

Analysis and Suggestions on current situation of Chinese Drug Shortage Problem

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Abstract. Medicines play an important role in protecting people's health, but drug shortage is a long-standing and complex problem in the world. As the world's second largest pharmaceutical market, China's drug shortage problem occurs frequently and requires a lot of research to be solved. This study uses the method of literature analysis to summarize the statistics, research and reports mainly from China on the domestic drug shortage problem. It is found that the main reasons for China's drug shortage are low drug profits, flawed centralized procurement policies, drug production capacity and insufficient development and inadequate supplement of APIs. According to this, this study also puts forward related suggestions including strengthening system construction, guaranteeing Supply and Strengthen Monitoring and improving the supply security of active pharmaceutical ingredients. This study enables other scholars to understand the situation of drug shortages in China, and also provide theoretical support for policy improvement and subsequent research.

Keywords: Drug shortage, China, Analysis, Suggestions.

1. Introduction

Medicines are commodities that treat, prevent, and diagnose diseases, and are what people need to ensure their health. Drug shortage will delay patient treatment, and the use of alternative drugs with poor efficacy and high side effects; increase the workload and work pressure of medical staff; and increase the economic burden of the national health system. Drug shortage is a global and complex problem [1]. Drug shortages also occur frequently in China. For example, protamine shortages occurred in many places in 2011, resulting in the inability to perform many cardiac surgeries; from 2012 to 2013, methimazole tablets were out of stock across the country, resulting in an increase in the price of the drug and the need to rely on imported drugs [2]. Although the Chinese government has listed drug supply security as an important content in the 13th Five-Year Plan, Healthy China 2023 Plan and other outline documents, there are many fundamental problems that need to be solved to solve the drug shortage problem. The current research mainly focuses on the current situation of drug shortages in China, such as dosage form, treatment effect category, regional distribution [3-5]; the practice of monitoring and early warning [6-8], and the analysis of single categories of drugs or causes [9, 10]. These studies can help other scholars quickly understand the current status and causes of drug shortages in China. However, existing research lacks specific explanations and analysis of the causes of drug shortages. This study summarizes and analyzes Chinese scholars' reviews, data analysis, and interviews on the causes of drug shortages to provide a specific and objective description of the causes of drug shortages in China. Clarifying the causes of drug shortages in China is of great significance to the formulation and improvement of policies, legislation, and law enforcement. At the same time, China is the world's second largest pharmaceutical market, and analyzing the reasons for its drug shortages has reference significance for other high, middle- and low-income countries.

2. Reasons of Drug Shortage

2.1. Low Profit of Drugs

In China, pharmaceutical manufacturers and hospitals trade directly on the provincial drug equipment procurement platform network, and in order to comply with policy, enterprises have to set

the prices of the drugs lower than the limit price making by local governments. However, the current costs of drugs in China have increased, such as the the raw material cost and transportation cost. This phenomenon leads to the predicament that the cost of the drugs is higher than the limit price [11]. Therefore, some cheap and effective drugs that have been used for a long period can't bring profit to enterprises, and it even brings negative economic benefits. So enterprises may be unwilling to manufacture, reduce the output and adjust product structure to replace such drugs by produce high-profit products [12]. Also, enterprises which have won the bid previously can't drive up prices, so they have to abandon the bid in order to maintain the business. According to some researches, the low-price drugs account for a large proportion of the shortage drugs [12], and professionals generally reflect the problem that some clinically necessary drugs, rescue drugs, and rare disease drugs are priced too low, and manufacturers are reluctant to produce them [11].

2.2. Defects of National Centralized Drug Procurement

There are some defects of the current policy of the drug bidding in national centralized drug procurement. The basic drugs are all included in medical insurance catalog drugs to make sure that these drugs can be reimbursed by the health insurance. In other to make sure the availability, Chinese government use the strategy that "large quantity for low prices" [13]. However, a study shows that from 2016 to 2018, the average annual shortage of essential medicines in each province (city) accounted for more than 50% [14]. One of the problems of centralized drug procurement which leads to the drug shortage is the insufficient specification [15]. In the grouping process of the centralized drug procurement, grouping is mainly based on the same generic name and the same route of administration. However, different specifications have an impact on patient compliance. Insufficient specification leads to that drugs available in the hospital cannot meet the needs of patients, so it causes the drug shortage to some extent. The second problem is that the circuit breaker mechanism of centralized procurement did not achieve the expected results and affected the operation of the medical insurance system. According to the Chinese government, the price difference of the selected varieties cannot exceed 1.8 times [16]. However, the research has found that the fuse mechanism did not fully used in practice, and it also mentions the problem leads to the unbalance that "companies selected at low prices tend to choose economically developed regions, while companies selected at high prices tend to choose economically underdeveloped regions" [15]. In Chinese health insurance system, the cost of the centralized drug procurement is payed from the local health insurance fund, so the unbalance may cause negative effect on the insurance especially to the relatively economically backward areas. The third and most important reason is the lack of comprehensive evaluation of the company's such as supply capacity and risk-taking capabilities and appropriate subsidy measures during the bidding process. In China, the lower the price, the easier for enterprises to win the bid while the government cannot make adequate evaluation to the manufacturer's production capacity, quality management and credit. So enterprises win the bid with a quite low price, but many of them give up the bid for the reasons that the low capacity of factories, unreasonable low price and low benefit of drugs [17]. Medical insurance drugs are the key support for the operation of medical insurance, and the shortage of a large quantity of these drugs will inevitably affect the operation of medical insurance [18].

