

Review of the Research on the Evaluation of Capitation

Nianli Xing, Xiaoying Jiang

Party and Government General Office, Fudan University, Shanghai Cancer Center; Department of Oncology, Shanghai Medical College, Fudan University, Shanghai, 200032 China

Abstract: To summarize and comparatively analyze the implementation effect of capitation in different countries or regions. Using "capitation" as keywords, the literature was searched in PubMed, CNKI, and Wanfang, and the effects of the capitation were summarized. The evaluation of the effect of the current research on capitation mainly includes four aspects: medical expenses, utilization of health services, quality of health services, and satisfaction. Due to the different characteristics of different capitation projects, the evaluation of the effect of capitation is also different. More research is still needed to assess the effectiveness of capitation projects.

Keywords: Capitation; Effect; Evaluation

Received 16 December 2019, Revised 23 January 2020, Accepted 30 January 2020

*Corresponding Author: Nianli Xing

1. Introduction

Medical insurance payment method is an important lever to regulate medical service behaviors and guide the allocation of medical resource. Since 2009, China has issued a series of policies to promote pilot work in outpatient clinics. In June 2017, the General Office of the State Council's "Guiding Opinions on Further Deepening the Reform of Basic Medical Insurance Payment Methods" once again emphasized the need to carry out a pilot payment system with chronic diseases as a breakthrough. Capitation has a high degree of control over the services and costs of medical institutions, but it may also reduce the number of services and the quality of services. In order to understand the implementation effect of capitation in various countries and regions, this review study was conducted.

2. Methods

The main databases of the literatures searched in this study are: PubMed, CNKI, and Wanfang database. The search time is April 2018. The keyword "capitation" is used in the database. After reading the title and abstract, the included studies are summarized.

3. Results

3.1. Capitation overview

3.1.1. Definition

Capitation means that the medical insurance institution regularly pays a fixed fee to the medical institution according to the number of insured persons provided by the medical institution within the time stipulated in the contract. The medical

institution provides all medical services stipulated in the contract[1]. Capitation has two distinct characteristics. One is that the income of medical institution is directly proportional to the number of insured persons who are provided with services. The larger the number, the higher the income. On the other hand, the income of medical institutions is inversely proportional to the amount of services provided to each insured. The less the amount of services are provided, the greater the income[1].

3.1.2. Pros and cons

The cost risk of medical service provision is borne by the medical service provider. Medical institutions control the cost and service as much as possible from its own interests. Therefore, capitation can highly control over the service and cost. On the one hand, medical institutions will carry out preventive work to reduce future workload and costs, and on the other hand, provide services to more people at the lowest possible medical cost[1].

Due to the consideration of their own economic benefits, medical institutions may also reduce the provision of services or the quality of services in order to save costs. At the same time, there will be "risk selection" behaviors, rejections of patients with complex conditions[1], and restrictions on patient referrals. Governments and payers may pay higher administrative costs[2].

3.2. Capitation in countries

At present, capitation in the United Kingdom, Italy, Thailand, and the United States is widely used to pay for basic health care services provided by GPs[2]. In 1948, the British government began to purchase

primary health care services and adopted capitation for general practitioners[3]. In the 1960s, a compound payment system including pay for performance was gradually established[4]. In 2004, the British government re-introduced pay for quality (70% for basic services + 30% for service quality)[5]. At present, the proportion of mixed payment methods in the UK's primary health care system is 75% of capitation income, 20% of performance-based income, and 5% of other special payments[6].

To control the rapid rise in health care expenditure, in the mid-1980s, managed care has become popular in the United States, which included payment of medical services for capitation[7]. In 2001, the Thai government launched the "30 Baht Plan" for universal health insurance. Participants only have to pay 30 baht (approximately RMB 6) to register health care and medical services and enjoy free services when they go to a designated medical institution. The outpatient fee is paid by capitation[2]. Taiwan's second-generation universal health insurance passed legislation in 2011 and was officially implemented in January 2013. Prior to the implementation of the second-generation health insurance, the payment method for universal health insurance was still based on fee-for-service payment under the global budget system. Under the system, Taiwan's health insurance was faced with financial imbalance and serious waste of medical resource. So it has begun a pilot work on capitation since 2011[8].

