Original Article

PURCHASING AND INVENTORY MANAGEMENT BY PHARMACIST OF A PRIVATE HOSPITAL IN NORTHEAST OF THAILAND

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ABSTRACT

Objective: The aim of this study was to improve the purchasing and inventory management system to transparent and checkable manner, before and after the improved system were compared.

Methods: The retrospective data including rate of approved purchasing documents, rate of inspected products, rate of correct received products, rate of destroyed or expired products, rate of reserved products, and rate of product shortages during January 2010 to December 2011were collected. The identified problems of purchasing and inventory management were solved by improving the purchasing and inventory management system. The key performance indicators during January 2012 to May 2012 were collected. The improved results were compared.

Results: After the purchasing and inventory management system were adopted, rate of approved purchasing documents and rate of inspected products in the first five months were 100%. Rate of correct received products was higher than 95%. Rate of destroyed or expired products was less than 0.5%. Rate of reserved products was less than 3 months. Rate of product shortages for all observed five months was less than 1%.

Conclusion: The improved purchasing and stock management system, which has been developed by pharmacists was successful. All purchase documents and received products were 100% approved and inspected by administrative team. Rate of correct received products was increased. Rate of destroyed or expired products and rate of product shortages were decreased. Furthermore, rate of reserved products was not more than 3 months.

Keywords: Purchasing, Inventory, Management, Pharmacist, Private hospital

INTRODUCTION

Medicines and medical supplies consume are the major portion of the hospital expenses. The rising of drugs and medical supplies cost directly affect the total expenses of the hospital. Thus, inventory system should be developed in a cost effective manner [1]. The stock systems that support enough products to each department are needed. However, the overstock causes more financial problems and spends more time to resolve. Conversely, drug shortages can unpleasantly affect drug treatment, delay medical processes, and may result in medication error [2]. Many causes of drug shortages were described i.e. unexpected demand, natural disasters, etc. [3]. Thus, over and unnecessary of drugs having very less used over a period of time and lower stocking should be prevented [4]. There are three components of a cost-management program; pharmacy-directed activities, interdisciplinary activities, and reimbursement & charging. The pharmacy-directed activities composed of three topics; purchasing, inventory management, and waste reduction [5]. Thus, the pharmacy management team plays the important role in this systematization.

ABC (always, better, and control) analysis is a method of categorizing drug items according to their relative importance. The analysis categorize items into three categories: category A-C means the first 10-15% of the items account for approximately 70% of cumulative cost, 20-25% of the items account for a further 20% of the cumulative cost, and the remaining 65-70% of the items account for 10% of the total value, respectively. The limitation of ABC analysis is that it is only based on financial value and consumption rate. For example, an item of low monetary value and consumption may be vital. Their importance cannot be ignored simply because they do not appear in category A [6]. Thus, coupling with VED (vital, essential, and desirable) analysis will solve this problem. The coupling of ABC and VED analysis showed the effective and efficient manner for drug inventory management [7-10]. A studied private hospital located in the Northeastern of Thailand. This hospital is a secondary hospital with 50 beds. The former purchasing and inventory management were managed by only one

pharmacist. But, the reveal, checkable, and systematic purchasing and inventory system are required. Recently, the purchasing and inventory management of the private hospital in this study were reformed by inventory pharmacist and administrative team. The aim of this study was to improve the purchasing and inventory management system to transparent and checkable manner, before (only one inventory pharmacist) and after (inventory pharmacist work with administrative team) the improved systems were compared.

MATERIALS AND METHODS

Phase 1 (problem identification)

The retrospective data including rate of approved purchasing documents, rate of inspected products, rate of correct received products, rate of destroyed or expiratory products, rate of reserved products, and rate of product shortages during January 2010 to December 2011were collected. The probable causes of problems were identified by pharmacist and administrative team. The major causes were lack of controlling from administrative team, the working process of purchasing and inventory management should be firstly modified. Secondly, standard procedure for handling and storage of products should be assigned.

Phase 2 (problem solving)

The identified problems of purchasing and inventory management during 2010-2011 were solved by inventory pharmacist and approved by the hospital administrative team. The top-down flow chart of improved purchasing and inventory management was constructed (Figure 1), the purchasing committee and the inspection committee were appointed by the executive vice president. The key processes, process requirements, and key performance indicators (KPI), and goal of purchasing and inventory system were specified by pharmacist and approved by the administrative team (Table 1). In addition, standard procedure for handling and storage of products were improved in order to maintain products stability.

