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Analyzing the Inventory System of Medical Medicine in Type B Pharmaceutical Installations at Regional Hospitals Using The ABC-VEN Analysis and Continuous Review System Methods

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ABSTRACT

The Regional General Hospital operates a Pharmacy Installation to oversee the management and regulation of medications. Presently, many pharmaceutical installations are encountering difficulties in effectively managing their medical medicine inventory, leading to excessive stock in some cases and occasional shortages that negatively impact the fulfillment of medical medicine services. This study aims to investigate the inventory management practices at the Regional General Hospital in order to enhance the efficiency of the medical medicine inventory management system. A specific Regional General Hospital was chosen as the focus of this case study. The approach employed to address the issue combines the ABC-VEN analysis with the Continuous Review System method. The proposed inventory medical medicine management design, as revealed by the study, demonstrates the potential to minimize overall inventory management costs and improve the level of medical medicine fulfillment services.

Keywords: regional general hospital; medicine; inventory; ABC-VEN; continuous review system

INTRODUCTION

The continual availability of medicine in health facilities plays a vital role in encouraging access to and utilization of health services [1]. Medicine availability could favorably affect patients' trust in healthcare providers [2]. Trust in healthcare providers is essential. This forms a pattern of health service utilization that affects medication adherence [3] and encourages communication with service [4]. However, hospitals often cannot stock every medicine in large quantities due to budget constraints. The budget for medicine generally becomes the largest component of hospital expenditures [5]. Medicines and medical supplies account for about a third of the total annual healthcare facility budget [6]. In numerous developing countries, spending on hospital medicines can reach roughly 40 to 50% of the total hospital costs. With a limited budget, hospitals must maintain medicine availability by improving inventory control management. Pharmaceutical logistics need to monitor inventory levels and determine what levels to hold, when to order, and in what quantities to keep inventory costs to a minimum while maintaining a high level of customer service [7] [8].

There are several methods for medicine inventory management. 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) are some of these categories. The ABC, VEN, and ABC-VEN matrix analyses are the most used inventory control techniques for hospital medical shops. The study of Always, Better, and Management is a crucial technique for identifying the medications that require strict inventory control [8]. Always, better and Control analysis is an important method for identifying medicines that require strict inventory control. This analysis was solely based on item costs.

The purpose of this study was to evaluate the effectiveness of the ABC-VEN-EOQ technique for managing medicine inventory and identify medicines that require strict managerial oversight.

RESEARCH METHOD

This research employed comparative non-experimental approaches and was a sort of quantitative research. At the beginning, all medicine items were categorized according to the ABC classification. The Pareto Principle, which is used in the ABC categorization, posits that a great number of items account for a small budget volume and, on the other hand, a small number of items account for a large budget volume [9]. ABC method classifies inventory based on the following three categories:

1. Class A (always), are goods that have an investment value of approximately 75-80% of the total investment value or are in the order of top of the list that dominates the total annual expenditure;

2. Class B (better), are goods with an investment value of about 10-15% of the total investment value or items that control a fairly high annual contest; and

3. Class C (control), are goods that have an investment value of about 5-10% of the total investment value.

ABC analysis is not yet effectively implemented in hospital pharmacy installations if it stands alone because it is not only a matter of money that becomes a priority, but vital, essential, and nonessential medicines must also be classified. VEN analysis is typically used to determine medicines purchase priorities and determine safe stock levels and medicines sales prices. The categories of VEN medicines are [10]:

1. V (Vitals)
Are medicines that must be present, which are needed to save a life, are included in the category of potentially life-saving medicines, have significant withdrawal side effects (administration must be done regularly and discontinuation is not sudden), or are extremely important in providing health services. In this group of medicines, there should be no vacancies.

2. E (Essential)
Are effective medicines to reduce pain and eminently significant for various diseases but not absolutely vital, only for basic system supply. The criteria for the critical value of these medicines are medicines that work causally, namely medicines that act on the source of the disease and are widely used in the treatment of most diseases. The void of this group of medicines can be tolerated in less than 48 hours.