However, most of China's medical insurance payment methods are still based on fee-for-service[7, 9, 10]. According to data from the 2011 National Medical Insurance Payment Method Survey, taking Urban Employee Medical Insurance as an example, the proportions of pooled areas where in-patient services, out-patient severe illnesses, and out-patient pooling are paid by fee-for-service are 77.1%, 67.3%, and 53.9%, respectively[11]. Since 2009, China has issued a series of policies to promote capitation pilot work in outpatient clinics[12-17]. With the general establishment of the medical insurance outpatient overall planning system, capitation is gradually used to compensate for outpatient services provided by primary medical institutions. Changde, Yinchuan, Yunnan, Nanchang, Xi'an, Guiyang and other cities also participate in the pilot[18, 19]. Pudong district, Shanghai includes both outpatient and inpatient services by capitation[19].

3. 3. Evaluation of international effect

3.3.1. Impact of capitation on costs

To control the growth of drug costs, the Iowa Medicaid program launched a capitation pharmacists projects. Researchers such as Yesalis[20-22] and Lipson[23] used a comparison method of before and after research to study their effects and found that,

compared with fee-for-service, pharmacist prescription behaviors in capitation have changed. As a result, the cost of medicines decreased.

Vietnam started capitation pilot in 2005. Most district hospitals switched from fee-for-service to capitation in 2010. Nguyen[24] evaluated the effect using the difference-in-difference method in 2015 and found that, compared with fee-for-service, capitation improves the operating efficiency of hospitals, and hospital recurrent expenditures, per capita recurrent expenditures, and per capita drug expenditures have decreased.

In 2005, Sharon[25] used the difference-in-difference method to study rural areas in Minnesota, and found that the cost the comprehensive management reform based on capitation is cheaper than the cost based on fee-for-service.

James[26] conducted capitation evaluation of the Intermonton in the United States in 2016 and found that the year after the reform reduced \$ 700 million of waste and reduced total medical costs by 13%.

Bloom JR[27] conducted a research on health service utilization and service costs in 2002 using the difference-in-difference method and two models, found that compared with fee-for-service, capitation reduces costs per capita.

Bloom JR[28] evaluated the capitation pilot in Colorado in the United States in 1998 and found that capitation can reduce per capita medical costs.

Yip W[29]and others in 2004 found that compared with fee-for-service, capitation can reduce the average outpatient cost.

From the above research, compared with fee-for-service, capitation can reduce medical expenses and control the increase of medical expenses.

3.3.2. Impact of capitation on utilization of health services

The United States began a capitation pilot in Colorado in 1995. The Center for Mental Health Services (DC) and Management Behavioral Health Organization (MBHO) implemented capitation, while other agencies still implemented fee-for-service. Bloom's[27] research on health service utilization and service costs in 2002 used the double-difference method and two models found that health service utilization was reduced only in the MBHO model and not in the DC model.

In 2015, Nguyen[24] evaluated the effect of capitation in Vietnam using the difference-in-difference method and found that the impact of the reform on the number of outpatient visits and health services of hospitalizations is unclear.

Balkrishnan's[30] 2002 evaluation of the effect of capitation in the United States found that capitation reduced the time and number of visits compared to fee-for-service, but increased preventive and

counselling services.

Northern Ireland paid for dental services in 2009 by capitation. Hill[31] used a regression model to evaluate its effect in 2017 and found that, compared with fee-for-service, capitation reduced the number of visits and treatments for patients.

A 2011 study by Hennig-Schmidt H[32] and others showed that fee-for-service leads to more services than capitation.

Lennon MA's[33] 1990 study of payment methods for children's oral care services found that capitation offers more preventive services than fee-for-service, and in particular provides parents with more oral disease prevention advice.

A 1998 study by Hassall DC[34] found that doctors provide more preventive services than capitation compared with fee-for-service.

Yip W[29] found in 2004 that capitation can reduce antibiotic use by 15% compared with fee-for-service.

