

**A STUDY ON ANALYSING THE INVENTORY MANAGEMENT TECHNIQUES
AT SANKARA EYE HOSPITAL, COIMBATORE**

Dissertation Submitted to



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in

Hospital and Health Management

By

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Under the Supervision and Guidance of

Dr P. R. Sodani

2024



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and has successfully completed her Project on

**A STUDY ON ANALYSING THE INVENTORY MANAGEMENT TECHNIQUES AT
SANKARA EYE HOSPITAL, COIMBATORE**

18th March 2024 to 19th June 2024

Organization: SANKARA EYE HOSPITAL, COIMBATORE

She comes across as a committed, sincere & diligent person who has
a strong drive and zeal for learning

We wish her all the best for future endeavours

Mr Sankaran G Sreenivasan
Head Internal Audit, Information Security
& Procurement

Ms Srini Karthikeyan
Chief People Officer

Mr Bharath Balasubramania
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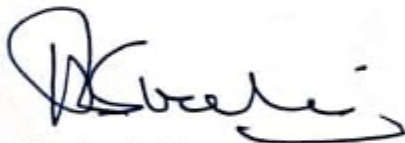
DECLARATION BY STUDENT

I hereby declare that this dissertation titled "A STUDY ON ANALYSING THE INVENTORY MANAGEMENT TECHNIQUES IN SANKARA EYE HOSPITAL, COIMBATORE" is the bonafide record of my original research work. I declare that it has not been submitted to any other university or institution for the award of any degree or diploma. Information derived from the published or unpublished work of others has been duly acknowledged in the text.

Sujona Bhattacharya
(Signature)

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This is to certify that dissertation titled **A STUDY ON ANALYZING THE INVENTORY MANAGEMENT TECHNIQUES AT SANKARA EYE HOSPITAL, COIMBATORE** is a record of the research work undertaken by **Ms. Srijona Bhadra** in partial fulfilment of the requirements for the award of the degree of MBA (Hospital and Health Management) from the IIHMR University, Jaipur under my guidance and supervision and her approach to the research study has been sincere, scientific, and analytical.

A handwritten signature in black ink, appearing to read 'R. K. Verma', written over a horizontal line.

Faculty Guide

IIHMR University, Jaipur

A handwritten signature in black ink, appearing to read 'S. K. Verma', written over a horizontal line.

School Dean

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Date:

02/07/24

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Chapter 1: Introduction/Background

Effective inventory management is a cornerstone of operational efficiency and patient care quality in healthcare facilities. This dissertation delves into the inventory management practices of Sankara Eye Hospital, Coimbatore. The research investigates the ongoing inventory management techniques including FIFO (First In First Out) and FSN (Fast Slow Non-moving). The study took place in Sankara Eye Foundation, Coimbatore where the entire inventory management was analyzed thoroughly. The Unit performance scorecard cited areas of excellence and improvement. The dissertation analyses the potential causes of Inventory variances by implementing a Fish-Bone analysis. After finding the potential causes, this dissertation proposes implementation of ABC-VEN analysis for prioritizing inventory items and an automated reordering system to ensure timely supply replenishment. Additionally, it recommends implementing RFID Technology which can streamline the overall inventory management process by reducing time and overall workload. By adopting these recommendations, the hospital can reduce Inventory variances, and improve overall efficiency. This study offers valuable insights into inventory management in specialized healthcare settings and provides a framework that can be leveraged by similar institutions to refine their inventory practices and elevate patient care quality.

About the Hospital:

The Sankara Eye Foundation was started with the mission of eradicating needless blindness. A not-for-profit entity founded by Dr. R.V. Ramani and Dr. Radha Ramani in 1977, this institution is dedicated to delivering high-quality eye care services to underserved communities. Today Sankara has 14 units all over India, including an upcoming unit in Varanasi.

Aim: To analyze the inventory management techniques in Sankara Eye Hospital, Coimbatore.

Objective:

- i) To evaluate the existing inventory management techniques at Sankara Eye Hospital, Coimbatore.
- ii) To propose the implementation of advanced inventory management strategies such as ABC-VEN analysis to prioritize inventory items based on their importance and criticality.
- iii) To understand the challenges in Inventory variances and their causes using a Fish bone (Ishikawa) diagram.
- iv) To analyze the Coimbatore Unit performance scores for the past 3 months from March to May 2024 and understand the areas of excellence and improvement.

Chapter 2: Review of Literature

Title	Author	Objectives	Key findings
Inventory management systems of small and medium enterprises in Bangladesh	Md. Kausar Alam et al	1. To investigate the inventory management practices of SMEs in Bangladesh. 2. To identify the challenges faced by these enterprises in managing inventory. 3. To understand the strategies used by SMEs to optimize inventory levels. 4. To provide recommendations to policymakers and stakeholders to improve SME efficiency and growth.	1. Most SME owners in Bangladesh collect raw materials locally, sometimes facing shortages and relying on digital platforms for procurement. 2. There is a significant issue with the quality of local raw materials compared to imported ones, impacting cost management and product demand. 3. Financial constraints and the inability to import small quantities lead to a 10-15% loss in raw materials. 4. Seasonal factors and storage limitations further contribute to the inefficiency and potential loss in inventory management .

