Enhancing Procurement and Inventory Management: A Comprehensive Analysis of Stockout Trends

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Abstract:

This scientific analysis concentrates on the causes of the stockout within hospital procurement and inventory management systems. Delving into the root causes of the issue through a comprehensive fishbone diagram, the analysis found key factors as the reasons behind shortages. The result of the research conducted in a hospital aims at the development of strategies to prevent stockouts and to keep continuous care services were possible. The discoveries will provide a guide to healthcare facilities that aim to enhance their supply chain management practices, which, in turn, will result in better patient results and less operational expenditure.

Keywords- Fishbone diagram, Stockouts, Procurement, Inventory Management, Healthcare, Supply Chain.

Introduction:

Hospitals need to manage their inventory and procurement effectively, especially in the pharmaceutical industry where the availability of medications can have a direct influence on patient care. Stockouts, or situations in which necessary pharmaceuticals are not accessible, present serious difficulties that might cause treatment delays, higher healthcare expenses, and jeopardize patient safety. Using the fishbone diagram methodology and root cause analysis, this research report attempts to give a thorough examination of stockout trends in hospitals.

The fishbone diagram or the Ishikawa diagram, it's a brilliant tool that makes it possible to identify and sort out potential reasons that are responsible for complex problems. Back in the 1960s, the Dr. Kaoru Ishikawa drew inspiration from the appearance of a fishbone which acts as the starting point and the various causes as fine bones. In this situation, hospital inventory management, nurses, and other things can be divided into the following groups such as staff, processes, materials, supplies, and the environment as the causes of the problem. Through this method of analysis, the team can undergo a step-by-step examination of the multifaceted reasons for stockout and unmask hidden issues that might be hard to see at first. [2]

Hospital stocks are not managed well because of several problems such as the misunderstanding among the staff, the ordering process, the absence of real-time tracking systems, and the lack of inventory protocols. Not only that, but there are also external factors such as reliability of suppliers and regulatory compliance, which can even more worsen these problems. With the help of a fishbone diagram, this study will explore these convolutions deeply in order to expose root causes that lead to stockouts in pharmaceutical storages.

Eventually, the knowledge of these root causes of stockouts is pivotal for devising best strategies to reduce and promote improved procurement of drugs and medication associations in the healthcare systems. This research will not only underscore the relevance of systematic examination in confronting inventory problems but also suggest means for improving care through enhancement of pharmaceuticals availability.

Conceptual Framework

Purchase planning involves P2P (Procure to Payment) process in Opex (Operation Expenditure). Purchase planning is based on inventory classification analysis which generates auto indents for PTS (Purchase-To-Stock) items by auto PR (Purchase Request), for PTO (Purchase-To-Order) items by direct PR (Purchase Request) and as per pending transfer request.

Inventory involves the concept of ABC, FSN and VED analysis for the inventory classification which helps to identify the PTO/PTS items for setting ROL on the basis of days after which it gets uploaded in a system. These concepts use for generating SOR (Stock out report) on a daily basis to identify KPI (Key Performance Indicator) and stock out trends.

Several key concepts and theories relevant to healthcare inventory management and procurement practices are: -

- **Inventory management practices: -**
  - **J-I-T Inventory**

    Just in Time (JIT) is a production principle to eradicate waste by the production plant getting the right material quantities as well as the right products processing at the right place and time. Just-in-Time (JIT) theory, although it was previously mainly applied in the Japanese automobile and electronics industry, has found its way into various other industries worldwide. The objective of all production systems today, under current circumstances, is to survive in the long run. The principle of JIT is "producing the necessary item in the necessary quantity at the necessary time is an eternal driver of production and operations management". The sustainability of a manufacturing company in the midst of intense competition is strongly related to producing high-quality products at the lowest cost and as quickly as possible thus the lowest lead time possible. [3]

  - **FSN Analysis**

    The FSN analysis, abbreviated for Fast, Slow and Non-Moving Inventory Analysis, is a method of strategic inventory management that arranges items according to their consumption rates. This introductory stage allows firms to create the stock that best fits productivity, reduce storage costs, and improve operational efficiency not only by product classifications but also through planned stock monitoring, stock-out, and unsafe inventory levels. [4]

    - **F Fast-moving inventory**

    Fast-moving inventory refers to items that are the most in-demand and frequently going in and out of stock levels. As a result of this, these are the most replenished items.

    - **S Slow-moving inventory**

    The items in this category are moving slowly, which means their replenishment cycle is also slow.

    - **N Non-moving inventory**

    The final tier of this study which contains the least moving part of the inventory is also called the dead stock. Time and replenishment may or may not come at the time of usage.

The categorization is done as follows: -

If per day consumptions is,

>1, F category.

>0 or <1, S category.

<0, N category.

- **VED Analysis**

VED Analysis for Healthcare Providers is a critical inventory management method that puts the medical supplies and drugs into three categories of most critical towards the patient care and, secondly, toward the general running of the healthcare facility. Resource allocation will be optimal in ensuring the availability of the most crucial items.

