An ABC-VEN Analysis for Outpatient Medicines Use in the Department of Internal Medicine at Universitas Airlangga Teaching Hospital

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Abstract
Background: Application of the ABC-VEN method in evaluating drug planning can increase efficiency and ensure optimal medicine availability and stable access to medications. Objective: To analyze ABC-VEN combinations to examine the profile of medicine use in the internal medicine department. Methods: This was an observational study with retrospective prescription data from outpatients in the Internal Medicine Department from January to March 2020. Collected data included the type, number of medicines, and medicine prices. Patients undergoing chemotherapy and retroviral therapy for HIV were excluded from the study. Subsequently, an ABC-VEN analysis was performed. Results: Of 4,242 prescription samples, 188 types of medicines were used. Based on the drug use evaluation with ABC analysis, category A contained 23 items (12.17%), category B contained 35 items (18.52%), and category C contained 130 items (69.31%). The ABC analysis for investment value found that category A contained eight items (4.23%), category B contained 22 items (11.64%), and 158 items (84.13%). Based on the VEN analysis, Group V had six medicine items, Group E had 152 medicine items, and Group N had 30 medicine items. The ABC-VEN investigation showed that there were eight, 151, and 29 items of medicines in Categories I, I, and III, respectively. Conclusion: Although there are medicines that are highly used, their investment value is quite low. The use of the ABC-VEN method to evaluate medicine use is crucial for organizing and controlling the medicine supply.

Keywords: ABC-VEN analysis, drug usage, investment, internal medicine department

INTRODUCTION

Inventory planning is a management system designed to determine how many items need to be ordered, when to order, and how many items are stored in the inventory (Fahriati et al., 2021). In developing countries, including Indonesia, the largest component of hospital spending is the budget for medicines, which accounts for approximately 40– 50% of the total cost (Karauan, 2022). However, the available funds do not always match needs, so the procurement of medicines needs to be economical to minimize expenses. Therefore, efficient and cost-effective budgeting is necessary to balance supply expenditure with drug needs (Deressa et al., 2022). Healthcare providers arrange the distribution of medicines according to their needs. In these situations, medical availability is essential to ensure that patients take them as prescribed.

Furthermore, medicine serves as a mediator between patients and health care providers to promote public confidence in this service (Rahem et al. 2021). The availability of the medicine stock is important. Therefore, it is necessary to maintain sufficient stock levels to ensure that the supply chain is not disrupted (Mfizi et al. 2023).

Several inventory management techniques have been used to analyze medicine use in pharmacy services (Mani et al., 2018). The most compelling analysis used in material management is the ABC analysis, according to Pareto's law, which states that as much as 80% of the overall value can represent 20% of the number of products (Antonoglu et al., 2017). This analysis classifies medicine use categories into three categories: category A, with a percentage of 10-20% representing 70-80% cumulative value (cost); category B, with a percentage of 10–20% representing 15–20% depicting a cumulative value; and category C, the percentage covering 60–80% of items representing 5–10% cumulative value (Migbaru et al., 2016).

The method used to help determine the priority level of medicine purchases and maintain the amount of medicine storage uses the VEN analysis. The VEN analysis is classified into three categories: vital, essential, and non-essential (Sharma et al., 2018). Vital classes (V) are medicines that are life-saving, consumed regularly, and must always be in stock; essential classes (E) are medicines in cases that are non-life-saving; and non-essential classes (N) are medicines in the therapy class for mild illnesses (Deressa. et al., 2022).

ABC and VEN analyses, when applied separately, are sometimes inadequate because of their limitations. Therefore, combining the ABC-VEN method is highly recommended to overcome this limitation, and medications should be split into groups. ABC and VEN analyses have successfully encouraged the employment of every technique to enhance others (Mohammed et al., 2020). Group I (AV, BV, CV, AE, and AN) includes vital medicines and medicines with high investment values. Group II consisted of medications included in categories E and B (BE, CE, BN), while those included in group III were medicines that were non-essential and had low prices (CN). Category III consists of a group of non-essential (desirable) goods and a group of affordable goods (CN) (Devarajan et al., 2016). Category I medicine must be constantly observed and managed; periodic inspections are necessary for Category II, but not Category III (Deressa et al., 2022).