Just-in-time approach in healthcare inventory management: Does it really work?	Bandar Balkhi et al	1.To provide an overview of techniques that can improve healthcare operations by implementing JIT systems. 2.To discuss the benefits of JIT systems for the healthcare industry. 3.To review relevant literature on JIT concepts and practices as a cost-saving strategy for healthcare organizations. 4.To explore the use of JIT approaches during the COVID-19 pandemic, including their benefits and risks. 5.To outline future implications and research directions for JIT systems in healthcare.	1.The COVID-19 pandemic revealed significant vulnerabilities in JIT systems, leading to severe shortages of critical medical supplies and equipment when demand surged unexpectedly. 2.The reliance on JIT systems without adequate buffer stock resulted in higher costs and strain on healthcare organizations' budgets during crises. 3.Proactive supply chain management, including digitization and automation, is crucial to address the inefficiencies and build resilience against future disruptions. 4.Building direct relationships with suppliers and employing strategic sourcing can enhance the efficiency and sustainability of healthcare inventory systems
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Inventory management techniques at hospitals	Keerthana.S and Dr. Ch. Bala Nageswara Rao	1.To understand the inventory control system of in-house pharmacies. 2.To maximize sales by implementing effective inventory management techniques. 3.To maintain a continuous and regular supply of drugs. 4.To serve more patients efficiently with improved drug management	1.The ABC analysis shows that 7% of items are very important (A), 13% are moderately important (B), and 80% are less important (C), with these categories making up 70%, 20%, and 10% of the total inventory value, respectively. 2.The FSN analysis categorizes 192 items as fast-moving, 385 as slow-moving, and 2292 as non-moving, with tablets being the most common fast-moving items. 3.Using these inventory management techniques can help the pharmacy increase profits and use resources better. 4.Introducing better cost control and stock management methods, like robotic systems, can reduce errors and improve inventory handling.
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An Analysis of Pharmaceutical Inventory Management at a Leading Teaching and Referral Hospital in Kenya	Ken Abuka et al	1.To evaluate the drug consumption and expenditure patterns at Jaramogi Oginga Odinga Teaching and Referral Hospital (JOOTRH) over a three-year period (2018-2020). 2. To use Therapeutic Class (TC), Always Better Control (ABC), and Vital Essential and Non-essential (VEN) analysis to assess these patterns. 3.To inform strategies for reducing recurring stockouts, prioritizing procurement, and acquiring cost-effective medications while managing inventory costs in line with medication needs.	1. The TPE(Total Pharmaceutical Expenditure) over the study period was \$1,329,213.91. 2. Class A medicines, which accounted for a small percentage of the total items (18.9% in 2018 and 19.9% in 2019 and 2020), consumed a significant portion of the APE(Annual Pharmaceutical expenditure) (70.2% in 2018, 71.7% in 2019, and 72.7% in 2020). 3. Vital items (173 drugs each year) accounted for a substantial portion of the APE: 77.7% in 2018, 75.1% in 2019, and 74.2% in 2020.
Inventory management techniques at hospitals	Keerthana.S and Dr. Ch. Bala Nageswara Rao	1. To implement inventory management techniques by identifying various categories of items for stringent management control. 2.To reduce procurement and carrying costs in the context of in-house pharmacy practices. 3.To enhance patient satisfaction and meet prescriber demand by optimizing inventory control systems. . To improve hospital revenue management from both financial and operational perspectives through effective inventory practices	1. The study identified tablets and high-value drugs as the most significant inventory items. 2. A small percentage of items accounted for the majority of inventory value, emphasizing the need to focus on high-value items. 3. Prioritizing fast-moving items like tablets can improve inventory management and availability. 4. Effective inventory management can significantly increase hospital revenue.

Classification of medicines and materials in hospital inventory management: a multi-criteria analysis	Amanda G. De Assis	1. To create a comprehensive model to classify the stock of medicines and materials, addressing the complexity of hospital inventory management. 2. To optimize purchasing decisions and streamline the monitoring frequencies of inventory items to save time and improve operational efficiency. 3. To ensure financial resources are optimally distributed among inventory items within institutional limits. 4. To guarantee that essential materials and medications are available when needed, preventing stockouts and ensuring continuous hospital operations.	1.The classification method improved purchasing decisions by optimizing stock levels and reducing the time needed for inventory management. 2.Medicines and materials were categorized into classes (W, B, and M) to streamline monitoring frequencies: weekly, biweekly, and monthly respectively. 3.The proposed model enhanced the efficiency of inventory management, providing a robust decision support system adaptable to various hospital scenarios. 4. Sensitivity analysis confirmed the robustness of the results, validating the model for wider application in hospital inventory management .
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Chapter 3: Methodology

3.1 Duration of the study: 18th March to 19th June 2024

3.2 Key Research Questions:

- i) What are the existing inventory management techniques used at the store of Sankara Eye Foundation, Coimbatore?
- ii) What are the current challenges faced in managing inventory at the Sankara Eye Hospital store in Coimbatore? (e.g., Inventory variances, expired medications, delay in vendor delivery, etc.)
- iii) Will the combined use of ABC -VED analysis and an automated reordering system improve Inventory variances compared to the current inventory management technique?

