

# *Study on the Influence of National Centralized Drug Procurement on Drug Use in Hospitals in Border Areas—Take Bayingolin Mongolian Autonomous Region of Xinjiang Autonomous Region as an Example*

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**Abstract:** This study mainly focused on the supply and use of drugs in the Mongolian Autonomous Prefecture of Xinjiang Uygur Autonomous Region, investigated the actual supply and use of drugs purchased in public hospitals of the autonomous region in China, compared the sales volume of national drugs and the total sales volume of related drugs after the implementation of the national centralized procurement policy. The objective is to understand the coverage and practical application of the drug supply scope of major medical reform policies in the autonomous region, as well as the key factors affecting the utilization rate of national centralized drug procurement in the autonomous region. It is clear whether the coverage rate of drugs for major diseases in the centralized drug procurement scope organized by the state is more conducive to reducing the burden on the people.

## 1. Research background

### 1.1 The transformation and upgrading of pharmaceutical enterprises is a great boost to China's economic development

The domestic pharmaceutical market is mixed, and major pharmacies and hospitals circulate and sell drugs with uneven efficacy. The same drugs vary in ingredient content, drug traits, indications, adverse reactions and other aspects, and their clinical effectiveness and safety are not the same. So in the pharmaceutical industry, a top-down reform is imperative.

Through consistency evaluation and selection of qualified drugs, through government quantity bidding, drug manufacturers can compete with each other in the market, reduce drug prices, and achieve the purpose of winning the government procurement project. In the way of "quantity price", the quantity of drug procurement can be made open and transparent, reduce vicious competition in the market, eliminate cyclic high market costs, and reduce drug prices to a reasonable range. Get the drug market back on track.

A recent systematic review found that the phenomenon of irrational drug use in China is serious, manifested by unnecessary overuse of combined drugs, antibiotics and injectable agents<sup>[1]</sup>. From 1990

to 2009, drug sales accounted for over 40% of total revenue. From 1990 to 2008, the per capita outpatient drug expenditure increased rapidly from 10.9 yuan to 146.5 yuan, exceeding the GDP growth rate (GDP)<sup>[2]</sup>.

## **1.2 National centralized drug procurement is one of the important reforms to address irrational drug use**

As a quasi-public product, the price of drugs is closely related to the payment of medical insurance. The drugs intervened by the government are generally drugs with medical insurance compensation, and the pricing of drugs is restricted by the payment of medical insurance<sup>[3]</sup>. In January 2019, The General Office of the State Council issued the national centralized drug procurement policy, which is the first of China's first policy attempt to implement bulk drug procurement nationwide, aiming to reduce drug prices and save drug costs through the model of economies of scale. In the first round of "4 + 7" pilot, 11 cities were selected, including four municipalities directly under the Central Government (Beijing, Tianjin, Shanghai and Chongqing) and seven sub-provincial cities (Shenyang, Dalian, Xiamen, Guangzhou, Shenzhen, Chengdu and Xi'an). The policy has purchased a total of 25 drugs on the "4 + 7" purchase list<sup>[4]</sup>. Previous studies have reported that the "4 + 7" policy has achieved positive results in promoting the replacement of generic drugs to original drugs, reducing drug prices, and promoting rational drug use<sup>[5]</sup>.

## **1.3 The effect of the national centralized drug procurement policy after the implementation**

The "4 + 7" policy has an initial cost-saving effect on antihypertensive drugs, and the price is the main determinant of drug affordability<sup>[6]</sup>. It is scientifically suggested that the price monitoring and drug management of policy drugs should be strengthened in the future<sup>[7]</sup>. A study based on national drug procurement data reported that after the implementation of the "4 + 7" policy, the winning original and generic drugs, as well as the non-winning original drugs, significantly decreased by 33.20%, 75.74% and 5.35%, and the daily cost of non-winning generic drugs significantly increased by 73.66%<sup>[5]</sup>.

