Original Article
http://mjiri.iums.ac.ir
Medical Journal of the Islamic Republic of Iran (MJIRI)

Med J Islam Repub Iran. 2022 (9 Apr);36.32. https://doi.org/10.47176/mjiri.36.32

The Effect of Prospective Payment Systems on Health Care Providers' Behavior: A Case Study of Global Surgeries Payment System in Iran

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Received: 2 Feb 2021 Published: 9 Apr 2022

Abstract

Background: Global payment system is a kind of case-based payment system which pays for 60 commonly surgical operations by the average cost for each specified surgery case in Iran. The aim of the study was to determine the effect of this payment system on the number of services provided for each global surgical case versus fee-for-service (FFS) for the same operation.

Methods: This is a retrospective study based on data from a large referral teaching hospital in Iran in the period of 2012-2015. Information related to 46 surgeries was performed which both global and FFS documents were gathered (N=7672). Statistical analysis was done on variables including Length of stay (LOS), Blood test (BT), Radiology (RA) and a mixed variable named VC (visit and consult number). Data were analyzed by a zero-inflated negative binomial regression model using STATA 11.

Results: Descriptive analysis showed the mean of each service was significantly (p<0.001) higher in the FFS document's group rather than the global payment group. Regression estimates showed the amounts of each service including LOS, BT, RA and VC were significantly (p<0.001) higher in FFS surgery than global documents for the 15 selected surgery. LOS and BT have shown a significantly higher amount in 100% of surgeries for FFS above global document. Same as for Radiology test and VC variables, there were significantly higher amounts in 93% of surgeries for FFS above global hospital documents.

Conclusion: The findings can reinforce the presence of a relationship between providing more clinical services in FFS document form and providers' incentives to adjust profits against their Costs. The significantly higher service provision in FFS documents can be controlled with a prospective global payment mechanism.

Keywords: Global Payment System, Prospective Payment System, Fee-For-Service, Fees and Charges, Reimbursement Mechanisms, Incentive Reimbursement

Conflicts of Interest: *None declared*
Funding: *This study was a research project (IR.TUMS.REC.1394.181 dated 21/6/2015) that was financially supported by Tehran University of Medical Sciences.*

Cite this article as: Behzadi A, Bayati M, Bashzar S, Jaafaripooyan E. The Effect of Prospective Payment Systems on Health Care Providers' Behavior: A Case Study of Global Surgeries Payment System in Iran. *Med J Islam Repub Iran.* 2022 (9 Apr);36:32. https://doi.org/10.47176/mjiri.36.32

Introduction

Payment systems are one of the most important levers of control in implementing health system reforms that are used to reach the intended goals of policymakers (1). The prospective payment systems (PPS) we re created for

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↑What is "already known" in this topic:
PPS have a variety of effects on health care providers, that the most significant are cost limitation, reduction in quantity and quality of provided services.

→What this article adds:
If providers do not have a serious obligation to comply with the defined prospective refund system or they will be able to choose one of some available reimbursement systems that will benefit them the most, they will definitely choose the most useful one. When several reimbursement methods are provided, appropriate control mechanisms should be in place to ensure that the provider follows the policy-maker's approach. they can reduce their profits where they have to control and limit costs while offsetting them by providing services that will be reimburse in more cost-benefit ways.

[DOI: 10.47176/mjiri.36.32]

goals such as cost control, increasing in quality efficiency, and effectiveness, but due to the wide variety of their motivational dimensions and the various behavioral effects observed after the use of these tools (2). in service providers, along with the achievement of the goals mentioned, undesired effects such as induced demand, reduced length of stay, reducing the quantity and quality of service provided are all a form of compensatory response by service providers to reduce costs and save resources (3). Investigating the behavioral responses of service providers to these payments puts forth a direct correlation between the real cost components of these systems with the degree of acceptance and willingness of providers to correct implementation and their commitment to these mechanisms (4). The adequacy and quantity of reimbursements are important in providing benefits and obtaining satisfaction from service providers (5).

One of the important features of the health market is the information asymmetry among the triangle of the receiver, the provider, and the insurer, which intensify the incidence of undesired functions such as induced demand, increased delivery for services that are reimbursed by methods rather than prospective method, reduced quantity and quality of services that are funded by PPS (6).

Prospective payments include a variety of types such as diagnostic related groups (DRG), per capita, case-based payment, episodic payments, bundled payments, and so on (7) that in developing countries which due to lack of cultural, technological and informational infrastructures, the possibility of implementing advanced payments such as related diagnostic groups do not exist, different localized versions of case-based payment systems are used as an intermediate phase to pass from fee-for-service to DRG (8).