Table 1: Key processes, process requirements, key performance indicators, and goal of purchasing and inventory management

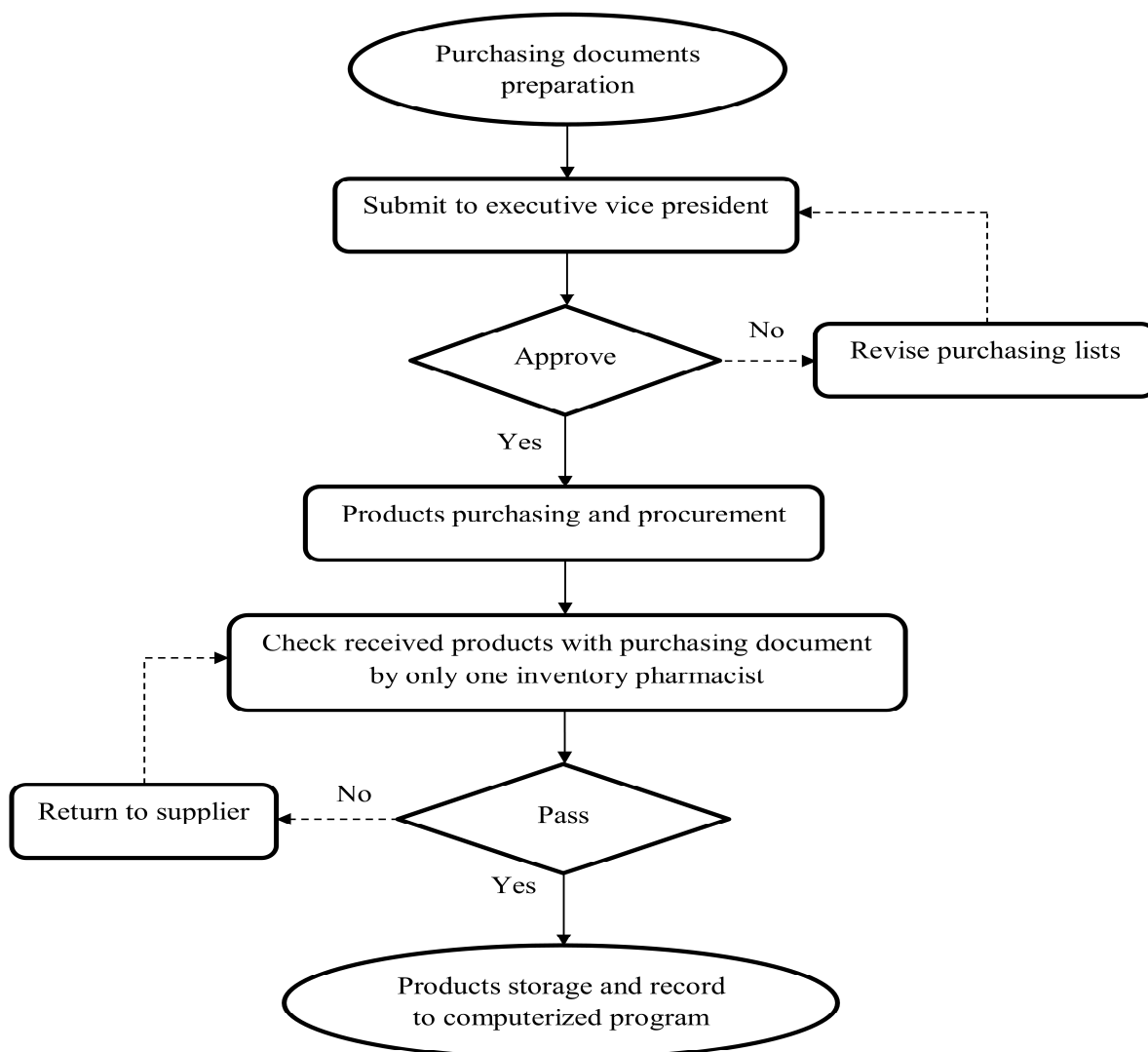| Key processes	Process requirements	KPI	Goal
1. Purchasing and procurement	Purchasing documents were approved by executive vice president of hospital	Rate of approved purchasing documents	100%
2. Products inspection	- All products were inspected by the committee	- Rate of inspected products	100%
	- All received products were correct with purchasing documents	- Rate of correct received products	> 95%
3. Products handle and storage	- Fewer destroyed or expired products	- Rate of destroyed or expired products	< 0.5%
	- Products were sufficed for hospital needs	- Rate of reserved products	< 3mo.
4. Products distribution	All departments were altogether received the correct products	Rate of product shortages	< 1%

Phase 3 (monitoring and evaluation)