From the above studies, capitation may have an impact on the use of health services, but further research is needed to reduce the use of services.

3.4. Impact of capitation on quality of health services

Ontario, Canada, established a primary care network in 2001, using capitation. Karen Tu[35] used variance and regression analysis to evaluate the effect of hypertension management in 2009. He found that among the three payment methods, capitation, emoluments, and fee-for-service, the detection rate of hypertension was the same. The treatment and control rates were the highest in capitation, and the service quality did not decrease.

Capitation pilot was conducted in Maryland in 1997. In order to evaluate the difference in the quality of medicines for children with permanent asthma from fee-for-service to capitation, Puneet[36] evaluated it in 2007 using a generalized linear model and found that the implementation of capitation reform did not affect the quality of medical care.

Ralph A. Catalano[37] used an intermittent time series in 2005 to find that capitation does not necessarily reduce the overall quality of medical services.

A 2009 study by Richard H. Glazier[38] found that capitation had lower mortality and comorbidities compared to fee-for-service.

Kangaroo H[39] research in 1996 found that the change from fee-for-service to capitation can improve the quality of medical imaging examinations.

Lurie N's[40] evaluation of the quality impact of payment methods in Minnesota in the United States in 1994 found no evidence of detrimental effects of capitation on quality.

Bloom JR's[28] evaluation of the capitation pilot

in Colorado in the United States in 1998 found that capitation has no significant effect on clinical outcomes.

From the above studies, the impact of capitation on the quality of health services is not obvious, and there is no evidence that capitation reduces the quality of health services.

3.4. China effect evaluation

Capitation is still in the pilot stage in China, and the pilot policies in different regions are different. The current evaluation research mainly include the impact on costs, health service utilization, health service quality, and patient satisfaction.

3.4.1. Impact of capitation on costs

In August 2012, Pudong district Shanghai fully implemented capitation payment as an intervention for the new rural cooperative medical care (NRCMS), including outpatient and inpatient services at all levels of medical institutions. Jing[41] in 2017, evaluated the empirical effect of capitation policy intervention, and found that capitation achieved a better effect in cost control, but under the background of integrated management of basic medical insurance in urban and rural areas, the actual compensation ratio of medical expenses of participating subjects should be further improved. Li[42]and Huang[43], in 2017 respectively using the comparative analysis , evaluated outpatient and hospitalization health service utilization found that the overall cost of outpatient and inpatient service are increasing year by year, especially in the secondary hospital, and after the intervention, the control outpatient cost and inpatient cost in all hospitals is better, especially in two tertiary hospitals. In 2017, Shu[44, 45] adopted the time series model to predict and analyze the outpatient and inpatient medical expenses of the participants, and found that the capitation had a significant effect on controlling the outpatient expenses per visits, and effectively curbed the rapid growth of the medical expenses of the inpatients. In 2014, Chen[46]conducted the evaluation of the implementation effect of insured farmers, which found that the benefit rate of insured farmers and hospital benefit degree have been improved to some extent, as well as the cost burden and the ability to resist disease risk have been improved. Through the analysis of the outpatient service behavior of participating farmers, Jing[47]found that the reform of payment method has shown an effect on guiding the patients utilize the outpatient service in the primary institutions and transfer to the higher level hospitals as the recommended referral, which is also beneficial to the balance of income and expenses of the fund. In the same year, Lou's[48]research of outpatient expenses

of insured farmers concluded that capitation has obvious effect for controlling of the excessive growth of outpatient service medical treatment, only makes the preliminary formation of community health service organization self-discipline mechanism. Further research are demanded in order to explore how to motivate the secondary and tertiary hospital medical staff to control cost and formulate supporting policies. In 2014, Cui[49, 50] conducted a study on the hospitalization behavior and expenses of insured farmers shows that capitation plays a certain role in controlling the rapid increase of hospitalization expenses, among which the most obvious effect is achieved by township institutions. Since January 2011, Yinchuan, Ningxia has implemented the capitation of urban employee medical insurance, and in 2013 Ge[49, 50] used the comparative analysis method to evaluate the results and found that after the implementation of the policy, the average hospitalization cost and the average drug cost were reduced. In 2014, Xu[52] found that the per capita hospitalization cost, per capita drug cost and drug proportion have all reduced, comparing the reform effect before and after the implementation of capitation.

