Developing comprehensive and integrated health system reform policies to improve use of medicines
Sun, Jing

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The Effects of Key Health System Reform Policies on Medicines

4.1 The Effect of Implementing "Medicines Zero Mark-up Policy" in Beijing Community Health Facilities

Wei Cheng
Yunyun Fang
Dehui Fan
Jing Sun
Xuefeng Shi
Jiao Li
Chapter 4

ABSTRACT

The "medicines zero mark-up policy" was introduced in Beijing community health centers (CHCs) with three government subsidy approaches: fixed subsidy (FS), income-linked subsidy (IS) with income and expenditure controlled by government, and self-financing with mark-up compensation from government procurement services (GPS). This study analyzes the cost containment effect and its effect on the operation of CHCs and staff morale. CHCs are randomly selected and distributed in three government subsidy approach groups. The effect was measured with changes of medicines use & cost, income of facilities and staff before and after the policy in each group, and compared among groups. Cost proportion of “zero mark-up” medicines per visit in FS/IS/GPS was 75.4%/57.8%/52.6% by 2009. The medicines costs per visit in FS and IS groups reduced 18.7% and 1.9% respectively by the end of first implementation year in 2007, and rebounded in 2008 and 2009. Both reductions were with statistical significance (p=0.001, α=0.05, t-test). There was a significant difference between the reductions of medicines cost per visit between FS and IS groups (p=0.016, α=0.05, t-test). GPS increased 25.2% by 2007 and kept growing. Between 2006 and 2009, government subsidy was always the highest in FS and lowest in GPS. The annual salary of FS was always the highest and increases the fastest. The “medicines zero mark-up policy” contained medicines costs. FS was more effective than IS and GPS. GPS caused lower willingness to use “zero mark-up” medicines. FS and IS had to improve the work enthusiasm of the staff. IS had the mixed effect.
BACKGROUND

During the planned economy, free medical services were provided to everyone in China. Public health facilities heavily relied on government subsidies and the government set a price which was far below real costs. Medicines mark-up by public health facilities was first allowed in 1954, when the Chinese economy experienced the most difficult times. Such a policy gradually evolved into a perverse incentive along with the economic reform starting from 1978, when public health facilities were encouraged to generate revenues and were allowed to issue bonuses. In turn, the income of individual staff was directly linked with revenue generation. The unchanged low level medical service fee forced providers to generate more revenue from mark-up of medicines. This contributed to unnecessary prescriptions written by doctors. Doctors preferred expensive medicines and poly-pharmacy, which contributed to increased medical cost and public out-of-pocket expenditure.

Beijing implemented the “medicines zero mark-up policy” in the community health centers (CHCs) in 2007. The aims of the policy were to eradicate the afore-mentioned incentives, contain the medicines cost, and reduce the financial burden to the public. Policy-makers selected 312 medicines based on the national essential medicines list. The CHCs were required to procure these medicines via government pooled tendering. Procurement and prescribing of “non zero mark-up” medicines were allowed and the CHCs were to dispense these medicines at the procurement price. Government subsidized CHCs via three financial approaches: (1) in high socioeconomic districts, the government allocated fixed subsidies (FS) to CHCs and all expenditures of CHCs were secured according to defined standards. Even in areas of deficit, the government subsidy was still allocated to CHCs. No surplus was allowed to be retained by individual CHCs; (2) in the poorer districts, the government allocated income-linked subsidy (IS), covering only staff and not other operational costs. The amount of subsidy was related to revenue generated; (3) for a few specific CHCs, the government did not bear their operational costs, but purchased services (GPS) from them, i.e. compensated the mark-up loss from selling “zero mark-up” medicines based on their historical medicines sales. These CHCs were responsible for balancing expenditure against revenue and had the autonomy to retain any surplus.

There are a number of studies which have analyzed the changes of medicines cost for patients in specific facilities after implementation of this policy in Beijing. Li’s regression analysis model showed that the government subsidy approach was a very important factor towards total medicines cost. This study analyzes the effects of the "medicines zero mark-up policy" on medicines cost, the operation of CHCs, and the work enthusiasm of the CHC staff with different government subsidy approaches (GSA) in FS, IS and GPS groups.
Table 1 CHC sampling scope and distribution in each district of Beijing