2.3. Stop Production and Lack of Research and Development

Though stop production is not as serious as low profit issue, it can be frequently found in studies and reports. For example, Ibuprofen sustained release capsules supply adequately in China in 2019 because of the insufficient production capacity [19]. A main reason for the stop production is the quality management and the change of laws, regulations and quality standards. In order to fit the standards, enterprises need to Invest a lot of money to improve the quality management system, upgrade the industrial line and train the workers to cope with the certification or inspection of Good Manufacturing Practices. During this period, the factory could not sustain the supply of medicines. For example, in 2015, the Baijingyu Pharmaceutical Company sterilized and upgraded the area of

ophthalmic preparations for 11 months, and its stop production during this period caused the shortage of the Chlortetracycline eye ointment in Chinese market [20]. Currently, though the brand new GMP has been published in 2023 and it abolishes the certification system, manufacturers are still facing more and more strictly supervision and inspection.

There are relatively few innovative new drugs in China because of it started late and of its characterizes of complexity, high investment in originality, and long development cycle [21]. Taking medicine for children as an example, the development of dosage forms that suitable for children is more difficult than that for adults, and the cost of research and development and production is higher, which means higher cost in research and development. As a result, most pharmaceutical manufacturers are lacking motivation for research, so the scarcity of dosage forms may be possible to cause the shortage of drugs for children [22]. What's more, some researchers consider that when drugs just invented, as its market is in the development stage, consumers do not have enough awareness of the product, and the market sales are sluggish, it has some risks to cause the shortage of drugs [23].

2.4. Stop Production and Lack of Research and Development

The shortage of active pharmaceutical ingredient is one of the biggest issues of drug shortage in China. Firstly, some API are hard to get due to the complex craft and seasonal reason [24]. For example, the Protamine, the only substance against heparin in surgery [25] has been nationally shortages for many times. The raw material "protamine" is a basic protein sulfate extracted from fresh mature sperm of fish. The extraction technology is difficult and cannot be chemically synthesized. In addition, the extraction of fish sperm is affected by the seasonal characteristics, which limits the production of drugs.

Secondly, there are few manufacturers in China. Because the market access mechanism is too strict, API manufacturers have to spend a lot of money to cope with inspection while the profit of the API is usually low, so the number of manufacturers in China is not adequate to support the healthy market competition [26]. This phenomenon leads to two problems of the supplement of API. The first problem is the high risk of stop production of API. According to research [27], 10% of raw materials can only be produced and supplied by single-digit manufacturers, and the API of 2 drugs in the National Key Monitoring List of Clinically Necessary and Shortage Drugs can be only produced by 2 companies. If these factories have some problems of the quality and capacity, or if there are some accidents happen in the production line, the stop production may probably cause the shortage of various drugs. The other problem is speculation and monopoly. Because the companies' profitability character and the low price of many kinds of API, enterprises have to be monopolized to get enormous profits. In reality, competitors enter into price monopoly agreements in a covert manner to manipulate drug prices [26]. Also, they use monopoly to harass the market by refusing to trade, using unfair prices, imposing unreasonable trading conditions and using tying sales [26]. However, the punish to the monopoly is not serious enough. For example, in April, 2022w, the TianJin KingYork Group Hubei TianYao Pharmaceutical Company was fined 29.88 million yuan for violating the Anti-Monopoly Law, but this did not affect its 2022 performance, and it was not the only time it was punished [28].

