Int J BioMed Public Health. 2018; 1(2):95-100
10.22631/ijbmph.2018.120156.1026

International Journal
of
BioMedicine and Public Health
http://www.ijbmph.com

Original Article

A comparative study of the California Book effect and relative value of services on the costs of hospitalization for common surgeries in selected hospitals of Sanandaj, Iran

Open Access

Parvin Heydari[1*]

ARTICLE INFO

Article History:
Received 21 February 2018
Revised 21 February 2018
Accepted 20 April 2018
Published online 27 April 2018

Keywords:
National healthcare reform program;
Relative value of services;
California Book

[1]*Iran Health Insurance Organization of Kurdistan, Sanandaj, Iran.*

Correspondence:
Parvin Heydari. Iran Health Insurance Organization of Kurdistan, Sanandaj, Iran.
haydariparvin@gmail.com

ABSTRACT

Introduction: Tariff determination is one of the important tools for policy making which governments use to intervene in the health market. The aim of this study was to compare California Book effect and relative value of services on the costs of hospitalization for common surgeries in selected hospitals of Sanandaj, Iran before and after the implementation of National Healthcare Reform Program (NHRP).

Methods: This semi-experimental study using before and after method was conducted on medical records of patients underwent surgeries in Tohid and Besat hospitals, Sanandaj, Iran that insured by Iran Health Insurance Organization in 2015. Data were collected from medical records of patients who underwent surgeries including; cataract, tonsillectomy-adenoidectomy, pilonidal sinus, cholecystectomy, delivery, cesarean section, curettage, abortion, appendectomy and anterior-posterior colporraphy. The data included the total cost, organization share, and patient share, the share of subsidies, out-of commitment and final payment.

Results: After the implementation of National Healthcare Reform Program the average cost of common surgical procedures showed 80.8% growth. The highest average growth rate of organization share was for abortion with 125.1% growth and the lowest average growth rate of organization share was for anterior-posterior colporraphy with 46.3% growth. In terms of the share of subsidies anterior-posterior colporraphy with 299.8% had the highest and delivery with a negative growth of 7.6% had the lowest share of the subsidies.

Conclusion: After the implementation of National Healthcare Reform Program the cost of surgery has doubled and additional burden has been inflicted on the health insurance organization to contribute the organization's share. Therefore, the organization's commitment to public and private health service providers was delayed.

Introduction

Health is one of the main priorities of life (1). In each health system, patients naturally expect to receive the quality services at the right time (2). According to the World Health Organization, health systems have three fundamental goals: Improving the health of individuals and society, expecting fair people financial participation for health services and responding to the non-clinical needs of people (3).

The main mission of the health system is to raise the level of health and respond to the needs of the society (4). These needs are constantly changing under the influence of economic, social, political and environmental conditions (5). In other hand diseases and health risk factors are changing constantly and they experience very rapid changes particularly at the current period (6). Responding to these changes is the