3. N (Nonessential)
Are medicines used for self-limiting diseases and medicines whose benefits are doubtful compared to other similar medicines. The criteria for the value of this medicines crisis are supporting medicines so that the action or treatment becomes better, for comfort or to overcome complaints. The void of this group of medicines can be tolerated for more than 48 hours.

The results of the ABC and VEN analyses were subsequently collected and grouped according to medicines priority. ABC-VEN combinations were classified into three categories (I, II, and III). Category I consists of AV, AE, AN, BV, and CV. Category II comprises BE, CE, and BN groups. Category III consists of the CN group. Furthermore, we calculated Economic Order Quantity (EOQ) value in category I on the ABC-VEN calcification results. EOQ is a formula to determine the number of quantity orders that minimizes ordering costs and carrying costs. EOQ uses the assumption of constant demand, constant waiting time, and fixed order costs per order. The computation of order quantity, reorder points, safety stock, and service level can be carried out using a continuous review system model referred to as the Hadley Within iteration with the following stages:

Step 1.
Calculate the initial q^*_{o1} value using the q^*_{ow} in the Wilson formula

$$q^*_{o1} = q^*_{ow} = \frac{\sqrt{2AD}}{h} \quad (1)$$

Where:
- A : fixed ordering (setup) cost per order
- D : annual demand
- h : holding cost per unit per unit time

Step 2.
Calculate the probability of a stock out (α) and initial reorder point (r_1*) using equation:

$$\alpha = \int_r^{\infty} f(x)dx = \frac{hq^*_{o1}}{c_u D + hq^*_{o1}} \quad (2)$$

$$r_1^* = D_L + z_\alpha S\sqrt{L} \quad (3)$$

where,
- c_u : stock out cost per unit per unit time
- r : reorder point
- S : standard deviation of demand
- L : lead time

Step 3.
Calculates the value of q^*_{o2} by entering the value of r_1* that has been obtained using equation:

$$q^*_{o2} = \sqrt{\frac{2D\left[A + c_u \int_r^{\infty}(x - r_1^*)f(x)dx\right]}{h}} \quad (4)$$

Where,

$$N = \int_r^{\infty}(x-r_1^*)f(x)dx = S_L[f(z_\alpha) - z_\alpha \Psi(z_\alpha)] \quad (5)$$

$f(z_\alpha)$: a function of the z_α value of the standard normal distribution for α
$\Psi(z_\alpha)$: a function of the z_α value of the standard normal distribution for α during the lead time

Step 4.
Recalculate the value of α using (2) and the value of r_2* using (6)

$$r_2^* = D_L + z_\alpha S\sqrt{L} \quad (6)$$

Step 5.
Comparing the values of r_1* and r_2*. The iteration is declared complete if the value of r_2* is relatively the same as r_1* and the values of r_1* = r_2* and Q*= q^*_{o2} are obtained. If not, then the iteration continues and returns to step 3 by replacing the value of r_1* with r_2* and the value of q^*_{o1} with q^*_{o2}

Step 6.
Calculate the safety stock level (ss) and service level (η) using the following formula:

$$ss = z_\alpha S\sqrt{L} \quad (7)$$

$$\eta = 1 - \frac{N}{D_L} \times 100\% \quad (8)$$

Step 7.
Calculate the total cost of inventory using the following equation:

$$TC = BB + BP + BK$$

$$TC = DP + \frac{AD}{Q^*} + h\left(\frac{1}{2}Q^* + D_L\right) + \left(\left(C_u \frac{D}{Q^*}\int_r^{\infty}(x-r)\, f(x)\, d_x\right) w\right) \quad (9)$$

where,
- BB : purchase cost in one year
- BP : ordering cost in one year
- BK : carrying cost in one year
- P : purchase cost per unit
- w : critical weight, 3 for vital; 2 for essential and 1 for nonessential.