<table>
<thead>
<tr>
<th>Name of districts</th>
<th>Fixed subsidy CHCs</th>
<th>Income-linked subsidy CHCs</th>
<th>Government purchase of services CHCs</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Number of CHCs</td>
<td>Sampling number</td>
<td>Number of CHCs</td>
</tr>
<tr>
<td>Total</td>
<td>351</td>
<td>70</td>
<td>91</td>
</tr>
<tr>
<td>Dongcheng</td>
<td>40</td>
<td>6</td>
<td>40</td>
</tr>
<tr>
<td>Xuanwu</td>
<td>8</td>
<td>2</td>
<td>8</td>
</tr>
<tr>
<td>Chongwen</td>
<td>5</td>
<td>2</td>
<td>5</td>
</tr>
<tr>
<td>Yanqing</td>
<td>15</td>
<td>3</td>
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</tr>
<tr>
<td><strong>Sub-total</strong></td>
<td><strong>68</strong></td>
<td><strong>13</strong></td>
<td><strong>68</strong></td>
</tr>
<tr>
<td>Fixed subsidy &amp; government purchase of services districts</td>
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<td></td>
</tr>
<tr>
<td>Fangshan</td>
<td>24</td>
<td>4</td>
<td>23</td>
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<tr>
<td><strong>Sub-total</strong></td>
<td><strong>24</strong></td>
<td><strong>4</strong></td>
<td><strong>23</strong></td>
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<td>Xicheng</td>
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<td>Chaoyang</td>
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<tr>
<td>Fengtai</td>
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<tr>
<td>Shijingshan</td>
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<tr>
<td>Haidian</td>
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<td>Mentougou</td>
<td>11</td>
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<td>Tongzhou</td>
<td>30</td>
<td>4</td>
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<tr>
<td>Shunyi</td>
<td>25</td>
<td>5</td>
<td>0</td>
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<tr>
<td><strong>Sub-total</strong></td>
<td><strong>172</strong></td>
<td><strong>36</strong></td>
<td><strong>0</strong></td>
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<td>Fixed subsidy districts</td>
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<tr>
<td>Changping</td>
<td>15</td>
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<tr>
<td>Daxing</td>
<td>20</td>
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<tr>
<td>Huairou</td>
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<tr>
<td>Pinggu</td>
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<td>4</td>
<td>0</td>
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<tr>
<td>Miyun</td>
<td>18</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td><strong>Sub-total</strong></td>
<td><strong>87</strong></td>
<td><strong>17</strong></td>
<td><strong>0</strong></td>
</tr>
</tbody>
</table>
METHODS

Utilization of “zero mark-up” medicines, medicines costs per visit, government subsidy, medicines and medical revenue of CHCs, and CHC staff salaries were measured before the introduction of the “medicines zero mark-up policy” in 2006 and then three years following implementation of the policy. We divided the CHCs into three groups according to GSA and compared the changes of the above measurements among three CHCs group with different subsidy approaches (FS, IS and GPS). We randomly selected 20% of the total number of CHCs adopting the same GSA in each district (Table 1). All data were directly obtained from a health information database of the CHCs.

A paired t-test was conducted to test the differences of medicines cost per visit one year before and after the implementation of the “medicines zero mark-up” policy in both FS and IS groups. A t-test for two independent samples (FS and IS groups) was conducted to compare the difference of the above policy impact on medicines cost per visit between 2006 and 2007 between FS and IS groups. As the primary cost data are not normally distributed, a natural logarithmic transformation was undertaken in order to normalize the data. Statistical analysis was undertaken using by SPSS® version 17.0.

RESULTS

The proportion of “zero mark-up” medicines cost to total medicines cost per visit quickly increased in all CHCs in 2007, maintained in 2008-2009, and achieved in 75.4%, 57.8%, and 52.6% in the fixed subsidy, income-linked subsidy and government purchase of services facilities respectively. CHCs with fixed subsidies demonstrate greater willingness to use “zero mark-up” medicines.

