

# Exploring the Pharmaceutical Supply Chain Management in a Tertiary Maternity Care Center in Sri Lanka

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## *Abstract-*

**Background:** Supply chain management is a process that creates a product or a service from raw materials to the final product that is consumed by the consumer. The pharmaceutical supply chain management in a healthcare facility is a vital procedure that ensures the availability of good-quality drugs for patient care management at all times. Maternity care centers are health facilities that offer a range of services including pre-natal, natal, and post-natal care, and gynecological care. Pharmaceutical supply chain management is integral to the smooth functioning and quality of care provided by maternity care centers, ultimately contributing to the health and well-being of women and newborns. This study explored pharmaceutical supply chain management in a tertiary maternity care center in Sri Lanka.

**Objective:** The study aimed to explore pharmaceutical supply chain management in a tertiary maternity care center in Sri Lanka.

**Method:** This case study was conducted in a premier maternity hospital in the country. Key informant interviews were conducted with major stakeholders and direct observations were made. Relevant documents were reviewed. Gaps in the supply chain management were identified by analyzing the data gathered. Fishbone analysis was performed to determine the root causes and vital root causes that are responsible for those major gaps were revealed via a Pareto analysis. Suitable interventions were determined by analyzing the above data and a literature review.

**Results:** Pharmaceutical store management was identified as the primary gap and poor physical structure led to inadequate space, high rodents and insects, and high temperatures causing substandard storage. Moreover, it induced staff demotivation and performance failures. The study revealed that relocating the drug stores to a place where good storage conditions are available, will strengthen the pharmaceutical supply chain management in the hospital.

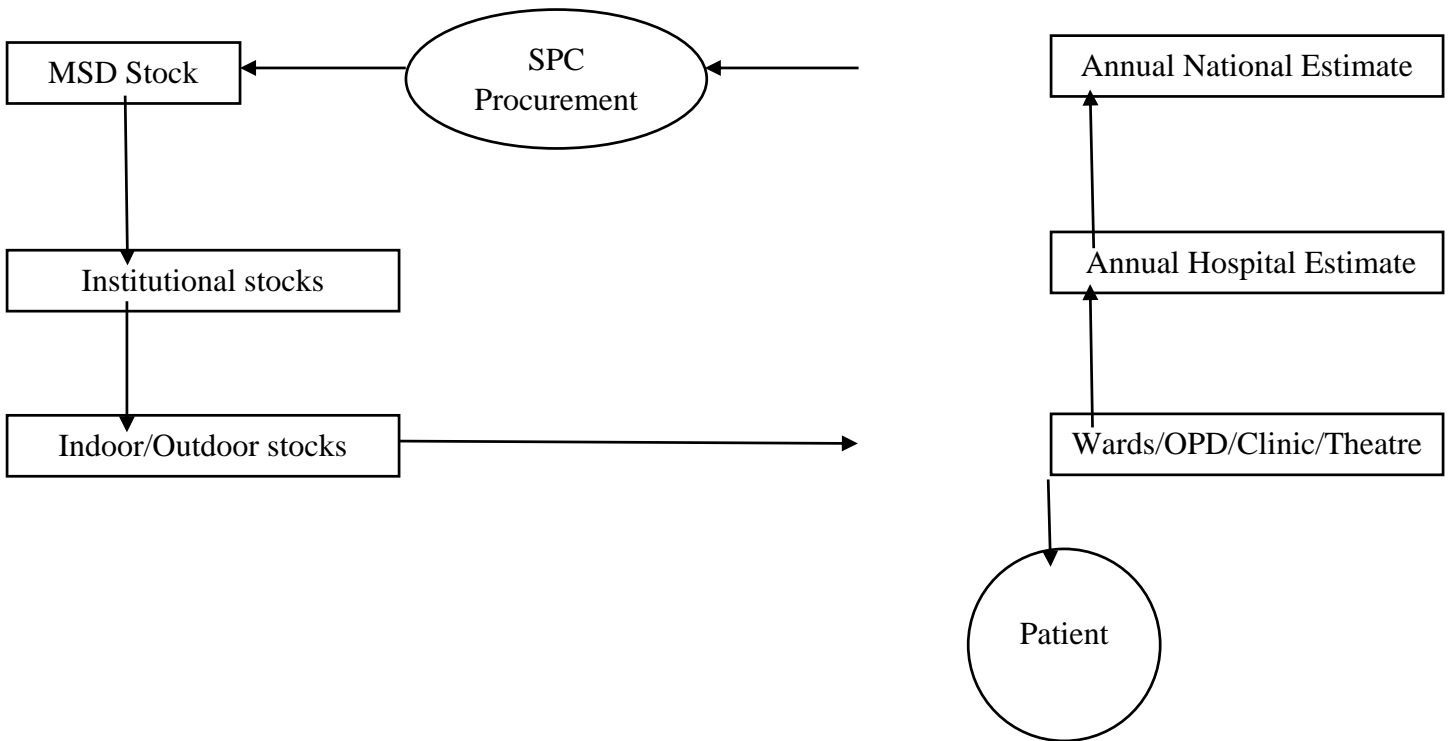
**Conclusion:** The unfavorable physical structure of the drug store had negatively impacted pharmaceutical supply chain management in the hospital. Moving the store under the perspectives of key stakeholders would enhance the situation.