In the case payment system, for all services provided for each case of disease, a general and the predetermined amount is paid regardless of the actual costs imposed on the service provider (9) which may lead to possible negative incentive effects (10). In Iran, also the global payment system has been applied as an indigenous version of PPS on the second and third levels of service providing in the state health centers since 1999 for 60 common surgical procedures (that have been determined by a joint committee of representatives from the Ministry of Health and Medical Education and the established insurer's organizations and their tariffs have been specified (11).

In this payment model, the average amount of the total cost components of payment is paid to the provider according to the assessment degree of the treatment center. The components of this payment are the length of stay, test, radiology, anesthesia, visit, operating room, surgeon's assistant, and others. The tariffs of global surgeries are determined regardless of the actual cost imposed on the service providers that are paid by the basic insurer organizations as the major purchaser of the health care system (12).

As far as Global payment system is the first kind of PPS in Iran similar to DRG or case-based and has been applied as the first generation of payment system reforms aims to contain the costs, so it is related to the providers' incentive in order to minimize the cost and increase profit which known as the most important examples of behavior change, providing extra and unnecessary services as a compensation mechanism through inducing demand in non-global surgical documents which finances through fee for service payment system.

In Iran's current global payment system, if provider records a non-global surgery plus global in the operation room or the patient has complication during surgery and needs intensive care unit (ICU), the surgery is out of global document form, and it would be financed through FFS system, therefore in global payment system, the provider has rights and is authorized to determine the type of surgery documents which cause some incentives for not performing global surgery according to the law. However, insurance inspection systems can question this and financial compensation to the hospital can be affected, but still, those motivations exist.

After near two decades of its implementation, there is no study of global payment effects on providers and their behaviors which contribute to control medical costs as the main objective of PPS payments and Due to the challenges of this type of payment system and providers growing incentives to compensate the costs through increasing of providing health services and use other mechanisms to increase their income through induced demand, we decided to compare the providers' behavior in providing health services for a global surgery document compare to non-global surgical document (FFS payment) for the same case (2012-2015) and determine the amount of probable increase in service providing due to maximizing the hospital income using Poisson regression analysis.

Methods

This is a retrospective case study done through zero-inflated negative binominal regression analysis used in order to compare service providing in a global surgery document against non-global document (from now on referred to "FFS" in this article) per the same case .

Among all cost components forming the patient hospitalization documents, including the length of stay, radiology, consultation, anesthesia, surgeon's assistant, operating room cost, and the like, the four items of the length of stay ,blood test, radiology, and VC (which composed from the visit and consult variables) according to literature and due to having the highest and the most significant difference in the extent of service providing in the form of fee-for-service compared to the bundled and case-based payments, and in the same time, to compare all surgeries in global and FFS states that have output in the used regression model, were selected to be compared in global and FFS groups for identical surgeries.

Data Collection

The study was conducted based on the data from a referral teaching hospital affiliated with TUMS for the period of 2012-2015. Global payment system, which was designed for 60 announced global operations, was launched in 1999 but because of HIS system which was established in 2011 in Iran's governmental hospitals and

[DOI: 10.47176/mjiri.36.32]

valid data for electronic inpatient documents was recorded from 2012 Therefore, the period of 2012-2015 was considered to collect data. Since the electronic record of information upon inpatient documents is composed of different cost elements, out of them, length of stay, blood test, radiology, and VC was chosen to compare among the global and FFS payment groups of inpatients documents. A self-made designed checklist form which was developed in excel format and included all selected cost elements of inpatient documents records, was used to collect the data from the hospital HIS system. Total available operation inpatients documents for 60 global surgeries in the global and FFS payment format, both were selected (N= 7672) and Secondary data were extracted in designed excel form as a checklist from the hospital HIS system. Information for selected variables for all operations entered to the designed regression analysis model for each surgery separately.

Out of 60 announced global operations, 46 have been recorded as global surgery documents in the hospital HIS system which both global and FFS documents related to these surgeries were gathered and due to the frequency and the providing a good sample and valid results, out of these 46 surgeries, 15 ones have been chosen to compare their global and FFS documents.

Data analysis

The primary model of our study for assessing the effect of payment mechanism on the behavior of providers is presented as follows: Volume of Service =f (global/non-global (FFS) payment, age of patient, year of surgery).