## **2. Research status, both at home and abroad**

### **2.1 Research status of centralized procurement**

#### **2.1.1 Centralized procurement shall guarantee the drug quality**

In order to ensure the quality and safety of the winning drugs, the following aspects must be done well: First, to ensure the controllability of the drug quality from the stage of the drug delivery to the patient medication. Second, in the process of drug bidding, we should strictly abide by the principles of fairness, openness and justice, and resolutely prevent unfair competition behaviors. Third, the pharmaceutical industry, medical insurance institutions and medical institutions should jointly establish the benchmark price range of drugs, and build an effective drug procurement and supervision system on the premise of ensuring drug quality, improving drug distribution and stabilizing drug prices.

#### **2.1.2 Centralized procurement makes drug prices lower**

In terms of reducing the purchase price of drugs, there are the following statements: First, batch purchase, with the advantage of quantity and price, in exchange for a lower purchase price. The second is to establish the joint procurement system. For the purpose of hospital management, the joint

procurement system should be established to realize the reduction of unit cost and also help to narrow the management gap in the field of medical care. Third, the government strives to create a competitive pattern where  $N$  is greater than  $n$ , that is, select the winning pharmaceutical enterprises and set the price of drugs within a reasonable range; fourth, the introduction of reference pricing. After scientific research and investigation of reference pricing policy in OECD countries, it is considered that RP usually reduces the price of drugs subject by the policy. Fifth, medical institutions adopt the method of curative effect substitution, that is, in the process of drug bidding, more alternatives and alternative drugs can be selected for similar quality treatments, so as to ensure the sufficient quantity and types of drugs, and then reduce the purchase price of drugs to the greatest extent.

### **2.1.3 Research on "quantity and price correlation"**

From the perspective of procurement economics, a certain procurement amount is a necessary and sufficient prerequisite to reduce the procurement price of drugs to keep the quality of drugs unchanged or even improved. As in foreign countries, China's pharmaceutical system is designed to reduce the purchase price of drugs by linking the sales quantity of drugs with the sales price. On the basis of the original purchase price, the purchase of medical insurance drugs in China follows the principle of purchase with quantity, dynamically adjusts the purchase price of drugs according to the quantity of drug purchase, exchanging the market for the space of price reduction, and the quantity, and the drug purchase supervision and management system is implemented. Although the strength is a little lacking, it is becoming increasingly perfect.

### **2.1.4 Study on drug supply**

After fully studying the drug pricing strategies in Germany, Australia and other countries, some scholars found that the government unilaterally limiting the price of drugs can indeed reduce the cost of drug procurement in the short term, but in the long run, it is likely to affect the timely supply of drugs. As for the supply problem in the centralized drug procurement organized by the state, Chinese scholars proposed to encourage excess supply but its scale should be moderately controlled, and link the actual supply of the winning enterprises with the high-level innovation investment.

## **2.2 Research on the impact of volume procurement on pharmaceutical manufacturing enterprises**

The implementation of the reform of the medical and health system and the introduction of the procurement policy with quantity have led to the competition between the original research drugs and the generic drugs, and the profits of the pharmaceutical enterprises have decreased significantly, which has formed a certain impact on the pharmaceutical enterprises. For generic drug companies, drug prices must be lowered in order to obtain orders and ensure a certain market share. The price reduction not only reduces the profits of enterprises, but also reduces the profits of enterprises. Some enterprises that cannot reduce the cost begin to take risks to reduce the quality of drugs, which brings huge potential risks to drug procurement. In the long run, purchasing with volume will force more and more generics companies out of the pharmaceutical market. Some scholars believe that the impact of the implementation of the volume procurement policy will have a profound impact on pharmaceutical enterprises in terms of price, cost, market share and enterprise scale.

