Effects of Chinese Medical Pricing Reform on the Structure of Hospital Revenue and Healthcare Expenditure in County Hospital: An Interrupted Time Series Analysis

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Abstract

Background

China has initiated a medical pricing reform to combat the overuse of drugs and relieve the financial burden of patients. This paper aims to analyze the effect of medical pricing reform on revenue structure and healthcare expenditure of county public hospitals in Guangdong province.

Methods

Based on the monthly data from January 2013 to August 2019, we use interrupted time series design to evaluate the effects of medical pricing reform on healthcare expenditure in both outpatients and inpatients. A counterfactual is also established to examine the net effect of the policy.

Results

The proportion of drug revenue decreased from 35% in 2015 to 29.7% in 2019, and the revenue from medical services and inspection increased 3.2% and 3% respectively. Meanwhile, the increasing trend of total expenditure and its main components is slowed down, especially the drug expense and medical consumable expense for inpatients after the Zero Mark-up Drug policy. However, the growth of inspection expense for outpatients continues to increase, while the healthcare expenditure for inpatients experiences an instant increase after the Zero Mark-up Medical Consumables policy.

Conclusion

The medical pricing reform is a valuable attempt in controlling the unreasonable increase of medical expenses. In the meantime, the unexpected increase in inspection expenditure and insufficient compensation from medical service adjustment should draw the attention of the policymakers.

Background

Over the past decade, China has initiated the medical pricing reforms, including the Zero Markup for Drug policy (ZMD) in 2009 and Zero Markup for Consumables (ZMC) in 2017, which is the central component of the newest round of health system reform[1]. The medical pricing reforms removed all of the markups at the price of drug and medical consumables that were previously allowed in public hospitals, and adjust the medical price structurally to compensate the policies-related losses. The purpose of these reforms is to control the proportion of drug and medical consumable expense and increase the proportion of medical service in total medical expenditure, so as to rectify the twisted pricing system and adjust the behavioral incentives in public hospitals.

Generally speaking, the implementation of medical pricing reforms has a specific historical background and realistic reasons. Since 1978 when the market forces have performed an increasingly important role in the economy, China's health system has undergone tremendous changes [2]. A series of policy interventions were implemented to promote the marketization in the health system, such as stopping the full subsidy and granting more autonomy to public hospitals [3]. It means that public hospitals must rely on providing drugs and medical services to maintain operations and make a profit, rather than government subsidy as before. At that time, the proportion of government subsidy in public hospitals' total revenue fell from 60% in 1980 to 11% in 2009, whereas the drug sales revenue rose rapidly to 42% for the drug markup policy [4].

The Drug Markup policy could date back to the 1950s when the public hospitals were allowed to add a 15% markup on the actual purchase price of medicine [5, 6]. Due to the substantial reduction in government funding, hospitals increasingly relied on the revenue from medicine sales for operation. Moreover, public hospitals have widely implemented an incentive system since the mid-1990s, which paid a lower baseline salary and awarded a high bonus directly related to hospitals' total revenue [7, 8]. The technical work performed by medical personnel is severely undervalued. Motivated by the revenue-related incentive system and drug markup policy, Chinese physicians prescribed more high-priced drugs and overused unnecessary medicines to increase hospitals' revenue as well as to maximize their own income [9]. In other words, there was a financial incentive that encouraged physicians to induce the demand of patients in drugs and medical service and overprescribe medicines according to profit margin rather than cost-effectiveness and clinical efficacy [10].

As such, the medical expenses were growing rapidly, especially the drug expenses which accounted for over 50% of the total medical expenditure per outpatient visit and over 40% per inpatient admission in 2012 [11]. Moreover, it is estimated that half of the antibiotic prescriptions in China are medically unnecessary [12]. Overuse and misuse of antibiotics is not only an important reason for high medical expenditure but also has long-term negative health effects, like antimicrobial resistance, threatening the quality of health care. Such profit-seeking behaviors ran counter to healthcare providers' professional ethics and norms that made the patients' benefit the highest. Difficulty and high expenses of medical service became a severe social problem [13].