3.3 Sample Size: 213 items

ABC Analysis:

Category A: 19 items

Category B: 30 items

Category C: 164 items

VEN Analysis:

Category V: 34 items

Category B: 62 items

Category C: 117 items

3.4 Study type: Quantitative descriptive study conducted on a retrospective basis, qualitative data obtained via interviews.

3.5 Study Setting: The study took place at Sankara Eye Hospital, Coimbatore for 3 months from 18th March 2024 to 19th June 2024.

3.6 Inclusion Criteria: Medicines

3.7 Exclusion Criteria: All items excluding medicines

3.8 Data Collection Method: Secondary data obtained from the **Stock summary, Purchase and Consumption Report and Scorecards.**

3.9 Data Analysis: Microsoft Excel, Power BI

3.10 Hypothesis: Implementing advanced inventory management strategies, including ABC-VEN analysis and an automated reordering system and RFID technology at Sankara Eye Hospital, Coimbatore, will significantly reduce Inventory variances, shortage of critical inventory items, and improve overall inventory performance as measured by performance scores from March to May 2024.

3.11 Ethical Considerations: Conducting research on inventory management at a healthcare facility involves several ethical considerations to ensure the integrity of the study and the protection of all participants and stakeholders involved. Informed consent was obtained from all the participants including procurement staff and administrative officials involved in the qualitative interviews. Participants were fully informed about the purpose of the study, the procedures involved, the types of data being collected, and how these data were used. The study ensured that all data collected, particularly personal and sensitive information from interviews, were kept confidential and anonymized to protect the identities of the participants. The accuracy and integrity of the data collected were maintained to ensure the validity of the research findings. Prior to commencing the study, ethical approval was obtained from the administrative officials. This study design adhered to ethical standards and guidelines.

Chapter 4: Results and Discussion

The Purchase or procurement system in Sankara Eye Hospital is Centralized. The Main Stores in Sankara Eye Hospital is categorized in 4 divisions:

- **Central stores- Paying** (catering to all the paying departments in the Paying division)
- **Central stores- Non-Paying** (catering to all the paying departments in the Non-Paying division)
- **Pharmacy-** for sale of drugs, certain consumables and contact lenses directly to patients)
- **General-** for stationery and other general items, including plumbing, electricity, etc.

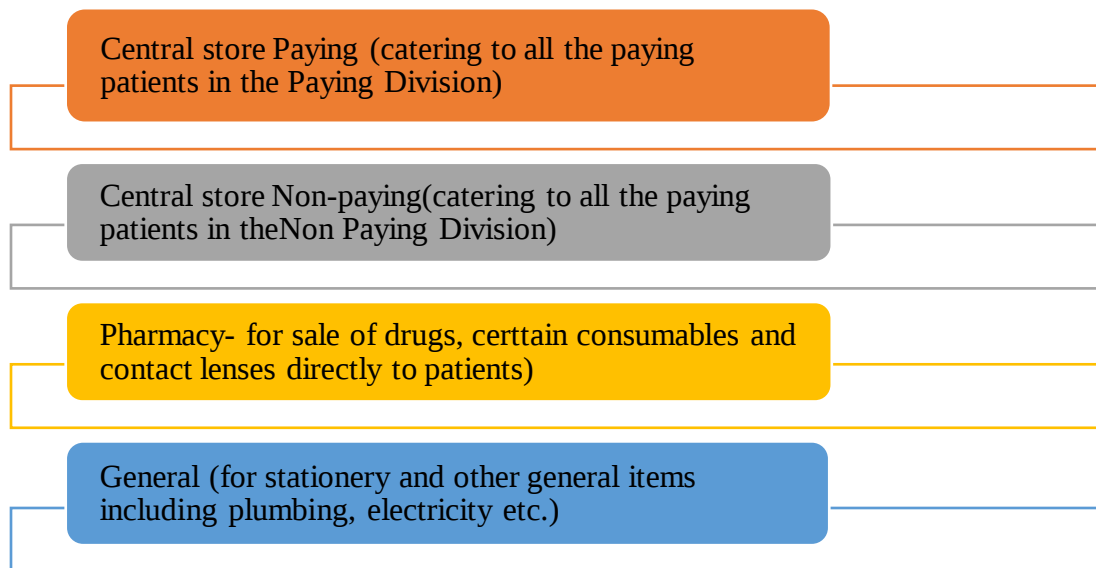


Fig 4.1: Categories of Stores in Sankara Eye Hospital

4.1 Review Cycle:

The procurement division in Sankara hospital is **Centralized**. The sub stores collect the information in the software.

If stock is not available or based on average consumption, a **Purchase Requisition (PR)** is raised to meet the monthly requirements. After Purchase Requisition, **Purchase Order** is raised.

Items are categorized in the store in 4 different parts- **Paying, Non-paying, General and Pharmacy.**

4.2 The Purchase Order Process in Sankara Eye Hospital

Procurement process:

- i. At first an indent is raised through the software (**NetSuite**). An indent is an official order or requisition for medicine and supplies from a medical store and the process of requesting is called indenting.
- ii. The **Purchase Requisition (PR)** is raised by the **Stores** department. While raising the purchase requisition, the existing stock of that item is checked.
- iii. After raising the **Purchase Requisition**, **Purchase Orders** are created.
- iv. **Purchase Requisition (PR)** and **Purchase Order (PO)** are two different and independent activities.
- v. The order is placed with a vendor which is selected on certain criteria and should have a proper GST registration.

