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Implementation of ABC and ROP Methods for Inventory Control of Mandatory Pharmacy Drugs

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ABSTRACT

Grawira Farma Pharmacy in Kulon Progo manages Mandatory Pharmacy Drugs, which require strict regulation for self-medication. Managing the inventory of Mandatory Pharmacy Drugs is necessary to prevent shortages and stockouts. This study aims to analyze the planning and control of Mandatory Pharmacy Drugs inventory at Grawira Farma Pharmacy, using the Always Better Control (ABC) method for inventory planning, categorizing drugs into three groups. Group A consists of fast-moving drugs with 11 types (27.5%), accounting for 79.38% of total drug usage and an investment value of Rp 1,697,300.00, group B consists of moderately-selling drugs with 11 types (27.5%), contributing 18.29% of total drug usage and an investment value of Rp 1,319,450.00, and group C consist of the slowest-selling drugs with 18 types (45%), representing 2.33% of total drug usage and an investment value of Rp 392,425.00. In addition to inventory planning, this study examines inventory control using the Reorder Point (ROP) method to determine when the reorder after grouping Mandatory Pharmacy Drugs. The research results obtained the reorder point of Mandatory Pharmacy Drugs, which include group A, ranging from 150-500 items, group B varies from 14-340 items, group C, ranging from 0-34 items.

INTRODUCTION

Based on the Regulation of the Minister of Health of the Republic of Indonesia No. 73 of 2016, a pharmacy is a pharmaceutical service facility where pharmaceutical practices are conducted by pharmacists (Widowati & Zamroni, 2023). Grawira Farma Pharmacy is localed in the Driyan Hamlet, Wates District, Kulon Progo Regency, Special Region of Yogyakarta. It is strategically located in the city center, close to shopping centers, terminals, and stations, making it easily accessible to the surrounding community in need of medical treatment. This pharmacy provides healthcare services, particularly in medication provision, to help achieve optimal health for the community, especially in dispensing Mandatory Pharmacy Drugs.

Mandatory Pharmacy Drugs are several categories of prescription drugs that can be dispensed directly by pharmacists in pharmacies without a doctor's (Mustika et al., 2020). Based on the Decree of Minister of Health Number 347/MenKes/S.K./VII/1990, drugs listed in the National Essential Drug List (DOWA) are generally used for non-serious illnesses (Pratama & Herlina, 2023). The classification of DOWA is based on the Decree of the Minister of Health Number 347/Menkes/SK/VII/ 1990 fir group 1, the Decree of the Minister of Health Number 924 / Menkes /Per / X / 1993 for group 2, and the Decree of the Minister of Health Number 1176/Menkes/SK/X/ 1999 for group 3. Mandatory Pharmacy Drugs can be obtained without a doctor's prescriptions and can be dispensed directly by pharmacists, and they are consumed by a

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large part of the population (Siregar & Darmawan, 2023). Therefore, the stock of these medicines must be secure to prevent shortages and stockouts.

Inventory is a deliberate accumulation of goods kept as reserves in case of scarcity, which can include raw materials, semi-finished goods, finished goods, and so on, during the production process (Azkia et al., 2017). Efficiency and effectiveness in procurement play a crucial role in the existence of a pharmacy. Insufficient pharmacy inventory results in the risk of unmet service needs for the community or shortages that force consumers to purchase the medication elsewhere. Therefore, in order to generate revenue from product sales, inventory needs to bes recorded and managed properly so that the company's objectives can be achieved (Fitrotun Nisa, 2019).

Inventory planning for medications can utilize the Always Better Control (ABC) method as one of its approaches (Almahdy et al., 2021; Rarung et al., 2020). According Prasetwayan and Nasytion, the inventory of a company is divided into three classifications: A,B, and C thus known as ABC analysis (Junaidi, 2019). ABC analysis directs the development of policies regarding better forecasting, physical control, supplier reliability, and more effective safety stock (Kafidzin et al., 2023).The calculation of medication inventory procurement using the Reorder Point method, aslo known as the reorder level, is the point at which reordering should take place based on the quantity of existing inventory (Wantoro & Alkarim, 2016). The reorder point for the required inventory is determined by the puchasing department, especially when demand exceeds the current stock level, to maintain inventory balance and prevent stockouts (Sucipto, 2015). This research analyzes the planning of Mandatory Pharmacy Drugs using the Always Better Control (ABC) analysis method and Reorder Point (ROP) to determine the procurement calculation of inventory as a means of controlling the Mandatory Pharmacy Drugs inventory at Grawira Farma Pharmacy.