The data including rate of approved purchasing documents, rate of inspected products, rate of correct received products, rate of destroyed or expired products, rate of reserved products, and rate of product shortages during January 2012 to May 2012 were collected. The improved results were evaluated.
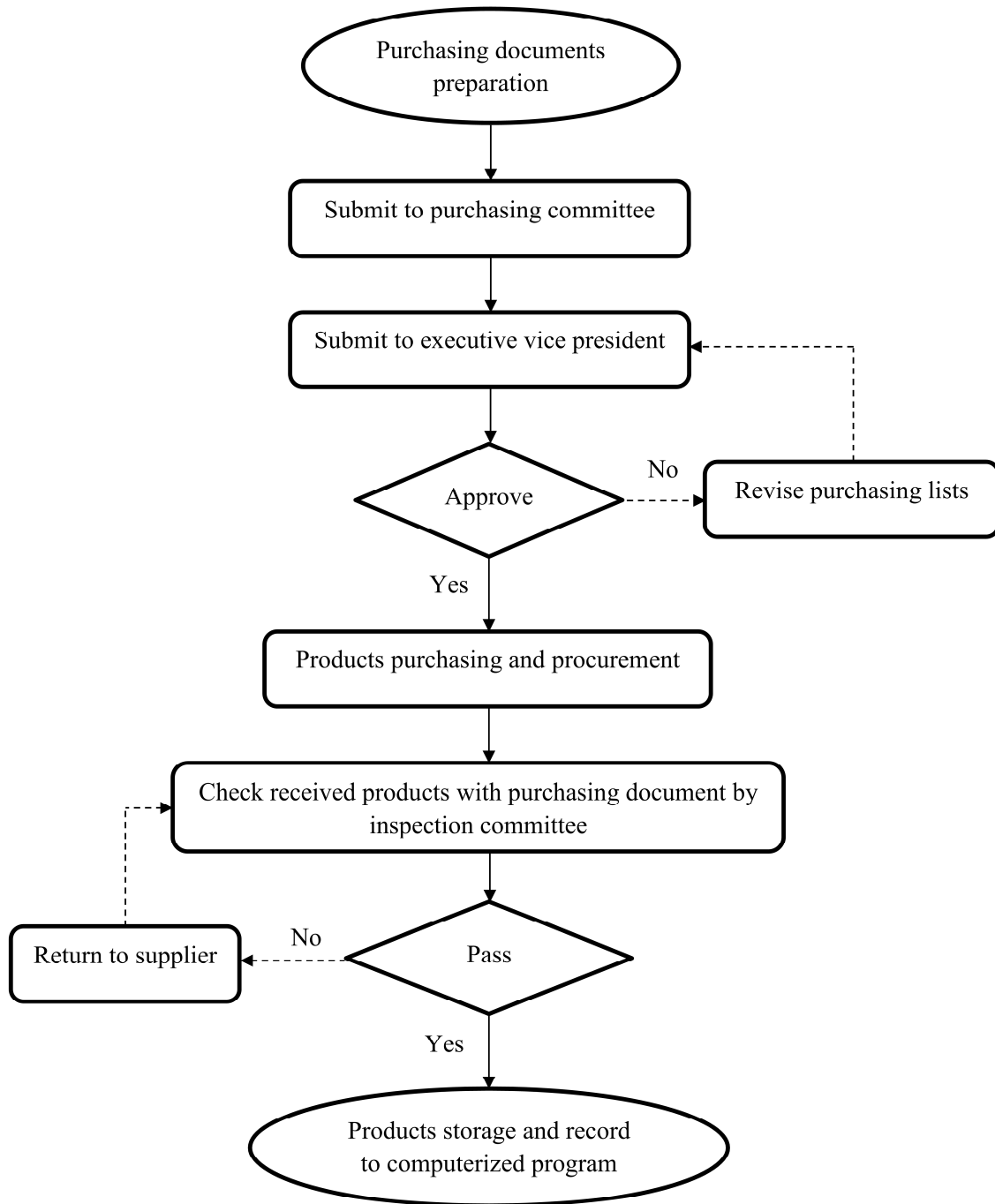
RESULTS AND DISCUSSION

Well-organized inventory management system reduces the problems of over-stock, out-of-stock, dead stock of drugs, and also decrease the time spent in gathering and taking care of drug stock control. In addition, the minimal purchase orders would decrease the total expenses in the current inventory control, and finally increase the hospital's profit [11]. In this study, the former inventory management, only one inventory pharmacist in this private hospital managed for all purchasing for the hospital without controlling from purchasing committee. However, World Health Organization suggested that no single individual should have total control of pharmaceutical purchasing and procurement. A designated purchasing committee will review and approve all purchases [12], the improved purchasing and inventory management were constructed. The top-down flow chart of improved purchasing and inventory management is shown in Figure 1.