Since March 1, 2005, Shenzhen has implemented the capitation reform for community outpatient service. In 2012 Shen[53] shows the pilot project of capitation in Shenzhen city has basically achieved the goal of balanced income and expenditure and the expected effect of the reform of the overall planning of community outpatient service.

In Qianjiang district, Chongqing, capitation was introduced in July 2007 for some village clinics, and from January 2008, this pilot program was expanded to 51 clinics in 30 subdistricts and towns. Yang's research[54] shows that the reform standardized the medical behavior of doctors and reduced the cost of outpatient service per visit.

In 2008, Dongguan implemented capitation reform in outpatient clinics of community health services. Zhang's[55] research shows that the capitation reform improves the efficiency of fund operation and reduces the burden on patients.

On January 1, 2004, Hangzhou implemented a capitation reform for outpatient clinics for urban employee retirees. Wang's[56] evaluation the effect of capitation found that the use and cost of health services of capitation are lower than fee-for-service. It also proposes an important measure to introduce a supplier risk-sharing mechanism in medical service cost compensation to control the rapid increase of medical expense.

Chen Qingqing[57] used a before and after method to study the cost of capitation reform in Hangzhou and found that the capitation reform implemented by retired employees in Hangzhou has caused medical insurance costs to increase by about 300%. The

reason is speculated that the coverage of the population is old, the cost is high, the quota standard and the hospital reward and punishment system is unreasonable. However, due to the lack of analysis of the control group, it is impossible to determine the specific effect of Hangzhou's payment method reform.

In 2014, Zhu[58] evaluated the effect of the reform of capitation in Haiyuan County using the difference-in-difference method and found that compared with the fee-for-service, capitation reduces the average outpatient cost.

In October 2007, Changde City, Hunan Province implemented capitation payment system for urban residents' medical insurance hospitalization services. The capitation reform covers all primary, secondary and tertiary hospitals in Changde. Patients can sign freely for the first consultation institution. They can replace signed hospital in the second year if they are not satisfied. Compared with fee-for-service, patients' out-of-pocket costs have been reduced, and they suggested capitation reforms should be implemented in outpatient clinics first[59]. In 2014, Lu Fangwen[60] evaluated the effect of Changde's capitation reform using double-difference method found that Changde's capitation and its supporting policies have reduced patient out-of-pocket expenses, but have not reduced the total medical expenses.

Tianjin has been conducting a pilot capitation trial for diabetes clinics since January 1, 2014. An evaluation conducted by Liu Mingyao[6] in 2014 found that the medical expenses of diabetic patients will decrease significantly within 2-3 months after the capitation pilot. Zhang Zaisheng's[6] research in 2014 found that the monthly per capita cost of diabetes has been significantly reduced after the implementation of diabetes capitation, and it has achieved staged achievements.

In summary, most studies in China have shown that the pilot capitation experiment has some effect on controlling fees. However, some studies have shown that the cost has increased by 300% after the implementation of the capitation reform, and the total cost has not decreased. China's research results vary widely and need to be further explored.

3.4.2. Impact of capitation on utilization of health services

In 2014, Lu Fangwen[60] used panel data to evaluate the effect of capitation in Changde, Hunan, using the difference-in-difference method and found that Changde's capitation and its supporting policies reduce the length of hospitalization.

In 2017, Li Ming[42] and Huang Yi[43] used the comparison of outpatient and inpatient health services in the Pudong District, Shanghai, respectively, and found that the total number of

outpatient and inpatient services used by the participating subjects increased year by year, and the number of outpatient visits to secondary and tertiary medical institutions obviously increased. In 2017, Shu Zhiqun[44, 45] used time series model to predict the outpatient and inpatient medical expenses of the participating subjects and found that the capitation reform did not inhibit the normal release of outpatient and inpatient needs. Jing Limei's[47] analysis of participating doctors' outpatient clinics found that the reform of payment methods has shown an effect in guiding outpatients to the community hospital for first visits and gradual referrals.