The medicines costs per visit in FS and IS groups reduced 18.7% and 1.9% respectively by the end of first implementation year in 2007, and rebounded in 2008 and 2009. Both reductions were with statistical significance (P=0.001, α=0.05). There was a significant difference between the reductions of medicines cost per visit between FS and IS groups (p=0.016, α=0.05). The medicines cost per visit in government purchase of services facilities increased 25.2% in 2007, and kept growing during 2008-2009, which is in line with the results of other studies conducted in recent years (Fig. 1).
Government subsidy to CHCs with different GSA all increased during 2006-2009. Such increase was a general trend around the country during the same time. FS group was always the highest and GPS group grew the slowest all along 2006-2009. The proportion of government subsidy to the total revenue grew the fastest in FS group from 21.8% to 57.1%. GPS group grew the slowest from 2.2% to 3.6%. IS group was in the middle (grew from 15.4% to 38.9%). The proportion of medical and medicines revenue shrunk both FS (from 23.5% to 3.8%, and from 54.6% to 39.1%), and IS groups (from 25.5% to 12.4%, and from 59.1% to 48.7%). GPS group generated more medicines revenue (from 61.4% to 65.3%), but less medical revenue (from 36.4% to 31.3%) during 2006-2009. GPS group always generated the highest total (medicines and medical) revenue. It kept at a continuing growth rate of 20.3%, 23.3% and 22.1% during 2006-2009 in GPS facilities, while FS and IS groups generated less total revenue (26.3% and 5.3% less) by the end of the first implementation year of 2007. Even though it turned to increase in 2008 and 2009 in FS and IS groups, the total revenues in FS and IS group were only about 20% and 30% of that in GPS group in 2009 (Fig.2).
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The annual staff salary in all CHCs continued to rise during 2006-2009. Wang's study showed the same increasing trend of CHC staff salary in Beijing in 2007-2008. Facilities were government purchased services always had the lowest staff salary. Income-linked subsidy facilities consistently had the highest staff salary costs.

**DISCUSSION**

At the initial stage of the policy implementation, CHCs were allowed to procure “non-zero mark-up” medicines. Although the Beijing Health Bureau primarily expected that, the “zero mark-up” medicines list would be able to meet the majority medicines needs in CHC. In reality, the range of medicines actually used in all CHCs was beyond that list. The list was then expanded in the following years step by step with the growing economy and the affordability. There has been a challenge for selection of the most cost-effective medicines within the limited financial capacity of the society, the government, and individuals.

Fixed subsidy group was more willing to adopt “zero mark-up” medicines than IS and GPS groups, which is probably due to that they receive full financial support from the government and therefore they have reduced financial pressures. These CHCs have no autonomy to keep any surplus generated and so there is neither incentive for them to generate more revenue nor incentive to procure medicines outside the essential medicines list. In the facilities where governments purchase services, budgets are not controlled by the government and so these CHCs have a strong incentive to generate revenue. These CHCs may prefer “non zero mark-up” medicines in order to generate more medicines revenue. Income-linked subsidy facilities can potentially generate more revenue by requesting a greater level of government subsidy. Budget management may help to restrain such intentions, so these CHCs have moderate incentive to prescribe “non zero mark-up” medicines.
Such “incentive” and “absence of incentive” also affect the other aspects of performance. Medicines costs were better contained as there was no revenue generation pressure in the fixed subsidy facilities. With the revenue generation incentive and a loosed control on medicines use, the government purchase of service facility would pursue the maximum of both quantity and unit service price. On one hand these CHCs try their best to attract more patients and provide more services, on the other hand these facilities would prescribe more medicines (either “zero mark-up” or “non zero mark-up” medicines) in-order to request greater government subsidy or to earn a higher level of more mark-up.

The result regarding levels of staffing salaries warrants consideration. It is assumed that with increased revenue the CHCs supported through government purchase of services should have higher salaries but this study suggests the contrary. It is possible that these CHCs did not disclose full income data so as not to affect future requests for subsidies from the government. This type of CHC is very likely to have un-official bonuses to stimulate and maintain enthusiasm for work. Salary scales in fixed subsidy facilities were significantly improved following the introduction of the “medicines zero mark-up policy” with the security of full government subsidy being in place.

CONCLUSION

The “medicines zero mark-up policy” did help in containing the rising trend in costs of medicines. The medicines cost per visit was significantly reduced one year post the policy implementation. Fixed subsidy approach was found to be more effective in reducing financial burden of medicines for patients.

LIMITATIONS

There are several limitations of this study and the results need to be considered with respect to these. Firstly, data were obtained from randomly selected CHCs, and factors such as facility scale and operation status were not considered. This may not fully reflect every specific aspects of the effect of policy. Second, in responding to the inflated costs in 2008 and 2009, the study did not involve in-depth key informant interviews to explore the reasons behind this and whether it was provider driven or demand driven. The assumption is made that a more comprehensive and consistent medicines use regulation is needed. No in-depth analysis of the contributors (changes of number of visits and quantity of medicines per prescription) to the differences in medicines and medical revenue generated by facilities was undertaken. Further, the study does not evaluate whether the quality of care provided by these facilities is affected by this policy and there is no understanding of the levels of satisfaction of the public and CHC staff. This is a rich area of future research and the current study provides a platform for doing more.
ACKNOWLEDGMENT

We thank the Beijing Health Bureau for approving this study and supporting the field survey and data collection.