RESULTS AND DISCUSSION

ABC Analysis

The case study was carried out at a type B regional hospital in West Java, Indonesia, specifically in its pharmacy installation. Type B hospital means that the hospital provides medical facilities and capabilities of at least four basic specialists, four medical support specialists, eight other specialists, and two basic sub-specialists. In Indonesia, type B hospitals are normally established in every provincial capital and provides referrals from district hospitals. The data on the type and number of medicines used in the current study are data on the use of 2021-2022. Recapitulation of the medicine store inventory pharmaceutical installations in type B regional hospitals consisted of a total of 146 generic medicines. ABC analysis was carried out based on usage analysis and medicines investment analysis. The results of the ABC analysis are depicted in Table 1.

In the year 2021-2022, ABC analysis showed that 30 (21%) items were categorized as category A and consumed around 83.7 % (1,962,166, 610 IDR) of total pharmaceutical cost.

Category B and C accounted for 43 (30%) and 73 (49%) items that consumed 14.7% (368,902,933 IDR) and 1.6 % (40,826,193 IDR) of total pharmaceutical cost severally (Table 1). The results of categories A, B and C are directly proportional to the amount of medicine use by patients at type B regional general hospital. This shows that the medicine inventory control is less effective and efficient because it is not suitable for medicine inventory in general. Based on the inventory control, that category A represents 20% of medicines in stock and 70% of total pharmaceutical cost. Meanwhile, category A in type B regional general hospital consumed around 83.7 % of total pharmaceutical cost. This means that there is an over stock of category A medicine.

ABC-VEN analysis

In this study, all medicines are classified into vital, essential, and nonessential groups. The classification of medicines into different categories is based on several things that form the basis of grouping. Medicines used to treat diseases with the greatest risk of death are classified as vital medicines [11]. All antibiotic medicines are classified into essential groups [11]. On the other hand, medicines used to treat minor ailments are classified as nonessential. Even if the medicine is expensive, if it is insignificant and does not have practical advantages over similar medicines, it is categorized as nonessential [11]. The results of the ABC-VEN analysis can be seen in Table 2.

TABLE 1: The results of the ABC analysis.

Classification	Item		Cost	
	Amount	Percentage of total item	Amount (IDR)	Percentage of total cost (%)
A	30	21	1.962.166.610	83,7
B	43	30	368.902.933	14,7
C	73	49	40.826.193	1,6

TABLE 2: The results of the ABC-VEN analysis.

Classification	Vital (V)	Essential (E)	Non Essensial (N)
A	AV, 5 items	AE, 16 items	AN, 9 items
B	BV, 10 items	BE, 28 items	BN, 5 items
C	CV, 4 items	CE, 63 items	CN, 6 items

The results of the ABC and VEN analyses were then collected and grouped according to medicines priority. ABC-VEN combinations were classified into three categories, i.e., I, II, and III. Category I consists of AV, AE, AN, BV, and CV. Category II comprises BE, CE, and BN groups. Meanwhile, category III consists of the CN group. Category I is a group of medicines that require greater management priority in their control. Based on the level of importance, medicines with category I was analyzed for further inventory management. ABC-VEN matrix analysis for the three categories is presented in Table 3. The portion of expenditure of each category is shown in Figure 1.

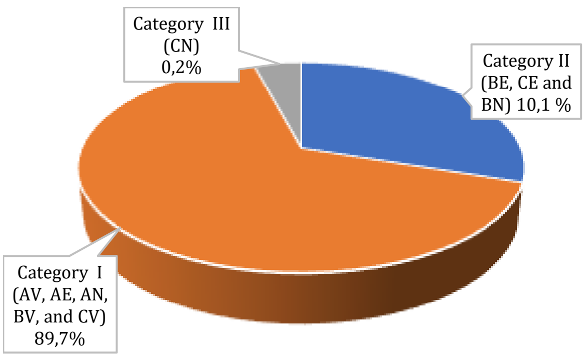

FIGURE 1: The portion of expenditure of each category.