3. Suggestions

3.1. Strengthen System Construction, Clear Division of Labor and Strengthen Cooperation of Each Parts

The reasons and situations for the current management of drug shortages in China are complicated, and the security work is also difficult. Moreover, Chinese drug shortage system management started relatively late. Chinese government should begin with organizing and carrying out detailed research on the characteristics of drugs in shortage such as cause analysis, policy impact analysis to provide technical Support to address drug shortages [29], and then improve the organizational structure of shortage drugs management, clarify the responsibilities of all parties, and strengthen the supervision

of the performance of relevant departments [30]. Solving the drug shortage problems needs the participant of each sector such as Health Commission, industrial and commercial bureau. So the government should improve the cooperation of each department, cooperate with industry associations like Chinese Pharmaceutical Association and conduct research and judgment on the shortage of drugs and take measures according to the classification and grading standards [31, 32].

3.2. Guarantee Supply and Strengthen Monitoring

To begin with, relevant sectors can incorporate more shortage drugs, especially which impact on public health and clinical treatment into medical insurance and increase reimbursement rates in order to ensure its priority supply status [22]. Then, improve the bidding system for centralized procurement and inspect drug suppliers in many aspects, especially long-term quality assurance and continuous supply capabilities; accelerate the formulation and introduction of laws and regulations for centralized procurement processes; government supervision and even set penalties to make medical institutions pay for drugs as soon as possible payment to ensure the capital circulation of the winning bidder [33]. For low-cost drugs that have won bids, in order to ensure that their supply is not cut off due to low profits, the government can provide appropriate prices for such drugs and provide appropriate financial support and policy support such as reducing taxes [34]. For companies that maliciously win bids and compete maliciously, it is necessary to increase penalties, increase the cost of breach of contract, and restrict their access to the market. For example, a list of violations should be formulated to restrict the application process of centralized procurement by illegal companies [15].

Improving the role of manufacturers, dealers and patients in report information to enhance the early warning of drug shortage. Currently, each province in China has individual monitoring System and hospitals play the most important role in report information. Though hospital can report information precisely, it is also characterized by its hysteresis because its relevant staff have significant pressure in dealing with both their work and drug shortage issues and it does not know about the situation of production and shipping [35]. Some researchers suggest two ways to improve the situation. Firstly, Improve the drug shortage information monitoring and management system in various provinces and cities. Improve the channels for manufacturers, hospitals, and patients to report drug shortage information and the coordination of information sharing, and strengthen the responsibility awareness of all parties for drug shortages [20]. Secondly, implement the responsibility of manufacturers and dealers in monitoring at the legal level and clarify reporting requirements and standards [34].

3.3. Improve the Supply Security of Active Pharmaceutical Ingredients

Because monopolistic behavior is relatively hidden and drug transactions are complex, some scholars believe that China needs to continue to improve legislation and law enforcement and strengthen the normalized antitrust review mechanism [36]. Punishments need to be strengthened because many companies that have been punished in time can still gain huge advantage through monopolistic behavior. So the laws need to clarify the penalties for violations and increase the intensity of penalties for API monopolization, such as increasing the amount of penalties and restricting the business activities of illegal companies [37]; On the premise of ensuring the quality and quantity of APIs, the government can appropriately reduce the market access for APIs to increase the number of manufacturers and broaden the supply channels for APIs to optimize market competition [38]; Laying out patented APIs is also a solution. The development and production of high-end APIs such as innovative APIs and specialty APIs will help enterprises improve their market competitiveness. But now the cost of intellectual property protection is very high, and the government needs to improve policies, and companies need to increase investment in talents, funds, and technology [39].

4. Conclusion

This study summarizes and analyzes the reasons for drug shortages in China. The reasons are 1) The profits of some drugs are too low: rising costs prevent drug manufacturers from selling at the same price. Continue supply; 2) Imperfect centralized procurement policy: There is a lack of comprehensive inspection of suppliers in bidding, resulting in bid abandonment and supply interruption; 3) Stop production and lack of research and development: Enterprises have insufficient production capacity or product The quality is not up to standard and the production is stopped. The lack of research and development of some drugs leads to the lack of enough drugs in the market. 4) Lack of API: The production process of some APIs is complicated or affected by the weather. The market access is too high and the number of suppliers is insufficient. Monopolistic behavior. continue living. In addition, this study also puts forward suggestions for solving these reasons: 1) Improve the policy system to deal with drug shortages, strengthen the setting of supporting documents, and strengthen the clear division of labor and cooperation between relevant departments; 2) Strengthen drug supply guarantee and improve monitoring System; 3) Improve the supply security of active pharmaceutical ingredients. This study enables scholars to comprehensively understand the shortage of drugs in China, and the study can continue to be refined in the future, such as improving the drug shortage reserve policy, strengthening the supply guarantee of raw materials, and improving the drug shortage monitoring and early warning system.

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