(2):93-102.
- Mousavi Rigi A, Bahrami M, Montazerolfarag R, Dehghani Tafti A, Dorahaki M, Barati O. Reviews and comparisons of hospital performance indicators before and after the implementation of the healthcare reform package design therapeutic hospitals of Bushehr University of Medical Sciences. *Tolooebehdasht.* 2017;15(6):107-19.
- Kasiri K, Raeesi AR, Ahmadi S. Evaluating The Role of Implementation of Healthcare Reform Plan on Efficiency Index in FayeZ Hospital Isfahan before and after the implementation of this plan in 2015. *The Second International Conference on Challenges and Solutions Management; Shiraz* 2015.
- Zarei E, Anisi S. Hospital performance indicators: before and after of implementing health sector evolution plan in Shahid Beheshti University of Medical Sciences. *PajooHande.* 2016;21(5):263-71.
- Barry SP, Diarra Nama AJ, Kirigia JM, Bakeera S, Somanje H. Monitoring and evaluation of health sector reforms in the WHO African region. *East African medical journal* 2009;86:S25-32.
- Piroozii B, Moradi G, Esmail Nasab N, Ghasri H, Farshadi S, Farhadifar F. Evaluating the effect of health sector evolution plan on cesarean rate and the average costs paid by mothers: A case study in Kurdistan province between 2013-2015. *Hayat.* 2016;22(3):245-54.
- Hashemian M, Moeinipour M. Assessment and comparison of Isfahan hospitals' performance indicators: beforeafter health reform plan. *International conference on sustainable reform in health system; Isfahan* 2015.
- Sajadi H, Zeinab S, Hadi M. Is There any Method to Compare Key Indicators of Hospital Performance Simultaneity? *Health Information Management* 2011;8(1):81.
- Jonaidi Jafari N, Sadeghi M, Izadi M, Ranjbar R. Comparison of performance indicators in one of hospitals of Tehran with national standards. *Journal of Military Medicine.* 2011;12(4):223-8.
- S Mohta A, Gupta A, Kamal G. Cancellation of elective cases in pediatric surgery: An audit. *Journal of Indian Association Pediatrics Surgery* 2010;15(3):90-2.
- Karami Matin B, Rezaei S, Soofi M, Kazemi Karyani A. Performance evaluating in hospitals affiliated in Kermanshah University of Medical Sciences based on PABON LASSO model (2006-2011). *Journal of Kermanshah University of Medical Sciences.* 2014;18(1):53-61.
- Bastani P, Rezaei Z, Kavosi Z, Ahmadzadeh M. Comparison of Number of Surgical Operations and Their Cancellation Causes in Namazi Hospital before and after the Health Transformation Plan. *Sadra Medical Sciences Journal.* 2017;4(2):77-88.
- Mastaneh Z, Mouseli L. Health information position in new reform of American health care system. *Journal of Health Information Management* 2011;8(1):97-101.
- Davari M, Khorasani E, Bakhshizade Z, Jazi M, Darab M, Maracy M. A single model for determining socioeconomic status in health studies; A crucial step to make the results more comparable. *Value in Health* 2014;7(17):730.

25. Moradi G, Meragi M. Using the principles of health indicators in the index 2005. 2005.
26. Najafi S. Hospital statistics and indicators. [internet] Sunday 18 June 2012. Cited [2013] 2013. Available from: <http://najafi88.belgfa.com/category/2>.
27. Seidali A, Namazi N. Assessment of changes in cesarean indications before and after the implementation of health sector evolution plan in pregnant women referred to Nezam-Mafi hospital, Shoush, Khoozestan province in 2013-2014. *Pejouhandeh* 2016;20(6):315-19.
28. Goudarzi L, Khayeri F, Mashkini E. Healthcare reform program design with an emphasis on promoting natural birth in public hospitals affiliated to medical universities and national health services. Eleventh National Congress Critical of the Government in the Field of Health 2015. p. 11-2.
29. Afshari S, Ebrahimzaded J, Yadegarfar G, Soleimani F. The effect of new health reform plan on the C-Section rate in the hospitals affiliated with Isfahan University of Medical Sciences. International conference on sustainable reform in health system; Isfahan 2015.
30. Karimi H. The comparison of C Section rate: before-after new health reform plan. International conference on sustainable reform in health system; Isfahan 2015.