From Figure 1, it can be seen that category I revealed the highest portion of 89,7% (IDR 2.116.358.841), whereas category II and category III contained 10.1% (IDR 237.671.576) and 0.2% (IDR4.527.396) of total expenditure, respectively. Then, it could be concluded that category I require the topmost management control for the whole budget and availability of medicines simultaneously. Stock for medicines listed in groups A and B should be kept as low as possible to facilitate easier control, but still, the supply must be maintained to meet the needs of pharmaceutical care services.

Meanwhile, medicines controlling in group C, which absorbed the smallest budget in procurement, can be recorded and reported by monitoring every two to six months. In supporting this study, according to a published study that highly efficient procurement process will ultimately demand a tinier budget for the costs of the medicine either in the pharmacies or the health center [12]. Similar to the results of the ABC analysis, in the ABC-VEN analysis, medicines items that are categorized in category I need continuous monitoring and control. In a regional hospital pharmacy installation in East Bandung, 44 items belonged to category I (89.7% of total cost), and the stock of these items can affect the service given by the hospital since they are either vital or essential. To manage the capital insufficiency due to these items, low buffer stock needs to be maintained while keeping strict control on the consumption level and stock on hand [13]. The ordering method for category I medicines should be monitored to avoid a shortage. For medicines belonging to category I, further inventory control management should be carried out.

Analysis of Economic Order Quantity (EOQ)

The order quantity for category I medicines was determined by a continuous review system model (Q Model). EOQ calculation is only performed for category I medicines because it is assumed that demand for them is constant or has the same request pattern. In determining the optimum order quantity, we used the EOQ method. Regarding the significance of category I, the forecasting model and EOQ were implemented to predict medicines demand and determine the order quantity of 44 medicines items in this group. The list of category I, II, and III medicines can be seen in Table 4 (red, orange, and yellow color symbolize vital, essential, and nonessential medicines, respectively).

The costs considered in the continuous review system model include purchase costs, ordering costs, carrying costs, and shortage costs.

The annual demand is based on data consumption during 2021-2022. Ordering costs include costs required to place an order, consist of: a) major costs, which are costs that must be incurred by the hospital in one order and do not depend on the order quantity and b) minor costs, which are costs that must be incurred by the hospital in one order and the amount is proportional to the number of orders. The carrying cost in this research was calculated using [14], which accounts for 26% of the cost of purchasing medicines.

The value of EOQ and also the frequency of ordering every item of medicine category I, compared with the typical variety of orders and the average order frequency on actual information history is given in Table 5.

In Table 5, the EOQ values are compared with the actual data for the number of medicine orders for the period 2021-2022. The calculation results show that the average number of orders for the EOQ model is smaller than the current order number. Changes in the number of orders cause an optimal balance between ordering costs, carrying costs and shortage costs so that there is an efficiency in the investment value of medicine procurement that must be issued by the hospital. With the same method, each medicine can be determined EOQ value and frequency of ordering.

TABLE 4: The list of category I medicines.

No.	Medicines	Category	No.	Medicines	Category
1	Gabapentin 300 mg	AV	23	Ondansetron 4mg/2ml inj	AE
2	Asam traneksamat 500 mg inj	AV	24	D 1/2 S	AE
3	Sevoflurane	AV	25	Metronidazol infus	AE
4	Dobutamin inj	AV	26	Meropenem inj 1 g	AE
5	Oxytocin inj	AV	27	Metilprednisolon 125 inj	AE
6	Mecobalamin 500 mcg	BV	28	Ondansetron 4 mg	AE
7	Manitol 250 ml	BV	29	Cefazolin 1 g inj	AE
8	Misoprostol 200 mcg	BV	30	Omeprazole	AE
9	Metformin 500mg	BV	31	Streptomicin 1 g inj	AE
10	Candesartan 16 mg	BV	32	Rifampicin 600	AE
11	Dexametason Inj	BV	33	Paracetamol 500 mg	AE
12	Fenitoin Inj 50 mg/ml	BV	34	Nacl 0,9% 100 ml	AE
13	Ethambutol 500	BV	35	Vit K1 2 mg/ml Inj	AE
14	Hydroxy Urea	BV	36	Aqua	AN
15	Fenitoin 100 mg	BV	37	Citicolin 250 inj	AN
16	Efinefrin 0.1%/ml Inj	CV	38	Dextrose 5%	AN
17	Isosorbid Dinitrat 5 mg	CV	39	Citicoline 500 mg	AN
18	Propanolol 10 mg	CV	40	Cefixim 100 mg/5ml syr	AN
19	Clonidin 0.15 mg	CV	41	Azythromycin 500 mg Inj	AN
20	Nacl 0,9%	AE	42	Ceftriaxone 1 g inj	AN
21	Atorvastatin 20 mg	AE	43	Cefotaxim 1g Inj	AN
22	Levofloksasin infus	AE	44	Ringer Laktat	AN