Procedure at Sub store

- Apart from the Stores, there are multiple sub-stores established at Sankara for receiving, safe keeping and issuing consumables (medical and non-medical) closer to the Operation theatres / ward.
- Whenever an item is required the sub store person raises an indent in the software.
- The IC of the department reviews the indent before approving it. The items are collected from the main store to the sub store by a Sub store person. The IC of the store then issues the items to the Sub-store person.
- The items are generally kept in sub stores with stock in period of one month.

The temperature sensitive products are maintained at store at 25 ° Celsius.

Post delivery of items at Sankara Eye Hospital

- Post delivery of items at Sankara Eye Hospital, the store person first checks the items for their quality and matches them with the **Purchase Order (PO)** to verify that whether the items received match with the items ordered.
- After checking the items, the **GRN (Goods Received Note)** is issued by the stores person.
- Once the GRN is issued, the products are arranged in the rack or sent to the sub stores as required.

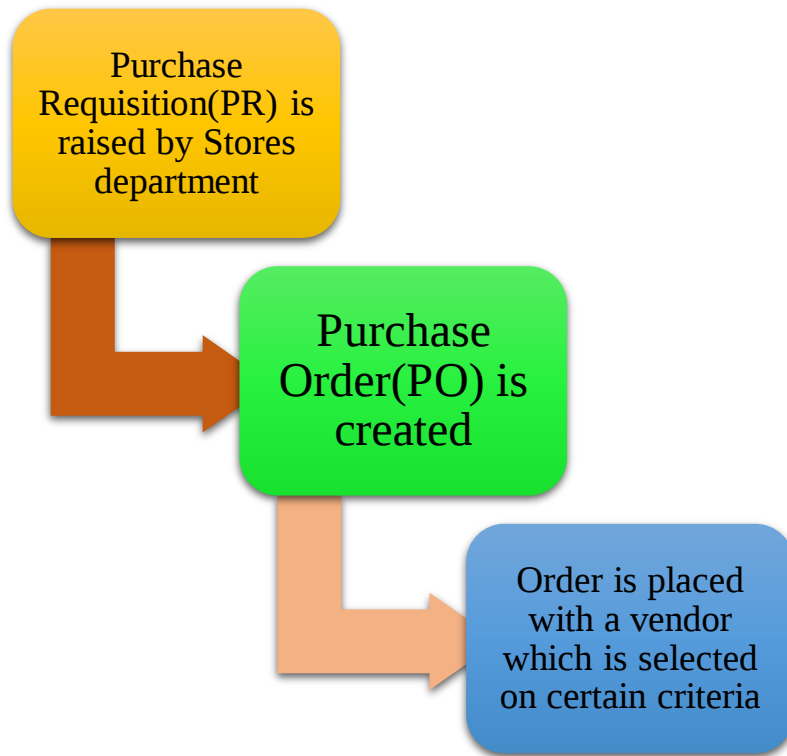


Fig. 4.2 Purchase Process in Sankara Eye Hospital

EXPIRED ITEMS: Materials returned for nearing expiry should be returned before 7 months of expiry.

NON-RETURNABLE ITEMS: Items that have crossed expiry date.

Stock verification is done in batch, held once a month every month.

4.3 Inventory methods used in the Stores Department of Sankara Eye Hospital:

- I. **FIFO (First In first Out):** FIFO, or First-In-First-Out, is a method where the earliest received inventory items are the first to be used and sold. This approach is crucial as it guarantees that older stock is utilized before newer ones, minimizing the likelihood of products expiring unused.
- II. **FSN (Fast Slow Non-Moving):** Another method used in Sankara Eye Hospital is the FSN method where the inventory management is based on the order of consumption.
 - Fast-moving goods are items in inventory that are frequently used, such as essential everyday products regularly bought by customers. These items have a high turnover rate and contend vigorously in the market.

- In contrast, slow-moving goods are only in demand for a brief period. They have a turnover rate lower than the quantity on hand.
- Non-moving goods are items that remain unused over a specific timeframe, with a turnover rate below one. These goods are often stocked over extended periods without being utilized.

TABLE 1
Shows particulars of FSN analysis

Particulars	F-class item	S-class item	N-class item
Stock	High	Intermediate	low
Control	High	Intermediate	Low
Check	Tight	Intermediate	No
Safety stock	High	Low	Rare



Fig. 4.4 Inventory items at stores and sub-stores

4.4 Classification of items at Stores

The total items in the Stores Department of Sankara Eye Hospital, Coimbatore were divided into 22 categories. These categories were:

ITEM NO.	CATEGORY
1	IOL
2	MEDICINES
3	CONTACT LENS
4	SURGICAL INSTRUMENTS
5	MEDICAL CONSUMABLES
6	CONTACT LENS
7	OPTICALS
8	PATIENT CARE
9	FACILITY MAINTAINENCE
10	CARPENTARY
11	COM PERIP
12	COW AND CALF
13	PAINTING
14	ELECTRICAL
15	PRINTING-PAYING
16	PRINTING- NON-PAYING
17	CIVIL
18	TEMPLE
19	UNIFORM
20	HOUSE KEEPING
21	LINEN
22	PLUMBING

These **Medicines** contributed **16 %** of the total items in the Stores Department. An analysis of medicines was done by taking **213** medicines.

