

ABC-VEN Matrix Analysis of the Pharmacy Store in a Secondary Level Health Care Facility in Arbaminch Town, Southern Ethiopia

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ABSTRACT

Objective: This study was aimed to analyze Arbaminch Secondary level Hospital inventories by using ABC-VED matrix analysis and to identify the medicines requiring strict management control. **Method:** The ABC, VEN and ABC-VEN matrix analysis of the medicines used by Arbaminch Hospital, Arbaminch, Ethiopia for the year 2015-2017. **Results:** The medicine store inventory of Arbaminch Secondary Level Hospital consisted of a total of 218 products. The total annual drug expenditure of the store on products issued in 2013-2015 was found to be 259049.4 USD. In the year 2015-2017, 15.14%, 22.47% and 62.39% items were placed into A, B and C category medicines respectively, costing to 70.08 %, 19.87% and 10.05 % of drug expenditure. On VED analysis, 31.19%, 67.43% and 1.38% products were placed into the vital, essential and non-essential categories and the hospital had spent 45.05%, 52.62% and 2.33% of drug expenditure respectively. On ABC-VEN reconciliation analysis, 39.91%, 59.17% and 0.92% medicines were in group I, II and III respectively and amounting for 80.86%, 18.79%

and 0.35% of drug expenditure respectively. **Conclusion:** The study showed that medicines belonging to category I need strict inventory control, also medicines belonging to categories II and III which need control by middle and lower managerial level respectively. ABC-VEN techniques should be applied for efficient use of resources and taking away of wastage and out-of-stock in the secondary level health care facility.

Key words: ABC analysis, ABC-VEN analysis, Pharmacy store, Secondary Level, VED analysis.

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INTRODUCTION

Pharmaceuticals constitute forty percent of the health care budget in unindustrialized countries; however, the majority of the population may lack access to even the lifesaving medicines.¹ One-third of the hospitals budget spent on pharmaceutical procurement.² In 2003-2004, the total drug expenditure in Ethiopia was 678, 42,138 USD (United State Dollar). The country spent 110,320,513 USD on medicines in 2005-2006 from total sources.³ This indicates that the country annual drug expenditure was increased from time to time. However many studies conducted in Ethiopia indicated that the availability of essential medicines was poor.^{4,5} A baseline assessment of pharmaceutical transaction and service in Ethiopia show that poor utilization of medicines budget in hospitals and some hospitals do not have health facility specific drug lists. Therefore, they do not make evidence-based procurement.⁶ This highlights that the need for managing pharmaceuticals in a way that brings balance between expenditure on medicines and demand for medicines.

With limited availability of drug budget, if rational drug use and enhanced drug inventory management practices are implemented, we can maintain continuous availability of medicines at all time inadequate amount with minimal expenditure.⁷ There are several methods for drug inventory management. These are HML (High, Medium, Low), SOS (Season-Off Season), ABC (Always, Better, Control), FSN (Fast-moving, Slow-moving, On-moving), SDE (Scarce, Difficult, Easy) and VED (Vital, Essential, Desirable).² Among inventory control methods existing, the ABC, VED and ABC-VED matrix analysis are the most chosen

for hospital medical stores. Always, Better and Control analysis is an essential method to recognize the medicines that need serious inventory control. This analysis based only on the cost of items. Pharmaceuticals of low cost and consumption may be essential or lifesaving. Their significance cannot be ignored simply since they do not belong to category A.⁸ Vital, Essential and Desirable analysis is based on the importance of items. Based on importance three groups were formed: vital, essential and desirable. However, considering VED alone carries a risk of some non-essential drugs although being expensive could get included as a primary drug. ABC-VED matrix analysis takes both the advantages of ABC and VED analysis. ABC-VED matrix analysis consists three main categories (Category I, Category II and Category III) and nine subcategories (AV, BV, CV, AE, BE, CE, AD, BD, CD) were made by the combination of ABC and VED analysis. This resultant matrix analysis also identifies not essential medicines which are susceptible to expiry.^{9,10}

