

Optimization Research of Pharmaceutical Cold Chain Logistics

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Abstract: In recent years, under the promotion of national policy, China's pharmaceutical cold chain logistics has gained rapid development, but at the same time there are some problems. To this end, this paper firstly describes the current situation of the development of pharmaceutical cold chain logistics in China, secondly puts forward the problems existing in the development of pharmaceutical cold chain logistics, and finally puts forward the corresponding improvement measures, in order to be able to effectively solve these problems and promote the healthy development of pharmaceutical cold chain logistics.

Keywords: Pharmaceutical cold chain; cold chain logistics; optimization.

1. Introduction

In recent years, under the promotion of national policies, cold chain logistics in China has gained rapid development, but there are still many challenges. Compared with the cold chain logistics industry of agricultural products and food, the pharmaceutical industry has certain special characteristics, and has higher requirements for related equipment and environment. Especially vaccine safety incidents occur frequently, the safety of pharmaceutical logistics is increasingly gaining people's attention. Therefore, how to improve our pharmaceutical cold chain logistics level and promote the development of pharmaceutical cold chain logistics has become the focus of social concern. The article analyzes the current situation and problems of pharmaceutical cold chain logistics, and puts forward corresponding optimization countermeasures to further promote the development of pharmaceutical cold chain logistics in China.

2. Relevant Concepts

2.1. Cold chain logistics

Cold chain logistics (Cold Chain Logistics) refers to the procurement, processing, storage, circulation, distribution and other steps, the final state of the goods will be controlled in the best cold chain state, and as far as possible, it will be placed in a lower temperature, so as to improve the quality of goods, and effectively extend its storage time. The common cold chain goods in China include: aquatic products, agricultural products, frozen food, pharmaceuticals, chemicals and electronic components that are easily affected by temperature, and so on.

2.2. Pharmaceutical Cold Chain

Pharmaceutical cold chain refers to the specialized cold chain transportation and storage system established in the process of pharmaceutical logistics for the requirements of maintaining specific temperature conditions for drugs, vaccines and other medical products. Pharmaceutical cold chain system mainly includes transportation, warehousing and other links to ensure that pharmaceutical products in the production, transportation, storage and sales process to maintain appropriate humidity and temperature conditions, so as to ensure the quality and safety of pharmaceutical products.

3. The Current Situation of China's Pharmaceutical Cold Chain Logistics Development

3.1. Strong development of pharmaceutical cold chain logistics industry

According to recent data, in 2020, the total retail value of China's pharmaceutical cold chain market has exceeded 390.34 billion yuan, which is 14.97% higher than the previous year. Due to factors such as the concentration of new crown vaccines on the market and people's increasing emphasis on their own health issues, the overall total retail sales in this sector has climbed to 481.4 billion yuan in 2021. In 2022, due to the continuation of the outbreak, the total retail sales in this sector has been further boosted to 545.9 billion yuan.

3.2. Pharmaceutical Cold Chain Logistics Infrastructure is Getting Better and Better

With the rapid growth of the demand for cold chain logistics in the fields of medicine, food and agriculture, China's reefer ownership continues to rise, to 2022, China's reefer ownership has reached 369,000 units. From the cold storage situation, China's cold storage capacity continues to expand rapidly, from 36.09 million tons in 2017 to 56.86 million tons in 2022.

3.3. Pharmaceutical cold chain logistics standard update

On November 26, 2021, the Technical Code for Pharmaceutical Cold Chain Logistics Operation was released, which put forward new requirements to ensure the safe and effective transportation of medicines, including: strict staffing and skill drills, improved facilities and equipment inspection and accreditation, fine logistics operations, strict treatment of temperature inspection and control, and improved internal inspection.

3.4. Pharmaceutical cold chain quality and safety improvement

Due to the continuous increase of administrative supervision and the "zero tolerance" attitude of the society towards the quality and safety of pharmaceutical cold chain,

cold chain technology and equipment are rapidly applied in the field of pharmaceutical cold chain logistics, thus promoting the pharmaceutical cold chain to informationization and intellectualization.

4. Problems in the Development of Pharmaceutical Cold Chain Logistics in China

4.1. Higher cost of pharmaceutical cold chain logistics

Due to the long process of pharmaceutical cold chain logistics chain, the whole process of cold chain logistics temperature-controlled transportation needs to provide continuous temperature equipment control, low-temperature environment also increases the staff's work intensity and professionalism requirements, which will improve the corresponding labor costs, thus increasing the cost of pharmaceutical cold chain logistics. Furthermore, in order to achieve the purpose of improving the efficiency of cold chain work, the pharmaceutical cold chain logistics industry has continuously introduced a variety of information systems. At the same time, the requirements for cold storage, refrigerated trucks and drug quality involved in the drug distribution process have become more and more stringent, but these improvements have also increased the cost of distribution management.