**Index Terms-** *Pharmaceutical supply chain management, Maternity care center*

## INTRODUCTION

A supply chain is “a set of three or more entities (organizations or individuals) directly involved in the upstream and downstream flows of products, services, finances, and/or information from a source to a customer”(Mentzer et al., 2001). Supply Chain Management (SCM) is defined as “a process that creates a product or a service from raw materials to the final product that is consumed by the consumer” (Samantha et al., 2021). Pharmaceuticals are a vital component for effective healthcare delivery and in mitigating the customers’ dissatisfaction level (Habib et al., 2022). Hence, drug supply chain management is crucial to a healthcare establishment. Pharmaceutical supply chain management plays a crucial role in maternity care centers that offer a range of services including pre-natal, natal, and post-natal care, and gynecological care, for several reasons. It ensures the timely availability of medication (Mathew et al., 2013) while maintaining quality and safety. Further, it optimizes institutional inventory levels avoiding stockouts or excess inventory.

Moreover, it assures emergency preparedness for maternity care. Drug supply chain management is a cyclical process that starts with the preparation of an annual institutional estimate using the adjusted consumption method (Revision, 2008). Prepared estimates are sent to the Medical Supplies Division (MSD) which is the key entity responsible for providing all Pharmaceuticals, Surgical items, Laboratory Items, Radioactive Items, and Printed materials for Government sector healthcare institutions throughout the country. Subsequently, the MSD consolidates all estimates of the country and prepares an annual national estimate. The State Pharmaceutical Corporation (SPC) which is the sole supplier of pharmaceuticals, surgical consumable Items, laboratory chemicals, and equipment to all institutions administered by the Ministry of Health (SPC, 2019), carries out the procurement according to the request of the MSD. The procured items are then sent to the stores of the MSD. According to the pre-planned quarterly program, necessary items are distributed to all healthcare facilities. Obtained pharmaceuticals and other related items are stored in the hospital drug stores. They are, then distributed to the relevant units on demand through indoor and outdoor pharmacies of the hospital. The whole drug management cycle in the hospital is shown in Figure 01.



MSD – Medical Supplies Division: SPC – State Pharmaceutical Corporation: OPD – Out Patient Department

**Figure 01:** Drug management cycle in the public tertiary maternity care hospital.

The studied hospital is a premier healthcare institution introducing maternity care to Sri Lanka. It is the oldest maternity hospital in the country and the second oldest in Asia. Currently, as a tertiary care center, it provides a variety of services that cover maternal, and child health and reproductive health with the vision of “to be the center of excellence in women’s health care in Sri Lanka”. Altogether, there is a 277-bed capacity for inward care (Li, 2023). More than 12000 OPD patients and 50,000 clinic patients were cared for by the hospital annually. Functions of the drug management cycle within the institution were operating with eight pharmacists and six health care assistants working from 8 am to 8 p.m. Drugs and Therapeutic Committee (DTC) meetings which were conducted once in three months, were the major forum to discuss all the matters relevant to the drug management cycle in the institution. This study aimed to explore and identify the gaps in the pharmaceutical supply chain management of the considered tertiary maternity care center in Sri Lanka and determine the reasons for those gaps with possible alternatives to overcome them.

