Original Research Article

Always, better and control - vital, essential, desirable matrix analysis of the drug store of a tertiary care teaching hospital of North India

Ravi K. Gupta, Namrata Makkar, Sonali Shamdasani*

Department of Hospital Administration, Government Medical College Hospital, Chandigarh, Punjab, India

*Correspondence:
Dr. Sonali Shamdasani,
E-mail: sonali7872@gmail.com

ABSTRACT

Background: Substantial improvement can be brought about in the hospital inventory and drug expenditure by inventory control techniques. These include ABC (always, better and control), VED (vital, essential and desirable) and ABC-VED matrix analysis. The objective of the study was to categorize the drugs based on cost and criticality and identify those which require stringent managerial control.
Methods: ABC analysis according to drug expenditure, VED analysis according to criticality of the drugs, ABC-VED matrix analysis to classify drugs into category I, II and III was done for drug store of a tertiary care teaching hospital of North India for the period of April, 2018 to March, 2019.
Results: The total number of the drug items used by the drug store was 315. The total drug expenditure was Rs. 9,61,29,859. By ABC analysis, it was found that 15.24%, 22.54% and 62.22% items belonged to A, B and C category respectively, accounting for 70%, 20% and 10% of Annual Drug Expenditure (ADE). VED analysis showed that 31.11%, 60.32% and 8.57% were V, E, and D category items respectively, accounting for 30.44%, 57.12% and 12.44% of ADE. By ABC-VED matrix analysis, 42.86%, 52.38% and 4.76% items were category I, II and III items respectively, accounting for 78.91%, 20.15% and 0.94% of ADE.
Conclusions: The study depicted the items belonging to category I which requires top managerial control, also the items belonging to categories II and III which require control by middle and lower managerial level respectively.

Keywords: Always better and control analysis, Always better and control - vital essential and desirable matrix, Cost, Drugs, Inventory, Vital essential and desirable analysis

INTRODUCTION

Inventories in any hospital occupy the most strategic position in the working capital and constitute a significant share in total cost. Inventory control is concerned with the acquisition, control, handling and use of inventories so as to ensure the availability of inventory whenever needed, providing adequate provisions for contingencies, deriving maximum economy and minimizing wastages and losses. Advances in medical care and drugs have disproportionately increased the expenditure on health care delivery.[1] India's healthcare inflation has been rising steadily and more alarmingly, it is increasing at double the rate of overall retail inflation. The average retail healthcare inflation for India was 7.14 per cent for 2018-19, witnessing a steep rise from 4.39 per cent in the previous fiscal.[2] As stated in Kant et al, about one-third of the annual hospital budget is spent on buying materials and supplies, including medicines.[3] It is imperative that due efforts should be taken to utilize available funds as economically as possible without affecting quality of health care. This emphasizes the need for planning,

designing and organizing the drug store in a manner that results in efficient clinical and administrative services.[4] The goal of the hospital supply system is to ensure adequate stock of the required items so that an uninterrupted supply of such items is maintained. Therefore, hospitals need to adapt efficient techniques for inventory control. A savings of 1% or 2% from these costs can lead to a significant increase in hospital productivity, profitability, financial performance and increase competitive advantage. Yiğit stated that inventory control analysis and precautions taken in a study conducted in a 1500-bedded hospital, resulted in saving 20% of the cost of expensive drugs.[5] The ability to provide the financial sustainability of hospital enterprises with today's highly complex, technological and competitive structure can only be possible by the availability of medical supplies and medicines at the right location, time, quantity, quality and price, protecting against the fluctuation in supply and demand, uncertainty and minimizing waiting time.[6,7] The need of the hour is to follow the principles of rational drug use and inventory management techniques so that in the existing budget it can cater to more number of patients.[8]

There are some commonly used inventory management techniques such as:

- ABC (Always Better Control),
- VED (Vital, Essential, Desirable items),
- SDE analysis (Scarce items, Difficult and Easily available items),
- HML (High, Medium, Low cost items),
- FSN (Fast moving, Slow moving, Non-moving items).[9]

Most commonly used amongst them are ABC and VED analysis.