In 2013, Ge Xuecheng[51] applied comparative analysis method to evaluate the Ningxia Yinchuan pilot capitation and found that after the implementation of the capitation policy, the cesarean delivery rate and average hospitalization day of the insured workers have decreased. Xu Haili's[52] comparison of the reform effect before and after 2014 found that the proportion of medicines decreases after the implementation of capitation.

Zhang Yalin's[55] evaluation of capitation reform for outpatient clinics about community-based health services in Dongguan 2014 found that there is no refusal to accept patients and reduce services.

On July 1, 2011 to June 30, 2012, Junan County, Linyi City and Liangshan County, Jining City carried out capitation reform for the NCMS Outpatient linked to quality assessment. Lu Ying's[62] research on its effect using the difference-in-difference method in 2014 found that the measured behavioral indicators of village doctors' prescriptions have improved markedly, and prescription medications tend to be reasonable.

Since July 2010, Ningxia Haiyuan County and Yanchi County have implemented performance-based prepaid capitation system for outpatient services provided by township hospitals and village clinics on a rural basis. Hu Min's[63] analysis of the Ningxia capitation pilot using a paired cluster randomized trial design in 2014 found that capitation effectively reduced the use of antibiotics in rural basic medical services and optimized the prescription behavior of suppliers.

In summary, most of the domestic studies have shown that the capitation pilot has a certain impact on the use of health services, but the results are inconsistent. The specific impact needs to be further explored.

3.4.3. Impact of capitation on quality of health services

Lu Ying[62] used difference-in-difference method found that most of the township health centers in the intervention group continued to strengthen the supervision of the village clinics under their

jurisdiction, saying that the assessment made the primary medical institutions pay more attention to the quality of health services. The scores of the village doctors' knowledge and skills test in the intervention group improve, but the increase is not large. The overall expertise of the village doctors is still at a low level. The combination of quality, capitation and quality assessment is a new idea.

Ge Xuecheng's[51] evaluation of the Ningxia Yinchuan Capitation Pilot in 2013 using comparative analysis method found that there was no statistically significant difference in maternal and neonatal mortality rates after the implementation of capitation policy.

In 2014, Zhu Jingjing[58] evaluated the effect of capitation reform in Haiyuan County using difference-in-difference method and found that there was no statistically significant difference in the service quality differences and residents' self-health evaluation indicators between capitation and fee-for-service groups.

There are few studies on the impact of capitation on health service quality in China. Existing research show that capitation does not reduce the quality of health services. But more scientific indicators and rigorous methods are needed for evaluation.

3.4.4. Impact of capitation on satisfaction

Zhiqun Shu[64] in 2017 and Chen Ru[46] in 2014 analyzed the satisfaction of the participants of the New Rural Cooperative Medical System in Shanghai Pudong district and found that capitation generally did not affect the satisfaction of patients.

Lu Fangwen[60] used panel data in 2014 to evaluate the effect of capitation in Changde, Hunan province, and found that Changde's capitation did not reduce patient satisfaction.

Yang Chengchen's[54] evaluation of the Chongqing capitation pilot in 2012 showed that the reforms have improved patient satisfaction.

In 2014, Zhu Jingjing[58] evaluated the effect of the reform of capitation in Haiyuan County using the double-difference method and found that, compared with fee-for-service, capitation did not reduce residents' service satisfaction.

There are few studies on the impact of capitation on patients' satisfaction in China. Existing studies show that capitation does not reduce patient satisfaction and even improves patient satisfaction.