most important argument that the health system should be reformed and improved. One of the main reasons to reform the health system is the increasing costs of health section (7). Ministry of Health and Medical Education as the main responsible for the health system of the country, regarding the general missions and upstream documents and also the document of 20-year vision of the Islamic Republic of Iran launched the National Healthcare Reform Program on May 5th, 2014 with three approaches; protecting people financially, providing access to health services, and improving service quality (8). Determining the rational value of health services is one of the key components of the allocation of resources and the purchase of health services in the health care system. Tariff system is one of the ways in which the value of provided services is determined. The main purpose of determining the tariff or the price of the provided service is to achieve the desired purpose for which the service is assigned to. Therefore, tariff determination is one of the important tools for policy making which governments use to intervene in the health market. California Book is a valid universal model and was used 40 years ago in California, USA for tariff determination of health services. From 20 years ago it was used as tariff determination tool of health services in Iran (9), but it had a lot of challenges. In order to correct existing challenges, experts from the Ministry of Health and Medical Education formulated a new book entitled "Relative Value of Diagnostic and Therapeutic Services" in 2009. According to the Islamic Republic of Iran budget law of 2014 and the growth of resources of insurance organizations as well as the program of the Ministry of Health and Medical Education, in order to rationalize the tariffs based on a scientific basis, the first step towards the realization of tariffs in the field of health insurance was lifted and this new book became the basis for medical expenses in outpatient and hospitalized departments. That is in this system services compensated per the services and tariff determined for each service. The basis for payment in this system is the relative value of the service (10). In many studies relating to health system reform the use of monitoring and control levers, including; financing, payment system, organizing, regulation, and behavior are among the most commonly used methods. Although it has many advocates, but these levers alone cannot be used to reform the health system. Therefore, the principle for implementing changes is to prepare the infrastructure, especially human resources, financing, regulation and appropriate planning. Because infrastructure increases activities, reduces costs and finally increases the efficiency, and also affects the economic growth of the health system (11). Considering the significant growth of the prices of medical services in "Relative Value of Diagnostic and Therapeutic Services" book and achieving the positive and negative results for available services the aim of this study was to compare the effect of California Book and "Relative Value of Diagnostic and Therapeutic Services" book on the costs of hospitalization for common surgeries in selected hospitals of Sanandaj, Iran before and after the implementation of National Healthcare Reform Program (NHRP).

Methods

This semi-experimental study using before and after method was conducted on medical records of patients underwent surgeries in Tohid and Besat Hospitals, Sanandaj, Iran that insured by Iran Health Insurance Organization on June and July 2014 (before the implementation of National Healthcare Reform Program) and January and February 2015 (after the implementation of National Healthcare Reform Program). Sampling method was census and sample size was equal to the community. Data were collected from medical records of patients who underwent surgeries including; cataract, tonsillectomy-adenoidectomy, pilonidal sinus, cholecystectomy, delivery, cesarean section, curettage, abortion, appendectomy and anterior-posterior colporraphy. Data were recorded in a check list which was designed based on required variables. Recorded data was encoded and validated by the project implementer and entered into the statistical software SPSS Ver. 20. The data included the total cost, organization share, patient share, the share of subsidies, out-of commitment and final payment. Descriptive statistics including; absolute and relative frequency, mean and standard deviation and also independent t-test were used. The collected information was considered confidential and was used only for the aims of the study. There was no other ethical consideration.

Results

The results showed that Iranian Insurance Fund had the highest frequency after the implementation of National Healthcare Reform Program, the Villagers Insurance Fund had the highest frequency before the implementation of National Healthcare Reform Program and also other Classes Fund had the lowest frequency before the implementation of National

Healthcare Reform Program. The growth of Public Health Insurance after the implementation of National Healthcare Reform Program was 27.1% and Iranian insurance decreased 34.5% after the implementation of National Healthcare Reform Program (Table 1). The frequency of patients who used supplementary insurance before the implementation of National Healthcare Reform Program declined from 5.3% to 3.6%. The highest growth rate of the average cost of common surgeries was related to Tonsillectomy-adenoidectomy with 130.7% and the lowest was related to anterior-posterior colporrhaphy with 42.9%. In general, the average cost of common surgeries after implementation of National Healthcare Reform Program grew by 80.8%. The highest average growth rate of organization share was for abortion with 125.1% and the lowest was for anterior-posterior colporrhaphy with 46.3%. Also, the average of the organization share was increased by 81.6%. In terms of subsidy share anterior-posterior colporrhaphy with 291.8% had the highest growth rate and natural delivery with minus 7.6% had the lowest growth rate.Using "Relative Value of Diagnostic and Therapeutic Services" book the patient share was increased to 78.1% than before the implementation of National Healthcare Reform Program. The highest average growth rate was related to tonsillectomy-adenoidectomy with 225.7% (Table 2). The final payment of patients who referred before the implementation of National Healthcare Reform Program was 6.3% which decreased to 4.1% after the implementation of National Healthcare Reform Program. The share of Health Insurance Organization increased from 68.4% to 75.1%. The results also showed that before the implementation of National Healthcare Reform Program patients paid 7.2% of the cost of services from their pockets and after it decrease to 4.2%. The share of organization also reached from 90.9% to 91.2 % (Table 3). Of-pocket patient payment for common gynecology procedures and surgeries decreased from 5% to 1.8%. It was also decreased for general surgeries from 5.9% to 4.2%, for ENT surgeries from 6.6% to 4.6% and for ophthalmology surgeries from 5.8% to 4.8 % (Table 4).