ABC analysis, popularly known as "Always Better Control", is an important tool used worldwide, to identify items that need greater attention for control. According to it, 10% items consume 70% of budget (Category A), next 20% consume about 20% of the budget (Category B) and the remaining 70% account for just 10% of the budget (Category C).[10]

An additional parameter of assessment is criticality by VED analysis. "V" is for vital items without which a hospital cannot function, "E" for essential items without which a hospital can function but may affect the quality of the services and "D" stands for desirable items, unavailability of which will not interfere with functioning.[11]

Combining these two techniques, ABC-VED matrix has emerged and this matrix is the most suitable method for hospital medical materials.[12]

Different classifications were presented by various authors using ABC and VED analyses.[13-16]

The present study has been conducted in a tertiary care teaching hospital of North India where there is huge inflow of patients directly or through referrals. To satisfy the healthcare needs of rising number of patients, it is necessary to use the resources wisely. Thus, ABC analysis, VED analysis and thereafter, ABC-VED matrix analysis was done so as to have strict inventory control over the items in drug store. The objective of the study was to categorize the drugs based on cost and criticality aspects and identify those which require stringent managerial control.

METHODS

Study period

Study was conducted for the period of 1 year i.e., from April 2018 to March 2019.

Inclusion criteria

- The drug formulary of the hospital consisted of 377 items. Out of these, the items which were procured by the hospital drug store during the study period were included in the study i.e. 315 items.

Exclusion criteria

- The items which were not purchased by the hospital drug store as requirement was not raised by any department during the study period were excluded from the study i.e. 62 items.

The methodology is list of drugs purchased by the drug store of tertiary care hospital along with their costs for the period of 1 year i.e. from April 2018 to March, 2019 was obtained. The data was then transcribed in an MS Excel spread sheet. The statistical analysis was carried out using MS Excel statistical functions.

For ABC analysis, total cost of each item was calculated by multiplying cost of each unit by the total quantity of that item. The items were arranged in descending order of their costs. Cumulative cost of the list was calculated. The items were then categorized according to their costs as per ABC analysis. The items accounting for the top 70% expenditure were classified as category A, next 20% as category B and the last 10% as category C. For VED analysis, items were then classified into 3 categories according to their criticality, namely, Vital, Essential and Desirable. The VED status of each item was decided with justification by the committee which consisted of faculty members and Consultant In charge, Pharmacy. Thereafter, number and percentage of items in each category was calculated.

The data from ABC and VED analysis was further used to perform ABC-VED matrix using MS Excel worksheet. The items were classified as shown in (Table 1) and

further categorized into category I, category II and category III based on their criticality and cost aspects.

Table 1: ABC-VED matrix.

	V	E	D
A	AV	AE	AD
B	BV	BE	BD
C	CV	CE	CD

Category I = AV + BV + CV + AE + AD
Category II = BE + CE + BD
Category III = CD

Statistical analysis

The statistical analysis was carried out using basic statistical tools like mean and percentages.

RESULTS

The drug formulary of the hospital consisted of 377 items. The total number of the items purchased by the drug store from April 2018 to March 2019 was 315 and study was conducted for these items only. The total expenditure incurred on these items was Rs. 9,61,29,859.

Table 2 shows classification of items according to their cost i.e. ABC analysis. 48 items (15.24%) which consumed 70% of the annual drug expenditure (ADE) were classified as Category A items; 71 items (22.54%) accounting for 20% of ADE were categorized as Category B and only 10% of ADE was done on remaining 196 items (62.22%) which fall in category C.

Table 2: ABC analysis.

Category	Items (n=315)	Items (%)	Annual drug expenditure (%)
A	48	15.24	70
B	71	22.54	20
C	196	62.22	10

Table 3 illustrates the classification of drugs according to their criticality. This classification was done at the organizational level by the committee, 98 items (31.11%) were classified as vital items without which the hospital cannot function. These items accounted for 30.44% of ADE. Essential items were found to be 190 (60.32%) and consumed 57.12% of ADE. Remaining, 27 items (8.57%) were desirable and 12.44% of ADE was done for procuring these items.

Table 4 shows number of items as per ABC VED matrix. Further, the items were classified based on cost and criticality into Category I, II, III (Table 5). Category I items were 135 (42.86%) which consumed 78.91% of ADE and needs strict managerial control. 165 items

(52.38%) fall in category II and 20.15% of ADE was done on them. Only 15 items (4.76%) were in category III, consumed 0.94% of ADE and needs lowest managerial control.

Table 3: VED analysis.