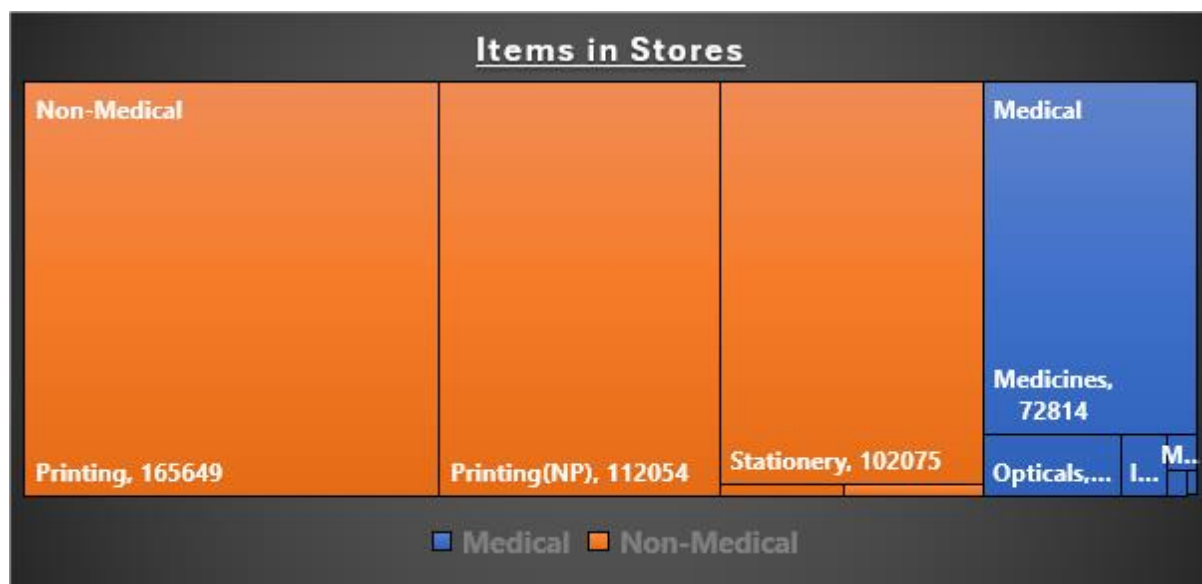


Fig 4.5. Treemap of classification of items in stores

4.5 ABC analysis on Medicines items:

A (19 items)	B (30 items)	C (164 items)	Total= 213 items
71.65	19.45	8.9	100%

Category A consisted of **19** items and contributed **71.65%** (~ 70 %) of the total purchase.

Category B consisted of **30** items and contributed **19.45%** (~20%) of the total purchase.

Category C consisted of **164** items and contributed **8.9%** (~10%) of the total purchase.

4.5 VEN Analysis on Medicine items:

Vital (34 items)	Essential (62 items)	Non-essential/Desirable (117 items)	Total = 213 items
16%	29%	55%	100%

Category V contained **34** items and contributed **16%** of the total medicines.

Category E contained **62** items and contributed **29 %** of the total medicines.

Category D contained **117** items and contributed **55 %** of the total medicines.

4.6 ABD-VED MATRIX

		VED Analysis is					
		V(Vital)		E(Essential)		D(Desirable)	
		No	% of Drugs	No	% of Drugs	No	% of Drugs
ABC Analysis	A(Always)	AV (0)	0	AE (14)	6.57	AD (5)	2.3
	B(Better)	BV (2)	0.93	BE (9)	4.22	BD (19)	8.9
	C(Control)	CV (32)	15	CE (39)	18.3	CD (93)	43

In the above table, it is shown that **24.88% (53)** drugs belong to **Category I**. **Category II** consisted of **31.45% (67)** of drugs. The remaining **43.66% (93)** drugs are in **Category III**.

Drugs in Category I (AV, AE, AD, BV, and CV) require stringent management. Top management should continuously monitor both consumption and stock levels. The AE and BV subgroups within Category I comprise 16 high-cost drugs, accounting for 7.5% of the total drug inventory. These drugs are either vital or essential, making stockouts unacceptable. The CV subgroup, representing 15.02% of the drugs, includes low-cost but highly critical medications.

Drugs in Category II (BE, CE, BD) are essential with moderate costs and should be managed with a moderate level of oversight by middle management.

Drugs in Category III (CD) encompasses desirable and low-cost drugs. These should be ordered periodically and managed by the lower levels of management.

4.7 SCORECARD SYSTEM:

The CPD Department in Sankara uses a score card for every operating unit. The GRN scores are calculated based on the performance of each unit.