Table 1. Frequency of medical records by insurance fund before and after the implementation of National Healthcare Reform Program

Insurance Fund	Before n (%)	After n (%)
Employee	29 (17.3)	14 (9.7)
Iranian	66 (39.3)	7 (4.8)7
Villagers	65 (38.7)	78 (53.8)
Public Health	2 (1.2)	41 (28.3)
Others	6 (3.6)	5 (3.4)
Total	168 (100)	145 (100)

Discussion

Based on our findings, Iranian Insurance Fund insured with 39.3% had the highest frequency before the implementation of National Healthcare Reform Program and the Villagers Insurance Fund had the highest frequency after the implementation of National Healthcare Reform Program with 53.8%. According to the Population and Housing Censuses in 2016 the rural population who were living in Kurdistan province was 22%. The doubling percentage of patients undergoing surgery with rural insurance to the actual rural population indicates that immigrant villagers insured in the Villagers Insurance Fund. Also, Public Health Insurance has increased from 1.2% to 28.3% after the

Table 2. Average and growth rates of common surgical procedures before and after the implementation of National Healthcare Reform Program (in Rials)

Surgical procedures	Before	After	Percentage of tariff growth	Percentage growth of the Health Insurance Organization share	Percentage average growth of subsidy	Percentage average growth of subsidy
Tonsillectomy-adenoidectomy	3589000	8280000	130.7	122.9	105.5	225.7
Abortion	3202000	7117600	122.3	125.1	29.2	91
Natural Delivery	4925000	10961800	122.6	117.6	-7.6	0
Curettage	2986800	5437600	82.1	85.6	26.9	61.3
Cesarean section	8466000	15421500	82.2	90.5	109.2	58.1
Appendectomy	8608900	14980000	74	69.2	105	149.5
Valenza cataract	10224000	15451000	51.1	51.3	31.3	70.8
Cholecystectomy	12118300	20396600	68.3	64.6	-1.4	111.6
Posterior anterior colopurium	8534000	12193000	42.9	46.3	291.8	124.6
Pilondial sinus	5165500	7627300	47.7	46.4	1.9	61.6
Total	7286200	13177000	80.8	81.6	35.5	**78.1**

Table 3. Comparison of the relative frequency of common surgical procedures share before and after the implementation of National Healthcare Reform Program

Surgical procedures	Stage	The share of organization	The share of supplementary insurance	The share of subsidy	The patient's share	Out of commitment	The patient's final payment
Tonsillectomy	Before	93.1	-	8.7	7.1	9.4	7.8
adenoidectomy	After	90	-	7.7	10	5.5	5.2
Abortion	Before	91.6	-	15.9	8.4	17.9	10.1
	After	92.8	-	0.9	7.2	7.8	4.5
Natural Delivery	Before	91.4	-	28.4	-	20.9	-
	After	89.4	-	11.8	-	6.2	-
Curettage	Before	89.5	-	9.8	9.9	10.1	11.1
	After	91.2	6.5	6.8	8.8	8.1	4
Cesarean section	Before	87.9	1.3	6.3	9.3	11.1	13.2
	After	92	1.5	7.2	8	5.4	4.3
Appendectomy	Before	94	-	4.3	6	4.8	6
	After	91.4	-	5.1	8.6	2.9	4.2
Valenza Cataract	Before	90.9	2.7	18.3	7.2	19.2	7.9
	After	92	-	15.9	8.1	15	6.4
Cholecystectomy	Before	92	4.8	12.6	8	16.6	7.4
	After	90	-	7.4	10	4.2	5.5
Posterior anterior	Before	90	9	2.8	5	5.8	5.4
colopurium	After	92.2	-	7.8	7.9	5.7	4.7
Pilondial sinus	Before	91.8	1.9	11.1	8.2	12.8	8.3
	After	91	2.4	7.6	9	6.7	5
Total	Before	90.9	2	16	6.3	16.4	7.2
	After	91.2	0.4	12	6.2	9.6	4.2