### **3. Centralized procurement**

#### **3.1 Concept of centralized procurement**

Centralized procurement refers to the centralized procurement of goods, projects and services in the centralized procurement catalogue. Pharmaceutical centralized procurement is the latest mode of medical procurement, namely the country for a large number of medical demand in the form of public bidding selection quality assurance, a procurement model of reasonable price suppliers, participate in purchasing pharmaceutical enterprises in addition to consider competitive factors such as price, but also consider their own production capacity and cost management level<sup>[8]</sup>. In November 2018, 11 pilot cities for centralized drug procurement including Beijing and Tianjin were established, which was the "4 + 7" volume procurement that caused a stir in the industry<sup>[9]</sup>.

#### **3.2 Characteristics of centralized procurement<sup>[10]</sup>**

##### **3.2.1. High degree of concentration**

Drug volume procurement improves the concentration of drug procurement from the perspectives of buyer and seller. From the buyer level, the government organizes the demand side of all drugs to form a consortium to determine the overall drug demand, and conducts the procurement operation by a unified platform. From the seller level, the promise of a single source, for some special drugs can only be provided separately, the enterprise will directly obtain the qualification of drug procurement, in the selection and selection process, if a pharmaceutical company chooses the price, while another pharmaceutical company chooses not to drop, so the first batch of pharmaceutical companies can choose to occupy all the listed hospital market declaration varieties.

##### **3.2.2. Centralized control of procurement business to reduce procurement costs**

Similar to the previous procurement system, the centralized procurement of medicine collects the local actual annual drug volume through local medical institutions, and takes a certain proportion of the total amount as the estimated procurement amount, so as to negotiate and negotiate with pharmaceutical enterprises to achieve the purpose of reducing the drug price.

##### **3.2.3. Prepay of the medical insurance fund to form a supply base**

Also known as "budget procurement", it means that the pharmaceutical enterprise that wins the contract after signing the contract enjoys a certain percentage of advance payment treatment before delivery. When the medical institutions or drug procurement institutions directly sign contracts with the drug supply enterprises and complete transactions, the settlement of payment can be directly settled by the medical institutions or the drug procurement institutions and the drug supply enterprises, or by the medical insurance institutions and the drug supply enterprises, gradually forming a supply industry chain.

### **4. Research content**

The study mainly focuses on the supply and use of drugs in major tertiary A public hospitals after the implementation of the national centralized drug procurement policy in Xinjiang Uygur Autonomous Region. The actual supply and use of regional hospitals were investigated, and the results were presented through descriptive analysis. The purpose is to understand the coverage and practical application of the major policy of drug supply lineage in the autonomous region. It is clear

whether the coverage rate of drugs for major diseases in the centralized drug procurement scope organized by the state is more conducive to reducing the burden on the people.

In this study, isosorbide mononitrate sustained-release tablets and voriconazole tablets were used as examples to study the change of drug unit price and regional purchase volume after the implementation of drug collection, and observe and compare the purchase of drugs.

## 5. The results of the study

### 5.1 Changes in the number of voriconazole tablets in Xinjiang and Bazhou, Xinjiang

Voriconazole tablets are a triazole broad-spectrum antifungal agent with good antimicrobial activity against *Aspergillus*. Our investigation found that voriconazole tablets 50mg \* 10 tablets (produced by Beijing Bokang Jian Gene Co., LTD.) are the fourth batch of Xinjiang (including production and Construction Corps) purchased by the state. Effective from May 10, 2021. Before winning the bid, the price is 449 yuan / box, and the winning price of the collective purchase is 119.88 yuan / box. In 2020, the Xinjiang factory only sold 100 boxes, the proportion of the same products in the same period was 3.33%, and Xinjiang Bazhou bought 0 boxes; In 2021, Xinjiang will purchase 24,700 boxes from the bidding factory, accounting for 75.53% of the same product, and Xinjiang Bazhou will purchase 580 boxes; In 2022, Xinjiang will purchase 29,500 boxes of bidding factories, accounting for 89.93% of the products of the same name in the same period, an increase of 19 boxes from 2021.4%; In 2022, Xinjiang Bazhou purchased 1,680 boxes, an increase of 189% over 2021; See the picture below. Thus, since its implementation in 2021, it has helped Xinjiang to save medical insurance expenditure at least 8129,264 yuan, 190,889.6 yuan; in 2022, it helped Xinjiang to save 9709,040 yuan and 1079513.6 yuan, as shown in Figure 1.