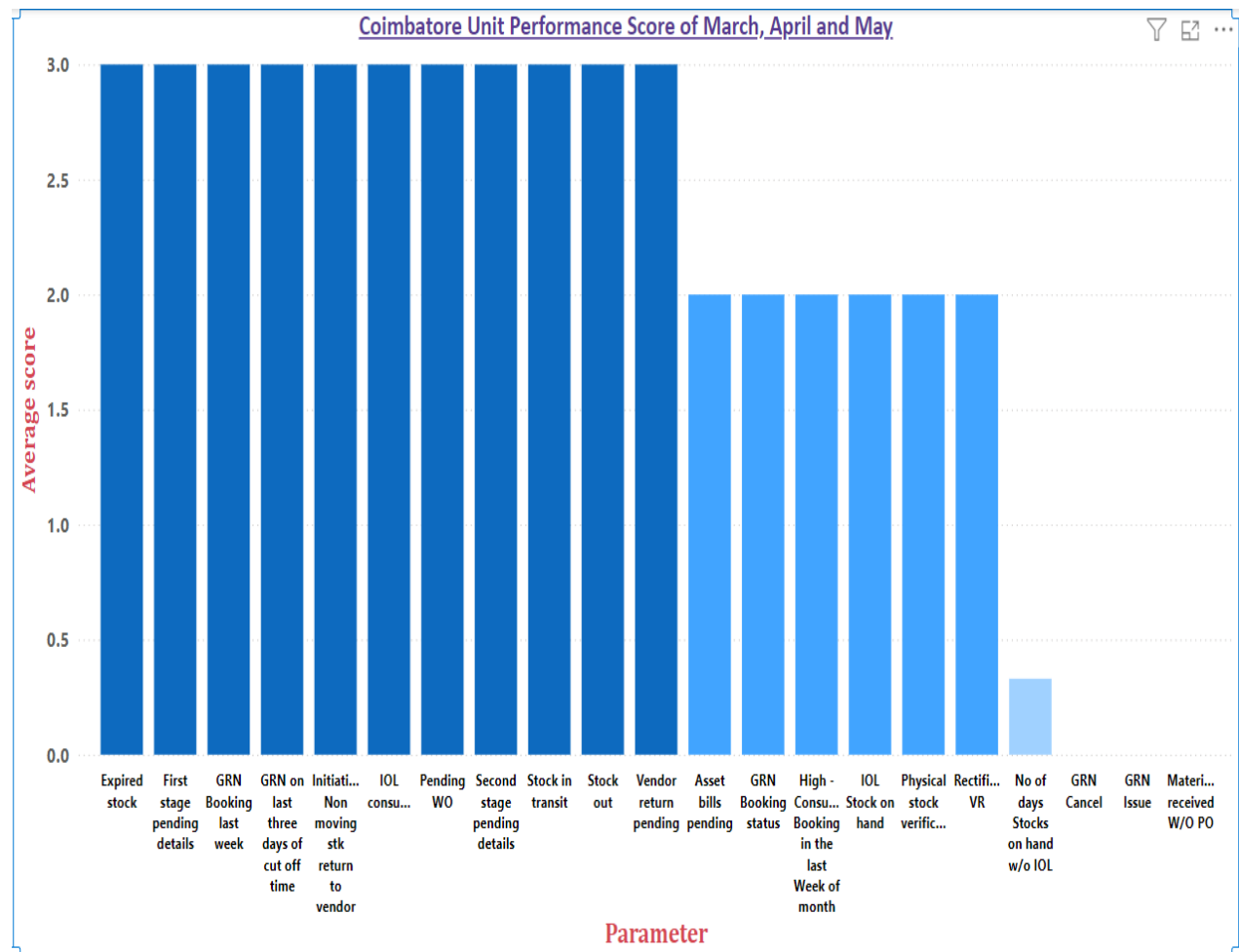


Fig 4.6 Coimbatore Unit Performance score of March, April and May 2024

As we can see from the above diagram, the Average score was calculated by combining the total scores of March, April and May 2024. Parameters like **Expired stock, IOL consumption, Stock in transit** etc. scored the highest while parameters like **GRN cancel, GRN issue and Material received without Purchase Order** scored low and need immediate attention.

4.8 FISHBONE(ISHIKAWA) ANALYSIS:

An analysis of the issues currently faced by Sankara Eye Hospital is done by applying a Fish bone diagram. At present the main issue in the CPD department is the Inventory variances. The

diagram breaks down the potential causes into four main categories: **Method, Machines, Environment, and People.**

The main issue identified by this diagram is the **Inventory Variances** and the potential causes identified below:

1. **Method:**

- **Hands-on inventory assessment:** The current process of counting stock items manually presents an opportunity to enhance accuracy and efficiency by reducing human errors.
- **Material flow:** Facilitating seamless material flow will contribute to maintaining accurate stock records.

2. **Machines:**

- **Exclusive vendor network:** Increasing the vendor size will enable more flexibility and will provide better response to supply issues.
- **Extended delivery timeline:** There are opportunities to enhance the efficiency of timely item receipt.

3. **Environment:**

- **Opportunity for restocking:** Occasionally, there is a need for critical items. This can be effectively managed by maintaining safety stock levels and utilizing real-time inventory tracking systems.
- **Less storage space:** Increasing the storage space in few sub stores will help better tracking of stock items, thereby decreasing the risk of discrepancies.