The dependent variable is the volume of provided services by the provider. In the present study, four provided services were considered as independent variables including LOS, BT, RA, and VC.

Except for global/non-global (FFS) payment which is the main explanatory variable, we entered the age of the patient and the year of surgery in the model and controlled their effects.

Because the independent variables included the number of services, we used count data models. With respect to over-dispersion in our data, the negative binomial regression provides more appropriate estimates than Poisson regression. Moreover, because of the high frequency of zero in the dependent variables, we used zero-inflated negative binomial regression.

The explained model was estimated for four dependent variables and for 15 selected surgeries. Therefore we estimated 60 regressions.

In this study, due to availability, valid data were gathered from the first year of standard data entry from the HIS system of a teaching referral hospital affiliated with TUMS. The global payment system had lunched in 1999, but because of running HIS system in governmental hospitals from 2011 and there is no valid recorded data till 2012, we decided to collect data from 2012 to 2015 meanwhile because of launching Health Transformation Plan and changes in global surgeries and their tariffs and impossibility of tracking and matching data, information related to the second six months of 2015 removed. The total number of entered surgery documents was 7672 and data analysis was done through mentioned regression analysis model using STATA v.11.

Results

The results are presented in two main categories. The first shows the mean of each service which is significantly higher in the FFS document's group rather than the global payment group (Table 1).

It can explain the FFS payment for non-global groups resulted in more service providing for each dependent variables included "LOS", "BT", "RA" and "VC" than global payment significantly.

The second category of results showed the amounts of each dependent variables included "LOS", "BT", "RA" and "VC" were significantly higher in FFS surgery than global documents for the 15 selected surgery (Tables 2-6).

The frequency of significances in studied variables is presented, which is a summary of estimates for different services presented separately before (Table 6). Length of stay (LOS) and Laboratory tests have shown a significantly higher amount in 100% of surgeries for FFS rather than global documents. In all non-global surgeries, the length of stay showed significantly higher values, the highest amount was related to delivery (no bed calculation) and the lowest was related to Sub-Total Thyroidectomy.

For Blood tests in the non-global group, the highest significant amount belonged to an Anterior umbilical hernia of any type and the lowest was Diagnostic laparoscopy (Tables 2, 3).

Same as for Radiology test and VC variables, there were significantly higher amounts in 93% of surgeries for FFS above global hospital documents too. In non-global surgeries, the highest amount was related to removing wires, pins, nails, needles or deep plates and the lowest was seen in Total Thyroidectomy. For the VC, the highest amount was seen in Remove wires, pins, nails, needles or deep plates and the lowest belonged to Diagnostic laparoscopy

Table 1. The mean and standard deviations for LOS, BT, RA, and VC variables between global and non-global groups of documents (FFS payment)

Response / Studied Variables	Global Group	Non-global Group	Students t-test t-value	*P*-value
VC (Visit plus Consultation)	1.007268 S.D (1.763975)	5.655614 S.D (13.9915)	-21.8897	≤0.001
Length of stay (LOS)	2.91679 S.D (3.556118)	8.100389 S.D(9.082031)	-36.4771	≤0.001
BT (Blood test)	22.25743 S.D (17.26464)	116.8223 S.D (187.8845)	-33.2190	≤0.001
Radiology	.7985043 S.D(1.216808)	4.184542 S.D (8.010144)	-27.8064	≤0.001

[DOI: 10.47176/mjiri.36.32]

Table 2. Estimates of zero-inflated negative binomial regression for the effect of global payment on Length of stay (LOS) for selected surgeries in Iran