Category	Items (n=315)	Items (%)	Annual drug expenditure(%)
V	98	31.11	30.44
E	190	60.32	57.12
D	27	8.57	12.44

Table 4: ABC VED matrix.

Category	V	E	D
A	11	31	6
B	20	45	6
C	67	114	15

Table 5: Categories as per ABC-VED matrix analysis.

Category	Items (n=315)	Items (%)	Annual drug expenditure (%)
I	135	42.86	78.91
II	165	52.38	20.15
III	15	4.76	0.94

DISCUSSION

The drug formulary of the hospital consisted of 377 items. Out of these, 315 items procured by the drug store of the hospital from April 2018 to March 2019. The total Annual Drug Expenditure (ADE) on these 315 items was INR 9,61,29,859. Drug inventory control is an important element of health care management and is an essential activity to achieve efficient patient care in a hospital. The regular availability of the necessary medicines is the topmost priority for any hospital. Each hospital has to evolve its own drug inventory analysis system depending on the population and the health care problems it caters. To avoid stock-outs as well as excess stocks, cost and criticality of the drugs are two important factors which have to be taken into account in drug inventory analysis.[7] ABC analysis and VED analysis which assess the cost and criticality respectively have been used in this study. Further, ABC-VED matrix analysis was done to identity the level of managerial control to be exercised for different items.

In this study, 48 items (15.24%) in category A consume 70%, 71 items (22.54%) in category B consume 20% and 196 items (62.22%) in category C consume 10% of the total ADE. Considering ABC analysis alone will enable us to ensure adequate control over 15.24% of items which consume 70% of total annual drug inventory cost. The results in the present study are almost similar to the study done by Wandalkar et al, Devnani et al, and Mahatame et al.[15-17] Contrary to this, study by Khurana et al, shows

that almost 90% of drugs are in Category C.[8] However, ABC analysis has certain limitation that it is based only on monetary value and cost of consumption of items. Some items of low monetary value are vital or lifesaving. Their importance cannot be overlooked simply because they are not in category A. Therefore, an additional parameter of assessment is their criticality by VED analysis.

VED analysis of the drug inventory in this study shows that, 98 items (31.11%) in vital category which accounts for 30.44% ADE, 190 items (60.32%) in essential category and expenditure incurred is 57.12% and 27 items (8.57%) in desirable category accounts for 12.44% of the ADE. Similar results were observed by Khurana et al[8] and Mahatame et al, in their study.[17] However, study by Wandalkar et al, classified almost 50% of the items as vital.[15] So, the categorization of the items as per this classification depends on type of healthcare facilities being provided i.e. primary, secondary or tertiary.

An ABC-VED matrix provides a balanced classification of the drug inventory into 3 categories based on both cost and criticality of the items. In the present study, 135 items (42.86%) consuming 78.91% of the ADE belong to Category I, 165 items (52.38%) consuming 20.15% of the ADE belong to Category II and 15 items (4.76%) consuming 0.94% of the ADE belong to Category III. Different studies have shown variable results for ABC VED matrix analysis as shown in (Table 6). ABC-VED matrix enables us to apply stringent managerial control measures to the 135 items in Category I which are either expensive or vital.

These drugs should always be maintained in stock since they are either vital or essential. But considering the high cost of these drugs, a low buffer stock should be maintained, and strict control should be exerted on the prescription and utilization of these drugs. Category II drugs can be controlled by the middle level management and Category III drugs can be controlled by lower managerial level. Appropriate ordering techniques should be employed for the different categories.

Table 6: Comparison of various ABC, VED and ABC-VED matrix study results.

Category	Wandalkar et al [15]	Mahatme et al [17]	Khurana et al [8]	Devnani et al [16]	Present study
A	13.40	14.5	3.45	13.78	15.24
B	16.50	18.2	6.9	21.85	22.54
C	70.10	67.3	89.65	64.37	62.22
V	50.90	24.2	32.41	12.11	31.11
E	40.20	68.5	61.38	59.38	60.32
D	08.90	7.3	6.2	28.51	8.57
I	57	31.5	33.8	22.09	42.86
II	35	68.5	60	54.63	52.38
III	8	-	6.2	23.28	4.76

CONCLUSION

Stringent upper managerial control should be applied to Category I drugs and these should never be out of stock as they are either vital or essential. But considering the high cost of these drugs, a low buffer stock should be maintained, and strict control should be exerted on prescription and utilization of these drugs. An effort should be made to bring down the number of AD items which take away a good chunk of the budget and their non-availability is not going to make much difference to quality of health care services.