RESEARCH METHODS

The research was conducted using descriptive analysis in the form of non-experimental research. The study was carried out at Grawira Farma Pharmacy. The fieldwork was conducted for 1 month, from October 1st to 31st, 2023. Both primary and secondary data were used in this research. Primary data were obtained from the owner of Grawira Farma Pharmacy through semi-structured interviews. These interviews focused on the control of the Mandatory Pharmacy Drugs inventory, particularly regarding the use of the defect book and stocktaking procedures. Secondary data were obtained from the sales volume of Mandatory Pharmacy Drugs and their prices at Grawira Farma Pharmacy by reviewing the list of available Mandatory Pharmacy Drugs at the pharmacy. The data analysis methods used in this study were ABC analysis and Reorder Point (ROP) calculation.

Always Better Control (ABC)

ABC analysis is an inventory control technique that considers the classification of items based on the level of importance of each item group (Abdolazimi et al., 2021). The ABC analysis method involves grouping items based on their value into three major categories: Group A (high investment value), Group B (moderate investment value), and Group C (low investment value) (Shapovalova, 2023). This method focuses inventory management's attention on determining the most important items and prioritizing these items first (Chairani et al., 2021). The ABC system is a common method for classifying drugs into categories for inventory control purposes: Group A represents 70% of total sales and 20% of inventory items, Group B represents 20% of total sales and 30% of inventory items, and Group C represents 10% of total sales but 50% of inventory items. Group A consists of very expensive and fast selling drugs. Group B has an average turnover rate. Group C includes less in-demand drugs that sell the slowest (Nadhifa et al., 2022). The ABC method classifies Mandatory Pharmacy Drugs into three groups based on their usage and investment value. This method helps determine the necessary inventory procurement by focusing management's attention on determining the types of items based on their usage (drug turnover). Grouping based on investement value in this method can help identify which items require more investment in procurement to ensure targeted inventory, thereby increasing sales efficieny and preventing additional carrying costs.

Reorder Point (ROP)

Reorder Point (ROP) is a method for deciding when to reorder to maintain balance, when inventory reaches this point, a reorder must be made (Huizen et al., 2021). If ROP is delayed, it results in stock out costs, and if ROP is too early, it leads to extra carrying costs. A minimal amount of safety stock is needed to prevent stock outs. Safety stock (SS) is additional inventory that acts as a buffer when there is a mismatch between demand and available stock (Purnomo & Riani, 2019). The amount of safety stock can increase when lead time is uncertain. Lead time arises because every order takes time, and not all orders can be fulfilled immediately, so there is always a time gap (Virlianda Marsha & Purwanggono, 2019). The advantage of Reorder Point in inventory procurement is its anticipation of fluctuating demand by considering the amount of safety stock available, so when inventory reaches this point, the procurement department must immediately place an order. The formula used according to John and Harding (2001) is shown in equation (1) with ROP is Reorder Point, D is average drug usage, L is lead time, and SS is safety stock (Ika Listyorini, 2016).

$$ROP = (D \times L) + SS \quad (1)$$

RESULTS AND DISCUSSION

The inventory planning of Mandatory Pharmacy Drugs at Grawira Farma Pharmacy is conducted by monitoring the stock of drugs daily, whis is recorded in the defect book. Reordering occurs when drugs are out of stock or running low, and there is no classification of drugs. The procurement of drug inventory is carried out without specific calculations to determine the reorder quantity. The inventory recording of Mandatory Pharmacy Drugs at Grawira Farma Pharmacy is conducted by monitoring the stock of drugs daily, which is recorded in the defect book. Reordering occurs when drugs are out of stock or running low, and there is no classification of drugs. The procurement of drugd inventory is carried out without specific calculations to determine the reorder quantity. The inventory recording of Mandatory Pharmacy Drugs at Grawira Farma Pharmacy includes the defect book and stocktaking. The defect book records drugs that are running low or out pf stock for reordering from suppliers. Stocktaking involves matching the stock card (recording incoming goods, outgoing goods, batch numbers, and expiration dates) with the physical stock to ascertain the quality, quantity, and appropriate expiration time of the drugs.

Reorder Point (ROP) and Inventory Control Strategy

Grawira Farma Pharmacy sells various types of medical supplies. The types of supplies examined in this study are Mandatory Pharmacy Drugs.

