Inventory management policy in a university pharmacy

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Abstract

This research analyzes the operation, management and inventory control of a University pharmacy. An inventory policy for medication was developed. Furthermore, procedures and recommendations for the process were established. The implementation of improvements led to enhance use of resources in order to provide a higher quality service to the community.

Keywords: Inventory policy, University pharmacy, ABC classification.

INTRODUCTION

One of the key points in managing the retail of pharmaceuticals is inventory control, being the foundation to ensure the required products, maintaining a balance between the service level to the customer and inventory costs. Inventory control is widely documented in the literature, in practice, policies and control techniques are selected depending on the type of items or products that are handled, volume of sales, costs involved, and other important factors. There are a number of schemes for the classification of inventories (Ketkar and Vaidya, 2014). ABC

classification is one of the most used techniques to group articles, based on the annual use value. There are other criteria on which is based the classification of inventories of products, such as cost of maintaining inventory, obsolescence, substitutability, inventory capacity, distribution of demand and shortage penalty (Cohen and Ernst, 1988; Millstein, 2014; Ng, 2007). Flores et al. (1992), recommend the use of one or more additional criteria; however, the greater the criteria used in the classification, the greater the increase in methodology complexity. The objective of this research is to develop a policy of inventories, as well as procedures and recommendations to enhance the operation of a University pharmacy dedicated to the sale of pharmaceutical products to students, teachers, University community and general public. The products sold by the University pharmacy are the following: OTC over-the-counter medicines that do not require prescription; prescription drugs which are those that are sold only by prescription; master formulas of drugs intended for a specific patient, prepared by the pharmacist or under his direction, to complement a medical prescription detailed of substances. For the purposes of our study we will focus on OTC medicines and prescription drugs. On the other hand, it is appropriate to stress the importance of the practical application of the concepts of administration and inventory control at the University pharmacy, since unlike many industries, pharmacy managers have to manage very complicated distribution networks and inventory management problems without proper guidance or training in efficient practices, this is because the majority of pharmacy managers are medical specialists, but not professionals in supply chains (Uthayakumar, 2013). On the other hand, within the context of inventory control, there should be consideration for organizational aspects such as assignments, the decision-making process, the communication process and the behavior of everyone involved (Zomerdijk and De Vries, 2003). According to Maestre et al. (2013), the objectives of the pharmacist in charge of the management of the service can be summarized in the following list in order of descending priority: 1. meet product demand, 2. minimization of the costs of purchase for medicines and stock levels and 3. minimization of the number of orders made. In addition, several economic and storage constraints must be taken into account, that is why it is relevant the development and implementation of the results of this research.

METODOLOGY

The work team, met with those in charge of the pharmacy in order to know the current situation of the management and control of inventories of medicines. Soon it was determined the problems and areas of opportunity to be addressed.

Subsequently, a physical inventory was conducted at the University pharmacy in order to identify missing stock and audit inventory procedures being used.

When we finished the physical inventory, we compared it with the computer database inventory control (System Solutions) in order to know the shortages and discrepancies in medicines stock.

Then we made an ABC classification of inventory based on unit costs of medicines and in the volume of historical annual demand as well as other important factors such as lead time and expiration. In typical form and according to the Pareto principle the top 20% of the articles explains the 80% of the annual monetary volume of sales. The products are classified into three categories: items category A corresponding to the 80% of the annual use value, category B that corresponds to 15% and category C which corresponds to 5% (Nahamias, 2007).

The procedure used by Fogarty et al. (1991) to determine ABC classification of products on the basis of the monetary value is presented below:

1. Determine the annual use of each item in the inventory.
2. Multiply the annual use of each article for the cost of the same to obtain the annual monetary value of each article.
3. Add the total annual monetary utilization of all the articles to determine the aggregate expenditures annual monetary from inventory.
4. Divide the total annual monetary use of each article between annual expenditure added by all articles in order to get the percentage of total use for each article.
5. Detail articles in rank order on the basis of the percentage of aggregate use.
6. Review of the distribution of the annual use and the articles of groups on the basis of the percentage of annual use.

From the obtained classification, controls and the periodicity of the cycle counts depending on the ABC classification were determined (Fogarty et. al., 1991) by type of medicines (OTC and prescription) in the following manner:

Items A

1. Frequent assessment of forecasts.
2. Monthly cyclic accounting, with rigid tolerances on the accuracy.
3. Daily update of records.
4. Frequent review of the requirements of demand, quantities to order and safety stock.
5. Strict monitoring and expediting to reduce the time of delivery.

Items B

Similar to the controls of items in A category, but are performed less frequently and the cycle count will be published quarterly.