Length of Stay (LOS)						
	Surgery Name	Surgery Type (NG/G)	Age	Year	Constant	LR chi2
1	Enterolysis of the intestinal obstruction or Duodenostomy or Jejunostomy or volvulus (24)	2.40161 (P ≤0.001)	1.00551 (P ≤0.001)	1.064865 (P ≤0.007)	1.75e-38 (P ≤0.008)	71.17 (P ≤0.001)
2	Appendectomy or peritonitis or both, with or without drainage of abscess (25)	2.456598 (P ≤0.001)	1.014452 (P ≤0.001)	1.006829 (P ≤0.841)	.000063 (P ≤0.838)	250.84 (P ≤0.001)
3	Cholecystectomy with or without Cholangiography or bile duct exploration (27)	1.789392 (P ≤0.001)	1.010958 (P ≤0.001)	1.002493 (P ≤0.897)	.0528694 (P ≤0.912)	348.60 (P ≤0.001)
4	Unilateral Richter's inguinal hernia (of any type) with or without hydrocele or spermatocele incision (28)	2.099989 (P ≤0.0001	1.005331 (P ≤0.001)	.9907593 (P ≤0.752)	381945.5 (P ≤0.754)	136.92 (P ≤0.001)
5	Anterior umbilical hernia of any type (umbilicus, Epigastric, Spiegel) (30)	1.952088 (P ≤0.001)	1.007162 (P ≤0.003)	.9848081 (P ≤0.681)	2.26e+09 (P ≤0.678)	86.74 (P ≤0.001)
6	Delivery by the doctor in any form (no baby bed calculation) (36)	4.235561 (P ≤0.001)	1.014003 (P ≤0.012)	.8977083 (P ≤0.125)	4.79e+64 (P ≤0.128)	226.99 (P ≤0.001)
7	Diagnosis and treatment dilatation and curettage (Non-obstetric) (43)	2.85028 (P ≤0.001)	1.014767 (P ≤0.001)	.9995741 (P ≤0.991)	.679668 (P ≤0.994)	179.23 (P ≤0.001)
8	Complete hysterectomy with or without removing ovaries or Colopurethrocytoscopy (44)	1.832403 (P ≤0.001)	1.003617 (P ≤0.009)	1.004218 (P ≤0.739)	.0065067 (P ≤0.774)	470.20 (P ≤0.001)
9	Unilateral or bilateral ovarian resection with or without cyst in any form (45)	1.583755 (P ≤0.001)	1.017271 (P ≤0.001)	1.079518 (P ≤0.003)	6.19e-47 (P ≤0.004)	134.85 (P ≤0.001)
10	Cesarean section surgery in any way (no baby bed calculation) (47)	3.122265 (P ≤0.001)	1.009156 (P ≤0.001)	.9474979 (P ≤0.001)	2.27e+32 (P ≤0.001)	1823.53 (P ≤0.001)
11	Surgical abortion with or without dilatation and curettage (48)	2.050119 (P ≤0.001)	.9982339 (P ≤0.629)	1.074256 (P ≤0.004)	6.81e-44 (P ≤0.004)	161.12 (P ≤0.001)
12	Total Thyroidectomy (49)	1.678917 (P ≤0.001)	1.006047 (P ≤0.005)	1.080696 (P ≤0.015)	2.62e-47 (P ≤0.015)	86.24 (P ≤0.001)
13	Sub-Total Thyroidectomy (50)	1.538924 (P ≤0.001)	1.015557 (P ≤0.001)	.9991593 (P ≤0.982)	4.346737 (P ≤0.977)	88.86 (P ≤0.001)
14	Remove wires, pins, nails, needles or deep plates (61)	2.434825 (P ≤0.001)	1.007004 (P ≤0.001)	1.053199 (P ≤0.174)	5.33e-32 (P ≤0.174)	130.51 (P ≤0.001)
15	Diagnostic laparoscopy with or without fulguration of ovarian lesions with or without adhesion and sampling and single or multiple aspirations (82)	1.614811 (P ≤0.001)	.9905046 (P ≤0.214)	.9679076 (P ≤0.631)	6.75e+19 (P ≤0.629)	19.46 (P ≤0.0002)

(Tables 4, 5).

In the non-global group, given the fact that repayments are made per service, the provider has a greater incentive to extend patient stay and provide more visits, radiology and laboratory and other services than needed.

Discussion

The findings showed that among 60 global surgical operations, 46 operations were done in a global form which information related to both global and FFS documents for these 46 surgeries was gathered and entered into the model. Response variables including the LOS, BT, RA, and VC have had significantly higher amounts in the FFS group that set forth the presence of induced demand where the reimbursement system changes and revert to FFS from a total figure as global payment.

These results also reinforce the relationship between the behavior of service providers on increasing income and minimizing their loss.

Various studies discussed similar results using different kinds of case-based payment systems like global. A study done by Chen et al., investigating the behavior of providers in using global budget payment system in Taiwan, revealed that an induced demand happened in providing more profitable services such as blood tests, radiology services and medicine prescription, while hospitals had decreased some of their services to compensate their costs (13).

A similar study done by Thompson and McVeigh revealed that all rehabilitation hospitals before and after using PPS decreased length of stay as a cost component and raised discharging and profitable services as a mechanism for making more income which showed the providers incentives (14). These results were found in another study about the hazards of PPS, including induced demand and reduced length of stay (15).