4. Conclusion

The evaluation of the effect of capitation based on existing domestic and abroad studies mainly includes four aspects: medical expenses, utilization of health services, quality of health services, and satisfaction. In terms of medical expenses, most domestic and foreign research results show that capitation has

reduced medical expenses, but there are also a few studies show that it increased medical expenses, which are related to the reform of capitation content, research design, and data sources. Regarding the use of health services, foreign studies have shown that the number of visits has generally decreased, but prevention and counselling services have increased, and some studies have shown that changes in the use of health services are unclear. Domestic research show that the number of hospitalization days for health services has decreased, the number of outpatients and hospitalizations has not decreased, and the use of antibiotics has decreased. The use of health services has tended to be rationalized, and the impact on the use of health services cannot be judged yet. In terms of medical quality, domestic and foreign studies have shown that capitation has not reduced the quality of medical services, but the construction of online information platforms should be strengthened, and patients' physical health indicators should be used to further conduct in-depth research on the quality impact of capitation in China. In terms of patient satisfaction, there are few studies on the impact of capitation on patient satisfaction. Existing studies show that capitation does not reduce patient satisfaction and even improves it. Therefore, the existing research shows that the effect of capitation payment varies, and more research is needed to evaluate the effect of capitation.

References

- [1] Cheng XM. Health economics (for preventive medicine) 3rd Ed[M]. 2012, People's medical publishing house, Beijing.
- [2] Liu X. A review of payment methods for medical services abroad[J]. Economics and management research, 2006, 16(07): 81-84.
- [3] Bunker J.P. The National Health Service: A Political History[J]. Bmj clinical research, 1998, 316(7138): 1176.
- [4] Lu J, Qi F, Ying X. The reform of payment method in the context of social history -- a case study of Germany, Britain and Taiwan[J]. China health policy research , 2013(09): 18-23.
- [5] Shao H. Research on the impact of the reform of capitation for diabetes on hospital management -- a case study of ST hospital, Tianjin[D]. 2014, Tianjin university.
- [6] Liu M. Effect analysis of capitation for diabetes on medical insurance costs -- a case study of ST hospital of Tianjin[D]. 2014, Tianjin university.
- [7] Du X, Huang K. A discussion on the application of capitation in outpatient service of community medical and health institutions[J]. Chinese journal of general practice, 2013(09): 731-733.
- [8] Deng Q, Wu R, Xiao L, et al. Introduction and review of the PPL reform of universal health insurance in Taiwan[J]. Chinese health economics, 2015(08): 28-31.
- [9] Shao S. Analysis of medical cost of insured diabetic patients and the influence of medical insurance payment method on them[D]. 2009, Huazhong university of science and technology.
- [10] Yao Y, Chen Y, Shi J, et al. Reform of medical insurance payment methods: a review of practice and research progress[J]. Chinese health economics, 2017(04): 36-39.
- [11] Ministry of human resources and social security social insurance management center. Medical insurance payment method handling guide[M]. 2014, China labor press.
- [12] Opinions of the CPC central committee and the state council on deepening the reform of the medical and health care system[EB/OL]. 2009, The state council .
- [13] Opinions of the ministry of human resources and social security on further promoting the reform of medical insurance payment methods[EB/OL]. 2011, The state council.
- [14] Guidance on the reform of the new rural cooperative medical care payment [EB/OL]. 2012.
- [15] Notice of the general office of the state council on key tasks for deepening the reform of the medical and health care system[EB/OL]. 2016 , The state council.
- [16] The state office of the state council has forwarded the opinions of the leading group for deepening the reform of the medical and health care system of the state council on further promoting the experience of deepening the reform of the medical and health care system of the state council[EB/OL]. 2016, The state council.
- [17] Guidelines of the general office of the state council on further deepening the reform of the payment method of basic medical insurance [EB/OL]. 2017, The state council.
- [18] Jiang Q, Zhang Z, Zhao Y, et al. Thinking on the principle and design of "capitation"[J]. China health economics, 2013(01): 34-38.
- [19] Wu R, Wang L, Cao Z, et al. Analysis of the capitation scheme for outpatient pooling of basic medical insurance in China[J]. Chinese journal of hospital administration, 2015(4): 266-270.
- [20] Yesalis C E, Lipson D P, Norwood G J, et al. Capitation Payment for Pharmacy Services[J]. Medical Care, 1984, 22(8): 737-745.
- [21] Yesalis CE, Norwood GJ, Helling DK, et al.