4. **People:**

- **Established practice:** There lies scope in adopting new materials and methods.
- **Need for more Training:** Although Sankara Eye Foundation is having a highly trained staff, more training like 5S, Kanban, etc can be implemented to improve the overall performance of supply chain practices.

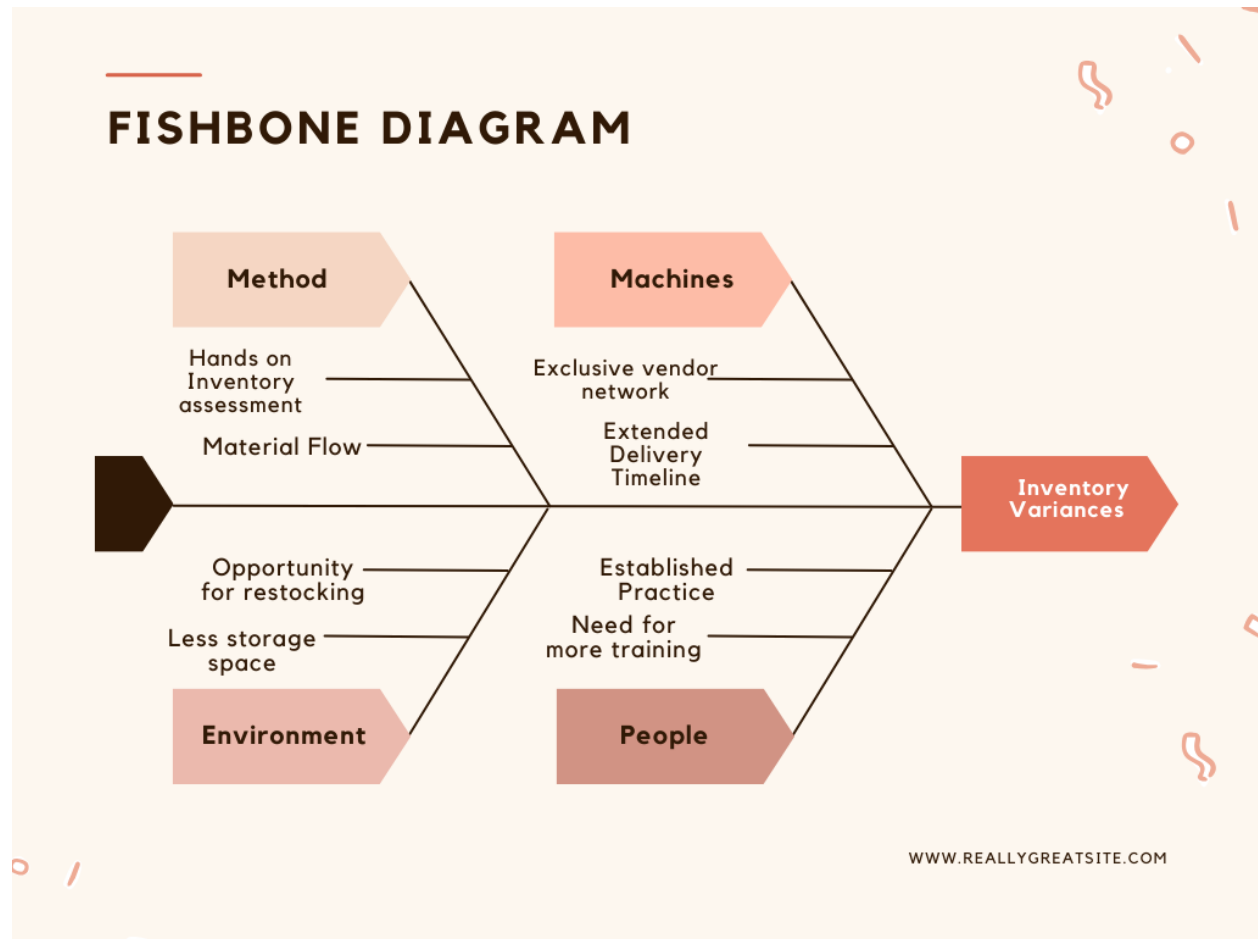


Fig 4.7 Fishbone analysis -Cause and Effect

Chapter 5: Recommendations

Effective inventory management hinges on thorough inventory analysis. Introducing advanced inventory control techniques in healthcare settings substantially improves patient care, customer satisfaction, and resource efficiency. This research proposes a few recommendations which can be made to streamline the overall procurement process.

5.1 ABC-VEN Matrix: Historical sales data can be analysed to identify trends and patterns. For effective inventory management, techniques such as ABC (Always Better Control) analysis, VEN (Vital, Essential, Non-desirable) analysis, and the ABC-VEN matrix are valuable tools. ABC analysis, widely used to reduce expenditures and enhance drug utilization efficiency, is based on the price and consumption rate of items. However, it alone is insufficient for efficient inventory management because it does not account for the criticality of drugs. Some inexpensive drugs can be vital or lifesaving. To address this limitation, VED analysis is applied, classifying drugs based on their criticality and importance to patient health. However, relying solely on either VED or ABC analysis does not achieve effective inventory control. Therefore, combining ABC and VED analyses results in the ABC-VED matrix. This matrix provides strict control over drugs for optimal budget usage and prevents out-of-stock situations in medical stores. By combining these analyses, the ABC-VED matrix helps identify drugs that require stringent control and those that can be managed more flexibly. The matrix has nine cells, each representing different combinations of ABC and VED categories.