Froimson et al., showed that the use of bundled or episodic payments resulted in decreasing in services which reimbursed under these payments and increase in the length of stay and induced costs as a compensatorymechanism (16).

The study on the effects of PPSs of Medicare outpatients on the rate of services provided showed that hospitals have reduced the rate of services reimbursed with this payment system (17) and have increased the number of their services reimbursed in other systems; (18) and payment reforms that are continued in parallel with keeping fee-for-services approach will not be effective in controlling costs, and hospitals will induce demands to compensate costs and earn money in services funded by non-global payment systems (19). A simultaneous study of a cost analysis of readmission rate in hip and knee replace-

[DOI: 10.47176/mjiri.36.32]

Table 3. Estimates of zero-inflated negative binomial regression for the effect of global payment on Blood Test (BT) For selected surgeries in Iran

Blood Test (BT)	Surgery Name	Surgery Type-G/NG	Age	Year	Constant	LR chi2
1	Enterolysis of the intestinal obstruction or Duodenostomy or Jejunostomy or volvulus (24)	4.193735 (P ≤0.001)	1.011014 (P ≤0.001)	1.105952 (P ≤0.001)	9.13e-61 (P ≤0.001)	131.29 (P ≤0.001)
2	Appendectomy or peritonitis or both, with or without drainage of abscess (25)	4.58599 (P ≤0.001)	1.026527 (P ≤0.001)	.9913324 (P ≤0.825)	420082.6 (P ≤0.814)	565.14 (P ≤0.001)
3	Cholecystectomy with or without Cholangiography or bile duct exploration (27)	4.807145 (P ≤0.001)	1.009297 (P ≤0.001)	1.099784 (P ≤0.001)	1.53e-57 (P ≤0.001)	1409.33 (P ≤0.001)
4	Unilateral Richter's inguinal hernia (of any type) with or without hydrocele or spermatocele incision (28)	4.024064 (P ≤0.001)	1.007094 (P ≤0.001)	1.040823 (P ≤0.193)	1.64e-24 (P ≤0.200)	357.51 (P ≤0.001)
5	Anterior umbilical hernia of any type (umbilicus, Epigastric, Spiegel) (30)	7.679427 (P ≤0.001)	1.00469 (P ≤0.092)	1.041365 (P ≤0.372)	5.71e-25 (P ≤0.378)	277.87 (P ≤0.001)
6	Delivery by the doctor in any form (no baby bed calculation) (36)	4.783049 (P ≤0.001)	1.007986 (P ≤0.055)	1.047672 (P ≤0.381)	2.38e-28 (P ≤0.390)	323.04 (P ≤0.001)
7	Diagnosis and treatment dilatation and curettage (Non-obstetric) (43)	4.192585 (P ≤0.001)	1.014005 (P ≤0.001)	1.071281 (P ≤0.064)	5.57e-42 (P ≤0.066)	272.32 (P ≤0.001)
8	Complete hysterectomy with or without removing ovaries or Colopurethrocytoscopy (44)	4.040564 (P ≤0.001)	.9995835 (P ≤0.779)	1.136974 (P ≤0.001)	1.89e-77 (P ≤0.001)	1517.79 (P ≤0.001)
9	Unilateral or bilateral ovarian resection with or without cyst in any form (45)	2.556727 (P ≤0.001)	1.006998 (P ≤0.019)	1.156794 (P ≤0.001)	7.28e-88 (P ≤0.001)	211.15 (P ≤0.001)
10	Cesarean section surgery in any way (no baby bed calculation) (47)	3.727179 (P ≤0.001)	1.008514 (P ≤0.001)	1.081753 (P ≤0.001)	1.59e-47 (P ≤0.001)	2409.07 (P ≤0.001)
11	Surgical abortion with or without dilatation and curettage (48)	3.003387 (P ≤0.001)	1.004074 (P ≤0.275)	1.211515 (P ≤0.001)	6.3e-116 (P ≤0.001)	363.63 (P ≤0.001)
12	Total Thyroidectomy (49)	2.886757 (P ≤0.001)	1.013028 (P ≤0.001)	1.134706 (P ≤0.001)	1.98e-76 (P ≤0.001)	321.44 (P ≤0.001)
13	Sub-Total Thyroidectomy (50)	2.971189 (P ≤0.001)	1.018626 (P ≤0.001)	1.162994 (P ≤0.001)	1.92e-91 (P ≤0.001)	248.79 (P ≤0.001)
14	Remove wires, pins, nails, needles or deep plates (61)	6.385358 (P ≤0.001)	1.014398 (P ≤0.001)	.9371164 (P ≤0.162)	2.10e+39 (P ≤0.161)	361.43 (P ≤0.001)
15	Diagnostic laparoscopy with or without fulguration of ovarian lesions with or without adhesion and sampling and single or multiple aspirations (82)	1.77169 (P ≤0.001)	.9765432 (P ≤0.007)	1.137996 (P ≤0.109)	1.68e-77 (P ≤0.115)	17.33 (P ≤0.0006)