Tabel 1. Mandatory Pharmacy Drugs Group 1 at Grawira Farma Pharmacy

Generic Name	Brand Name
Aminophyllin	Erphafillin
Bromhexin	Bisolvon
Benzocain	Superhoid
Bisakodil	Dulcolax
Diphenhydramine	Antimo, Dramamine
Theophylline	Teosal
Triprolidine	Crofed, Lapifed, Tremenza, Trifed
Triamcinolone	Trilac
Levonogestrel+Ethinylestradiol	Andalan, Planotab, Microgynon
Metoclopramide	Vosea
Metampiron/ Metamizole	Ginifar, Infalgin
Triamcinolone	Bufacomb cr
Betametason	Benoson cr, Betason Cr, Bevalex Cr, Nisagon Cr
Desoximetasone	Denomix Cr, Dexigen Cr, Inerson Cr, Esperson Cr

Generic Name	Brand Name
Salbutamol	Lasal
Asam Mefenamat	Anastan, Ponstan, Fargetix
Mebhidrolin	Interhistin
Acetylsistein	-
Dechlorpheniramine maleat	Dextamine, Dexteem plus, Dextafen
Nystatin	Candistin, Cazetin, Kandistatin

The results of the research identified 40 types of Mandatory Pharmacy Drugs in the forms of tablets, capsules, oinments, syrups, suppositories, drops, and eye drops, with a total of 66 different brands. From an inventory management perspective, an effective ROP calculation ensures that stock levels are maintained to avoid shortages while minimizing excess inventory. This aligns with the Economic Order Quantity (EOQ) principle, which seeks to balance holding and ordering costs. Table 1 shows the results of document processing, containing 20 types of Mandatory Pharmacy Drugs in the forms of tablets, capsules, ointments, suppositories, and drops with 38 brand names. Table 2 available is the result of document processing, containing 12 types of Mandatory Pharmacy Drugs in the forms of tablets, ointments, and syrups with 16 brand names.

Tabel 2. Mandatory Pharmacy Drugs Category 2 at Grawira Farma Pharmacy

Generic Name	Brand Name
Bacitracin	Nebacetin
Clindamicin	Mediklin
Dexametason	Baycuten
Dexpanthenol	Bepanthen
Diclofenac	Voltaren gel
Hidrocortison	Bufacort cr, Chloramfecort cr
Ibuprofen	Proris, Farsifen
Ketoconazole	Mycoral, Zoralin
Methylprednisolone	Lameson, Rhemafar
Omeprazole	-
Prednison	Elthazon
Sucralfate	Inpepsa, Nucral

Table 3 available is the result of document processing, containing 8 types of Mandatory Pharmacy Drugs in the forms of tablets, capsules, ointments, and drops with 13 brand names.

Tabel 3. Mandatory Pharmacy Drugs Category 2 at Grawira Farma Pharmacy

Generic Name	Brand Name
Allopurinol	Allofar
Cetirizin	Incidal, Lerzin
Diklofenak natrium	Gratheos, Renadinac, Samcofenac, Voltadex, Voltaren
Sediaan mata :Gentamicin	Genoint
Sediaan mata : Kloramfenicol	Erla, Reco
Siproheptadin	Pronicy
Piroxicam	Pirocam
Ranitidine	-

ABC Analysis and Its Role in Inventory Control

Group A consists of very important drugs (highest sales value), fast moving, and in some cases, very expensive drugs. Group B includes items with moderate sales value and inventory turnover. Group C consists of items with the smallest sales value, slowest moving, and less in demand drugs. Implementing ABC analysis allows the pharmacy to allocate resources efficiently by focusing on high-value, fast-moving drugs (Group A), ensuring that essential medications are consistenly available while optimizing procurement cycles. The total number of drugs used in October is 6,570. Meanwhile, the total cost of inventory spent on purchasing Mandatory Pharmacy Drugs is Rp 3,409,175.00.

Tabel 4. Classification of Mandatory Pharmacy Drugs into Group A, B, and C

Classification of Drugs		
A	**B**	**C**
Asam mefenamat	Betametasone	Aminophylin
Acetylsistein	Bromhexin	Bacitracin
Allopurinol	Dechlorpheniramine maleat	Benzocain
Cetirizine	Diphenhydrinat	Bisakodil
Dexametasone	Ibuprofen	Clindamycin
Diclofenak natrium	Ketoconazole	Desoximetasone
Methylprednisolone	Levonogestrel+Ethinylestradiol	Dexpanthenol
Piroxicam	Omeprazole	Diclofenac
Ranitidine	Prednisone	Hydrocortison
Salbutamol	Sucralfate	Mebhidrolin
Theopylin	Triamcinolone	Metoclopramide
		Nystatin
		Metamizole/ Metampiron
		Siproheptadine
		Sediaan krim: Triamcinolone
		Sediaan mata : Gentamicin & Chloranfenicol
		Triprolidine