- **V Vital**: Those things that could impact the survival of patients, and at the same time, compromise the functions of the hospital. Their effects are so drastic that they would lead to disasters, for instance, interruptions in treatments to patients.
- **E Essential**: Important items which are essential for the provision of quality care, though their lack does not pose an immediate threat to life but only if used for a short period.
- **D Desirable**: The items are desirable and not critical for operations wherein the patients will not be affected if they are missing.

- **ABC Analysis**

ABC classification: This refers to a three-grade ranking of how useful the item can be in achieving business goals. It takes three categories in grading:
A -- vitally important.
B -- moderately important.
C -- relatively unimportant.
The Pareto principle, which focuses on the idea that 80% of a system's results are made up of 20% of its inputs, is the foundation of the ABC classification. Moreover, it is providing organizations with an ability to identify their most important business segments so that they can be controlled more closely.
In the management of inventory, ABC classification allows an organization to focus more attention on the most critical items. It classifies products according to value and importance; this is derived from the Pareto principle.

- **Class A**: These are high-value products with a small amount of 10 percent of quantity, but it represents 70 percent to 80 percent consumption value.
- **Class B**: These are products that have a moderate amount of importance and thus registering 10 percent to 20 percent of revenues.
- **Class C**: These are the least precious items, accounting for a mere 10 percent of income.

- **Procurement Theories**

- **Supplier Relationship Management**

Supplier Relationship Management is a strategic approach taken by organizations in ensuring that suppliers are accommodated in building, managing, and maintaining mutual beneficial supplier relationships. This whole process ensures the effectiveness and resilience of the supply chain since supplier interaction is aligned to the business goals.

- **Stockout Analysis**

  - **Root cause Analysis**
    A systematic method for determining the underlying reasons of stockouts and creating remedial measures to stop them from happening again is called root cause analysis, or RCA. Businesses can reduce stockouts and related expenses by methodically examining the underlying causes.

Objectives

- To identify and analyse pattern of stockouts to understand their frequency and impact on inventory management.
- To identify the root causes of stockouts using fishbone analysis.
- To recommend strategies for improving inventory management and reducing stockouts.

Project Details

Week 1-3: Orientation and understanding the Procurement Process

- Attended orientation sessions to understand the Procurement Process of Hospital which follows P2P i.e. Procurement to Payment Process.
- Had a meeting with the team and the project supervisor to go over the goals, parameters, and deliverables of the project.
- Reviewed existing Purchase Manual to understand the in depth steps involve in P2P process in Opex.

Week 4-6: Purchase manual amendment

- Completed Purchase manual amendment, done updation in Purchase activity processes which involves Supplier selection, RFQ (Rate for Quotation), item master creation, preparation of Purchase order, rate negotiation, price control, GRA/GRN (Good Receipt Note) process, Corrigendum PO.

Week 7-10: Data Collection

- Gathered stockout information in Excel from the stockout reports on a daily basis to identify KPIs and stockout trends, from the different hospital main stores.
- Coordinated with Stores and Purchase Department to ensure comprehensive data collection.

Week 11-12: Fishbone Analysis

- Analyzed the collected data to understand the frequency of stockout of pharmaceuticals from various stores of Hospital.
- Visited stores for inspection to identify the root causes of stockouts.
- Recorded data, findings and preliminary conclusions, mentioning any difficulties that were encountered.
- Developed a Fishbone diagram for analyzing stockout issues.

Analysis and Findings

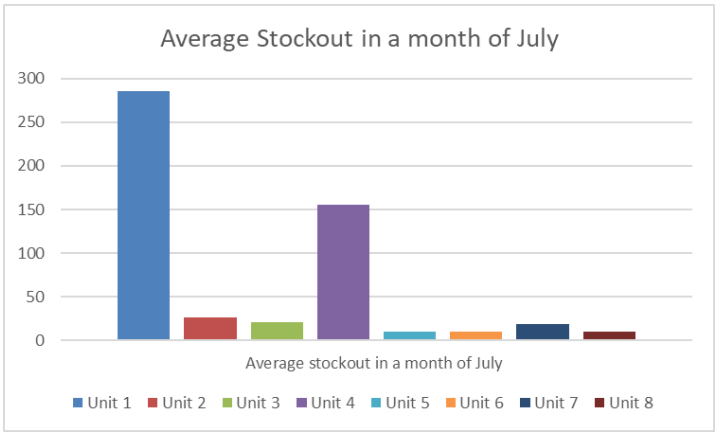

Fig 1: On the basis of analysis it was found that unit 1 was having maximum stockout in a month of July 2024.