A study conducted in a large hospital revealed that inventory control for high cost drugs brought about 20% saving.¹¹ By performing ABC-VEN matrix analysis, Felege Hiwot referral hospital and Debere Markos Referral Hospital saved drugs with a total value of 7,042 and 29,840 United State Dollar, respectively. By doing ABC-VED reconciliation, the expire rate of medicines in Debre Markos Referral hospital decreased from 4.5% to less than 0.27%. Similarly, in Felege Hiwot referral hospital the rate of medicine expires declined from 10% to less than 2%. By

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performing VEN analysis, Debre Markos Referral Hospital identifies inappropriate use of surgical glove which is consume the highest budget.¹² Using ABC analysis, Aga Khan University Hospital in Nairobi identified irrational use of antibiotics.¹³

All inventory management studies conducted in Ethiopia were at tertiary level health care facilities. But there is no any medicine inventory management study done in secondary level health care facility which gives a basic health care package to the majority of the population. The aim of the study was to analyze Arbaminch Secondary Level Hospital medicines inventories from 2015-2017 by using ABC, VED and ABC-VED matrix analysis and identify medicines which need strict managerial control.

MATERIALS AND METHODS

Study area and design

This study was conducted at Arbaminch Secondary Level Hospital in Gamo Gofa Zone of Southern Nation Nationalities People Republic (SNNPR), Southern Ethiopia with the recently estimated population of 1,597,767 people. Arbaminch General Hospital is the biggest secondary level health care facility in the area having a total of 450 beds. The hospital provided outpatient services for specialties like dental, emergency surgery, psychiatry, ophthalmology, pharmacy, gynecology and pediatrics. The hospital also provided inpatient care for pediatrics, medicine, surgery, ophthalmology and gynecology. The hospital also provided antenatal care, postnatal care and immunization service.

Pharmaceutical Fund and Supply Agency (PFSA) and private whole sealers were the source of supply of medicines. PFSA was under government control. Every two months it provides medicines for the hospital according to the request under the Report and Requisition Form (RRF). Arbaminch Secondary Level Hospital could procure medicines from private wholesalers when medicines were not found in PFSA.

Data collection

The data of annual consumption and expenditure incurred on medicines of the store for the financial year 2015-2017 were collected from the receiving voucher (model 19). The data were then transcribed in an MS Excel spreadsheet. The analysis was carried out using the Micro Soft Excel statistical functions. Drugs that are donated to the Arbaminch General Hospital or procured by hospital procurement committee from 2015-2017 were included. Program drugs such as family planning drugs, anti-tuberculosis and antiretroviral drugs were omitted from this study.

Data analysis

ABC analysis

All medicines purchased in the financial year from 2015 to 2017 were listed and entered their unit cost. Then the number of basic units purchased was entered. This unit cost was multiplied the number by the number of units purchased. The percentage of total value represented was calculated. The total expenditure of each medicine was organized in descending order. The cumulative percent total cost of all medicines and the percent order of medicines were calculated. This list was then portioned into three groups: Always (A), Better (B) and Control (C), based on the cumulative percentage total cost of 70%, 20% and 10%, respectively.⁷

VEN analysis

For VED analysis, list of drugs procured during the study period was given to the experts who were providing clinical services for several years at Arbaminch Secondary Level Hospital. They were requested to classify the drugs into vital, essential and desirable. The vital group included the medicines are lifesaving. Essential medicines are those satisfy the health care needs of the most population. Desirable items are those effective for minor illnesses and have a low therapeutic advantage.¹³

ABC-VED matrix analysis

The matrix was framed by combining the ABC and VED analysis. From the subsequent grouping, three categories were formed (Category-I, II and III). Category I consisted of AV, AE, AD, BV and BE subcategories. Category II consisted of BE CE and BD groups. Category III constituted items belonging to CD subcategory. The first letter in subcategory represents its group in ABC analysis whereas the next letter is for its group in VED analysis. These three categories requiring different types of controlling methods.¹⁰

RESULTS

The medicine store inventory of Arbaminch Secondary Level Hospital consisted a total of 218 products. The total annual drug expenditure of the store on products issued in 2015-2017 was found to be 259049.4 USD.