## OBJECTIVE

To explore the pharmaceutical supply chain management in a tertiary maternity care center in Sri Lanka.

## METHODOLOGY

This case study was conducted in a leading tertiary maternity care center in Sri Lanka. The empirical data were gathered via Key informant interviews and direct observations. Key Informant Interviews were conducted with the Medical Administrator, Consultant obstetrician and Gynecologist, neonatologist, Chief pharmacist, Sectional pharmacists, and the chief nursing officer. Direct observations were done on the different sections of the drug stores. Secondary data were collected with relevant document reviews. Major gaps in

the system were determined and root causes for them were explored through fishbone analysis. Most vital causes were identified via Pareto analysis. Finally, the appropriate measures to overcome the gaps were determined.

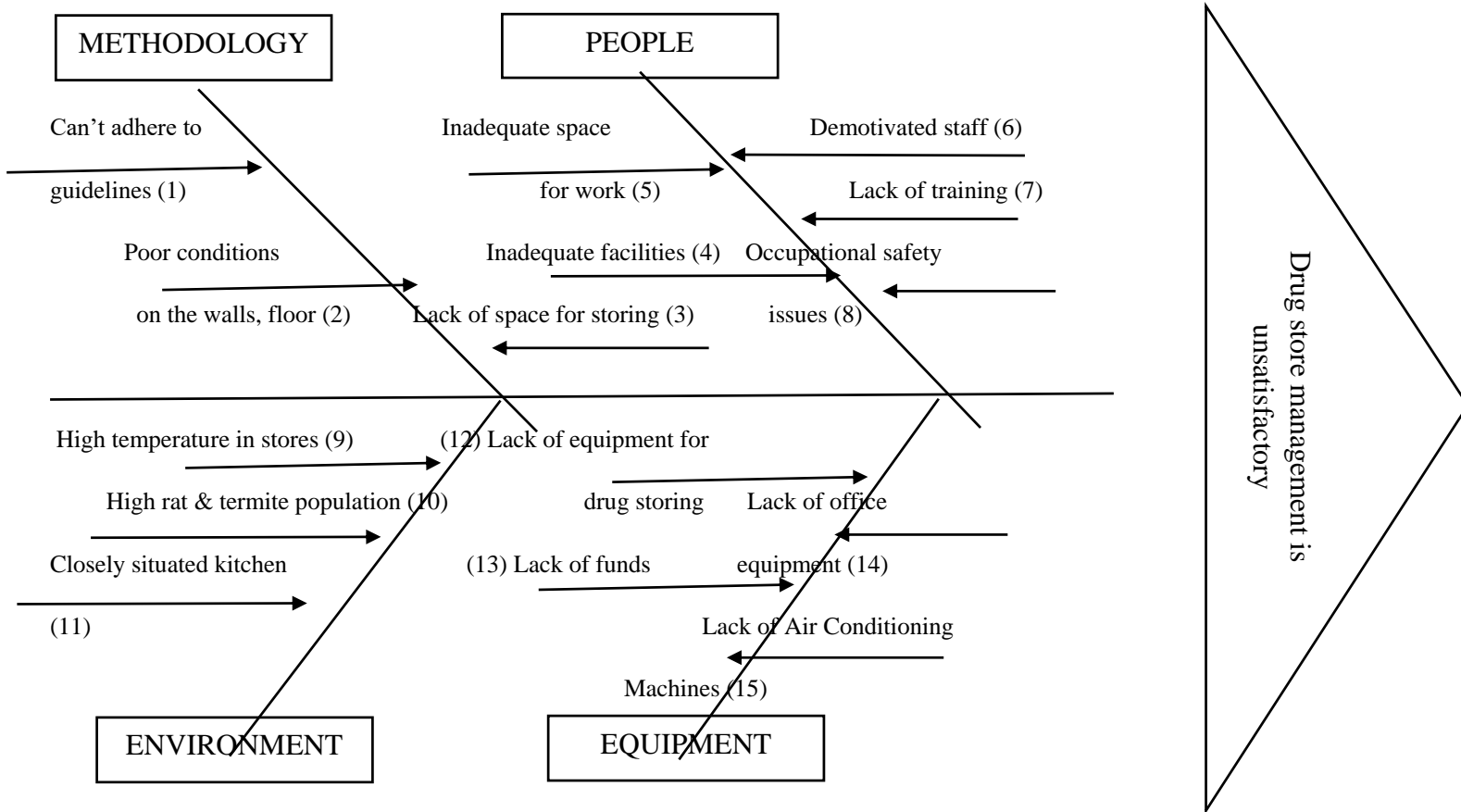
## **PROBLEM ANALYSIS**

Annual estimates of drugs have been prepared following lengthy discussions at the institutional DTC meetings. Estimates were uploaded to the MSD online platform called “Swastha”, at the request of MSD. Many inaccuracies and delays of estimation were rectified with this information technology (IT) solution. However, the function of storing the drugs and related items showed remarkable gaps in the drug stores. According to the manual on drug management issued by the Ministry of Health, clean store rooms with adequate space proper ventilation, and whitewash walls are necessary for the proper storage of drugs. However, the storage capacity in stores was inadequate. Hence, the expired drugs also have been stored within the premises where normal items were stored. The chief pharmacist and other employees working in the drug stores claimed that the store temperature was beyond the acceptable limits. During the observatory visit, the principal investigator (PI) also experienced high room temperature. There was a possibility of dust coming into the stores through the areas that were covered by iron nets. Access into the stores was through a narrow door that was marginally adequate to manage the received and issuance. Occupational injuries were also possible through this access. The same day PI visited; an employee had an injury due to this unsafe access. Even though a security point has been established closer to the drug stores, the possibility of theft cannot be overlooked as there was no CCTV facility. The electric wirings of the establishment were old and there was a risk of fire and no fire safety measurements had been set up. The drugs and substances having special risks should be stored in a demarcated area with extra safety, and precautionary measures (Revision, 2008). However, surgical spirits and items like gauze were stored in the same area without any additional precautions. Floors were not tiled and there were instances where floors were subjected to water penetration, affecting the quality of stored items. However, the roof had been repaired recently due to the water leaks on rainy days.

Though the staff allocation was adequate, they were not performing optimally due to many reasons. Their motivation for work was low as they did not have adequate facilities, especially for the proper storage of drugs, as mentioned earlier. Further, some pharmacists share the same place and furniture for both of their works. Training on good storage practices, regulations, procedures, safety, and accountability that help to update the skills and knowledge, was not undergone regularly. Guidelines for pests and rodent control were provided in the drug management manual. However, there was a significant risk of damage to supplies by rats and termites. Controlling rats was further difficult since the kitchen was situated adjacent to the drug stores.