AUTHOR CONTRIBUTIONS

The order of the authors of this manuscript follows the original project report. Considering that the other authors are the key recipient of the project fund, Jing Sun is only listed as the 4th author of this manuscript. In fact, Jing Sun provided major contribution to the conception and design of this evaluation study and data interpretation, and the manuscript was drafted and critically revised by Jing Sun. She is also the corresponding author.

REFERENCES

Chapter 4

The Effects of Key Health System Reform Policies on Medicines

4.2 Did the Capitation Payment Reform Make a Difference for Primary Care in China?

Jing Sun
Jun Kang
Qian Qu
Weibin Zhang
Yongqian Tan
Weixian Xiang

*Healthcare in Low-resource Settings 2014; 2:1839p9–13*
ABSTRACT

Shifting fee-for-service to capitated payment to primary health providers has been regarded as a tool of insurance programs to contain costs and to change prescription behaviors in China. This paper explored if such a reform achieved its expected objectives in rural primary healthcare in Qianjiang, a less developed county in west China. Key measurements included cost, prescription behaviours, hospitalization and referral rate, and provider income. Retrospective administrative claims were analyzed to compare changes of these measurements in the studied facilities started the reform in different stages, and to compare with overall Qianjiang. Growth rate of cost was contained at the beginning of each stage of reform. The containment effect vanished thereafter. Except a significant increase of the proportion of number of essential medicines to total medicines per prescription in township health centers, prescription behaviors were not significantly improved. No significant change of referral rate was observed. Hospitalization rate shifted from upward to downward after the reform. Monthly income and outpatient revenue continuously increased. To conclude, the capitated payment reform in Qianjiang achieved cost containment objective without unintended results, but failed to achieve prescription behavior change objective. More comprehensive combined policies are needed.
INTRODUCTION

After the foundation of the P.R.China, health security system for rural residents relied on a collective model under the planned economy. In 1978, this health security system collapsed when China shifted from the planned economy to the market economy. In 2003, New Rural Cooperative Medical Scheme (NRCMS) was set up to provide basic health security for rural residents. It greatly alleviated the medical needs of farmers constrained in a longtime since 1978. The financing of NRCMS heavily relies on government subsidy. NRCMC expenditures have been continuously increasing, due to rapid progress towards universal population coverage and significant improvements of benefit packages. The governments have increasing cost containment pressures to keep the financial sustainability of NRCMS.

Fee-for-service (FFS) is the key payment method of NRCMS. Intermixed with other complicated factors (including distorted pricing policies, policies allowing hospitals to generate operational fund from selling medicines through dominated hospital pharmacies, etc.), FFS has been creating perverse incentives in Chinese health systems, driving preference of expensive medicines and over prescriptions, and intensifying the surging medical costs.

International experiences also demonstrated the inefficiency of FFS payment, and its problematic financial incentives for overuse of services. It does nothing to encourage cost-effective services and thus lower the value of care. Paying physicians with FFS is the major driver of higher health care costs in the United States, which is a country with the highest health expenditure in the world.

There have been increasing numbers of high and low income countries looking to capitated payment to avoid the cost inflation effect of FFS payment. Many Chinese local insurance programs also piloted capitated payment reforms. Qianjiang is one of the case. NRCMS in Qianjiang shifted its payment to the designated primary health facilities from resource exhausted FFS to capitation in July 2007. The expected aims were to encourage cost-effective care through raising cost awareness of providers with capitated payment to providers, thereby to contain the surging NRCMS expenditures.

As most of the existing studies about capitated payment in China only documented its effects on cost, little was studied on prescription behaviors and health outcomes. This paper comprehensively measured if the capitated payment reform made any changes to the rural primary healthcare in Qianjiang in the full aspects: cost containment, changing prescription behaviors, altering referral and hospitalization rates, and affecting provider income. It ended by identifying lessons for better implementation of this reform.
Chapter 4

MATERIALS AND METHODS

Township health centers and village clinics are the key primary health providers in rural China. The capitated payment reform in Qianjiang targeted the outpatient services of township health centers and village clinics.


To measure the effect of the reforms in four phases, we randomly selected six village clinics and three township health centers as studied facilities. The sample size was determined to have at least 10% of 51 village clinics and four township health centers in initial phase I and II reforms. Reform implementation and sampling flowchart was described as showed in Table 1.