4.2. Pharmaceutical Cold Chain Logistics Technology and Facilities Construction in Some Regions Urgently Needs to be Upgraded

China's pharmaceutical cold chain logistics technology and management level has been improved in recent years, but the problem of broken chain still occurs in cold chain logistics, which indicates that there are still technical problems in the construction of pharmaceutical cold chain logistics. There are still some gaps in the construction of pharmaceutical cold chain logistics facilities, especially in small and medium-sized cities and rural areas, the lagging problem of cold chain facilities construction has not been solved fundamentally, resulting in the demand for cold storage and freezing of pharmaceutical products can not be effectively met. In terms of regional layout, the distribution pattern of cold storage is not balanced, in which the number of cold storage in the southeast region is larger than that in the northwest region.

4.3. Lack of pharmaceutical cold chain logistics professionals

Pharmaceutical products belong to high-demand, high-tech and high-standard materials, in which the drugs requiring cold chain transportation are highly sensitive to the environment. Therefore, in order to ensure their quality, we not only need to have advanced equipment, but also need a professional logistics team. Although China has gained great development in the field of logistics in recent years, there is still a shortage of high-end logistics experts, the training of logistics-related talents lags behind the rapid development of modern logistics, and at the same time, there is a serious lack of talents in the field of pharmaceutical logistics, which greatly impedes the further development of China's pharmaceutical cold chain logistics industry.

4.4. Pharmaceutical cold chain logistics regulatory system is imperfect

Because of its high cost, high value and high complexity, pharmaceutical products must have more strict management in supervision. In some developed countries, a perfect standardized and transparent pharmaceutical cold chain logistics regulatory mechanism has been established. However, in China, there are still many problems in the supervision of pharmaceutical cold chain market, such as the lagging of the supervision mechanism, poor operability, and lack of clarity of the legal provisions of the illegal behavior, which leads to the existence of some unqualified enterprises and products in the market, and brings potential safety risks to the consumers.

5. The optimization of the Development of Pharmaceutical Cold Chain Logistics Countermeasures

5.1. Control the cost of pharmaceutical cold chain logistics

Firstly, establish a reasonable logistics network, optimize the logistics network, choose suitable logistics suppliers and partners in order to reduce logistics costs; consider establishing a pharmaceutical cold chain logistics transit center to reduce the logistics path and transportation time. Secondly, integrate the supply chain, work closely with supply chain partners such as suppliers, distributors and retailers, implement supply chain integration and synergy, and make joint efforts to reduce logistics costs; measures such as sharing logistics resources, centralized purchasing and distribution can be taken to improve the scale effect in order to reduce costs. Finally, build a perfect information system, the implementation of information management, so as to improve the transparency and accuracy of logistics information, timely grasp of the situation of logistics links, adjustment and optimization, to reduce logistics costs.

5.2. Accelerate infrastructure investment and technology update

Although the number of China's refrigerated trucks and cold storage has been significantly improved, but compared with China's huge population base, there is still a significant shortage. With the continuous development of China's economy, the demand for medical services is increasing, and the demand for cold chain drugs is also increasing, therefore, the government must increase investment in cold chain infrastructure investment, especially for the western region, in order to realize the relative balance between the east and the west. For pharmaceutical cold chain logistics, refrigeration and temperature control are crucial, therefore, how to realize the improvement of reefer performance, give full play to the performance of reefer, and take into account the modern green logistics ideas, will be a development direction in the future.

5.3. Cultivating talents in pharmaceutical cold chain logistics

The rapid development of pharmaceutical cold chain logistics, practitioners not only need to have comprehensive logistics expertise, but also must master certain pharmaceutical product characteristics and other knowledge.

The government should give necessary support to the relevant research institutions and actively promote the sustainable development of the pharmaceutical cold chain industry to meet the continuous changes in the market and improve the cold chain logistics service level. In addition, logistics enterprises also shoulder the responsibility of providing more high-quality and advanced pharmaceutical cold chain logistics talents to meet the ever-changing market demand, especially in the cultivation of compound professionals such as supervision, verification, information, etc., to improve the quality of professionals and focus on echelon construction. Further narrow the development gap with developed countries and promote the development of China's cold chain logistics in the direction of advancement and specialization.

5.4. Improve the supervision system of pharmaceutical cold chain logistics

First of all, in the scope of drug management, the government should establish and improve the drug traceability system, expand the scale of drug traceability service platform and supervision system, in order to realize the full traceability and standardized supervision of key varieties, such as blood products, vaccine drugs, psychotropic drugs and narcotic drugs, etc. Secondly, in order to further improve the development of pharmaceutical cold chain logistics, the government should improve the supervision system of cold chain logistics in China. Secondly, in order to further improve the management level of the pharmaceutical cold chain industry, the government should improve the management system of the pharmaceutical cold chain industry, incorporate the management level of enterprises on the cold chain of drugs into the assessment standards, and require professional organizations to carry out reviews, and

only qualified enterprises can carry out the cold chain logistics of drugs. Furthermore, in order to build an emergency response system for public health incidents, the government should gradually improve the regulatory system and emergency rescue system for cold chain logistics of medicines, incorporate cold chain logistics into the emergency resource protection system, and improve the mechanism of coordinated linkage and unified scheduling of emergency rescue and medicine cold chain.

Finally, in accordance with the relevant national requirements, we should promote the intelligence, informatization and automation of logistics facilities, and make use of advanced information network technology to optimize the distribution system, so as to ensure that there is no chain breakage in the process of distribution and transportation, and to ensure the safety of medicines.

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