In view of this situation, China has initiated a health system reform in 2009 [14], including the first round of medical pricing reform which was known as the Zero Markup for Drug policy (ZMD). According to the ZMD policy, public hospitals are required to remove all the profit margin that was previously allowed on the actual drug purchase price [15]. To ensure policy sustainability, the ZMD policy is also featured with an adjustment in medical price, including an increase in the price of medical services and a decrease in medical inspection fees, such as the expense of computed tomography and nuclear magnetic resonance [1]. The medical services involve the great experience, skill, and technical work of medical personnel, like acupuncture, surgical operations, and nursing care, etc. The introduction of ZMD policy is aimed to cut off the economic linkage between drug sales and drug use, and control the proportion of drug expense in total healthcare expenditure, so as to reduce the medical expenditures for patients.

Meanwhile, by adjusting the medical price, the policy also intends to shift the focus of hospital managers from drug sales to technical work of medical personnel, from profit-seeking to quality promoting.

The ZMD policy was carried out in stages, and county-level public hospitals were chosen to pilot the reform before fully rolling it out in September 2017 [1]. Although the first round of medical pricing reform has made some progress, the profit-seeking behavior of public hospitals formed over decades cannot be sufficiently reversed overnight. Some researchers have found that compensation from government subsidies and medical pricing adjustment is insufficient to offset the shortfall caused by ZMD policy [16, 17]; and public hospitals may seek other income sources to make up for the significant reduction in drug sales income, such as high-value medical consumables and medical inspections [17, 18]. Medical consumables, including disposable syringe needles, hemostatic gauze, heart stents, etc., is used widely in medical service. Actually, public hospitals are required to control the proportion of drug income within 30%, and medical consumables income's within 20% before 2017. In addition, 5–10% markup was still allowed for selling medical consumables after 2009, which drove the inappropriate use of consumables by similar financial incentives in drug markup policy. It means that medical consumables account for a large proportion of the hospitals' revenue, and it may become a new driver of healthcare costs escalation [19, 20].

In this context, China proposed the latest round of medical pricing reform in 2017, known as the Zero Markup for Consumables policy (ZMC), to further reform the healthcare pricing system. Similarly, public hospitals were required to remove all of the profit margins on medical consumables and carry out a structural adjustment in medical price to offset the reduction of medical consumable revenue. Based on the lessons from the ZMD policy, recently, the ZMC policy was implemented firstly in some provinces, like Fujian, Anhui, and Guangdong, and being rolled out gradually in every public hospital throughout the country.

There have been some researches conducted to evaluate the effects of the ZMD policy implemented on different hospitals in different regions in China. For example, Zhou et al. [21] analyzed the impact of ZMD policy on county hospitals in Shaanxi through the difference-in-difference (DID) method and found a reduction in drug expenditure and total expenditure in both outpatients and inpatients. Yang et al. [22], Zhang et al. [23] got similar results in primary health institutions. In addition, Zeng et al. [20] conducted a propensity score-matched study in tertiary hospitals in Beijing and proved that ZMD policy played a positive role in decreasing drug expense and total expenditure per admission but an unexpected and rapid growth was found in medical consumables expenditure. As the existing researches showed, the ZMD policy had reduced the drug cost and healthcare expenditure in the short term whereas its effects on controlling the growth of medical expenditure were questionable with some unintended consequences.

Although the existing literature yielded major advances on the preliminary impacts of ZMD policy, most of the researches on ZMD policy used the short-term data pre and post-reform [19–26]. It's difficult to conclude the trend change in the future, and it's uncertain whether the policy impacts return to the previous trend after a short period. Due to the short-term analysis, the unexpected policy impacts and

substitution effects observed by researchers are also different. Therefore, it's necessary to review the ZMD policy at this critical point, analyze the long-term effects and provide empirical evidence to prove the unintended consequences. Moreover, there is little research to examine the effects of the newly issued ZMC policy on health expenses and hospital revenue structure.

Public county hospitals are the leader in the rural healthcare network, the main provider of healthcare in the Chinese healthcare system, and also the focus of medical reform in China. According to statistics, at least 85% of patients choose the medical institution within county areas in 2018, especially county hospitals. Taking county hospitals as examples, our paper presents a new analysis on the effects of ZMD policy with 4 years of follow-up data and the preliminary effect of ZMC policy. We investigated how the ZMD policy and ZMC policy changed the structure of hospital revenue and healthcare expenditure, aiming to detect the positive influences and unintended consequences of the medical pricing reform. A counterfactual is also constructed to exclude the impact of natural growth trends and assess the net effect of medical pricing reform. The empirical fundamentals and evidence-based experience provided in this paper may help inform the further reform and shed light on other countries with similar systems.