<table>
<thead>
<tr>
<th>Reform phase</th>
<th>Reform time</th>
<th>Facilities in each phase of reform</th>
<th>Reform group</th>
<th>Sample size</th>
</tr>
</thead>
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<tr>
<td>Phase I</td>
<td>July 2007</td>
<td>2/158 village clinics</td>
<td>1st Group</td>
<td>2 village clinics</td>
</tr>
<tr>
<td>Phase II</td>
<td>Jan. 2008</td>
<td>51/158 village clinics</td>
<td>2nd Group</td>
<td>4 village clinics</td>
</tr>
<tr>
<td>Phase III</td>
<td>Oct. 2008</td>
<td>158 village clinics + 4/30 township health centers</td>
<td>3rd Group</td>
<td>3 township health centers</td>
</tr>
<tr>
<td>Phase IV</td>
<td>Jan. 2009</td>
<td>158 village clinics + 30 township health centers</td>
<td>/</td>
<td>/</td>
</tr>
</tbody>
</table>

Table 1 Capitated payment reform implementation in Qianjiang and the studied facilities selection flowchart

Cost, prescription behaviors, outpatient & inpatient services utilization, and provider income were the key measurements, which were listed in Table 2. Annual average total costs per visits were calculated based on the data directly extracted from Qianjiang NRCMS management database. The change of it during 2006-2009 was compared among different groups of the studied facilities started the reform in different phases, and compared with overall Qianjiang, as well as with the maximum expenditure per prescription (major components of outpatient service cost are for medicines). The changes of proportion of essential medicines prescribed, proportion of prescriptions with antibiotics, steroids and injectables/infusions were measured to assess the prescription behavior. The
change of referral rate helped to assess if patient selection occurred. Hospitalization The change of hospitalization rate reflected if patients were shifted from outpatient to inpatient care. The change of revenue of facilities and salary of staff showed if the interests of primary health providers were affected by the reform. Prescription and income data was obtained from surveys in the studied facilities. Under the support of Qianjiang Health Bureau, the studied facilities were required to track prescriptions, and reported income and revenue. Referral and hospitalization rates were regular data collected annually, which were extracted from the Qianjiang NRCMS management database. Township health centers and village clinics were compared separately.

RESULTS

**Annual average total cost per visit**

**Township health centers (Fig. 1)**

In 2007, no township health centers started the reform. The annual average total cost per visit of three studied township health centers (CNY 16.71, US$ 2.3, exchange rate=7.3) and that of overall Qianjiang township health centers (CNY 15.4) were above the 2007 maximum expenditure per prescription (CNY 15).

Reform started in four township health centers in October 2008. The annual average total cost per visit of three studied township health centers reached CNY 17.6. The annual average cost per visit of overall Qianjiang township health centers reached CNY 16.85. Both increased, but were still under the 2008 maximum expenditure per prescription (CNY 18). The intercept of three studied township health centers was smaller than that of overall township health centers between 2007 and 2008: $H_{\text{studied}}^{\text{07-08}}(0.89) < H_{\text{overall}}^{\text{07-08}}(1.45)$. Assumed that the contribution of three studied facilities (changes brought by the capitated payment reform started in October 2008)
to 30 overall facilities in 2008 could be neglected. Although the capitated payment reform only implemented three months in 2008, it still gained cost containment effect, as the growth rate of annual average cost per visit got smaller.

The other 26 township health centers joint the reform in January 2009. The annual average total cost per visit of three studied township health centers (CNY19.73) and overall Qianjiang township health centers (CNY19.34) further increased in 2009. The growth rate of the latter one was faster than that of the former one. Both went below the maximum expenditure per prescription (CNY 20). The intercepts of three studied and overall township health centers between 2008 and 2009 were: \( \text{H}_{\text{overall} \ 08-09} = 2.45 \) and \( \text{H}_{\text{studied} \ 08-09} = 2.13 \). \( \text{H}_{\text{overall} \ 08-09} > \text{H}_{\text{studied} \ 08-09} > \text{H}_{\text{overall} \ 07-08} > \text{H}_{\text{studied} \ 07-08} \) which implied that: (1) in 2009, the growth rate of annual average cost per visit of overall Qianjiang township health centers was faster than that of the three studied township health centers which joined the reform in October 2008. No cost containment effect was observed of the capitated payment reform started in January 2009; (2) the growth rate of annual average cost per visit in three studied township health centers in 2009 was faster than that in overall Qianjiang township health centers in 2008. Cost containment effect in 2008 on three studied township health centers did not continue in 2009.