ABC analysis

In the year 2015-2017 out of the total medicine formulary, 33 (15.14%), 49 (22.47) and 136 (62.39%) items were found to be A, B and C group items respectively, costing to 70.08 % (181,532 USD), 19.87% (51,484.1USD) and 10.05 % (26,033.3USD) of annual drug expenditure (Table 1). The partitioned points were not exactly at 70/20/10% and differed marginally, which is allowable.

Table: 1 The ABC, VED and ABC-VEN matrix analysis of the Arbaminch Secondary Level Hospital pharmacy store from 2015 to 2017.

Category	Number	Percentage of total drug	Cost	Percentage of total cost
ABC-classification				
A	33	15.14	181532	70.08
B	49	22.47	51484.1	19.87
C	136	62.39	26033.3	10.05
VED- classification				
V	68	31.19	116710	45.05
E	147	67.43	136300	52.62
D	3	1.38	6038.42	2.33
ABC-VEN matrix				
Category I(AV+BV+CV+AE+AD)	87	39.91	209479	80.86
Category II(BE+CE+BD)	129	59.17	48674.9	18.79
Category III(CD)	2	0.92	895.455	0.35

Table 2: Comparison of the present study with various Always, Better and Control, Vital, Essential and Desirable and ABC-VED matrix studies.

Category	Present Study	TASH, Addis Ababa Study ¹⁸	PGIMER, Chandigarh ¹⁴	GMCH, Aurangabad ¹⁶	Primary care Tamil Nadu ¹⁵	SGH, Pune ¹⁷
A	15.14	9.60	13.78	16.8	17.9	13.4
B	22.47	20.40	21.85	21.8	20.2	16.5
C	62.39	70	64.37	61.4	61.9	70.1
V	31.19	67.2*	12.11	35.3	29.8	50.9
E	67.43	22*	59.38	50.4	36.9	40.2
D	1.38	0.4*	28.51	14.3	33.3	8.9
I	39.91	68.4*	22.09	47.9	42.8	57
II	59.17	20.8*	54.63	43.7	36.9	35
III	0.92	0.4*	23.28	8.4	20.2	8

Note: All figures are in percent, TASH-Tikur Anbessa Specialized Hospital, PGIMER-Post. Graduate of Medical Education and Research, SGH-Sassoon General Hospitals, CRHSP -Comprehensive Rural Health Service Project.

*Classification of medicines which found only on drug formulary of the hospital (Total sum not equal to 100%).

VEN analysis

On VED analysis, 68 (31.19%), 147 (67.43%) and 3(1.38%) products were placed into the vital, essential and non-essential categories and hospital had spent 45.05 % (116,710 USD), 52.62 % (136,300 USD) and 2.33 % (6038.42 USD) respectively (Table 1).

ABC-VEN matrix analysis

The medicines were assigned to AV, AE, AD, BV, BE, BD, CV, CE and CD subgroups using ABC-VED reconciliation analysis. These nine subcategories were further grouped into three main categories, categories I (AV, AE, AD, BV and CV), II (BE, CE and BD) and III (CD). On ABC-VEN reconciliation, 39.91% (87), 59.17% (129) and 0.92% (2) medicines were in group I,II and III respectively and amounting for 80.86% (209479 USD), 18.79% (48674.9 USD) and 0.35% (895.455 USD) respectively. Matrix analysis also shows that 79.86% and 20.14% of drug expenditures were spent on medicines within the hospital-specific medicine list and medicines out of drug formulary, respectively.

