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Review Article

Unveiling supply chain efficiency: exploring ABC-VED analysis studies on drug inventory management in India

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ABSTRACT

About one-third of annual hospital budget is spent on buying materials and supplies including medicines. In any health facility, be it small health center or a big teaching institution, drugs forms an essential and indispensable element. Non-availability of drugs particularly in the developing countries is due to lack of proper material management. A poor management in a public pharmaceutical supply can result in wastage or blockade of financial resources, irrational utilization of drugs, shortage or overage of essential drugs, increased holding cost, and reduction in flexibility and decline in quality of health care services. Adaptation of a scientific approach of inventory management in healthcare manages all the issues regarding stocking of pharmaceutical items, ensuring safety, stability, efficacy, availability and maintenance of quality of drugs to provide better healthcare services. This review will focus on inventory management and its importance with special emphasis on always better control-vital, essential, desirable (ABC-VED) analysis technique on essential medicine concept and report of various research studies conducted on ABC-VED analysis in different parts of country.

Keywords: Drug inventory, Stock management, ABC-VED analysis, Essential medicines, Drug store

INTRODUCTION

Inventory represents the stock of items, resources or materials utilized in an organization.¹ In any hospital setting, effective inventory management is crucial for maintaining a harmonious equilibrium between demand of medicines supplies and investment in drug inventory.² Hospitals are one of the most common organizations to provide healthcare services to the community thus hospitals required to maintain their services at highest level in order to fulfil the patients' needs.³ The rising costs of healthcare services are growing disproportionately in relation to the available resources.⁴ In a hospital, inventory represents "all the drugs, other raw materials which are used for the purpose of diagnosis and therapeutic use".⁵ Inventory at healthcare setting have a significant part in a total cost.⁶ Supply system in hospital ensures adequate stock of required items in order to maintain regular supply of all items to provide uninterrupted healthcare services.⁷

Approximately one third of the total expenditure in hospital are lies in purchasing the medicines.² About one-third of annual hospital budget is spent on buying materials and supplies including medicines.⁸ It has been estimated that materials and supplies like drugs accounts for 30-35% operating costs in a hospital.⁹ Medicines always remains the vital and indispensable resource elements of a healthcare setting irrespective of the size of healthcare organizations. In any health facility, be it small health centre or a big teaching institution, drugs forms an essential and indispensable element.¹⁰ Approximately 60% of the overall consumable budget allocated to the medicines in hospitals.¹¹ The insufficient availability of medicines in pharmacy may lead to poor healthcare services and negative reputation. Enough stock is required to ensure regular accessibility of required drugs in the required dosage and strength. To ensure uninterrupted supply of drugs and required items, an adequate stock should be maintained by hospital supply system.¹² An efficient inventory management is important to reduce the

associated costs across different levels on the supply system. Inventory management is a methodical system that guides decisions on what items to procure, when to make purchases, and the optimal quantities to order. This approach aims to minimize both procurement and storage expenses.³ Inventory management is defined as the continuing “process of organizing and controlling inventories” that aims at “minimizing investment in inventory while balancing supply and demand. The basic goal of inventory management is to maintain an inventory level that will provide optimal stock at lowest cost. It is a fact that inventory is an idle resource with an economic value and efficient management can definitely bring meaningful saving in hospital expenditure.¹³ A study has found that appropriate control measures for high cost drugs lead to 20% savings in the budget of a medical store.¹⁴ Department of Personnel and Administrative Reforms in India conducted a study and it was found that the medicines which are received by primary health centers fall short of the demand and also the erratic supply system is responsible for out-of-stock position of the common drugs.¹⁵ Non-availability of drugs particularly in the developing countries is due to lack of proper material management.¹⁰ The total activity of stock management should be done keeping in view the essential drugs concept.¹⁴ A balance need to be maintained between the service level and the stock level considering the concept of essential drugs.¹⁵ A poor management in a public pharmaceutical supply can result in wastage or blockade of financial resources, irrational utilization of drugs, shortage or overage of essential drugs, increased holding cost, and reduction in flexibility and decline in quality of health care services. Inventory management in health policy addresses all these issues. Adaptation of a scientific approach of inventory management in healthcare manages all these issues regarding stocking of pharmaceutical items, ensuring safety, stability, efficacy, availability and maintenance of quality of drugs to provide better healthcare services.¹³

ABC-VED ANALYSIS

ABC analysis

Always, better, control analysis, popularly called ABC analysis is the most commonly used tool for inventory management. Under this analysis, the inventory which is the drug list in case of a hospital setting are divided into three classes namely A, B and C. This classification is based on Pareto's principle which state that “80% of effect is due to 20% of causes”. There is no homogenous contribution of cost from all the items listed in the inventory. ABC analysis considers the annual consumption value.¹⁶

The advantage of this type of analysis is that it warrants control over that class in which maximum investment is made. It introduces a scientific model of inventory management, thus reducing clerical cost, and ensuring that stock is maintained at an optimal level. It helps reduce the

storage cost by preventing overstocking and maintaining appropriate levels of safety stock. The important limitation of this analysis is that cost factor alone is used and other factors such as the criticality of the drug is ignored.¹⁷

VED analysis

VED refers to the “vital, essential, desirable” is another technique used in inventory control where the drug's criticality is considered. It is based on the requirement of the medicine in the hospital. The vital group are life-saving drugs for the patients and should be available without any interruption in the supply chain. Essential drugs are defined as “those which satisfy the priority health care needs of the majority of the population and are intended to be available at all times and in adequate amount”.¹⁸ Desirable drugs are those with the least criticality whose stock out will not have any effect on the health of the patients.