**Village clinics (Fig. 2)**

Annual average cost per visit of two studied village clinics in 2006 was not available. Assumed that there was no significant difference among the two studied village clinics started the reform in July 2007, the four studied village clinics started the reform in January 2008, and the other village clinics before implementation of the capitated payment reform. Also assumed that, the contribution brought by two studied village clinics to 158 overall village clinics in July 2007 could be neglected. Annual average
cost per visit of overall Qianjiang village clinics in 2006 (CNY 11.56) was regarded as the baseline of the 1st group (two studied village clinics pioneered the reform in July 2007) and the 2nd group (four studied village clinics joined the reform in January 2008) village clinics. The annual average total cost per visit of two studied village clinics (CNY 11.29) was a bit lower than that of overall Qianjiang village clinics (CNY 11.35) in 2007. Both decreased and were above the maximum expenditure per prescription (CNY 10). Larger intercept of two studied village clinics between 2006 and 2007 (H\textsubscript{06-07} = -0.27) than that of overall village clinics (H\textsubscript{overall} \textsubscript{06-07} = -0.21) in the negative part of Y-axis, implied slight cost containment effect in 2007 on two studied village clinics.

**Fig. 2** Annual average total cost per visit of village clinics 2006-2009

![Graph showing annual average total cost per visit of village clinics 2006-2009](source: NRCMS management database of Chongqing Health Bureau)

In January 2008, another 49 village clinics jointed the reform. Annual average total cost per visit of two and four studied village clinics decreased to CNY 10.75 and 10.97 respectively. Both were lower than the maximum expenditure per prescription (CNY 12). On the contrary, that of overall village clinics further increased to CNY 12.34. This indicated that, cost containment effect of the capitated payment reform in July 2007 on the 1st group of two studied village clinics continued in 2008, and there was also positive cost containment effect of the capitated payment reform in January 2008 on the 2nd group of four studied village clinics. The intercepts of two and four studied village clinics 2007-2008 were: H\textsubscript{07-08} = -0.54 and H\textsubscript{07-08} = -0.16. H\textsubscript{07-08} - H\textsubscript{06-07} < H\textsubscript{07-08} < H\textsubscript{06-07} indicated that: (1) cost containment effect in 2008 on the 1st group of two studied village clinics kept same as it was in 2007; (2) cost containment effect in 2008 on the 2nd group of four studied village clinics was not as strong as on the 1st group of two studied village clinics.

In January 2009, all 158 village clinics fully implemented the capitated payment reform. The annual average total cost per visit of all village clinics shifted from upward to downward trend, and decreased to CNY 11.97. On the contrary, that of two and four studied village clinics increased to CNY 11.01 and 11.54 respectively. This indicated strong cost containment effects of the capitated payment reform in January 2009 on the 3rd group of village clinics. Cost containment
effects of the capitated payment reform in July 2007 on the 1st group of two village clinics, and cost containment effects of the capitated payment reform in January 2008 on the 2nd group of four village clinics did not continue.

**Prescription behavior**

During 2007-2009, the referral rates and prescription indicators of the studied township health centers were showed in Table 3. Statistic analysis showed that, the proportion of number of essential medicines to total medicines per prescription in the studied township health centers significantly increased following the reform ($\chi^2$ test, $p<0.05$), that in the studied village clinics did not significantly change ($\chi^2$ test, $p>0.05$). Other prescription indicators of the studied township health centers did not statistically change as well ($\chi^2$ test, $p>0.05$). Steroids, antibiotics and injectables/infusions prescriptions in village clinics were not assessed due to absence of data. There was no significant change of referral rate following the reform.

<table>
<thead>
<tr>
<th>Table 3</th>
<th>Prescription indicators and referral rates in sample facilities during 2007-2009</th>
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<tbody>
<tr>
<td></td>
<td>2007</td>
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<tr>
<td>Referral rate in health centers (%)</td>
<td>37.16</td>
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<tr>
<td>% of essential medicines</td>
<td>Health centers</td>
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<td>Village clinics</td>
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<tr>
<td>% of prescriptions with steroids in health centers</td>
<td>3.58</td>
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<td>% of prescriptions with antibiotics in health centers</td>
<td>24.11</td>
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<tr>
<td>% of prescriptions with injectable/infusions in health centers</td>
<td>13.69</td>
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</table>