ABC-VEN analysis, which stands for "Always, Better, Control-Vital, Essential, Non-Essential," provides a deep understanding of medicine management by identifying essential medicines, measuring consumption, and effectively controlling supply. This study aimed to analyze the use of medicines using ABC-VEN analysis in JKN outpatients of the Internal Medicine Department at Airlangga University Hospital.

MATERIALS AND METHODS
Materials

The study data were obtained from the outpatient prescriptions. The Ethics Committee of Airlangga University Hospital reviewed the research methodology and decided that it was ethically approved based on the Ethics Certificate Review Number 002/KEP/2022.

Method

This observational study used retrospective prescription data from outpatients at the Internal Medicine Department Universitas Airlangga Teaching Hospital from January to March 2020. The study was conducted at the Outpatient Pharmacy Installation at Airlangga University Teaching Hospital with samples of all prescriptions. The data collected included the type, number of drugs, and drug price. Chemotherapy and retroviral therapy for HIV were excluded. ABC-VEN analysis was performed for the amount of drug use and drug investment values in the ABC group. Group A had a cumulative value of 80%, Group B had a value of 15%, and Group C had a value of 5%. The analysis was continued using ABC-VEN. Determination of whether a drug is in the vital (V), essential (E), or non-essential (N) category is carried out through discussion by internal medicine specialists, pharmacists, and pharmacy faculty members. Group V consists of pharmaceuticals that are necessary to save human lives;

Group E consists of vital drugs that address the underlying cause of the illness; and Group N advocates the use of medications so that minor issues can be better handled by action or therapy. The VEN and ABC expenditure value data were cross-tabulated to form a matrix. The matrix was further subdivided into three groups: group I was the priority group (AV, AE, AD, BV, CV), group II was the primary group (BE, CE, BD), and group III was the extra group (CD).

RESULTS AND DISCUSSION
ABC analysis
ABC value usage

The results of this study show that the total number of prescriptions that met the inclusion criteria was 4,242, with a total of 188 items of medicines, which will then be carried out by ABC-VEN analysis. ABC analysis based on medicine use values is presented in Table I. For group A, there were 23 items of medicines (12.17%) of the total medicines used for three months in the Internal Medicine Department, with a total use of 321,645 pcs (80.94%) of the total use. Group B contained 35 medicines (18.52%) of the total items used, with a total use of 56,022 pcs (14.10%). In group C, there were 130 medicines (69.31%) of the total medicines used, with a total usage of 19,732 pcs (4.87%).

ABC investment

For three months, ABC's investment analysis of medicine use in the Internal Medicine Department showed that eight items of medication (4.23%) were in group A, where the investment represented 80.50% of the total medicine investment. This is because in group A, there is insulin, where this therapy is recommended (Perkeni, 2021) as a combination therapy in cases of diabetes and has a high investment value. Group B, with an investment value of 14.55%, contained 22 medication items (11.64%). At the same time, Group C comprised 158 medication items (95.05%) and represented 4.95% of all drug investment values.

VEN analysis

The results of the VEN analysis are presented in Table II. The Internal Medicine Department utilized six items, or 3.18% of the medicine items included in the critical group medications. Of the total number of medications administered, 152 (80.95%) were in the essential group. Thirty medical items (15.87%) were assigned to the non-essential group.

ABC and VEN combination analysis

According to Table III, the Internal Medicine department used eight items (12.08%) out of all the drugs in Category I over a three-month period. The cost of medicine was 80.50% of the overall cost. Of the total number of medications, 151 (84.60%) were included in Category II, with an investment value of 18.97%. There were 29 medications in Category III (3.32%) of all the drugs, with 0.53% of the total cost of medicine use.

Medicine classification according to the ABC analysis on medicine use in the neurology department showed that group A, or medicine with the highest use value, were antihypertensive and antidiabetic medicine groups. Antihypertensives belong to group B, or medicines with modest utility. Vitamins and supplements are classified as class C pharmaceuticals or low-use pharmaceuticals. Class A medications require regular monitoring to prevent pharmaceutical shortages caused by excessive use (Fahriati et al., 2021). Nonetheless, medicines in group B had a moderate utility value, and group C medicines could not be disregarded since patients still required them to support their treatment demands (Damayanti et al., 2024).