5.2 Automated reordering system: Implementing an Inventory management software that automatically triggers reorders based on predefined criteria will alert the team about the stock levels when the reorder level is reached. In an automated reordering system, as the stock levels reach the predetermined threshold, the system automatically generates Purchase Order. This approach will free from relying on fixed time intervals, ensuring that adequate stock level is maintained without needing extra buffer inventory. Alerts for low stock will be shown directly on the dashboard or sent via email to the respective In-Charges of the Purchase Department.

5.3 Regular Training and Development: At present Sankara has a highly trained staff, however for continuous improvement **5S (Sort, Set in Order, Shine, Standardize, Sustain)**, Kanban, Kaizen etc., can be given to all levels of staff and employees. Implementing 5S in a hospital setting will provide better efficiency and productivity. Additionally, it will lead to cost savings by reducing waste and optimizing resource use, while maintaining continuous improvement and ensuring compliance with regulatory standards.

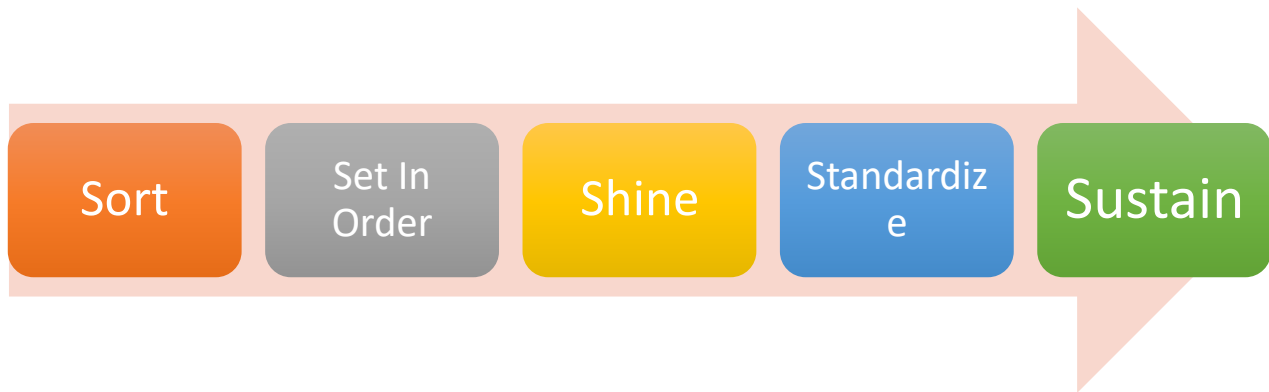


Fig 5.1 Process of 5S (Sort, Set in Order, Shine, Standardize, Sustain)

5.4 Economic Order Quantity (EOQ) Model: Economic order quantity model can be adopted which can minimize overall cost related to ordering, receiving and holding inventory. Implementing the Economic Order Quantity (EOQ) model in inventory management would optimize order size, minimizing total costs associated with ordering and holding inventory. This approach ensures a balance between ordering costs and carrying costs, leading to reduced Inventory variances and overstock situations, ultimately improving cash flow and operational efficiency.

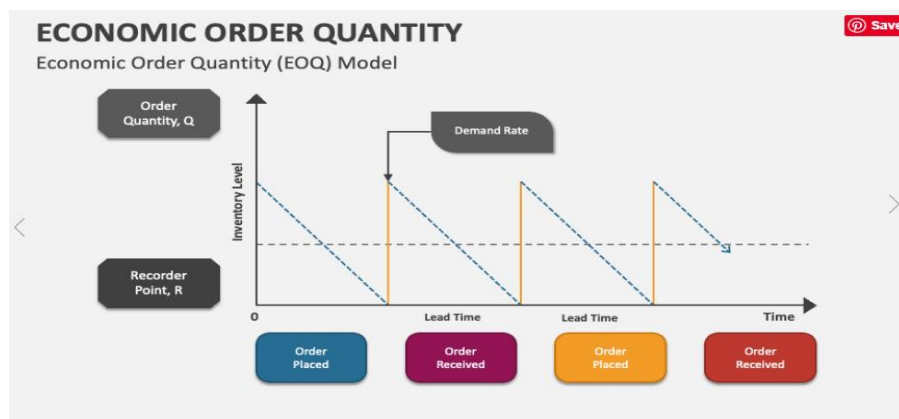


Fig 5.2 Economic Order Quantity Model

5.5 RFID (Radio Frequency Identification): At present, barcode scanner is present at Sankara Eye Hospital. Alternatively, RFID technology can be considered one of the options for fast analysis of scanning. However, RFID's main drawback is its cost. RFID tags are more expensive than barcodes, and the cost of RFID tags for multiple products can be significant. One main advantage of RFID is its ability to scan a large no. of items at any given moment and thereby reducing time and overall workload. If applied, it will streamline the overall inventory management process at Sankara Eye Hospital.



Fig: 5.3 RFID Technology

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