ment surgery under episodic and case payment systems showed that as a result of the reduction in the length of stay and the incidence of surgical complications, the rate of readmission has increased up to 54% in the hip replacement and 44% in knee replacement and the saving done by these payments ultimately have led to an increase in total costs in the form of the induced demand (20).

It should be mentioned, If the global surgery document because of happening any complexity in operation, or patient's need for intensive care unit (ICU), or registering a non-global surgery alongside global surgery, excluded from global form, it will compensate through fee-for-service payment and lead to an incentive for hospitals and providers to induce demand and increase profits.

For example, Behzadi et al. studied the trends of global surgeries, showed that the increase in the finished costs of these surgical operations compared to their global tariffs resulted in the loss of the centers and the removal of these surgeries from the global and providing them in the form of an open document as a compensatory mechanism and, finally, a reduction in the percentage of global documents for hospitals and insurances (21).

These findings raise the need for continuous review and updating of tariffs and costs in the PPSs while emphasizing the importance of monitoring the implementation of these payments in order to ensure that they are properly implemented, the consequences of possible deviations are minimized, and the realization of the costs will moderate the motivation of the service providers to compensate the cost and profit.

Given that this information has only been collected from one big teaching referral hospital among the government-sponsored centers of the global payment system willing to cooperate in the study process, and although the behavior of this referral training center can be an example of the behavior of other service providers in the public sector in implementing this payment system, the results of this study cannot be generalized to the private sector and the entire public sectors in the country.

Study Limitations

The participation of only one center among the government-sponsored educational institutions administrating the global payment system in data collecting and the lack of information related to the years prior to the launch of the hospital HIS system in Iran has led to a limited number of

[DOI: 10.47176/mjiri.36.32]

Table 4. Estimates of zero-inflated negative binomial regression for the effect of global payment on Radiology Test (RA) for selected surgeries in Iran