implementation of National Healthcare Reform Program. The reason for the increase in the public health insurance fund was inconsistencies in government hospitals and delay separating medical records of patients insured in Iranian Insurance Fund and those who insured in Public Health Insurance in the first six months after the implementation of National Healthcare Reform. The average cost of common surgeries after implementation of National Healthcare Reform Program (NHRP) was 80.8%. Tonsillectomy, abortion, and natural labor had the highest tariff growth rates and anterior-posterior colporrhaphy; pilonidal sinus had the lowest tariff growth after the implementation of National Healthcare Reform Program. This shows that the limitations applied to managed care and the Natural Childbirth Promotion Program are promoting in the National Healthcare Reform Program. The average of the organization share for common surgeries was 81.6% which the highest was related to abortion and the lowest was for anterior-posterior colporraphy. In a study by Nasri *et al*. the average of the organization share was 67.7% (13). The reason was the change of tariffs in "Relative Value of Diagnostic and Therapeutic Services" book and 2k factor for surgeons who were faculty member. The frequency of patients who used supplementary insurance decreased after the implementation of National Healthcare Reform Program (from 6% to 3.4%). This finding was inconsistence with Nasri *et al*. study which conducted in Ilam, West of Iran (13). Maybe that was due to the reduction of hospital costs of the insured which has reduced their need for supplementary insurance. Although the average cost of surgery has increased from 7,286,245 Rials to 13,177,000 Rials, but before the implementation of National Healthcare Reform Program patients paid 7.2% of the cost of services from their pockets and after the implementation it decrease to 4.2%. In a study by Nasri *et al*. patient`s share decreased from 7% to 5% (13) which is similar to our finding. According to the National Healthcare Reform Program and "Relative Value of Diagnostic and Therapeutic Services" book, this increase in cost growth and reduction in the percentage of people's share is acceptable. The interesting point is the increase in patient`s payment from pocket after the implementation of National Healthcare Reform Program, which, apart from women's surgeries (abortion, natural delivery, and curettage), it increased for other surgical procedures. The hidden costs of patients for the purchase of surgical equipment that were imposed on the patient prior to implementation of National Healthcare Reform Program by the hospitals are not included in our calculations. In this case, the proportion of patients

Table 4. Average and percentage of common surgical procedures costs before and after the implementation of National Healthcare Reform Program by specialty (in Rials)

Specialty	Stages	The share of organization	The share of subsidy	The patient's share	Out of commitment	The patient's final payment	Total
Gynecology	Before	5196000(70.4)	994000(13.5)	270800(3.7)	914600(12.4)	372000(5)	7376000(100)
	After	10692700(82.3)	1146000(8.8)	443500(3.4)	705500(5.4)	239500(1.8)	12988000(100)
General Surgery	Before	8088000(74.2)	948000(8.7)	672000(6.2)	1193000(10.9)	647000(5.9)	10901000(100)
	After	11948000(82.6)	805000(5.6)	1180000(8.2)	526000(3.6)	609500(4.2)	14459000(100)
ENT	Before	3343000(78.7)	312000(7.3)	254000(6)	1967800(8)	806000(6.6)	4248000(100)
	After	7452000(79.5)	641000(6.8)	828000(8.8)	457000(4.9)	428000(4.6)	9379000(100)
Ophthalmology	Before	9297000(67)	1874000(13.5)	731000(5.3)	1968000(14.2)	806000(5.8)	13870000(100)
	After	14215000(70.2)	2460000(12.2)	1249000(6.2)	2315500(11.4)	981000(4.8)	20239000(100)