**Hospitalization rate**

Hospitalization rate of Qianjiang NRCMS enrollees was 2.1% in 2003, lower than the 2003 3rd National Health Service Survey (NHSS) age-standardized hospitalization rate in rural China (the low annual net per capita income group was 3.7%). Hospitalization rate of Qianjiang NRCMS enrollees rapidly increased in the following four years. It continued the increase from 7.15 in 2006 to 7.81% in 2007. As only two village clinics piloted the capitated payment reform in 2007, they might not have any effect on the hospitalization rate of Qianjiang NRCMS enrollees. Following the expansion of the reform to another 49 village clinics in January 2008, and to the four township health centers in October 2008, hospitalization rate of Qianjiang NRCMS enrollees dropped to 5.68% in 2008. It was lower than the 2008 4th NHSS age-standardized hospitalization rate in rural China (the low annual net per capita income was 7.2%). When all village clinics and all township health centers in Qianjiang joined the reform, hospitalization rate of Qianjiang NRCMS enrollees further dropped to 3.65% in 2009 (Fig. 3).
Fig. 3  Hospitalizations rates of Qianjiang NRCMS enrollees during 2003-2009 and 2003 3rd & 2008 4th NHSS age-standardized hospitalization rate in rural low annual net per capita income group

Source: Qianjiang Health Bureau.
Abb reviations: NRCMS means new rural cooperative medical scheme; NHSS means nations health service survey.

Provider income
The monthly income of primary health facility staff in Qianjiang kept growing during 2007-2009. It increased from CNY 1,683 (US$ 231, exchange rate=7.3) to CNY 2,575 (US$ 379, exchange rate=6.8) in township health centers, and increased from CNY 1,220 to 1,975 in village clinics. The increasing government subsidies to primary healthcare during this period might contribute to the income growth the most. For example, the secured government subsidy to village doctors increased from CNY 500 per year in 2007 to CNY 2,160 per year in 2009. The outpatient revenue of all studied facilities kept growing during 2007-2009. None of the studied facilities had actual expenditures that exceeded the capitated amount (Table 4).

Table 4  Salary, outpatient revenue and surplus of New Rural Cooperative Medical Scheme (NRCMS) fund in sample facilities 2007-2009 in CNY

<table>
<thead>
<tr>
<th></th>
<th>2007 Monthly income</th>
<th>NRCMS outpatient revenue</th>
<th>NRCMS outpatient fund surplus</th>
<th>2008 Monthly income</th>
<th>NRCMS outpatient revenue</th>
<th>NRCMS outpatient fund surplus</th>
<th>2009 Monthly income</th>
<th>NRCMS outpatient revenue</th>
<th>NRCMS outpatient fund surplus</th>
</tr>
</thead>
<tbody>
<tr>
<td>Health centers</td>
<td>1,683</td>
<td>869,295</td>
<td>38,000</td>
<td>1,897</td>
<td>972,968</td>
<td>38,000</td>
<td>2,575</td>
<td>1,248,445</td>
<td>35,000</td>
</tr>
<tr>
<td>Village clinics</td>
<td>1,220</td>
<td>39,763</td>
<td>615</td>
<td>1,712</td>
<td>40,442</td>
<td>554</td>
<td>1,975</td>
<td>43,517</td>
<td>2,395</td>
</tr>
</tbody>
</table>

Source: Qianjiang Health Bureau

Discussion

Cost containment
Owing to the aging population and the rapid economic and medical technological development,
like in most of the other areas in China, total cost per visit in Qianjiang has been continuously growing. The capitated payment reform in Qianjiang did not decrease the cost, but contained its growth rate, and were kept below the maximum expenditure per prescription target.

The reform was implemented in four stages. All have cost containment effect on both village clinics and township health centers during the initial period in each stage of reform. Except that, the cost containment effect on the 1st group of two studied village clinics continued in 2008, it was not kept in all facilities in 2009. Such a phenomenon was caused by a shift of NRCMS management function from Health Bureau to the Insurance Bureau in 2009. Management and supervision were slacked in that year.

**Prescription behavior**

Although the proportion of number of essential medicines to total medicines per prescription in township health centers increased significantly, other prescription indicators did not significantly change. This was not a concrete demonstration of improvements. The reform did not have an overall significant effect on changing prescription behaviors. Prescription behaviors are complex and are affected by multiple perverse incentives like pricing system and others incentives in the health system, single capitated payment reform approach might not be able to make a complete change. Changing prescription behaviors will need more comprehensive interventions with combined multiple approaches.

**Unintended patient selection**

Unchanged referral rate implies that, under the capitated payment reform, prescribers did not simply reduce services, or select patients with minor illness to avoid comprehensive treatment. The reform did not bring un-intended side effect of patient selection, which was successfully averted through a performance assessment system. A set of specific and comprehensive indicators were formulated with considerable weights to valued workload, revisit rate for the same symposium within 72 hours, etc. Quarterly and year-end evaluations were conducted. Irregular and spot checks were also carried out to examine performance. Payment was made monthly with 80% of the budgeted expenditure and settled at the year end. The final 20% payment could be full or 20% cut down, based on the results of various assessment results throughout the year, and was kept within the budget.