Radiology test (RA)						
	Surgery Name	Surgery Type	Age	Year	Constant	LRchi2
1	Enterolysis of the intestinal obstruction or Duodenostomy or Jejunostomy or volvulus (24)	2.24797 (P ≤0.001)	1.004882 (P ≤0.002)	1.037349 (P ≤0.203)	7.66e-23 (P ≤0.204)	38.61 (P ≤0.001)
2	Appendectomy or peritonitis or both, with or without drainage of an abscess (25)	2.197545 (P ≤0.001)	1.013684 (P ≤0.001)	.977784 (P ≤0.523)	3.44e+13 (P ≤0.524)	189.19 (P ≤0.001)
3	Cholecystectomy with or without Cholangiography or bile duct exploration (27)	3.041672 (P ≤0.001)	1.003422 (P ≤0.017)	1.067601 (P ≤0.004)	1.72e-40 (P ≤0.004)	513.42 (P ≤0.001)
4	Unilateral Richter's inguinal hernia (of any type) with or without hydrocele or spermatocele incision (28)	2.481024 (P ≤0.001)	1.001106 (P ≤0.639)	1.096445 (P ≤0.050)	1.16e-56 (P ≤0.049)	83.46 (P ≤0.001)
5	Anterior umbilical hernia of any type (umbilicus, Epigastric, Spiegel) (30)	3.405816 (P ≤0.001)	1.006796 (P ≤0.070)	1.180031 (P ≤0.005)	2.9e-101 (P ≤0.005)	87.25 (P ≤0.001)
6	Delivery by the doctor in any form (no baby bed calculation) (36)	2.373843 (P ≤0.001)	1.016598 (P ≤0.272)	.7991173 (P ≤0.296)	7.7e+134 (P ≤0.297)	19.31 (P ≤0.0002)
7	Diagnosis and treatment dilatation and curettage (Non-obstetric) (43)	3.298342 (P ≤0.001)	1.003441 (P ≤0.421)	1.034659 (P ≤0.585)	8.15e-22 (P ≤0.576)	92.00 (P ≤0.001)
8	Complete hysterectomy with or without removing ovaries or Colopurethrocytoscopy (44)	1.873064 (P ≤0.001)	.9942559 (P ≤0.015)	1.123453 (P ≤0.001)	5.71e-71 (P ≤0.001)	199.73 (P ≤0.001)
9	Unilateral or bilateral ovarian resection with or without cyst in any form (45)	1.778742 (P ≤0.001)	.9939693 (P ≤0.093)	1.044455 (P ≤0.275)	6.28e-27 (P ≤0.277)	43.14 (P ≤0.001)
10	Cesarean section surgery in any way (no baby bed calculation) (47)	2.280031 (P ≤0.001)	1.000515 (P ≤0.901)	1.057942 (P ≤0.074)	5.25e-35 (P ≤0.072)	164.45 (P ≤0.001)
11	Surgical abortion with or without dilatation and curettage (48)	1.859174 (P ≤0.001)	1.002416 (P ≤0.707)	1.070766 (P ≤0.117)	3.59e-42 (P ≤0.116)	41.91 (P ≤0.001)
12	Total Thyroidectomy (49)	1.314135 (P ≤0.001)	1.006055 (P ≤0.030)	1.132988 (P ≤0.003)	3.55e-76 (P ≤0.003)	25.32 (P ≤0.001)
13	Sub-Total Thyroidectomy (50)	1.314608 (P ≤0.017)	1.011765 (P ≤0.002)	1.155042 (P ≤0.004)	6.79e-88 (P ≤0.004)	34.71 (P ≤0.001)
14	Remove wires, pins, nails, needles or deep plates (61)	6.128161 (P ≤0.001)	1.003839 (P ≤0.112)	.8721731 (P ≤0.003)	1.32e+82 (P ≤0.004)	282.57 (P ≤0.001)
15	Diagnostic laparoscopy with or without fulguration of ovarian lesions with or without adhesion and sampling and single or multiple aspirations (82)	1.149532 (P ≤0.528)	.9952807 (P ≤0.686)	1.184682 (P ≤0.117)	5.9e-103 (P ≤0.118)	2.50 (P ≤0.4746)

samples and the studied years, and if the data of more centers were gathered, the output opportunity for more response variables was provided in the regression model, and more items were compared from the cases hospitalized in the global and FFS groups.

Another limitation was that some of the cases reported non-global and reimbursed by FFS are patients who develop complications due to age or underlying diseases. Therefore, these patients are more likely to receive more services and ICU care. However, we entered the age variable in the regression model, controlled and investigated its effect helped with the complications which probably happened to old patients and led to the need for extra surgery, ICU and put these cases out of global form. Investigating the issue that to what extent the difference in the rate of service provided to global and FFS cases has been to compensate the financial losses or to earn income or more benefits requires a more comprehensive qualitative study or specialized quantitative study.

Conclusion

The results of this study indicate that the service providers' behavior depends to a large extent on their motivations and interests and minimization of their losses under PPSs. The direct and obvious feature of cost- containment of these payments intensifies their ability to influence the behavior of the providers, which this issue makes more evident the need for supervising on the performance of these systems by the authorities and ensuring the correction of the financial and behavioral deviations of the executives than before.

The realization of the tariff and the cost of global payment as the only payment system which claims that it controls costs and optimizes the use of health system resources in the country is effective in rationalizing the amount of reimbursement made to service providers and moderating their behavioral motivation while safeguarding the resources of the service purchasers.

The continuous review and updating of the cost components of global payment have greatly contributed to the acceptance and commitment of executors, and their engagement and participation efficiently help benefit more from the strengths of this policy and avoid deliberate and accidental errors in service providing for compensating the costs and achieving more income.

Ethics approval and consent to participate

In order to observe the ethical considerations for using

[DOI: 10.47176/mjiri.36.32]

Table 5. Estimates of zero-inflated negative binominal regression for the effect of global payment on Visit & Consult (VC) for selected surgeries in Iran

