

A STUDY OF MULTI CRITERIA PHARMA INVENTORY CLASSIFICATION FOR A HOSPITAL

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ABSTRACT

It is an insight into the design and implementation of a Pharmacy Management System. The primary aim is to improve accuracy and enhance safety and efficiency in the pharmaceutical store. Today management is one of the most essential features of all form. Management provides sophistication to perform any kind of task in a particular form. The proper inventory control is a must as most of the components used by this industry are procured from either its ancillary units or other industries. The inventory control of these units can be carried out separately so that safety stocks can be further reduced.

Key Words: *Multi Criteria, Inventory Classification, Pharmaceuticals, XYZ Classification, ABC Classification, HML Classification.*

1. INTRODUCTION

Pharmacy inventory management is a complex but critical process within the healthcare delivery system. Without adequate pharmacy inventory management practices, hospitals run the risk of not being able to provide patients with the most appropriate medication when it is most needed. Additionally, pharmacies dispensing patterns and drug selection choices may have a direct effect on the affordability of care. Utilizing drugs that are non-contracted or not on the formulary may be more costly to the patient or may result in a lower than expected reimbursement. In addition to patient safety and financial considerations, stringent regulatory requirements pertaining to drug traceability, inventory reporting and inventory management elevate the importance of maintaining effective control over drug inventories in today's everexpanding healthcare compliance environment.

Hospitals are complex organization providing a multitude of service to patient, physicians and staff. These services include pharmacy, laboratory, surgery, dietary, linen, housekeeping, administration and others. Moreover, each area has specific and often unique material and supply need. The hospital product line consists of high cost and low cost items as well as perishable and durable goods that are consumed in large and small. Pharmaceutical components characterize as a large amount of hospital's operating expenses. Several researchers pointed out that inventory costs in the healthcare sector are substantial and are estimated between 10% and 18% of total revenues. Any measures to control expenditures in this area can have significant impacts on the overall efficiency of the organization. The importance of effectively managing the pharmaceutical flow in internal chain has been emphasized by many practitioners and academicians. Hospital supply chain, in terms of pharmaceutical products is providing the supplies of medicine for the patients and it's critical in ensuring high standard care. First, pharmaceutical industry is influenced by strong institutional and regulatory pressures. The regulatory pressures affected in determining accurate demand forecast. Second, hospitals are operationally different with another business, because it's extremely difficult to make a forecast about the patients and their consumption of drugs. Third, hospital pharmacy mainly

holds a large amount of safety stock to cope with uncertainty demand, which resulting in a high operational cost and have to deal the drug expiry problems. Also, several reasons why pharmaceuticals deserve extraordinary consideration in controlling inventory, such as: medicine are developed, manufactured and distributed according to strict regulatory requirements and it makes fundamental differences between medicines and other consumer products; medicines are most often selected by a physician for a specific patient and reimbursed in whole or in part by a third-party insurer or state.

2. OBJECTIVES OF THE STUDY

Primary objective:

- To conduct a study of multi criteria inventory classification for a hospital.

Secondary objectives:

- To analyze and classify materials based on consumption value.
- To identify materialised on criticality enable for the decision makers to have a better control on availability.
- To classify components based on the movement which enable the inventory person to have adequate stock in inventory.
- To analyze the value of item in stock facilitate to have supply control.

3. LITERATURE REVIEW

A pharmacist is a medical professional who dispenses drugs to patients according to a prescription ordered by a physician or other clinician. Pharmacists have an in-depth knowledge of the chemistry of various drugs and how they react in humans, and also how drugs interact with each other (Charles E. Rosenberg, 1980). Pharmacists must accurately measure and package medicine, ensuring its dosage and safety to be administered properly to a patient.

Multi-criteria inventory classification has been addressed by some studies in the literature. Flores and Whybark (1985) suggested that ABC classification considering multiple criteria, such as lead time, criticality, commonality, obsolescence and substitutability can provide a more comprehensive managerial control. classical ABC analysis by developing a multi criteria inventory classification approach for supporting the planning and designing of a maintenance system. Relevant classification criteria and control characteristics of maintenance spare parts are identified and selected and discussed in terms of their effects on maintenance operations, purchasing characteristics, positioning of materials, responsibility of control, and control principles

They proposed a bi-criteria approach which uses standard ABC classification of each of two criteria, and then combine the two single-criterion grouping by a joint-criteria matrix. The resulting matrix requires the development of nine different policies, and for more than two criteria it becomes impractical to use the procedure.

Botter and Fortuin (2000) presented a case study for developing a strategy for spare parts inventory and use a multi-criteria classification of items. They defined a distinction between vital, essential and desirable service parts through the criteria of criticality of the function to be performed by a system that has become defective, response time, consumption, price, delivery time, repair ability and life-cycle phase of the service part. Gajpal et al. (1994) elaborated the criticality analysis of spare parts by using the analytic hierarchy process (AHP) for classifying the spare parts.