Table 5 shows drug groups based on usage. Mandatory Pharmacy Drugs classified in Group A amount to 11 types or 27.5% of all drug inventory types, with a total usage of 5,215 items or 79.38% of total drug usage at Grawira Farma Pharmacy. Mandatory Pharmacy Drugs classified in Group B also amount to 11 types or 27.5% of all drug inventory types, with a total usage of 1,202 items or 18,29% of total drug usage at Grawira Farma Pharmacy. Mandatory Pharmacy Drugs classified in Group C amount to 18 types or 45% of all drug inventory types, with a total usage of 153 items or 2.33% of total drug usage at Grawira Farma Pharmacy.

Tabel 5. ABC analysis based on the usage of Mandatory Pharmacy Drugs in October 2023

Drug Group	Number of Drug Types	Types of Drugs (%)	Usage	Usage (%)
A	11	27.5%	5215	79.38%
B	11	27.5%	1202	18.29%
C	18	45%	153	2.33%
Total	40	100%	6570	100%

Table 6 show drug groups based on investment value. Mandatory Pharmacy Drugs classified in Group A amount to 11 types or 27.5% of all Mandatory Pharmacy Drugs, with an investment value of Rp1,697,300.00 or 49.79% of total Mandatory Pharmacy Drugs investment at Grawira Farma Pharmacy. Mandatory Pharmacy Drugs classified in Group B also amount to 11 types or 27.5% of all drugs, with an investment value of Rp 1,319,450.00 or 38.7% of total Mandatory Pharmacy Drugs investment at Grawira Farma Pharmacy. Meanwhile, drugs classified in Group C amount to 18 types or 45% of all drugs, with an investment value of Rp392,425.00 or 11.51% of total Mandatory Pharmacy Drugs investment at Grawira Farma Pharmacy.

Table 6. ABC analysis based on the investment value of Mandatory Pharmacy Drugs in October 2023

Drug Group	Number of Drug Types	Types of Drugs (%)	Investment Value (Rp)	Percentage of Investment Value (%)
A	11	27.5%	1.697.300	49.79%
B	11	27.5%	1.319.450	38.7%
C	18	45%	392.425	11.51%
Total	40	100%	3.409.175	100%

ROP Analysis and Its Implications for Inventory Management

Calculating ROP with safety stock based on monthly drug usage data and a 95% service level. The value of $Z_{0.05}$ is the value at the intersection of row 0.05 with α column 0, which is 1.645 (from the critical values table of the Z distribution). A 95% service level means there is a 95% probability that all demand will be met, with a %% probability of demand not being met. The average lead time for drugs is 2 days. Table 7 shows the ROP calculation for each drug group. Table 7 available shows the calculation of ROP for Group A (fast moving).

Table 7. ROP for Group A

No	Drug Name	Average Sales Quantity	Total Sales	Lead Time	Safety stock	Z (95%)	ROP
1	Allopurinol	30	290	2	200	1.64	260
2	Asam mefenamat	40	329	2	200	1.64	280
3	Acetylsistein	30	290	2	100	1.64	160
4	Cetirizin	50	662	2	250	1.64	350
5	Dexametasone	60	670	2	200	1.64	320
6	Diclofenac sodium	50	620	2	250	1.64	350
7	Methylprednisolone	50	574	2	400	1.64	500
8	Piroxicam	30	270	2	200	1.64	260
9	Ranitidine	30	280	2	200	1.64	260
10	Salbutamol	50	670	2	300	1.64	400
11	Theopylin	40	560	2	300	1.64	380

Table 8. ROP for Group B

No	Drug Name	Average Sales Quantity	Total Sales	Lead Time	Safety stock	Z (95%)	ROP
1	Betametasone	3	24	2	10	1.64	14
2	Bromhexin	5	23	2	10	1.64	20
3	Dechlorpheniramine maleat	20	140	2	100	1.64	140
4	Diphenhydrinat	9	56	2	50	1.64	68
5	Ibuprofen	20	171	2	100	1.64	120
6	Ketoconazole	5	123	2	100	1.64	120
7	Levonogestrel+Ethinylestradiol	10	130	2	100	1.64	120
8	Omeprazole	20	150	2	100	1.64	140
9	Prednisone	20	210	2	150	1.64	340
10	Sucralfate	10	110	2	50	1.64	70
11	Triamcinolone	3	65	2	50	1.64	106

Table 8 shows the calculation of ROP for Group B (moderate moving). Table 9 shows the calculation of ROP for Group C (slow moving).