- Capitation Payment for Pharmacy Services[J]. Medical Care, 1984, 22(8): 746-754.
- [22] Yesalis CE, Norwood GJ, Lipson DP, et al. Capitation Payment for Pharmacy Services: Impact on Generic Substitution[J]. Medical Care, 1980, 18(8): 816-828.
- [23] Lipson DP, Yesalis CE, Kohout FJ, et al. Capitation Payment for Medicaid Pharmacy Services: Impact on Non-Medicaid Prescriptions[J]. Medical care, 1981, 19(3): 342-353.
- [24] Nguyen HTH, Bales S, Wagstaff A, et al. Getting Incentives Right? The Impact of Hospital Capitation Payment in Vietnam. Health economics[J], 2015, 26(2): 263-272.
- [25] Long SK, Coughlin TA, King J. Capitated Medicaid managed care in a rural area: the impact of Minnesota's PMAP program[J]. The Journal of Rural Health, 2005. 21(1): 12-20.
- [26] James BC, Poulsen GP. The Case for Capitation[J]. Harv Bus Rev, 2016. 94(7-8): 102-111, 134.
- [27] Bloom JR, Hu TW, Wallace N, et al. Mental health costs and access under alternative capitation systems in Colorado[J]. Health Services Research, 2002. 37(2): 315-340.
- [28] Bloom JR, Hu TT, Wallace N, et al. Mental health costs and outcomes under alternative capitation systems in Colorado: early results[J]. J Ment Health Policy Econ, 1998. 1(1): 3-13.
- [29] Yip W, Powell-Jackson T, Chen W, et al. Capitation combined with pay-for-performance improves antibiotic prescribing practices in rural China[J]. Health Aff (Millwood), 2014. 33(3): 502-510.
- [30] Balkrishnan R, Hall M A, Mehrabi D, et al. Capitation payment, length of visit, and preventive services: Evidence from a national sample of outpatient physicians[J]. American journal of managed care, 2002, 8(4): 332-340.
- [31] Hill H, Birch S, Tickle M, et al. Does capitation affect the delivery of oral healthcare and access to services? Evidence from a pilot contact in Northern Ireland[J]. BMC health services research, 2017, 17(1).
- [32] Hennig-Schmidt, H, Selten R, Wiesen D. How payment systems affect physicians' provision behaviour--an experimental investigation[J]. J Health Econ, 2011, 30(4): 637-646.
- [33] Lennon MA, Worthington HV, Coventry P, et al. The Capitation Study: Does capitation encourage more prevention?[J]. Br Dent J, 1990, 168(5): 213-5.
- [34] Hassall DC, Holloway PJ. Levels of restorative care under capitation[J]. Br Dent J, 1998, 184(7): 348-350.
- [35] Tu K, Cauch-Dudek K, Chen Z. Comparison of primary care physician payment models in the management of hypertension[J]. Can Fam Physician, 2009, 55(7): 719-727.
- [36] Puneet K Singhal BP, Ilene Zuckerman PP, et al. Quality of Drug Treatment of Childhood Persistent Asthma in Maryland Medicaid Recipients in Transition From Managed Fee for Service to Managed Capitation[J]. JMCP, 2007: 310-315.
- [37] Ralph A. Catalano PD, Janet M, et al. The Impact of Capitated Financing on Psychiatric Emergency Services[J]. Psychiatric services, 2005: 685-690.
- [38] Glazier RH, Klein-Geltink J, Kopp A, et al. Capitation and enhanced fee-for-service models for primary care reform: a population-based evaluation[J]. Canadian medical association journal, 2009, 180(11): 72-81.
- [39] Kangarloo H, Ho B, Lufkin RB, et al. Effect of conversion from a fee-for-service plan to a capitation reimbursement system on a circumscribed outpatient radiology practice of 20,000 persons[J]. Radiology, 1996, 201(1): 79-84.
- [40] Lurie N, Christianson J, Finch M, et al. The Effects of Capitation on Health and Functional Status of the Medicaid Elderly[J]. Ann Intern Med, 1994, 6(120): 506-511.
- [41] Jing L, Shu Z, Li M, et al. Evaluation of the empirical effect of the policy intervention of the new rural cooperative medical care with capitation payment[J]. China health economics, 2017(07): 35-37.
- [42] Li M, Shu Z, Huang X, et al. Analysis on the impact of policy intervention on outpatient service utilization of patients based on capitation[J]. China health economics, 2017(07): 41-43.
- [43] Huang X, Shu Z, Huang X, et al. Analysis of the impact of policy intervention on inpatient service utilization of patients based on capitation[J]. China health economics, 2017(07): 47-49.
- [44] Shu Z et al. Analysis on the impact of capitation payment on outpatient medical expenses based on time series[J]. China health economics, 2017(07): 38-40.
- [45] Shu Z, Li M, Gu J, et al. Analysis on the impact of head-to-head payment on hospital expenses based on time series[J]. China health economics, 2017(07): 44-46.
- [46] Chen R, Jing L, Shu Z, et al. Implementation effect evaluation of new rural cooperative medical care based on the perspective of demand-side "capitation"[J]. Chinese health