According to Bill G. Felkey, BA, MS, professor of healthcare informatics in the department of pharmacy care system at Auburn University in Alabama predicted that many pharmacies across the country will choose to move the pharmacist to a more conspicuous forward location in their stores. With the pharmacist in front, however, you can put the technology behind closed doors or you can believe that patients will be fascinated to see how these robotics work.

4. TOOLS FOR ANALYSIS

1. ABC Analysis

2. XYZ Analysis
3. HML Analysis

4.1 ABC analysis

In supply chain, ABC analysis is an inventory categorization method which consists in dividing items into three categories, A, B and C: A being the most valuable items, C being the least valuable ones. This method aims to draw managers' attention on the critical few (A items) and not on the trivial many (C-items). Prioritization of the management attention Inventory optimization is critical in order to keep costs under control within the supply chain. Yet, in order to get the most from management efforts, it is efficient to focus on items that cost most to the business. The Pareto principle states that 80% of the overall consumption value is based on only 20% of total items. In other words, demand is not evenly distributed between items: top sellers vastly outperform the rest. The result of the ABC Classification is shown in Figure 4.1.

The ABC approach states that, when reviewing inventory, a company should rate items from A to C, basing its ratings on the following rules:

- A-items are goods which annual consumption value is the highest. The top 70-80% of the annual consumption value of the company typically accounts for only 10-20% of total inventory items.
- B-items are the interclass items, with a medium consumption value. Those 15-25% of annual consumption value typically accounts for 30% of total inventory items. The annual consumption value is calculated with the formula: (Annual demand) x (item cost per unit). Through this categorization, the supply manager can identify inventory hot spots, and separate them from the rest of the items, especially those that are numerous but not that profitable.
- C-items are, on the contrary, items with the lowest consumption value. The lower 5% of the annual consumption value typically accounts for 50% of total inventory items

The following steps will explain the classification of items into A, B and C categories.

1. Find out the unit cost and the usage of each material over a given period.
2. Multiply the unit cost by the estimated annual usage to obtain the net value.
3. List out all the items and arrange them in the descending value. (Annual Value)
4. Accumulate value and add up number of items and calculate percentage on total inventory in value and in number.
5. Draw a curve of percentage items and percentage value.
6. Mark off from the curve the rational limits of A, B and C categories.

4.2 HML Classification

The High, medium and Low (HML) classification follows the same procedure as is adopted in ABC classification. Only difference is that in HML, the classification unit value is the criterion and not the annual consumption value. The items of inventory should be listed in the descending order of unit value and it is up to the management to fix limits for three categories. For examples, the management may decide that all units with unit value of Rs. 2000 and above will be H items, Rs. 1000 to 2000 M items and less than Rs. 1000 L items. The HML analysis is useful for keeping control over consumption at departmental levels, for deciding the frequency of physical verification, and for controlling purchases.