(a)

(b)

Fig. 1: Top-down flow chart of former (a) and current (b) purchasing and inventory management system constructed by the inventory pharmacist and administrative team

In 2012, the new purchasing and inventory management was adopted. Initially step of purchasing, purchase documents were prepared by only one pharmacist. The purchase documents contained product items, supplier's name, quantity, price per unit, total price, and consumption rate. The required products from different departments were concluded by the pharmacist before submit to the purchasing committee. The purchasing committee contains five people including the administrative director, the administrative assistant director, the general administrative manager, the account and financial department supervisor, and the

pharmacy department supervisor. The meeting was set at once a month in the first week. The approved purchasing documents were signed by all committee and then were submitted to the executive vice president of the hospital. The approved documents were signed by the executive vice president. If they were not approved, the unapproved purchasing documents were revised and re-submitted. After all documents were completely approved, the inventory pharmacist can send these purchase orders via telephone, fax, or e-mail. The inspection process was initiated when the purchased products were received. The three inspection committee including the inventory pharmacist, the

inventory pharmacist assistant, the general administrative manager, or the account and financial personnel inspected the products with purchasing document. If the products were correct, the committee signed in the inspection documents. In case of destroyed or wrong products were sent to the inventory department, they were returned to the suppliers. The inspected products were stick with colored sticker and write the number to identify the expired date. Expired year was identified by sticker color; grey, purple, cream, red, yellow, green, light blue, orange, and dark blue were indicated products expired in 2011-2020, respectively. Expired month was identified by number; 1-12 means products expired in January-December, respectively. The identified products were stored in inventory department and handling with standard procedure. The product items, supplier's name, quantity, price per unit, total price, lot number, and expired date were recorded in the computerized program. Inventory pharmacist concerned about the quality of products during store in inventory department, the standard management was used. Some methods were developed to minimize expired drugs [13]. The "first expired first out" manner was used; shorter shelf life products were used before the new one. The handwritten stock card system was removed and substituted with the computerized program. Computerized program was selected because it can decrease workload, personnel time, and administrative budget, made inventory functions faster and easier [14, 15].

For the best quality and efficacy of drug during storage period, the temperature control and temperature monitoring equipment are very necessary. The two new air conditioners were installed and these air conditioners automatically switch on every 12 hours alternatively. The temperature and humidity monitoring equipment were purchased and the temperature and humidity were recorded twice a day at 8.00 a.m. and 4.00 p.m. In addition, the quality and efficacy of refrigerated medicines or thermolabile drugs, especially vaccines were concerned. Sustaining the vaccine cold chain is a critical part of a successful immunization program [16]. The two

new high quality refrigerators were obtained, the temperature of the refrigerators were recorded in the same manner as the inventory temperature. The storage and handling of vaccines was followed the vaccine storage and handling guideline of Centers for Disease Control and Prevention, National Center for Immunization and Respiratory Diseases, USA [17].

Table 2 showed that all KPI results in 2010 were higher than the goal value, except that rate of approved purchasing documents and rate of inspected products were not available. The rate of correct received products was less because many invoices were overdue and the suppliers did not distribute products to the hospital. However, an average rate of reserved products was still more than three months, over-stocked occurred. Consequently, product shortages were found, and expired products were high amount. These problems were caused by discontinuous of inventory management and lack of systematic management. In the year of 2011 is the first year that hospitals in the same network assembled purchasing in one hospital and then distributed to other hospitals in different provinces. Thus, most of the purchasing procedure was moved to other hospitals. All KPI results were improved; however, it was still lower than goal value except rate of destroyed or expired products and rate of reserved products. Furthermore, in the last trimester of 2011, there was a big flood in Thailand that caused many drug shortages. In 2012, the assembled purchasing was cancelled because it was ineffective process for this hospital group, product shortages were still high with delayed of product delivery.

After the purchasing and inventory management system were adopted, rate of approved purchasing documents and rate of inspected products the first five months of exchange were 100%. Rate of correct received products was improved; the results were higher than 95%. Rate of destroyed or expired products was less than 0.5%. Rate of reserved products were less than 3 months. Rate of product shortages for all observed five months was less than 1% (Table 2).

Table 2: Results of each key performance indicators during January 2010 to May 2012

KPI	Results						
	2010	2011	Jan 2012	Feb 2012	Mar 2012	Apr 2012	May 2012
Rate of approved purchasing documents (%)	N/A	93	100	100	100	100	100
Rate of inspected products (%)	N/A	52	100	100	100	100	100
Rate of correct received products (%)	56	91	96	100	100	97	98
Rate of destroyed or expired products (%)	2	0.1	0.2	0	0	0.3	0.2
Rate of reserved products (months)	5.4	2.1	2.4	2.5	2.5	2.9	2.4
Rate of product shortages (%)	12.0	5.4	0.2	0.0	0.3	0.5	0.2

N/A = not available

CONCLUSION

The improved purchasing and stock management system, which has been developed by pharmacists was successful. All purchase documents and received products were 100% approved and inspected by the administrative team. Rate of correct received products was increased. Rate of destroyed or expired products and rate of product shortages were decreased. Furthermore, rate of reserved products was not more than three months. However, the sustainable of the improved system must be further monitored.

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