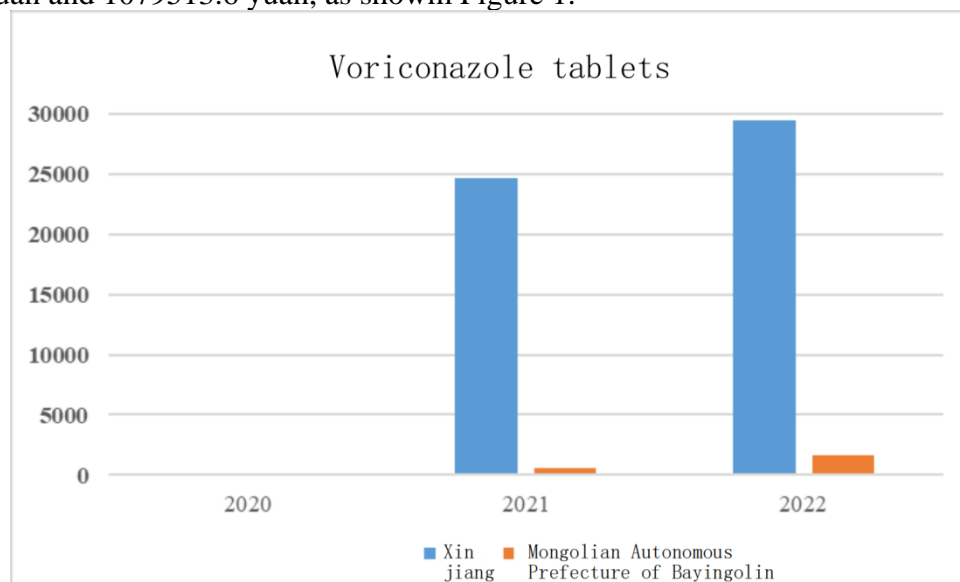


Figure 1: Changes in the number of voriconazole tablets (Beijing Bokangjian) in Xinjiang and Bazhou of Xinjiang in the past three years (the assumed model is that the total demand of voriconazole tablets per year is certain)

### 5.2 Changes in the number of isosorbide mononitrate sustained release tablets in Xinjiang and Bazhou, Xinjiang

Isosorbide mononitrate is a new generation of anti-angina pectoris drugs, which is mainly used in the long-term treatment of coronary heart disease and the prevention of angina pectoris. The

investigation found that isosorbide mononitrate tablets (Lepu Pharmaceutical Co., Ltd.) were selected from the sixth batch of Xinjiang (including production and Construction Corps). Effective from September 10, 2021. Before winning the bid, the price is 23.98 yuan / box, and the winning price is 19.18 yuan / box. In 2020, only 5000 boxes in Xinjiang and 620 in 2021, 60000 in 2021 and 13510, up 1100% and 2079% in 2022 in 2022 and 209% compared with 2021. It helped Xinjiang save 2,338,560 yuan of medical insurance expenditure, and helped Bazhou save 2,00,486.4 yuan of medical insurance expenditure, as shown Figure 2.