TABLE 5: The calculation results of order quantity and order frequency of various medicines.

No.	Medicines	Unit	Demand	Order		Order Frequency	
				EOQ,	Actual Average order	EOQ,	Actual Average
1	Ringer Laktat	Kolp	46,719	5,801	7,714	9	7
2	Nacl 0,9%	Kolp	41,847	5,114	4,364	9	10
3	Atorvastatin 20 mg	Tablet	99,823	19,275	24,771	6	5
4	Gabapentin 300 mg	Tablet	145,610	26,683	159,069	6	1
5	Levofloksasin infus	Bottle	4,151	877	880	5	5
6	Ondansetron 4mg/2ml inj	Ampoule	30,056	5,784	13,167	6	3
7	D 1/2 S	Kolp	8,482	1,864	2,439	5	4
8	Aqua	Bottle 20 ml	23,937	4,892	6,750	5	4
9	Metronidazol infus	Bottle	8,127	1,678	1,797	5	5
10	Meropenem inj 1 g	Vial	1,750	487	698	4	3
11	Asam traneksamat 500 mg inj	Ampoule	12,401	2,787	1,875	5	7
12	Metilprednisolon 125 inj	Vial	4,824	1,162	6,259	5	1
13	Ondansetron 4 mg	Tablet	14,883	3,752	4,095	4	4
14	Citicolin 250 inj	Ampoule	8,527	1,991	989	5	9
15	Dextrose 5%	Kolp	5,655	1,610	1,200	4	5

16	Cefazolin 1 g inj	Vial	2,852	821	388	4	8
17	Omeprazole	Tablet	82,758	22,074	17,927	4	5
18	Streptomicin 1 g inj	Vial	2,806	843	5176	4	1
19	Rifampicin 600	Kapsul	31,266	9,379	23,977	4	2
20	Citicoline 500 mg	Tablet	8,346	2,400	2,123	4	4
21	Paracetamol 500 mg	Tablet	139,944	39,921	80,000	4	2
22	Sevoflurane	Bottle	19	38	20	1	1
23	Nacl 0,9% 100 ml	Kolp	4,236	1,241	605	4	7
24	Cefixim 100 mg/5ml syr	Bottle	1,786	603	545	3	4
25	Azythromycin 500 mg Inj	Vial	244	150	122	2	2
26	Ceftriaxone 1 g inj	Vial 1 g	5,615	2,085	3,440	3	2
27	Vit K1 2 mg/ml Inj	Ampoule	6,613	2,123	1,390	4	5
28	Dobutamin inj	Vial	1,048	428	279	3	4
29	Oxytocin inj	Ampoule	9,901	3,341	3,481	3	3
30	Cefotaxim 1g Inj	Vial 1 g	4,914	1,987	2,136	3	3
31	Mecobalamin 500 mcg	Tablet	36,679	15,362	18,340	3	2
32	Manitol 250 ml	Bottle 250 ml	662	317	188	3	4
33	Misoprostol 200 mcg	Tablet	5,178	1,904	12,962	3	1
34	Metformin 500mg	Tablet	111,395	48,433	56,330	3	2
35	Candesartan 16 mg	Tablet	12,255	4,707	6,330	3	2
36	Dexametason Inj	Ampoule	7,852	3,066	1,973	3	4
37	Fenitoin Inj 50 mg/ml	Vial	780	381	176	3	5
38	Ethambutol 500	Tablet	22,594	9,459	17,242	3	2
39	Hydroxy Urea	Tablet	2,265	1,226	2,810	2	1
40	Fenitoin 100 mg	Bottle	15,937	9,526	8,609	2	2
41	Efinefrin 0.1%/ml Inj	Ampoule	935	2,706	951	1	1
42	Isosorbid Dinitrat 5 mg	Tablet	14,358	19,013	14,539	1	1
43	Propanolol 10 mg	Tablet	6,850	13,224	20,837	1	1
44	Clonidin 0.15 mg	Tablet	1,008	3,235	3,981	1	1