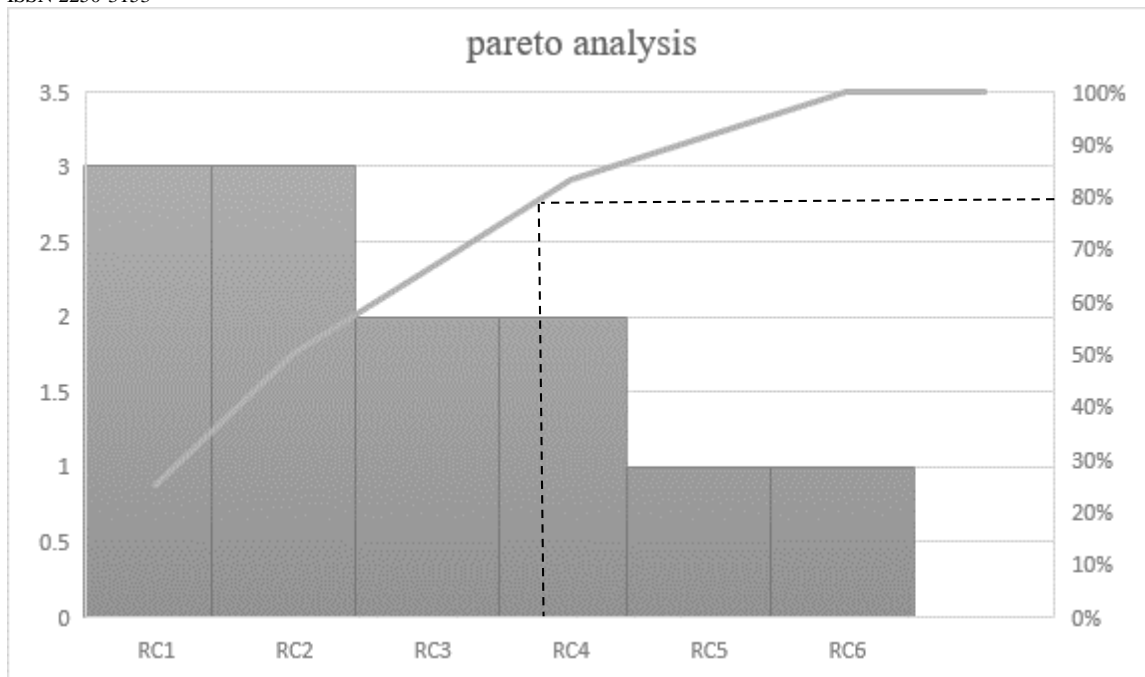
In the latter part of the drug management process, prescription errors such as poor handwriting and polypharmacy were also noticed.

Among these gaps, poor management of drug stores was chosen as the major area to be addressed to improve drug supply chain management in the center. It was further analyzed with a quality improvement tool; fishbone analysis (Figure 02).



**Figure 02:** Fishbone analysis to identify the cause-and-effect relationship of unsatisfactory drug store management in the public tertiary maternity care center.

According to the analysis of root causes, many factors responsible for the current situation in the drug stores were identified. However, the most important causes needed to be elicited for effective interventions. Pareto analysis was performed (Figure 03) in this regard and the most influential factors for inadequate store management were identified.



RC – Root Cause

RC1: Lack of space for storing

RC3: Poor conditions in walls and floor

RC2: High rat & termite population

RC4: High temperature in stores

RC5: Inadequate space for work

RC6: Demotivated staff

**Figure 03:** Pareto Analysis to prioritize the root causes of unsatisfactory store management in the public tertiary maternity care center.

### PROPOSAL

Drug supply chain management in the maternity care center was negatively affected by the storage function, mainly due to the poor physical structure of the drug stores. Inadequate space, high rodents and insects, poor wall and floor conditions, and high temperature within the stores were the major deficiencies identified. Establishing a new drugstore would be the ideal solution for the issue. It could be planned with all the relevant stakeholders by avoiding any issue currently facing as well as future expected. However, that option would not be realistic in the current financial situation of the country as the project incurs substantial costs. Renovation of the building could be considered as the other alternative. Provisioning of racks for storing alongside the renovation may help to maximally utilize the available space. This will help to improve the storage conditions to some extent. Still, the funding may be the key challenge in the current economic crisis. Shifting the department as a whole or part into other suitable spaces within the hospital would be the alternative option with minimal budget allocations. Nevertheless, finding and shifting into a new place itself would be a challenge with many administrative pressures and additional requirements.

### RECOMMENDATION

Even though all the options were burdensome, shifting to a new place would be the easiest with minimal monetary allotments. It is necessary to find a space with a good physical structure as well as infrastructure facilities.

### CONCLUSION

As a premier tertiary care establishment for women in the country, the hospital is performing its best to achieve the center for excellence for women's health. Drug supply chain management in the institution is an essential component to achieve this goal. However, the drug storing function was not optimal mainly due to the poor physical structure of the drug stores. Shifting to an alternative place would be the best solution in the current context with the consensus from all the key stakeholders.

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