In this study, the medicines in Group A, which had the highest investment value, included medicines to treat diabetes and hypertension. Regular use of medications with lengthy treatment durations, such as diabetes treatment, is a major cause of investment in group A. This is because insulin therapy units have a high value and diabetes has the highest incidence (PeuPatty et al., 2022). Medicine for liver disease, adjuvant analgesics, and antihypertensives had medium-scale investment values in group B in this study, where internal medicine patients typically had multiple comorbidities. Although the prevalence of liver disease is lower than that of hypertension, the cost of utilizing ursodeoxycholic acid is the highest in class B owing to its 25 times higher unit value than that of metformin. Other clinics, including the Cardiovascular Department, also frequently prescribe antihypertensive medications. The findings of this study are directly related to those of Ab Rahman's research from 2022, which discovered that despite no differences in the average number of medications taken, the therapy for individuals with diabetes was significantly more complex than that for those with hypertension. Group C comprises food supplements, antisecretory drugs, and oral antidiabetic drugs, all of which have a minimal investment value. (Schulman-Rosenbaum, 2023).

Table 1. The result of ABC analysis medicine application data and the amount of investment value data from January until March 2020

	Usage Amount				Investment Cost			
	Number of Items (n)	Percentage of items (%)	Top 5 Pharmaceutical Product	Amount of Cost (%)	Number of Items (n)	Percentage of items (%)	Top 5 Pharmaceutical Product	Amount of Cost (%)
A	23	12.17	Metformin 500 mg Acarbose 100 mg Glimepirid 2 mg Nifedipine Simvastatin 20 mg	80.94	8	4,.3	Insulin Aspartat 100 iu Insulin Aspartat 30% protamine crystallized insulin aspartat 70% Insulin Detemir Nifedipin Insulin Lispro 25%	80.50
B	35	18.52	Sulfasalazine 500 mg Mecobalamin 500 mg Paracetamol 500 mg Insulin Aspartat 100 iu Domperidon 10 mg	14.10	22	11.64	Urosodeoxycholic acid 250 mg Gabapentin 300 mg Candesatan 16 mg Gabapentin 100 mg Metformin 500 mg	14.55
C	130	69.31	Diazepam 2mg Curcuma FCT 20 mg Betahistine 6 mg Gliquidon 30 mg Amoxicillin 500 mh	4.97	158	84.3	Glimepirid 3 mg Omeprazole 20 mg Probiotik lactobacillus acidophilus Amlodipin 10 mg Cilostazol 100 g	4.95
Total	188	100.00		100.00	188	100.00		100.00

Table 2. VEN Analysis Result for January to March 2020

Group	Number of Item (n)	Percentage of items (%)	Amount of Drug (pcs)	Top 5 Pharmaceutical Product	Amount of Cost (%)
V	6	3.18	6,459	Insulin Aspartat 100 iu Insulin Detemir Insulin Aspartat 30% protamine crystallized insulin aspartat 70% Insulin Glulisine 100 iu Insulin Glargine	1.63
E	152	80.95	374,359	Metformin 500 mg Acarbose 100 mg Glimepirid 2 mg Nifedipin Simvastatin 20 mg	94.20
N	30	15.87	16,581	Vit. Bcomp Mecobalamin 500 mg Vit. B1 Curcuma FCT 20 mg Vit. B6	4.17
Total	**188**	**100.00**	**397,399**		**100.00**

Table 3. Distribution of medicines to Group I, II, and III

Group	Number of Item (n)	Percentage of items (%)	Amount of Drug (pcs)	Amount of Costs (%)
I	8 (AV, AE, AN, BV, CV)	12.08	47,987	80.50
II	151 (BE, CE, BN)	84.60	336,219	18.97
III	29 (CN)	3.32	13,192	0.53
Total	**188**	**100.00**	**397,399**	**100.00**

Based on the usage and investment values, different results were obtained from the ABC analysis. There were 23 medicines in Group A based on use values and eight medicine items based on investment value. Group B comprises 35 medicines valued for use and 22 medication items valued for investment. Group C comprises 130 medication products valued for use and 158 medication items valued for investment. The findings of this investigation are similar to those of Deressa et al. 'sresearch from 2022, with minor differences: Group A had 13.74% of medicine items, Group B had 18.18% of medicine items, and Group C had 68.08%. Research by Suprapti et al. (2022) in cardiology clinics A, B, and C in Indonesian teaching hospitals provided additional support for this data; the percentages were 7.45 %, 9.58 %, and 82.97 %, respectively. These discrepancies may result from several variables, including variations in research methodology, location and time, and classification and definitional frameworks.