Table 9. ROP for Group C

No	Drug Name	Average Sales Quantity	Total Sales	Lead Time	Safety stock	Z (95%)	ROP
1	Aminophylin	-	-	2	-	-	-
2	Bacitracin	-	-	2	-	-	-
3	Benzocain	-	-	2	-	-	-
4	Bisakodil	-	10	2	5	1.64	-
5	Clindamycin	-	-	2	-	-	-
6	Diclofenac	-	1	2	1	1.64	1
7	Desoximetasone	-	3	2	1	1.64	1
8	Dexpanthenol	-	-	2	-	-	-
9	Hydrocortison	-	1	2	1	1.64	1
10	Mebhidrolin	-	30	2	10	1.64	10
11	Metamizole	-	30	2	20	1.64	20
12	Metoclopramide	-	10	2	5	1.64	5
13	Nystatin	-	2	2	1	1.64	1
14	Siproheptadine	-	-	2	-	-	-
15	Triprolidine	2	60	2	30	1.64	34
16	TM Gentamicin	-	1	2	1	1.64	1
17	TM Chloramfenicol	-	2	2	1	1.64	1
18	Triamcinolone zlf	-	3	2	1	1.64	1

The ROP calculation incorporates safety stock considerations, ensuring that the pharmacy maintains a buffer against demand fluctuations. The calculation considers the lead time and service level to minimize stockouts and maintain service quality. By integrating safety stock principles, the pharmacy can mitigate risks associated with supply chain disruptions and unexpected demand spikes.

Table 7, 8, and 9 available represent the ideal reorder points/quantities to avoid stockouts due to increased demand and ensure availability. The research findings indicate that the reorder points for 11 Mandatory Pharmacy Drugs in Group A range from 150 to 500 items. Cetrizine, diclofenac sodium, and methylprednisolone are among the drugs in Group A with the highest ROP values. For 11 Mandatory Pharmacy Drugs in Group B, the reorder points vary from 14 to 340 items. Meanwhile, the reorder points for 18 Mandatory Pharmacy Drugs in Group C range from 0 to 34 items. In Group C, there are 7 types of drugs that do not have an ROP value: aminophylline. bacitracin. bisacodyl. clindamycin. dexpanthenol. dan cyproheptadine. By calculating ROP and maintaining safety stock, pharmacies can improve service quality and avoid backorders that can lead to losses.

CONCLUSION

The inventory management of drugs at Grawira Farma Pharmacy was previously conducted using the defecta book and stock opname as references. This method risked stockouts because it relied solely on real-time needs and the adjustments of visiting patients. Orders were placed only when stock was low or out, without categorizing drugs or calculating specific reorder quantities. Inventory planning using the Always Better Control) analysis method showed that drugs in Group A (Always) amounted to 11 types (27.5%) with usage accounting for 79.38% of total drug usage and an investment value of Rp 1,697,300.00. Group B (Better) also comprised 11 types of drugs (27.5%) with usage amounting to 18.29% of total drug usage and an investment value of Rp 1,319,450.00. Group C (Control) included 18 types (45%) with usage accounting for 2.33% of total drug usage and an investment value of Rp 392,425.00. Group A drugs are fast-moving, requiring higher investment due to their rapid turnover and highest sales value.

Calculating the Reorder Point (ROP) helps ensure that drugs arrive at the pharmacy before stock runs out, preventing stockouts that could lead to losses from unfulfilled drug requests. Considering safety stock, the reorder points for 11 Mandatory Pharmacy Drugs in Group A range from 150 to 500 items. The reorder points for 11 Mandatory Pharmacy Drugs in Group B vary from 14 to 340 items. For the 18 Mandatory Pharmacy Drugs in Group C, the reorder poimts range from 0 to 34 items. Group C includes 7 types of drugs that do not have an ROP because there were no sales of these drugs in a month, making reordering unnecessary. Drugs in Group C are generally slow-moving. Grawira Farma Pharmacy requires effective inventory management to maintain smooth stock turnover. Priotizing drug inventory planning is crucial to enhancing efficiency and reducing costs. Controlling drug inventory by reordering helps avoid stockouts. Anticipating drug procurement considering fluctuating demand ensures stock shortages are addressed and drug supplies remain sufficient.

By aligning ROP calculation with Just-In-Time (JIT) inventory principles, the pharmacy can enhance operational efficiency, ensuring the drugs are replenished precisely when needed, minimizing excess storage costs. Furthermore, integrating ABC analysis with ROP strategies allows pharmacies to implement a hybrid approach to inventory control, optimizing financial, and operational performance.

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