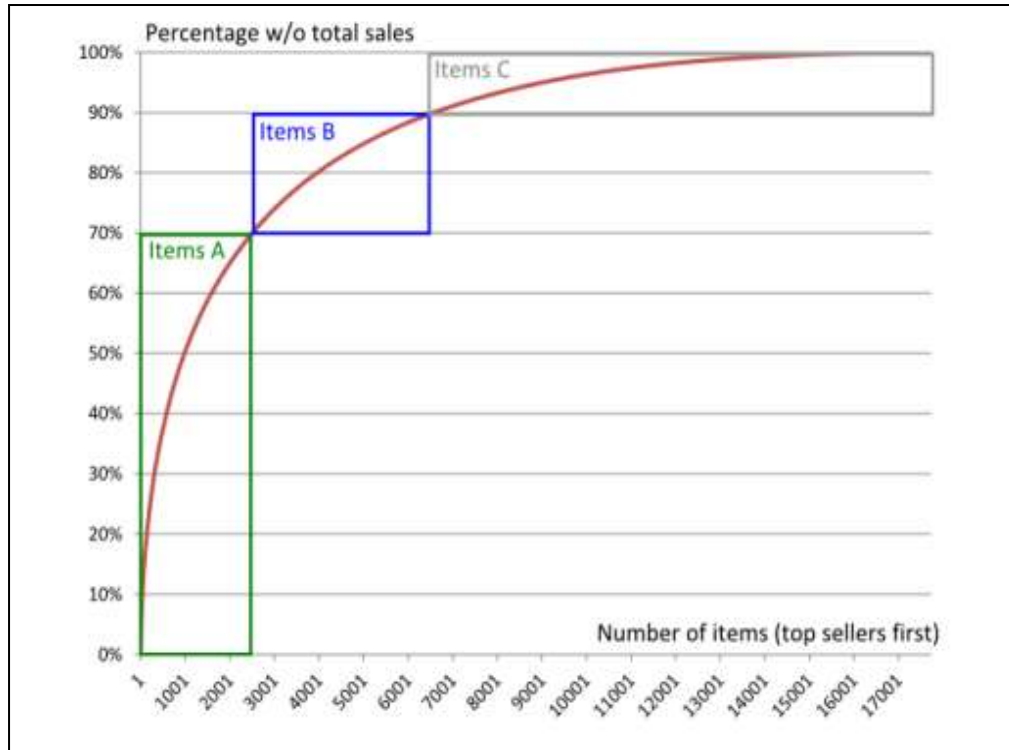


Figure 4.1 ABC Classification

4.3 XYZ Analysis

XYZ analysis is one of the basic supply chain techniques, often used to determine the inventory valuation inside Stores. It's also strategic as it intends to enable the Inventory manager in exercising maximum control over the highest stocked item, in terms of stock value. A system of categorization, with similarities to Pareto analysis, the method usually categorizes inventory into three bands with each band having a different management control associated. Although different criteria may be applied to each category the typical method of "scoring" an inventory item is that of annual stock value of said item (qty in stock X cost of item) with the result then ranked and then scored (X, Y or Z). Bandings may be specific to the industry but typically follow a 70%, 90%, 100% banding in that X class items represent 70% of the stock value (although they may account for 20% number wise), Y class items fall between 70% and 90% of the annual stock value with C class the remaining. In practical terms the complex high cost materials typically fall into the X class items, with the consumable, low cost (and typically fast moving) classed as X class. Not all stock is equally valuable and therefore doesn't require the same management focus. The results of the XYZ analysis provide information that helps evaluate how each inventory part should be monitored and controlled. These controls are typically - X class items which are critically important and require close monitoring and tight control - while this may account for large value these will typically comprise a small percentage of the overall inventory count. Y class are of lower criticality requiring standard controls and periodic reviews of usage. Z class require the least controls, are sometimes issues as "free stock" or forward holding. The result of XYZ analysis is shown below in the figure 4.3.

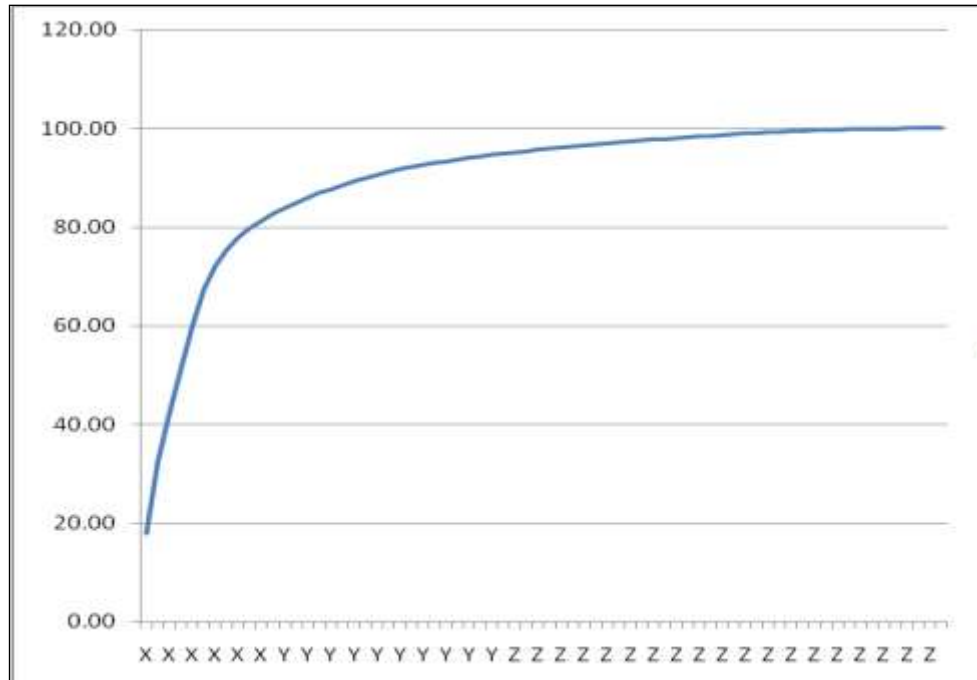


Figure 4.2 XYZ Analysis

5. CONCLUSION

The total inventory cost comes out to be less than the existing total inventory cost. Though the total inventory cost works out to be minimum for ABC method, yet it cannot be applied, as no such practical aspect is undertaken in this method. Safety stocks for different combinations are modified depending upon the usage of safety stock during the last four years. The proper inventory control is a must as most of the components used by this industry are procured from either its ancillary units or other industries. The inventory control of these units can be carried out separately so that safety stocks can be further reduced.

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