- economics, 2014(03): 21-24.
- [47] Jing L, Pu L, Cui X, et al. Analysis on the influence of the reform of "capitation" on the outpatient service behavior of participating farmers[J]. China health economics, 2014(03): 16-18.
- [48] Lou J, Jing L, Cui X, et al. A study on the impact of the reform of "capitation" on the participation of rural outpatient medical expenses[J]. China health economics, 2014(02): 21-24.
- [49] Cui X, Jing L, Sun X, et al. A study on the impact of the reform of "capitation" on the hospitalization expenses of participating farmers[J]. China health economics, 2014(02): 25-27.
- [50] Cui X, Jing L, Sun X, et al. Analysis on the influence of the reform of "capitation" on the hospitalization behavior of participating farmers[J]. China health economics, 2014(03): 18-20.
- [51] Ge X, Liu Q, You J, et al. Analysis on the application effect of capitation payment in hospital [J]. Chinese journal of hospital management, 2013, 29(8): 586-589.
- [52] Xu H, Liu Y, Ge X. A study on the influence of the payment model of capitation payment on obstetrics and medical expenses[J]. Modern health maintenance B, 2014(2): 291-292.
- [53] Shen H. "Three lines" of outpatient service planning in Shenzhen[J]. China medical insurance, 2012(01): 56-57.
- [54] Yang C, Yang M. Analysis on the effect of capitation for new rural cooperative outpatient service[J]. Journal of Sanmenxia vocational and technical college, 2012(02): 88-91.
- [55] Zhang Y, Xiong X, Pan K. Exploration and practice of the capitation for outpatient service in Dongguan[J]. China medical insurance, 2014(12): 31-34.
- [56] Wang M. The impact of cost compensation on demand and utilization of medical services[J]. Hospital management in China, 2005(09): 49-50.
- [57] Chen Q, Zhang Y. On the payment method of medical insurance outpatient service for retirees in enterprises and institutions in Hangzhou[J]. China health economics, 2006(11): 76-77.
- [58] Zhu J. Research on the influence of capitation on the governance of rural integration organizations[D]. 2014, Fudan university.
- [59] Cai G, Dong C. "Changde model" of capitation[J]. China social security, 2014(02): 76-79.
- [60] Lu F, Gao C, Xu F, et al. Capitation and open first-care reform: an analysis based on the survey of urban residents and household insurance[J]. China health economics, 2014(06): 37-39.
- [61] Zhang Z, Xu H. Tianjin medical insurance research institute, Effect analysis of "capitation" payment model for diabetes[J]. Management of rural health services in China, 2014(09): 1058-1060.
- [62] Lu Y. Effect evaluation of new rural cooperative outpatient service reform based on capitation on prescription behavior of village doctors[D]. 2014, Shandong university.
- [63] Hu M, Winnie C-M Yip, Chen W, et al. How to improve the efficiency and quality of rural primary medical services -- design and effect of the reform of the new rural cooperative medical care (NRCMS) outpatient system in ningxia[J]. China health policy research, 2014(08): 14-18.
- [64] Shu Z, Li M, Huang X, et al. Analysis on the changes in the satisfaction of both suppliers and suppliers of medical services before and after the policy intervention of capitation[J]. Management of rural health services in China, 2017(05): 500-502.