**Hospitalization rate**

The rapid increasing trend of Qianjiang NRCMS enrollee hospitalization rate during 2003-2007 was in line with the observations on other areas. NRCMS was initially designed to share the financial risks for hospitalization. Outpatient care was not reimbursable at the beginning stage. Enrollees had to be hospitalized in order to get reimbursed for some treatments. High hospitalization rate was thus induced. The expanded reform in all village clinics and four pioneer
township health centers in Qianjiang between January and October 2008 had a strong effect on reducing hospitalization rate of NRCMS enrollees. This could be explained by the positive incentive brought by the capitated payment, i.e. designated providers pronged to contract more outpatient patients in order to obtain more insurance fund. In addition, one supporting policy of the capitated payment reform was implemented in 2007, which imposed strict admission standard and strengthened supervision on inpatient services in NRCMS designated facilities. Hospitalization criteria were clearly defined and circulated to all NRCMS designated health facilities. Unnecessary hospitalizations were regulated and possible shifts of patients from outpatient to inpatient services were controlled.

**Provider income**
The no overruns result and the continuously increased staff salary of township health centers and village clinics in Qianjiang showed that, maximum expenditure per prescription, insurance payment budget limit, and relevant supporting policies in inpatient services in Qianjiang were generally reasonable. These policies secured a steady implementation of the capitated payment reform. There was no negative impact on the operation of the facilities and the income of the health workers.

**CONCLUSION**
The cost containment objective of the capitated payment reform in Qianjiang was achieved, but needs strategy to keep sustainability. Prescription behaviors were partially improved with limited effects. More comprehensive interventions with combined multiple approaches are needed to change the complex prescription behaviors. Careful development of comprehensive performance assessment system and supporting policies were crucial to address the unintended effects of capitated payment, like patient selection and unnecessary hospitalization. The reform brought no financial loss to both the facilities and the individuals.

**LIMITATIONS**

**Availability of data**
In order to relief data collection workload, the study heavily relied on administrative data of Qianjiang Health Bureaus. Data was collected annually as an average, quarterly or monthly data was not available. The assessment was then a rough trend analysis rather than a strict interrupted time series analysis.

**Quality of data**
Data were obtained from Qianjiang Health Bureaus, and were reported by individual facilities. Although Chongqing and Qianjiang Health Bureaus organized regular trainings for lower
level health bureaus and facilities, helped them in conducting appropriate data collection and reporting, possible quality problems may still exist. We assumed that the reported data is true and correct.

**Sampling**
Reform started in two village clinics in July 2007, and expanded to all primary facilities of Qianjiang until January 2009. It was implemented in four stages within one and half year. It was difficult to design a good sampling model for concise measurement of the changes. Annual average data for Qianjiang covered facilities which reformed in different time period, which was contributed by the effects of reforms on different groups of facilities which started to reform in different time. Although the contributors were only a small number of facilities comparing with overall Qianjiang, its contribution was weak and could be neglected, 2007 and 2008 annual average data of overall Qianjiang village clinics was not a perfect controller for two pioneer village clinics and four studied village clinics. This was same for 2008 annual average data of overall Qianjiang township health centers, which was not a perfect controller for four pioneer township health centers.

**Mixed policy effect**
Although the payment reform was the most important reform in Qianjiang during 2006-2009, there were tremendous policy changes under the overall health system reform framework during the same period. Other policy changes might not directly link with the NRCMS payment, but might indirectly contribute to the effects either positively or negatively. The evaluation drew mixed effects of all those policy changes, among which the payment reform contributed the most. Comparison among different groups of facilities which reformed in different stages helped to control confounding policies effects.

**Inflation factor**
One of the key measurements of this study is cost, which was not adjusted by the consumer price index (CPI). CPIs for healthcare during 2006-2009 in the province where Qianjiang is located varied a little between 98.8 and 104.4. It included medical instrument, appliance and services, traditional medicines and western medicines. The inflation effect to the cost containment analysis was neglected.

**Patient care and facility indicator**
Consultation time, dispensing time, patients’ satisfaction, patients’ perception on medicines use, and availability of key essential medicines are important indicators for comprehensive assessment on quality of care. However, they were not regularly collected and recorded in Qianjiang. This study did not include these patient care and facility indicators, instead of focused on prescribing indicators and referral rate. The aim was to focus analysis on prescribing behavior changes.
ACKNOWLEDGMENT

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REFERENCES