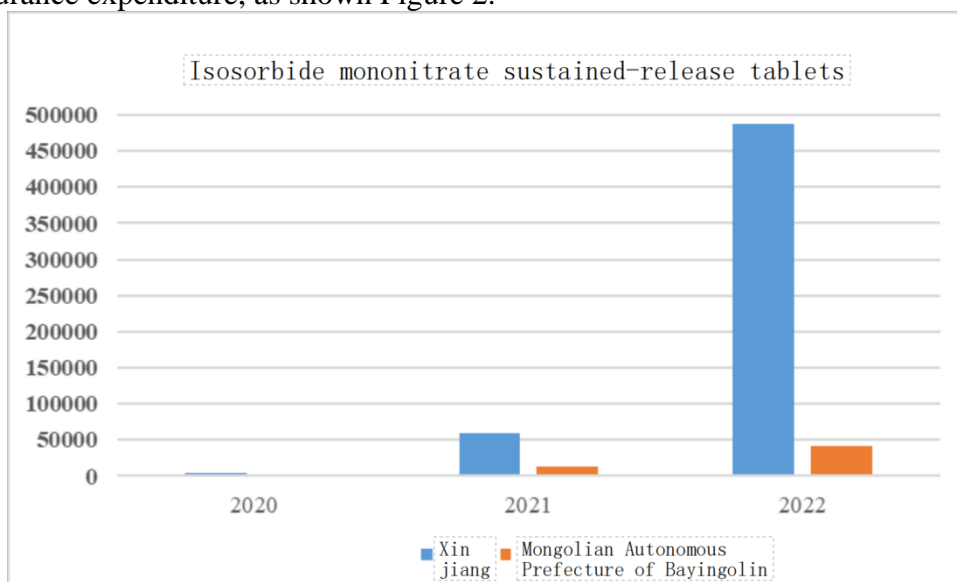


Figure 2: Changes in the number of isosorbide mononitrate sustained-release tablets in Xinjiang and Bazhou in the past three years

The assumed model is that the total annual demand of isosorbide mononitrate is certain.

## 6. Summary and suggestions

### 6.1 The government

#### 6.1.1 Increase government subsidies to encourage pharmaceutical enterprises to develop innovative drug research and development

For small and medium-sized enterprises, the research and development of innovative drugs often needs continuous financial support, and the research and development results are extremely uncertain. Therefore, the government should increase subsidies for the research and development of innovative drugs in pharmaceutical enterprises to help enterprises avoid the risks caused by participating in quantity procurement, and encourage the independent research and development work of research and development centers, so as to develop more innovative drugs and form a benign development.

#### 6.1.2 Improve the relevant legal system to protect the innovative drug market

There is still much room for progress in the research and development level of pharmaceutical enterprises in China, and the relevant regulatory system and other relevant laws and regulations have not been improved. As a result, some enterprises in the market take advantage of this point to exploit legal loopholes and steal the research results of other enterprises' innovative drugs, resulting in vicious competition. Therefore, the relevant government agencies should accelerate the pace of improving the relevant legal system of the innovative drug market, and promote the healthy competition among

enterprises, so as to further improve the research and development level of pharmaceutical enterprises.

### **6.1.3 Strengthen the monitoring of drug transactions**

In order to standardize drug procurement in medical institutions and purify the drug circulation environment, all competent departments should strengthen the supervision of drug trading, urge drug distribution enterprises to timely supply, formulate and improve the corresponding punishment laws and regulations, establish and improve the dynamic management mechanism of drugs, and constantly improve the supporting policies of centralized procurement.

## **6.2 Enterprises**

### **6.2.1 The Angle of large pharmaceutical enterprises**

#### **(1) Improve the operating capacity of enterprises**

Enterprises should actively seek ways to reduce the proportion of enterprise inventory in current assets and the proportion of accounts receivable in current assets, so as to increase the proportion of working capital of enterprises, so as to improve the operating capacity of enterprises. Therefore, enterprises should seize the opportunity of the quantity procurement and actively participate in the quantity procurement. Public medical institutions shall use the medical insurance fund to pay a certain proportion of advance payment in accordance with the provisions of collective procurement, and complete the payment of all orders within the prescribed period, so as to further promote the ability of enterprises to collect payment and improve the performance of enterprises.

#### **(2) Enhance enterprise development capacity**

The wide application and implementation of the volume procurement policy makes the majority of practitioners deeply realize that this industry has been at the inflection point of development, and faces both new opportunities and new challenges in the future. Enterprises should, based on their own actual situation and combined with the development trend of the industry, reasonably formulate enterprise development plans and enhance their sustainable development ability. At present, large pharmaceutical manufacturing enterprises need to pay more attention to the challenges faced by the enterprise strategy under the new volume procurement policy, and they need to think about how to layout the future so that enterprises can better deal with the risks brought by market changes.