This condition causes a decrease in carrying costs. The difference in ordering frequency at this time shows inefficiency in ordering medicines so that it will affect carrying costs. When the frequency of orders increases, the cost suppression occurs in carrying costs and reduces the risk of damage/ expiration, although ordering costs increase, but there can be considerable cost efficiency.

Even though the number of orders is greater than the EOQ, there is still the possibility of a shortage of medicine supplies. This is due to the absence of the right time to place an order for medicine. Besides being able to determine the optimum order quantity, the EOQ model can also determine the re-order point by considering safety stock. Safety stock is needed to prevent inventory shortages due to uncertainty in demand and delays in the arrival of orders [14]. The calculation results of order quantity, reorder point, safety stock, and service level using EOQ model can be seen in Table 6.

TABLE 6: The calculation results of order quantity, reorder point, safety stock, and service of various medicines.

No	Medicines	Unit	*Quantity* (q_0)	*Reorder Point* (r)	*Safety Stock* (ss)	*Service Level*
1	Ringer Laktat	Kolp	5,801	5,768	1,875	99.9%
2	Nacl 0,9%	Kolp	5,114	4,814	1,327	99,9%
3	Atorvastatin 20 mg	Tablet	19,275	18,095	9,776	99,5%
4	Gabapentin 300 mg	Tablet	26,683	20,665	8,531	99,7%
5	Levofloksasin infus	Bottle	877	461	115	99,7%
6	Ondansetron 4mg/2ml inj	Ampoule	5,784	3,252	747	99,9%
7	D 1/2 S	Kolp	1,864	1,041	335	99,7%
8	Aqua	Bottle 20 ml	4,892	2,500	505	99,8%
9	Metronidazol infus	Bottle	1,678	901	224	99,8%
10	Meropenem inj 1 g	Vial	487	266	120	99,3%
11	Asam traneksamat 500 mg inj	Ampoule	2,787	1,261	228	99,8%
12	Metilprednisolon 125 inj	Vial	1,162	529	127	99,8%
13	Ondansetron 4 mg	Tablet	3,752	1,939	699	99,8%
14	Citicolin 250 inj	Ampoule	1,991	836	126	99,7%
15	Dextrose 5%	Kolp	1,610	685	214	99,8%
16	Cefazolin 1 g inj	Vial	821	371	134	99,6%
17	Omeprazole	Tablet	22,074	9,058	2,161	99,8%