Methods

Study design

We conducted this study in Guangdong province, which is located in south China and acts as the pioneer of healthcare system reform in China. In response to the national policy, Guangdong province singled out some county hospitals as pilot units to conduct the ZMD policy in November 2012, and fully implemented it in county hospitals across the province in August 2015. According to the ZMD policy in Guangdong province, public hospitals are required to remove the 15% mark-up for drugs with an “811” compensation measure. “811” compensation measure means that 80% of the losses caused by ZMD policy is compensated by adjusting the price of medical services, 10% by increasing the government funding, and the rest 10% by the hospital itself. Besides, the ZMC policy in Guangdong province was launched and fully implemented at the end of 2018, when the ZMD policy's reform costs were basically compensated. Unlike the ZMD policy, 100% of the losses from the ZMC policy is compensated by further adjusting medical service price.

According to Guangdong province's geographical divisions, it can be divided into 4 regions of East Guangdong, West Guangdong, North Guangdong, and Pearl River Delta. Thus, we adopted the purposive sampling method to investigate eight county-hospitals from four regions respectively, which also represent the level of economic development in Guangdong province. Given the lag in policy implementation, we choose the time when the policy was fully implemented as the intervention point. Therefore, August 2015 and December 2018 are the intervention measure of ZMD policy and the intervention measure of ZMC policy, respectively.

Data sources and outcome indicators

Monthly data from January 2013 to August 2019 were collected, which covers the total number of outpatients, number of inpatients, and total service revenue in both outpatients and inpatients. The total service revenue also includes drug revenue, consumable revenue, inspection revenue (assay revenue), medical service revenue, and others. We define medical service revenue as the income from providing technical services, such as treatment, surgery, and nursing. These services involve the rich experience, high skill, and heavy labor of medical personnel.

Given the objective of medical pricing reforms, indicators on hospital revenue and healthcare expenditure in both outpatients and inpatients are designed and calculated. The indicators are the proportion of the major component revenue in total revenue, total expenditure per capita for outpatient and inpatient, and its major components, such as the drug expense per capita for outpatient. In this study, the sample ranges from 2013 to 2019, with 80 observations in total.

Statistical analysis

An interrupted time series (ITS) design with two interventions is applied in this study to evaluate the effects of medical pricing reform. As the strongest quasi-experimental study, the ITS design can exclude the impact of typical and fairly constant confounding variables for evaluating the short-term effect and long-term effect of the intervention [27, 28]. We also construct a counterfactual without medical pricing reform and predict the pseudo value of indexes in the post-reform period, in order to evaluate the “net effect” of medical pricing reform [29, 30]. Usually, the ITS regression model with two interventions takes the following form:

$$Y_t = \beta_0 + \beta_1 T_t + \beta_2 P_{1t} + \beta_3 D_{1t} + \beta_4 P_{2t} + \beta_5 D_{2t} + \varepsilon_t,$$

Where Y_t denotes the healthcare expenditure in month t ; T_t is the time since the start of the sample; P_{1t} is a dummy variable representing the first intervention (August 2015, preintervention periods 0, otherwise 1); D_{1t} is time after the first intervention; P_{2t} is a dummy variable representing the second intervention (December 2018, preintervention periods 0, otherwise 1); D_{2t} is time after the second intervention.

In our regression model, β_0 represents the baseline level of the dependent variable; β_1 is the slope until the introduction of the first intervention, representing the underlying pre-intervention trend; β_2 (β_4) measures the level change after the implementation of ZMD (ZMC) policy; β_3 (β_5) represents the difference of the slope between preintervention and postintervention. The Newey-West method was used to handle heteroscedasticity and autocorrelation.

Result

Structural change in hospitals' service revenue

Table 1 shows the proportion change of major revenue from 2015 to 2019. Several findings are noteworthy. First, The proportion of drug revenue in total revenue dropped significantly by 5.4% after the

implementation of ZMD policy and continued to decrease by 1% after ZMC policy in 2019. Second, the proportion of the revenue from medical consumables, inspection, and medical service increased and filled the space vacated by drug revenue percentage. It seems that the ZMC policy fails to fulfill its objective to decrease medical consumables income in the total revenue. In particular, the inspection revenue and medical service revenue increased by 3% and 3.2% respectively. However, the inspection revenue became the main source of income in the county public hospitals, accounting for almost 1/3 of the total revenue.