paid before the implementation of National Healthcare Reform Program was more than 7%. The results of our study showed that the share of organization reached from 90.9% to 91.2%. In Nasri's *et al*. study, the organization's share was 87%, which was slightly lower than our study (13). It means that with the implementation of the third stage of National Healthcare Reform Program and the increase in health services tariffs, although the payment has increased by 80%. The percentage of insurance coverage of Health Insurance Organization did not increase significantly. In this study, the share of rural patients who received services through the referral system has decreased. This shows that using the "Relative Value of Diagnostic and Therapeutic Services" book and providing the software platform and hospital HIS system the patient's final share corrected and referred patients have not paid more than 3%. The share of health insurance organization for gynecological and general surgeries has increased by 10% after the implementation of National Healthcare Reform Program, but for ophthalmology and ENT surgeries it was less than 3%. This difference was probably due to reviewing the surgery tariffs and the view of Ministry of Health and medical Education to support women. Challenges for implementation of the National Healthcare Reform Program in the country included; focusing on resources spent on treatment, screening and making patients, severe stagnation and reducing health resources, lack of money management in the health system, failure to rely on disease prevention and reducing health care costs, strengthening physic anarchy in the country and discrimination. The problems of the National Healthcare Reform Program and "Relative Value of Diagnostic and Therapeutic Services" book are as follow; the National Healthcare Reform Program is mismatch with the macro policies of the country, pure thought of health producing in hospitals, objectives of the plan are disproportionate with equity in distributing financial resources, lack of balance and health equity, the lack of readiness to accompany with this plan within the Ministry of Health and Medical Education itself, the budget of the plan is not proportionate to the health system reform goals, excessive increase in physicians` tariff , imbalance between physicians` receipts, discrimination in the implementation of new tariffs, budget package does not fit with the needs of patients and the strong dependence of the health insurance system on government credits (15). Therefore, paying attention to the adverse effects of tariffs on people, insurance organizations, physicians, hospitals and other service providers is essential. Neglecting this issue can lead to not accepting the tariffs set by service providers in various sectors (16). Therefore, to continue the National Healthcare Reform Program the Ministry of Health and Medical Education should be committed to leveling all diagnostic and therapeutic services based on referral system, preparing clinical guidelines implementation of national generic drug system and accelerate electronic health records (17). Also the Ministry of Health and Medical Education should be committed to insured over 11 million people who were not covered by any insurance system and those who take advantage of legal gaps and received free insurance booklets and doing the test, remove those who are not in need from free health insurance coverage.

Conclusion

In general, it can be concluded that after the implementation of National Healthcare Reform Program the cost of surgery has doubled and additional burden has been inflicted on the health insurance organization to contribute the organization's share. Therefore, the organization's

commitment to public and private health service providers was delayed.

Ethical disclosure

In this study, tests that threatened the health of individuals were not used.

Acknowledgements

Author would like to thank Mr. Younis Soheilizad, the supervisor of the project, and Dr. Hamid Reza Bahramian, and Mrs. Fariba Mokari, Azita Jahangiri and Nadia Rahimi, who helped me implementing the study. I also thank the Center for Insurance Computing and Studies of Iran Health Insurance Organization, which supports the study financially.

Authors' contribution

All the authors have accepted responsibility for the entire content of this submitted manuscript and approved submission.

Conflict of interest

The authors declare that they have no conflict of interest.

Funding/Support

None declared.

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