DISCUSSION

This is the first study of ABC-VEN analysis of drug expenditure at a secondary level health care facility in Ethiopia. In our study, we analyzed the annual expenditure of 218 items of Arbaminch Secondary Level Hospital medical store from 2015-2017. We found that out of total of 218 items, 33 (15.14%) items in the A category which consumes 70.08% of medicines budget. The current study also shows that 22.47% of medicines were in category B and 62.39% of medicines were in category C. Comparable results were found at studies conducted at referral hospitals of Ethiopia and tertiary, secondary and primary hospitals of India (Table 2).¹⁴⁻¹⁷ Stress should be placed on watching the shelf life, stock status and stock turnover of 33 medicines (Category A), because an unanticipated shortage may lead to an expensive emergency purchase and improving inventory management of category A drugs can save the majority of the medicine budget. The procurement manager should also concentrate on receiving lesser prices for A category medicines by searching for low-priced dosage forms or cheaper supplier.

Our study indicated that if ABC analysis alone is considered for medicine inventory management, it would sufficiently control over only 33 (15.14%) items in category A which consume 70.08% of ADE of the hospital. On the other hand, Category B and C contain 25 and 38 lifesaving medicines (Category V) respectively and therefore it is not likely to pay no attention to B and C category completely. This study found out that 38.1%, 53.2% and 8.7% of medicines categorized as vital, essential and desirable

respectively. In studies conducted at tertiary, secondary and primary level hospitals it had varied from 12-52%, 36-60% and 4-34% respectively (Table 2).¹⁴⁻¹⁸ This disparity might be due to the level of the hospital in which the study conducted.

Our study found out that there was less number of non-essential drugs in Arbaminch general hospital in comparison to referral and tertiary hospitals (Table 2).¹⁴⁻¹⁸ The present study was conducted at a secondary level health facility; the percentage of category D medicines was anticipated to lower than a tertiary level hospital. This difference might be due to the type of study setting, as well as, due to the conscious decision of the managers to stock category D drugs in their facility. Ours being a secondary health care facility, the percentage of desirable drugs were expected to be lower than those in a tertiary health care setting. The present study indicated that if VEN analysis alone is considered for drugs inventory management, the category D items grouped in category A and take high cost are overlooked.

The resultant ABC-VED reconciliation analyses allow us to make intensive inventory control to the 96 (44%) items in category I (AV, AE, AD, BV and CV) which are either vital or with high cost (Table 2).^{15,18} The stock level of these medicines should always be at optimal stock level because they are either lifesaving or essential. The ordering method for AV, AE and BV subgroups of category I medicines should be a two-bin method in order to avoid a shortage. The prescribing trend of AV, AE and BV subgroups items should always be monitored. Category II medicines consist of 59.17% of total medicines which is comparable with a study conducted at tertiary care teaching, research and referral hospital in India.¹⁴ Only one item was belonging to AD subgroup of category I that consume 1.99% of the total drug expenditure. The removal of this item from the procurement list is possible if removal brings a considerable saving of money without influencing the service. 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.

CONCLUSION

Our study is the first ABC-VEN matrix analysis of drugs at a secondary level health care facility in Ethiopia. Our analysis showed that the drug expenditure of a general hospital medical store in the year 2015-2017 was 259, 049.4 USD. This demands efficient and effective inventory control technique so as to make right utilization of budget by concentrating on vital or essential medicines based on ABC-VEN matrix analysis. ABC-VEN analysis finds medicines requiring strict monitoring for effective

and efficient budget utilization. This analysis should be done before and after the procurement of medicine. Conclusion overall, ABC-VEN matrix analysis is the best inventory control method at a secondary level health care facility. ABC-VEN classification and results of the research have been informed to the procurement and drug store staffs and are being integrated into the decision-making on procurement, storage and controlling of drugs.

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CONFLICT OF INTEREST

The authors declare that there is no conflict of interest.

ABBREVIATIONS

ABC: Always, Better and Control; **VED:** Vital, Essential and Desirable; **ADE:** Annual Drug Expenditure; **USD:** United State Dollar; **PFSA:** Pharmaceutical Fund and Supply Agency; **RRF:** Report and Requisition Form.

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