VEN analysis is used in drug categorization to categorize medications based on their degree of criticality. AVEN analysis was performed for all 181 medication items. Insulin was a class V drug in this study and is a necessary medication for treating diabetes in individuals with both DM 1 and DM 2. Treating acute hyperglycemia and optimizing treatment therapy are two benefits of insulin in the treatment of diabetes (Maifitriani et al., 2020). Although they are utilized for situations that are severe but not life-threatening, class E medications are also used for disorders of lower severity. Owing to the use of substitute medications, unavailability in this category is accepted for two–three days (Al-Najjar et al., 2020). Oral antidiabetic and hypertension medications were among the medications used in the essential group. Class N medications are used to treat mild ailments and are the least important. Vitamins and supplements are classified as medicines in this category.

Taking needs and costs into account, ABC-VEN analysis can assist in identifying medication groups that require intensive monitoring and control. According to Pilankar et al. (2014), the ABC-VEN matrix works better and provides an approach for managing pharmaceutical drug inventories. We focused on eight drug items and their related costs, which totaled 80.50% and belonged to Category I (AV, BV, CV, and AE) for strict supervision guidelines, thanks to the resultant matrix that was produced after an examination of the ABC-VEN combo. Three of the 151 drug items in

Category II (AE, BE, and CE) accounted for 18.97% of total drug expenses. When these drugs are bought in bulk, management complexity is reduced, there are no capital limits, transportation costs are low, and ordering charges are avoided with modest storage costs (Devnani et al., 2010; Anand et al., 2013). Because Category II is the Drug most frequently used in Internal Medicine Clinics and is a member of the CE group, it is important to keep an eye on drug procurement to preserve medication supply. One type of medication in this category was metformin 500 mg. The extra category (CN) comprised 29 drug products, accounting for 0.53% of the total drug expenses in this study. According to Anand et al. (2013), there are no substantial financial restrictions, and it is possible to order these medications three or four times a year to save money. Vitamins and supplements are a class of extra-category pharmaceuticals that have the greatest number of applications.

The present study's findings are consistent with research carried out at The Millennium Medical College at Saint Paul Hospital (Ethiopia) between 2013 and 2014 and 2015–2016. In that study, the three drug categories represented over 85%, 12%, and less than 1% of the total amount spent on pharmaceuticals annually over three years (Legese, 2017). This might be a result of the high number of diabetes mellitus patients that the nation's internal medicine departments have seen.

These findings differ from those of research carried out in tertiary care neuropsychiatric hospitals in India, where results showed that items in group I accounted for 33.8% of pharmaceutical spending, group II items for 60% of pharmaceutical expenditure, and category III items for 6.2% of pharmaceutical expenditure, or 92.33% of annual pharmaceutical costs (Khurana et al., 2013). The current study differs from another one by Nigah et al. (2010), wherein 22.09% of pharmaceutical expenditure is absorbed by Category I, which accounts for 74.21% of pharmaceutical expenditure, 22.23% of pharmaceutical spending is absorbed by Category II, which accounts for 23.28% of pharmaceutical expenditure, and Category III absorbs 3.56% of pharmaceutical expenditure. Numerous variables, including variations in hospital levels, healthcare facilities, pharmaceutical goods used, and budgets at individual healthcare facilities, may have contributed to this discrepancy.

The limitation of this study is that it was conducted in a single department that provides outpatient services. Overall, service data are required for the planning and procurement of hospital pharmacies. For this purpose, a similar analysis must be conducted for other services.

CONCLUSION

There was a discrepancy between the results of ABC analysis based on drug use and investment value. Drug items are frequently used, but their investment value is quite low. Using ABC-VEN analysis helps improve pharmacy management, especially in the hospital's planning and procurement of drugs.

AUTHOR CONTRIBUTIONS

Conceptualization, B.S.; Methodology, B.S., D.M.N.R.; Software, Z.N.; Validation, B.S., D.M.N.R., C.W.N.; Formal Analysis, Z.N., Y.S.; Investigation, Z.N., Y.S.; Resources, Z.N., Y.S.; Data Curration; Z.N., Y.S.; Writing - Original Draft, Z.N., Y.S.; Writing - Review & Editing, B.S., D.M.N.R., Y.S.; Visualization, Z.N., Y.S.; Supervision, B.S., D.M.N.R., C.W.N.; Project Administration, B.S., D.M.N.R., C.W.N.; Funding Acquisition, B.S.

CONFLICT OF INTEREST

The authors declared no conflict of interest.

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