Table 1
Proportion change of major revenue in total service revenue between pre and post of reforms (%)

	Pre of ZMD	Post of ZMD	Post of ZMC	Proportion Change		
	2015	2018	2019	2018/2015	2019/2018	2019/2015
Drug revenue	36.05	30.66	29.67	-5.39	-0.99	-6.38
Consumable revenue	10.50	10.92	11.50	0.42	0.58	1.00
Inspection revenue	29.23	32.47	32.20	3.24	-0.27	2.97
Medical service revenue	22.41	24.17	25.58	1.76	1.41	3.17
others	1.81	1.78	1.05	-0.03	-0.73	-0.76

ITS analysis of the expenditure for outpatient

We use the ITS regression to analyze the change in level and trend on total expenditure, drug fee, medical consumable fee, inspection fee, and medical service fee. Figure 1 shows an intuitive reflection of the change in outpatient healthcare expenditure per capita with interventions. The ZMD policy (first intervention) resulted in a clear decline in total expenditure and its major components. However, the total expenditure, inspection fee, and consumable fee continued the decline since the ZMC policy, while the drug expense and medical service fee experienced a mild increase in 2019.

Table 2 reports the estimation result of our ITS regression for different dependent indicators. First, the ZMD policy has a negative effect on the total expenditure and its components. The level of total expenditure per capita and inspection fee decreased statistically significantly (coefficient = -11.96, $p < 0.05$; coefficient = -5.84, $p < 0.05$, respectively). In addition, the slope of all the time trends experienced a slight decline. Some of these changes are significant and slows the growth rate of medical fees, i.e. drug and medical consumables expense (coefficient = -0.22, $p < 0.05$; coefficient = -0.04, $p < 0.05$, respectively).

Second, the effects of the newly adopted ZMC policy on the expenditures are mixed. An instant decline and a decreasing trend change can be observed in total expenditure per capita and consumable fees with no statistical significance. Additionally, the inspection fee per capita was reduced in the short term with a significant level change while it grows faster than before. (coefficient = -8.16, $p < 0.01$; coefficient = 0.75, p

< 0.01, respectively). Different from inspection fee, the drug expense, as well as medical service, increased in level and decreased in the long run.

Table 2
ITS regression results for outpatient

	Total expenditure	Drug fees	Consumable fees	Inspection fees	Medical service fees
Intercept(β_0)	127.50**	61.11**	4.89**	44.82**	15.67**
Baseline trend(β_1)	0.81**	0.21*	0.08**	0.32**	0.18**
Level change after ZMD(β_2)	-11.96*	-3.64	-0.62	-5.84*	-1.76
Trend change after ZMD(β_3)	-0.17	-0.22*	-0.04*	0.12	-0.08
Level change after ZMC(β_4)	-1.65	6.05**	-1.38	-8.16**	5.20**
Trend change after ZMC(β_5)	-0.32	-0.60**	-0.03	0.75**	-0.34
Two-tail P value: *p<0.05, **p<0.01. HAC (Newey-West) standard error.					

ITS analysis of the expenditure for inpatient

Figure 2 graphs the change in healthcare expenditure per capita and its major component expenses in inpatient. The graph illustrates a reduction in drug fees and a rise in inspection fees under the intervention of medical pricing reform. Nevertheless, the total expenditure along with its components have a huge surge in the short term which is opposite to the trend change in the long run.

Table 3 shows the parameter estimates of our ITS regression for inpatients. The main findings are summarized as follows. First, the slopes of total expenditure, along with drug, consumables, and inspection expenditure, declined significantly after the ZMD policy was implemented in 2015. Most of the expenditure components experienced an instant but trivial level change, which showed that the policy was not intended to cut price aggressively. In addition, the ZMD policy has no effect on the medical service fee statistically.

Second, an instant and sharp level rise was observed in total expenditure and its components after the ZMC policy. In addition, most of the changes in the slope of time trend were not significant and meaningful. Both the obvious increase in level and the ineffective slope change are not in line with our expectation of the policy.

Table 3
ITS regression results for inpatient

	Total expenditure	Drug fees	Consumables Fees	Inspection Fees	Medical service fees
Intercept(β_0)	5188.63**	1901.74**	491.74**	1231.59**	1450.15**
Baseline trend(β_1)	36.11**	5.01	10.74**	12.83**	6.68**
Level change after ZMD(β_2)	-16.37	-71.20	-18.06	81.56	-9.86
Trend change after ZMD(β_3)	-21.93**	-10.73**	-8.11**	-5.11*	3.94
Level change after ZMC(β_4)	848.47**	258.79**	209.46**	217.57**	170.31**
Trend change after ZMC(β_5)	-28.13	-12.97**	-4.24	-3.50	-7.90
Two-tail P value: *p<0.05, **p<0.01. HAC (Newey-West) standard error.					