Similarly, category II and category III drugs should receive middle and lower managerial control respectively.

The drug inventory analysis enabled the classification of drugs into categories based on their priority and assignment to appropriate managerial levels. This analysis should help promote effective management of drug inventory with minimal monetary resources while maintaining required safety stocks of high priority drugs and reduce frequency of drug supply shortage. This analysis should be performed every quarterly by the drug store to ensure efficient and judicious use of resources.

REFERENCES

1. Gupta RK, Gupta KK, Jain BR, Garg RK. ABC and VED analysis in medical stores inventory control. Medica J Armed Force Ind. 2007;63(4):325-7.
2. Healthcare inflation is increasing at double the rate of overall inflation. India Today, New Delhi, July 4, 2019. Available at:https://www.indiatoday.in/diu/story/healthcare-inflation-is-increasing-at-double-the-rate-of-overall-inflation-1562254-2019-07-04. Accessed 20 September 2019.

3. Kant S, Pandaw CS, Nath LM. A management technique for effective management of medical store in hospitals. Medical store management technique. J Acad Hospital Adm. 1996;8(2-1):41-7.

4. Kunders GD, Gopinath S, Katakam A. Planning and designing supportive services-Pharmacy. Hospitals: Planning, Design and Management. New Delhi: Tata McGraw-Hill Publishing Company Limited; 2000:273-281.

5. Yiğit V. Hastanelerde Stok Kontrol Analizi: Akdeniz Üniversitesi Hastanesinde Bir Uygulama. Sayıştay Dergisi. 2014;93:105-28.

6. Özcan AY. Quantitative Methods in Health Care Management: Techniques and Applications. 2nd Ed. USA: A Wiley Imprint;2009.

7. Nursing Management ABC, VED, HML analysis in material management. Available at: http://www.currentnursing.com/nursing_management/material_management_ABC_VED_HML_analysis.html. Accessed 24 September 2019.

8. Khurana S, Chhillar N, Gautam VK. Inventory control techniques in medical stores of a tertiary care neuropsychiatry hospital in Delhi. Health. 2013;5(1):8-13.

9. Gupta S, Kant S. Inventory Control: Hospital Stores Management- An Integral approach. 1st Ed. New Delhi: Jaypee Brothers Medical Publishers (P) Ltd; 2000.

10. Das JK. Inventory control. Essentials of Logistics and Equipment Management, Manual of Post Graduate Diploma in Hospital and Health Management. New Delhi: Indira Gandhi National Open University, School of Health Sciences. 2001.

11. Vaz FS, Ferreira AM, Kulkarni MS, Motghare DD, Pereira-Antao I. A study of drug expenditure at a tertiary care hospital: An ABC-VED analysis. J Health Manag. 2008;10(1):119-27.

12. Gupta N, Krishnappa P. Inventory Analysis in a Private Dental Hospital in Bangalore, India. J Clini Diagnostic Res: JCDR. 2016;10(11):IC10-2.

13. Yiğit V. Medical Materials Inventory Control Analysis at University Hospital in Turkey. Inter J Health Sci Res. 2017;7(1):227-31.

14. Yeşilyurt Ö, Sulak H, Bayhan M. SağlıkSektöründe Stok Kontrol Faaliyetlerinin ABC ve VED AnalizleriyleDeğerlendirilmesi: IspartaDevletHastanesiÖrneği.SüleymanDemirel İktisadiveİdariBilimlerFakültesiDergisi. 2015;20(1):365-76.

15. Wandalkar P, Pandit PT, Zite AR. ABC and VED analysis of the drug store of a tertiary care teaching hospital. Indian J Basic Applied Medica Res. 2013;3(1):126-31.

16. Devnani M, Gupta AK, Nigah R. ABC and VED Analysis of the Pharmacy Store of Tertiary Care Teaching, Research and Referral Healthcare Institute of India. J Young Pharm. 2010;2(2):201-5.

17. Mahatme MS, Hiware SK, Shinde AT, Salve AM, Dakhale GN. Medical store management: An integrated economic analysis of a Tertiary Care Hospital in Central India. J Young Pharma. 2012;4(2):114-8.