The Fishbone Analysis

The fishbone analyse is a tool for analyzing the business process and its effectiveness. It is also commonly referred as "Ishikawa Diagram" because it was invented and incorporated by Mr. Kaoru Ishikawa, a Japanese quality control statistician. It is defined as a fishbone because of its structural outlook and appearance. In normal stature it looks like a skeleton of a fish. The Fishbone diagram and analysis typically evaluates the causes as well as sub-causes of one special problem and therefore enables identification of all the symptoms of any business problem (American Society for Quality, 2005). Due to that particular reason it is also known as "Cause-Effect analysis".
In an average fishbone diagram, the central problem which has to be addressed has been placed on the head of the diagram and the causes are written as the bones and then small bones are developed as the similarities of the sub-causes. Finally after completion of the diagram it is a comprehensive analysis of the causes of the leading problems and also unfolds the root causes as well (Balanced Scorecard Institute, 2007). There are six classic categories of a fishbone diagram which are classified as the primary causes of any business process problems. There are people, equipment, materials, environment, management and process. Analysis of these six variables identifies the reasons for a problem irrespective of its type or severity (Ishikawa, 1986). [2]

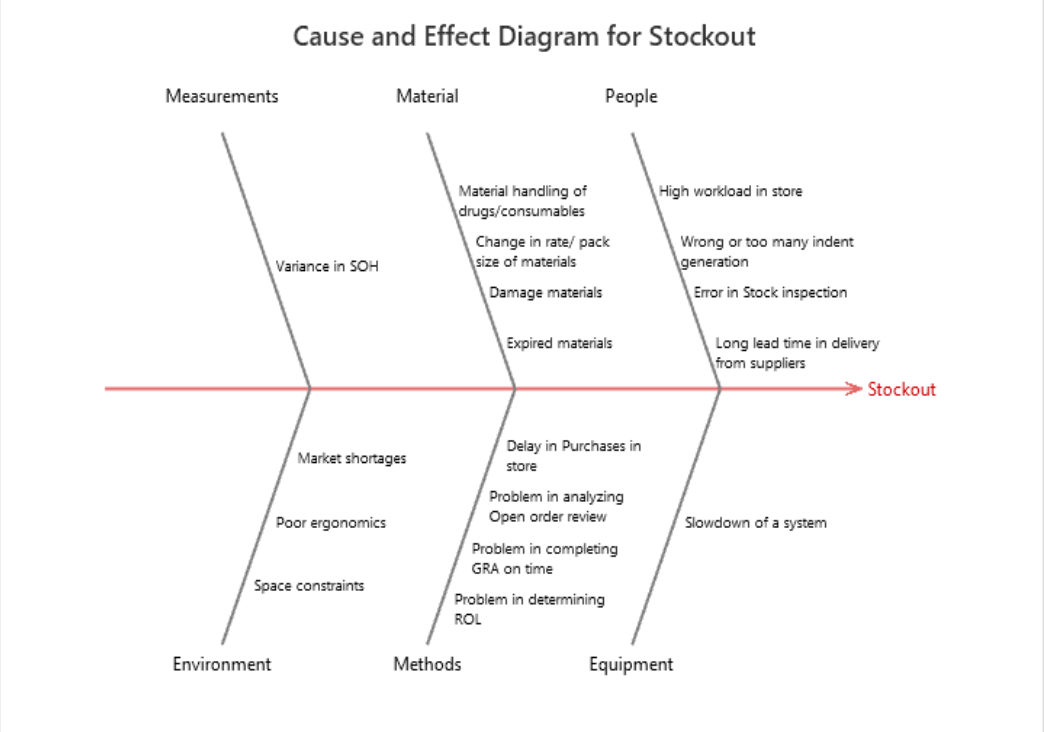

Fig 2: The fishbone diagram for stockouts in unit 1 showing the possible causes of a problem, which has been concluded by categorizing various causes.

Solutions

- As per consumptions, changes in classification of items are required according to ABC analysis- The inventory items are classified under "A," "B," and "C," based on their consumption values. The classification has to be updated in accordance with changing consumption patterns, so that it brings into the forefront the critical items under "A" and similarly keeps alert to low priority items under "B" and "C".

- Monthly Update of Reorder Levels (ROL): The Reorder Level is the stock level at which a new order should be placed to avoid stockout. Every month, it is advisable to update the ROL, considering the market fluctuations and consumption changes to ensure the inventory level is appropriate with no overstocking or understocking occurring.

- Daily Follow-up for Pending GRNs (Goods Receipt Notes): GRN is a confirmation that items ordered via the PO have arrived. Regular monitoring of pending GRNs every day ensures no materials get lost or delayed along the supply chain, hence improving overall accountability.

- Identifying Alternative Brands for Items Facing Market Shortages: In case of market shortages or supply chain disruptions, the need is to source alternative brands or suppliers, so operations can continue according to scheduled plan. This ensures that production or services are not halted for the reason that items cannot be found.

- Open Order review need to be conducted on a daily basis- Reviewing the open orders daily is helpful in checking the progress of the orders, to detect delays, and to address any issues that may arise in the procurement process, which will ensure on-time delivery.

- Reduce Excess Stocks of Non-Moving Inventory by 10-15%**:** Reducing non- moving inventory by 10-15% helps free up storage space and minimize holding costs, improving overall store management efficiency.

These approach can ensure better inventory management, minimizing holding costs and can reduce problem of stockouts.

Conclusion

This paper gives an overview of the root cause analysis, i.e., fishbone analysis of the stockouts that take place in hospitals. With these strategies put in place to address the root cause of stockouts, hospitals will greatly improve procurement and inventory management and, therefore, have better patient care and cost control in addition to resilient supply chains.

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