The net effect of medical pricing reform

Using the pre-intervention level and trend estimates, we build a counterfactual prediction to evaluate the net effect of the medical pricing reform in this section. Table 4 shows that the medical pricing reform successfully fulfilled the policy objective to lower the growth rate of drug and consumable expense, and even cut the expenditure to a lower absolute level.

The actual growth rates of total expenditure, drug expense, and consumable expense are lower than the predicted value to varying degrees from 2015 to 2019. For example, the actual growth rate of total expenditure per capita for outpatient is 15.45% lower than the predicted 29.37%. In addition, the effects of the reform on outpatient are generally larger than that on inpatient.

The last thing to be noticed is the contrasting effects of the reform on inspection fees and medical service fees for outpatient and inpatient. It is shown that the ZMD and ZMC policy accelerated the growth of medical service fees for inpatient. However, the growth of medical service was slowed down for outpatient, which was about 9.01% lower than the counterfactual forecasted growth rate. Moreover, the inspection fee shares the same feature as the medical service fee in that the net growth was 3.46% for inpatient and -9.99% for outpatient.

Table 4
The net effect of medical pricing reform

	Actual fee pre-	Actual fee post-	Forecasted fee post-	Actual growth	Forecasted growth	Net growth
Inpatient						
Total expenditure	6180.80	7680.83	7951.37	24.27%	28.65%	-4.38%
Drug fee	2036.25	1937.14	2285.21	-4.87%	12.23%	-17.09%
Consumables fee	783.75	1124.92	1313.37	43.53%	67.57%	-24.04%
Inspections fee	1616.33	2269.36	2213.44	40.40%	36.94%	3.46%
Medical services fee	1609.01	2260.98	1960.92	40.52%	21.87%	18.65%
Outpatient						
Total expenditure	146.36	166.73	189.34	13.92%	29.37%	-15.45%
Drug fee	66.04	66.94	77.16	1.37%	16.83%	-15.47%
Consumables fee	7.05	6.82	11.07	-3.26%	57.05%	-60.31%
Inspections fee	51.60	64.08	69.24	24.20%	34.18%	-9.99%
Medical services fee	20.21	27.52	29.34	36.14%	45.15%	-9.01%

Discussion

Our study contributes to the evidence for the impacts of medical pricing reform in China, especially for the unintended effects that cannot be revealed in short-term research. Specifically, the proportion of drug revenue in total revenue realized a considerable decline, and the increase of the medical service revenue compensated most of the loss in drug revenue. These changes are in line with the policy maker's expectation to value medical service and cut the drug price, which has also been previously demonstrated[26, 31]. It means that medical pricing reform helps the public hospitals to alleviate their dependence on the inappropriate revenue from drug sales and motivate them to value technical work performed by medical personnel.

In addition, the growth rate of total medical expense for both outpatient and inpatient decreased considerably, as well as the growth rate of drug expense and medical consumable expense, which are directly related to medical pricing reform. Similar findings can also be found in previous studies[22, 23,

26]. Besides, the effects of the reform on medical expenses in outpatient are generally larger than that on inpatient, which is consistent with another study [32].

Not all the impacts of the medical pricing reform satisfy the policymakers, and there are also several unexpected effects on revenue structure and healthcare expenditure. One of the important policy goals is to increase the price of medical service and control the inspection fee. However, we find that the ZMD and ZMC policies have a limited effect on the medical service revenue. In particular, the negative slope of the time trend illustrates that the medical service expense has decreased over time. We are not sure if this decreasing trend will continue or revert in the future. Nevertheless, the analysis clearly shows that the compensation from adjusting medical service price is insufficient. A possible reason is the slow adjustment of regulated prices in the complex health system, such as registration fee, surgery fee, and nursing fee [33]. Therefore, it is necessary to conduct continuous monitoring of policy impacts and perform corresponding interventions.

Additionally, a measurable increase in the proportion of inspection revenue in total revenue is found. In fact, the inspection revenue has already accounted for the highest proportion in 2019. Besides, the actual expense on inspection for inpatient grew even faster from 2015 to 2019 after the pricing reform. A similar sign of faster growth can also be found for outpatients after the ZMC policy when the slope of the time trend increases in our ITS regression. These results are consistent with the structural change in the revenue that inspection fees has become the main source of hospital revenue. The unexpected soaring of inspection fee indicates that the healthcare service provider tends to prescribe more examinations and increase the inspection service volumes to fill the deficit caused by the removal of drug markup [18].