Items C

1. Count on them as basic rule.
2. Simple registers.
3. Large amounts of order and safety stock.
4. Storage in area available for dispensing.
5. Half-yearly cycle count.

According to Mohammaditabar et al. (2012), in the majority of cases, for the most important items, i.e. items in A category is proposed a system of continuous review and for the less important, it means the categories B and C is recommended a system of periodic review.

In addition, reorder points were estimated by type of medicine according to equation (1), on the basis of its daily demand, the lead time from supplier, the lot size and the safety stock. The safety stock, is the minimum amount that must remain in the inventory, in order to cover any delays due to supply problems in order to ensure customer service (Fogarty et al., 1991).

$$ROP=(DD*(LT+ SS))/LS \quad (1)$$

where, *ROP* is the reorder point, *DD* is the daily demand, *LT* is the lead time, *SS* is the safety stock, and *LS* is the lot size.

Based on these calculations, the minimum and maximum inventory level was estimated for each product.

Finally, a comprehensive policy of management and inventory control according to the needs of the University pharmacy was established.

RESULTS

In physical inventory conducted to 540 University Pharmacy Drugs, the following results were found regarding the products, process control and computer system.

In regards to products, the following results were obtained:

1. It was noted that the products are not arranged on the basis of a specific and well defined order, as for example a code that can be read by rack or location.
2. There is no layout of the locations of the products.
3. There are repeated shelf locations for a single product.
4. Items A category (high cost medicines e.g. antibiotics) do not have a shelter under lock and key.
5. There is no ABC classification of products.

From the ABC classification of OTC medicines and prescription by frequency, the following results were observed, Table1.

Table 1. ABC classification by type of medicine.

Category	OTC medicines	Medicines of prescription
A	137	63
B	110	57
C	113	60
Total	360	180

It was established a policy of cycle counting (Chase et al., 2004) for articles analyzed, this count was conducted in such a way that the articles category A will be held on a monthly basis, all articles category B will be on a quarterly basis and the totality of articles category C will count biannual way, leaving the cycle counts as shown in Table 2.

Table 2. Cycle counts for each category by type of medicine.

Category	Number of items to count per day		Periodicity of count
	OTC medicines	Medicines of prescription	
A	7	4	Monthly
B	2	1	Quarterly
C	1	1	Half-yearly

The reorder points were obtained for each of the 540 medicines, Table 3 shows the point of reorder ranges for each category by type of medicine.

Table 3. Estimates of the point of reorder ranges for each category by type of medicine.

Category	OTC medicines	Medicines of prescription
A	1 a 13	1 a 5
B	1 a 5	1 a 4
C	1 a 5	1 a 3

Finally, the following results were obtained in regard to the control procedure and the computer system and data base during the physical inventory:

Control procedure

1. The physical inventory is not made in a single day.
2. The procedure for the physical inventory has serious deficiencies as during inventory sales were made to customers and product entries to the system and physically to the store.
3. The physical inventory does not use cards or books to record, instead a list of items is printed and employees only check what´s on the list, this can lead to a failure, to include products lost or that are not entered into the system.
4. There is duplication of medications and negative in the lists of the system.
5. Used sheets of sticky notes instead of labels to formal identification of products.
6. There are many discrepancies in the inventories that are not revised thoroughly.

Computer system

1. The system in use is deficient in regard to the handling of the data.
2. It is not clear how to handle the issues of expiration.
3. It is not clear how and who has authorization to fix discrepancies in the system after the physical inventory.

CONCLUSIONS AND RECOMMENDATIONS

From the results obtained, it is suggested to analyze and establish a new procedure for the realization of the half-yearly physical inventory in order to improve the accuracy of the information in the system and avoid shortages or discrepancies in the daily operation. It is recommended to apply the ABC analysis taking into account the costs of the products, as well as perform the cyclic inventories taking as a basis the ABC analysis. In addition, it is important to calculate the maximum and minimum based on the historical demand of products and to establish safety stocks for each product of high demand. On the other hand, it was essential to redefine the locations for each product within the pharmacy, depending on the category and type of medication. Besides, it is suggested to update the computer system and database of medicines from the pharmacy, in accordance with the needs and changes that will be required. It is recommended to analyze other costs associated with stock management, such as the shipping cost, ordering cost of the medication, cost of shortages of the product, among others. On the other hand, it is suggested to review periodically the responsibilities of those in charge of the

pharmacy in the area of inventory management, quality of information and database, in order to generate relevant and efficient decision-making.

This article has provided a management policy and control of inventories to a Pharmacy University, in order to respond to the needs of the customers, students and the general public.

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