### **6.2.2 Perspective of small and medium-sized pharmaceutical enterprises**

#### **(1) Do a good job in cost control and scientific accounting of bidding prices**

For small and medium-sized enterprises, it is more important to survive, reduce costs, focus on increasing investment in research and development, pay attention to the efficacy and targeting of products, take innovative drugs as the winning chip in the future quantity procurement, and actively participate in the quantity procurement. Do a good job in financial accounting, accurately calculate the break-even point of the enterprise, determine the final quotation of the enterprise, and measure the risk between the bid and the bid at the low price.

#### **(2) Transformation and upgrade the sales promotion mode**

In order to cope with the new opportunities and challenges brought by "purchasing with quantity", pharmaceutical manufacturing enterprises must transform and upgrade the original sales promotion mode. Pharmaceutical enterprises should pay attention to the market demand, make the research and development of new products and make the improvement of new technologies according to the demand, improve the research and development efficiency of enterprises through specific market research and clinical feedback information, and seize the opportunity as soon as possible to fill the market gap.

### (3) Respond to the policy call and enhance the dynamic capabilities

Small enterprises should focus on the policy support and preferences given by the state, give priority to enhancing their own dynamic capabilities, and make use of their own flexibility to respond quickly to the changes in the external policy environment, so as to maintain the stable growth of corporate financial performance. Gradually increase the total amount of R & D expenses, or adopt the form of R & D outsourcing to accelerate the layout of new products; improve the production process, reduce the production cost; increase the production capacity to meet the purchase supply and reach the marginal production cost; improve product quality, help the "consistency evaluation", make the enterprise stand out in the fierce competition.

## References

- [1] Mao W, Vu H, Xie Z, et al. Systematic review on irrational use of medicines in China and Vietnam. *PLoS One* 2015; 10: e0117710.
- [2] Mao W, Chen W. The zero Mark-up policy for essential medicines at primary level facilities. Background paper, China. 2015.
- [3] Kang S Y, DiStefano M J, Socal M P, et al. Using external reference pricing in Medicare Part D to reduce drug price differentials with other countries. *Health Affairs*, 2019, 38(5): 804-811.
- [4] Joint Procurement Office. Announcement of the results of the planned selection of centralized drug procurement in 4 + 7 cities. 2018.
- [5] Wang J, Yang Y, Xu L, Shen Y, Wen X, Mao L et al. The impact of National Centralized Drug Procurement policy on the use of policy-related original and generic drugs in public medical institutions in China: A difference-in-difference analysis based on national database. *medRxiv* 2021. 06. 21. 21256568. 2021.
- [6] National Academies of Sciences EAM, Division HAM, Services BOHC, Therapies COEP. Making Medicines Affordable: A National Imperative. Washington (DC): National Academies Press (US); 2017.
- [7] Yang Y, Tong R., Yin S. et al. The impact of "4 + 7" volume-based drug procurement on the volume, expenditures, and daily costs of antihypertensive drugs in Shenzhen, China: an interrupted time series analysis. *BMC Health Serv Res* 21, 1275 (2021).
- [8] Lu J, Long H, Shen Y, Wang J, Geng X, Yang Y, Mao Z, Li J. The change of drug utilization in China's public healthcare institutions under the "4 + 7" centralized drug procurement policy: Evidence from a natural experiment in China. *Front Pharmacol.* 2022 Aug 23; 13: 923209.
- [9] Long H, Yang Y, Geng X, Mao Z, Mao Z. Changing Characteristics of Pharmaceutical Prices in China Under Centralized Procurement Policy: A Multi-Intervention Interrupted Time Series. *Front Pharmacol.* 2022 Jul 15; 13:944540.
- [10] Huang A, Wang X, Tao Y, Lin L, Cheng H. Healthcare professionals' knowledge, attitude and practice towards National Centralized Drug Procurement policy in central China: A cross-sectional study. *Front Pharmacol.* 2022 Oct 7; 13: 996824.