We also find that the total expenditure per capita and its major component show an instant and considerable increase in inpatient around the time when the ZMC policy was implemented. The total expenditure per capita increased by 12% in mean, which is an unexpected increase. In fact, we find a sizeable rise in expenditure about half years before the ZMC policy was formally started. The public hospital may increase the price of healthcare when the policy was still in the air but to be conducted soon. Furthermore, the fee charged for inpatient is higher than the outpatient in China and the expense of outpatient is only partly insured by the public insurance, doctors were thus incited to admit outpatient as an inpatient [34]. Another important reason for the conspicuous increase in hospitalization expenditure is the improvement in service capacity and the ability to perform complicated surgery in county hospitals.

Although the medical pricing reform has made some positive progress, some unintended effects have weakened the whole effect. An unexpected increase in inspection expense indicated that medical pricing reform has caused the healthcare service provider to seek a new and potentially inappropriate income source. It means that a single pricing intervention seems to be unable to reverse the profit-driven behavior of public hospitals, and deal with the problem of supplier-induced demand. In order to rectify the improper behavior of health service providers in a true sense, it's necessary to strengthen the role of government in the healthcare system to limit the excessive marketization of the medical industry. Meanwhile, the

relevant policy should be promoted actively, such as the reform of the medical insurance system, the salary system in public hospitals.

After the implementation of medical pricing reform, the Diagnosis-intervention packet (DIP), a new medical insurance payment method, was launched as the linkage policy in Guangdong province. According to the DIP, hospitals' revenue from the funds of medical security is related to treating diseases, treatment technology, treatment quality, and cost management [35]. In other words, the DIP may affect hospitalization expenditure by directly affecting the hospital management mode. How the DIP affects hospital management and hospitalization remains to be further studied for this reform is in the stage of exploration.

Limitation

Although our study provides an empirical fundamental and evidence-based experience for the intended and unintended effects of ZMD policy and ZMC policy newly launched, our study has several limitations. First, we only conducted this study in some county public hospitals in Guangdong province and lacked a nationally representative sample, for the reason that the ZMC policy has not yet been implemented nationwide. Second, a control group should be helpful to separate the effects of medical pricing reform from other policy interventions that may occur during the medical pricing reform. Third, because hospitals implemented policy following area-specified schedule, the intervention points are slightly different for eight hospitals.

Conclusion

Using the interrupted time series design to analyze the effects of medical pricing reform in China, our study showed that the ZMD and the ZMC policy is a valuable attempt in optimizing the revenue structure of hospitals and alleviating the financial burden on healthcare. The proportion of drug revenue decreased considerably. Medical service has increasingly become a more important source of hospital revenue in recent years. In addition, the rapid growth of healthcare expenditure, drug expense, and medical consumable expense has been slowed down effectively. It indicates that the medical pricing reform successfully restricted the profit-seeking behavior in drug and consumable sales and incited the healthcare providers to pay more attention to improving the service quality of medical personnel. However, the compensation from the adjustment of medical service price is still limited and the inspection expense increases unexpectedly, which may deteriorate the effect of ZMD and ZMC policies in the public hospital. The impact of the medical pricing reform needs to be further examined and monitored dynamically. And more research on ZMC policy is needed to assess the long effect on hospital's revenue structure.

List Of Abbreviations

ZMD

The Zero Markup for Drug policy;
ZMC
The Zero Markup for Consumables policy;
ITS
An Interrupted Time Series;
DIP
The Diagnosis-intervention Packet.

Declarations

Ethics approval and consent to participate (Not applicable)

Consent for publication (Not applicable)

Availability of data and materials

The datasets generated during the current study are not publicly available in accordance with the project agreement, but are available from the corresponding author at dongw96@smu.edu.cn on reasonable request.

Competing interests

The authors declare that they have no competing interests.

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Authors' contributions

ML and MJ led the design of the study and drafted the manuscript. ML and MJ contributed to data acquisition, data analysis and interpretation. QL and JZ participated in drafting the manuscript and substantively revised it. DW guided ML in the design of the study and contributed to writing the manuscript. All authors have read and approved the final draft.

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Figures

Figure 1

Change of average expenditure per capita in outpatient

Figure 2

Change of average expenditure per capita in inpatient