Visit plus Consultation (VC)						
	Surgery Name	Surgery Type-G/NG	Age	Year	Constant	LR chi2
1	Enterolysis of the intestinal obstruction or Duodenostomy or Jejunostomy or volvulus (24)	3.577794 (P ≤0.001)	1.002769 (P ≤0.177)	1.098204 (P ≤0.013)	1.52e-57 (P ≤0.013)	36.62 (P ≤0.001)
2	Appendectomy or peritonitis or both, with or without drainage of abscess (25)	3.436661 (P ≤0.001)	1.030229 (P ≤0.001)	1.170487 (P ≤0.003)	1.23e-96 (P ≤0.003)	302.64 (P ≤0.001)
3	Cholecystectomy with or without Cholangiography or bile duct exploration (27)	2.295207 (P ≤0.001)	1.011693 (P ≤0.001)	1.271796 (P ≤0.000)	3.7e-146 (P ≤0.000)	274.20 (P ≤0.001)
4	Unilateral Richter's inguinal hernia (of any type) with or without hydrocele or spermatocele incision (28)	2.835493 (P ≤0.001)	.9956694 (P ≤0.333)	1.078113 (P ≤0.386)	3.45e-46 (P ≤0.386)	34.11 (P ≤0.001)
5	Anterior umbilical hernia of any type (umbilicus, Epigastric, Spiegel) (30)	2.216459 (P ≤.001)	1.011086 (P ≤0.039)	1.021029 (P ≤0.797)	1.25e-13 (P ≤0.792)	22.69 (P ≤0.001)
6	Delivery by the doctor in any form (no baby bed calculation) (36)	7.013042 (P ≤0.001)	1.016013 (P ≤0.012)	.9963152 (P ≤0.964)	18.64695 (P ≤0.980)	389.51 (P ≤0.001)
7	Diagnosis and treatment dilatation and curettage (Non-obstetric) (43)	4.632093 (P ≤0.001)	1.017246 (P ≤0.002)	1.038244 (P ≤0.641)	3.42e-24 (P ≤0.629)	100.67 (P ≤0.001)
8	Complete hysterectomy with or without removing ovaries or Colopurethrocytoscopy (44)	3.390005 (P ≤0.001)	1.007297 (P ≤0.016)	1.088051 (P ≤0.007)	3.79e-52 (P ≤0.006)	361.13 (P ≤0.001)
9	Unilateral or bilateral ovarian resection with or without cyst in any form (45)	2.036123 (P ≤0.001)	1.012094 (P ≤0.018)	1.232905 (P ≤0.002)	1.7e-127 (P ≤0.002)	51.60 (P ≤0.001)
10	Cesarean section surgery in any way (no baby bed calculation) (47)	5.393328 (P ≤0.001)	1.011025 (P ≤0.001)	1.002727 (P ≤0.849)	.0041957 (P ≤0.784)	2388.21 (P ≤0.001)
11	Surgical abortion with or without dilatation and curettage (48)	3.682423 (P ≤0.001)	.9968361 (P ≤0.712)	1.140264 (P ≤0.018)	2.97e-80 (P ≤0.018)	99.14 (P ≤0.001)
12	Total Thyroidectomy (49)	4.112198 (P ≤0.001)	1.007658 (P ≤0.310)	1.194802 (P ≤0.104)	6.2e-109 (P ≤0.102)	38.06 (P ≤0.001)
13	Sub-Total Thyroidectomy (50)	2.03897 (P ≤0.007)	1.02775 (P ≤0.001)	1.287162 (P ≤0.017)	5.8e-154 (P ≤0.017)	29.70 (P ≤0.001)
14	Remove wires, pins, nails, needles or deep plates (61)	10.05981 (P ≤0.001)	1.005415 (P ≤0.339)	.8467742 (P ≤0.070)	5.96e+99 (P ≤0.073)	65.62 (P ≤0.001)
15	Diagnostic laparoscopy with or without fulguration of ovarian lesions with or without adhesion and sampling and single or multiple aspirations (82)	1.489131 (P ≤0.308)	.9916559 (P ≤0.640)	1.174879 (P ≤0.432)	5.21e- (P ≤0.433)	1.32 (P ≤0.7237)

Table 6. The frequencies of significances of study variables in selected surgeries (summary of 2-5 Tables)

Table	Surgery Group- G/NG	Age	year	P ≤0.050
VC	%93.3	%46.66	53.33%	
Radiology	%93.3	%40	46.66%	
Laboratory	100%	80%	53.33%	
LOS	100%	86.66%	6.66%	

data from one teaching hospital affiliated with Tehran University of medical science, the relevant licenses were obtained. The name of the hospital in which we gathered the data for documents remained confidential. This project with code number IR.TUMS.REC.1394.181 was approved by the Ethics Committee of Tehran University of Medical Sciences.

Acknowledgments

Not applicable for this section

Conflict of Interests

The authors declare that they have no competing interests.

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[DOI: 10.47176/mjiri.36.32]