ABC-VED matrix

By combining ABC and VED analysis the limitations of both will be supplemented and give a more reliable classification of drugs. It is now the most common way of managing inventory in most of drug utilization studies. ABC-VED matrix thus results in nine groups which are further classified as category I (AV, AE, AD, BV and BE) and category II (BD, CV, CE and CD). Category I requires high managerial control whereas category II need lower lever of control.¹⁸

ROLE OF INVENTORY STUDY IN RATIONAL DRUG USE

In pharmaco-epidemiological studies these analyses will give an idea of what are the drugs for which maximum expenditure is being made and its increase or decrease in a long term utilization study. It gives the picture of drugs with maximum and minimum consumption and thus helps in designing further studies on specific drugs and its utilization. These analyses when coupled with economic order quality will improve the inventory control of the pharmacy.¹⁹

STUDIES CONDUCTED IN INDIA

There are various surveys conducted in different parts of India on ABC-VED analysis of pharmacy stores. Summary of findings from these studies are listed in Table 1. Most of the studies are conducted at hospital level while few at primary care level. At hospital level percentage of items classified in class A category ranged from 3.4% to 21.2% while at primary level percentage of class A items ranges from 18% to 19.5%. Percentage of items in class B items at hospital level ranged from 6.9% to 22.6% and at primary level ranged from 20.2% to 23.9%. Percentage of items in class C category ranged from 51.5% to 89.6% at hospital level and 56.6% to 61.9% at primary care level. VED analysis of different studies conducted in India revealed

that percentage of total budget spent on vital medicines ranged from 5.1% to 73% at hospital level and 2.9% to 29.3% at primary care level. Percentage of budget spent on essential medicines ranged from 17.5% to 61.4% at hospital level and 44.2% to 57.7% at primary care level. Percentage of budget spent on desirable medicines ranged from 2% to 63% at hospital level and from 26.5% to 39.3% at primary care level. ABC-VED matrix analysis of different studies conducted in India revealed that percentage of budget spent on category I medicines ranged from 21.4% to 92.3% at hospital level and 71.8% to 78.4% at primary care level. Percentage of budget spent on Category II medicines ranged from 7.3% to 58.3% at

hospital level and from 17.1% to 22.9% at primary care level. Percentage of budget spent on category III items ranged from 0.4% to 30.2% at hospital level and 4.5% to 5.2% at primary care level. Studied conducted in different parts of India have reported a variation in number of class A, class B and class C medicines which could be because of several reason such as budget spent on medicines is varies in different states. It also depends on hospital formulary or hospital list of items procured and hospital status as large hospital procure more items as compared to small or medium items therefore falling of items in different classes may vary.

Table 1: Studies conducted in different parts of India to study ABC-VED analysis of pharmacy stores.

S. no.	Author	Years	Location	Types of health facility	% of items in following classes			% of budget spent on following classes			% of budget spent on following classes		
					A	B	C	V	E	D	I	II	III
1	Sikdar et al ²⁰	1996	Delhi	Hospital	17.8	22.6	59.6	5.1	58.9	35.9	21.6	56.2	22.3
2	Thavani et al ²¹	2004	Maharashtra	Hospital	10.8	20.6	68.6	23.8	38.1	38.1	29.1	41.3	29.6
3	Gupta et al ³	2007	Pune	Hospital	14.5	22.5	63.1	7.4	49.2	43.4	20.9	48.9	30.2
4	Vaz et al ⁶	2008	Goa	RHC	19.5	23.9	56.6	2.9	57.8	39.4	71.8	22.9	5.2
5	Vaz ²²	2008	Goa	Hospital	12.9	19.5	67.5	12.4	47.1	40.5	22.9	41.7	35.3
6	Devnani, et al ²³	2010	Chandigarh	Hospital	13.8	21.8	64.4	12.1	59.4	28.5	22.1	54.6	23.3
7	Khurana et al ²⁴	2013	Delhi	Hospital	3.4	6.9	89.6	32.4	61.4	6.2	92.3	7.3	0.4
8	Wandalkar et al ²⁵	2013	Maharashtra	Hospital	13.4	16.5	70.1	55.2	41.5	3.3	85.3	14.2	0.5
9	Reddy et al ²⁶	2013	Andhra Pradesh	Hospital	4	9.4	86.6	35.3	37.1	27.6	80.8	17.5	1.8
10	Pirankar et al ²⁷	2014	Goa	Hospital	12.8	17.2	70.2	5.9	32.5	61.7	71.9	24.4	3.7
11	Mani et al ²⁸	2014	Tamil Nadu	PHC	17.9	20.2	61.9	29.3	44.2	26.5	78.4	17.1	4.5
12	Singh et al ²⁹	2015	Chandigarh	Hospital	11.2	24.6	75.4	12.3	61.5	26.2	21.4	58.3	20.3
13	Mathew et al ³⁰	2016	Karnataka	Hospital	21.2	27.6	51.1	19.5	17.5	63	70.9	19.4	10.3
14	Hussain et al ³¹	2019	Delhi	Hospital	14	21	65	73	26	2	-	-	-

CONCLUSION

Studies conducted in different parts of India have shown variation in percentage of budget spent on vital, essential and desirable medicines which could be because these studies conducted in different time and there are chances that they have used different list of essential medicines to select list of essential medicines as we have used NLEM 2015 which was the latest edition during this study. Variation also depends on selection of vital medicines as there is no standard list of vital medicines therefore during VED analysis, researcher select vital medicines based on

opinion and requirement of experts of a particular health facility which leads to different in list of vital medicines and also resulted in variation in values. In most of the studies more than 10% of total budget was spent on A items therefore these items required better managerial control.

Except few, most of the studies reported that more than 60% of total budget was spent on essential and vital medicines. Allocating more budget to vital and essential medicines is important to maintain a regular supply of these medicines and to ensure uninterrupted health care services.

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