18	Streptomicin 1 g inj	Vial	843	350	116	99,6%
19	Rifampicin 600	Kapsul	9,379	4,160	1,555	99,6%
20	Citicoline 500 mg	Tablet	2,400	958	262	99,7%
21	Paracetamol 500 mg	Tablet	39,921	16,663	5,001	99,7%
22	Sevoflurane	Bottle	38	3	2	99,8%
23	Nacl 0,9% 100 ml	Kolp	1,241	433	80	99,7%
24	Cefixim 100 mg/5ml syr	Bottle	603	210	61	99,4%
25	Azythromycin 500 mg Inj	Vial	150	47	27	98,9%
26	Ceftriaxone 1 g inj	Vial 1 g	2,085	967	499	99,2%
27	Vit K1 2 mg/ml Inj	Ampoule	2,123	696	144	99,8%
28	Dobutamin inj	Vial	428	109	22	99,8%
29	Oxytocin inj	Ampoule	3,341	1,050	225	98,9%
30	Cefotaxim 1g Inj	Vial 1 g	1,987	787	377	99,7%
31	Mecobalamin 500 mcg	Tablet	15,362	5,756	2,699	99,5%
32	Manitol 250 ml	Bottle 250 ml	317	75	20	99,8%
33	Misoprostol 200 mcg	Tablet	1,904	579	147	99,7%
34	Metformin 500mg	Tablet	48,433	20,255	10,972	99,6%
35	Candesartan 16 mg	Tablet	4,707	1,357	336	99,5%
36	Dexametason Inj	Ampoule	3,066	823	169	99,6%
37	Fenitoin Inj 50 mg/ml	Vial	381	92	27	99,9%
38	Ethambutol 500	Tablet	9,459	2,691	808	99,7%
39	Hydroxy Urea	Tablet	1,226	272	83	99,2%
40	Fenitoin 100 mg	Bottle	9,526	1,700	372	99,2%
41	Efinefrin 0.1%/ml Inj	Ampoule	2,706	114	36	99,3%
42	Isosorbid Dinitrat 5 mg	Tablet	19,013	1,305	109	99,4%
43	Propanolol 10 mg	Tablet	13,224	664	93	99,6%
44	Clonidin 0.15 mg	Tablet	3,235	119	35	99,5%

According to table 5, each medicine has a different ROP. Medicine orders will be fulfilled only when stocks reach the ROP level. ROP is a method of acquiring medicines that takes into account lead time, safety stock, and the number of needs. Lead-time is used to estimate when inventory will arrive before it runs out, whereas safety stock is used to avoid fluctuating demand [15]. At the moment, the hospital has set the service level of medicines services to patients at 98%. The service level value is determined by considering conditions that are often not ideal for a regional hospital with a limited budget.

The calculations using the continuous review system model method resulted in an average service level value of 99.6%. The service level value obtained is higher than the service level that has been set. This condition implies that the proposed model can meet patient needs in terms of medicines availability which will undoubtedly improve patient satisfaction with hospital services. The comparison of total cost between the continuous review system model and the existing inventory management system for category I medicines can be seen in Table 7.

TABLE 7: The comparison of total cost between the continuous review system model and the existing inventory management system for category I medicines.

	Existing Inventory Management System	Continuous Review System Model	Savings	%
Total Cost Management Inventory (IDR)	2,310,493,103	2,191,080,521	119,412,582	5.2

The comparison of the total cost management inventory between the continuous review system model and the existing inventory management system show that the former model is able to provide a total inventory cost savings of 119,412.582 IDR or a saving of 5.2%. Inventory management aims to ensure product availability, reduce handling time, and keep working capital and purchasing costs as low as possible. The continuous review system model can be used as a standard in inventory control as it can be used as a determinant of the amount of safety stock and the time to reorder so that it can meet service-level requests.

CONCLUSIONS

The proposed method (combination of ABC-VEN and continuous review system model) produced a smaller total cost when compared to the existing inventory management system. According to [16] the goal of inventory management is to ensure product availability, reduce the handling time maintaininginventory, and keep working capital and purchasing costs at a minimum. According to the findings of our study, in pharmaceutical iinstallations of a type B regional hospital medicine expenditure in 2022 fiscal year was 2,191,080,521 IDR.

This necessitates an efficient and effective inventory control strategy in order to make the best use of the budget by focusing on vital or essential medicines based on ABC-VEN matrix analysis. Total Inventory cost savings provided are 5.2% with an average service level of 99.6%. Conclusion overall, ABC-VEN matrix analysis and continuous review system methods produces a better solution than the ordering method currently used in pharmaceutical installations of a type B regional hospital at west Java Indonesia. The ABC-VEN classification and research findings have been communicated to procurement and medicine pharmacy staff and are being incorporated into medicine procurement, storage, and control decision-making. Thus this proposed method in controlling medicine can be implemented by type B regional hospital at west Java Indonesia to minimize stock inventory medicine in the pharmacy installations.

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