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Analysis of the Implementation of Drug Inventory Control with the Always Better Control-Economic Order Quantity-Reorder Point-Safety Stock Method

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Abstract

BACKGROUND: The pharmaceutical installation currently uses the consumption method in controlling drug supply.

AIM: The purpose of this study is to provide a choice of other methods for controlling drug inventory.

METHODS: This study is a mix-method study with retrospective data for quantitative data and primary data for qualitative data. The research population used was all drug items during August 2020, totaling 269 items.

RESULTS: The results showed the always better control method Group A were 59 items, B were 64 items, and C were 146 items, the results of the economic order quantity method Group A were 414–159, B was 414–159 and C was 778–1407 for certain types of drugs, the results of the method. The reorder point of Group A was 12,027–962, Group B was 6014–20,045, and Group C was 3007–200 for certain types of drugs. The results of the safety stock method Group A were 627–50, B was 314–1054 and C was 157–11 for certain drug groups.

CONCLUSION: Suggestions Hospital to try methods of controlling drug supplies other than the consumption method. Moreover, it can provide training to human resources at the pharmacy.

Introduction

Drug control is an activity that ensures the use of drugs by the formulary, by diagnosis and therapy and ensures effective and efficient supplies or there are no excess and also shortages or vacancies, damage, expiration, and loss as well as returning orders for pharmaceutical preparations, medical devices, and medical materials that run out use [1].

Efficient drug management is one of the many important factors in the success of overall management, and aims to ensure the availability of good quality drugs, in the right type, in the right amount, at the right time, and used rationally so that the available funds can be used as well as possible and sustainably, to meet the interests of the community who seek treatment at the community service unit [2].

Pharmacy installation is a function implementing unit in a hospital that carries out pharmaceutical service activities or activities, starting from planning and procuring drugs until the drugs are handed over to patients [3].

Pharmaceutical service standards are benchmarks used as guidelines for pharmaceutical staff in providing pharmaceutical services [4].

According to the data obtained from observation with the interview method, it was found that the control of drug supplies at the pharmacy installation used the consumption method. The consumption method is a planning method based on the analysis of the previous period's logistical consumption [5].

The advantages of the consumption method are that the data obtained are accurate, the method is the easiest and does not require disease data or treatment standards, but the drawbacks are that it cannot assess the use of drugs in improving prescription writing, the shortage and excess of drugs are difficult to rely on and do not require good morbidity data recording [5].

With the background of this problem, the researcher wants to use another method in controlling drug supply, namely, the always better control economic order quantity reorder point safety stock (ABC-EOQ-ROP-SS) method.

The ABC method classifies inventory based on rupiah volume into three categories, namely, high

rupiah volume (A); moderate rupiah volume (B); and low rupiah volume (C) [6].

The EOQ method is a formula for determining the number of order quantities that minimize ordering costs and storage costs [7].

The ROP method is a decision as to when to reorder to be made by the installation in meeting drug requests [8].

The SS method aims to reduce the risk of running out of inventory due to delays in delivery of inventory, thereby minimizing sales losses due to running out of inventory [9].

In connection with this and according to the results of observations made by researchers that the pharmacy installation uses the consumption method in drug procurement, which this method has advantages such as being relatively easy and fast and does not need epidemiological data but has shortcomings in determining the type and amount and supports irrationality, in use [10]. While researchers are interested in conducting research with a different control method, namely, the ABC-EOQ-ROP-SS method, this research is entitled "Analysis of the implementation of drug inventory control using the ABC-EOQ-ROP-SS method." Hence, it is necessary to research the implementation of drug inventory control. Analysis needs to be done to find out whether the method or method in the process of implementing drug inventory control.

Research Methods

This type of research is mixed-method research with retrospective data for quantitative data and primary data for qualitative data. The data sample which includes research data is 269 items because this study uses the total sampling method. There are two data collection instruments, namely interview and observation instruments, in this study data analysis using ABC-EOQ-ROP-SS analysis.

Results and Discussion

Human resources

According to data analysis, the pharmaceutical installation has two pharmacists and nine pharmaceutical technical personnel, this number has met the classification and hospital licensing regulated by the Minister of Health Regulation No. pharmaceutical technician.

Data on drug use

According to the results of the analysis of drug planning using the ABC method, there is a match between the types of drug items in Group A with the ten largest inpatient and outpatient diseases, with an example of diabetes which is the ten biggest disease both in outpatient and inpatient treatment. Antidiabetic grouped in Group A, namely, novorapid with a cumulative value of 20,854, Sansulin Log G with a cumulative value of 49,262 and glimepiride 2 mg with a cumulative value of 51,716.

Data analysis of drug inventory control with the always better control method

ABC method is a method used to classify drug use data into three groups based on the percentage of drug use. Table 1 explains that there are 59 types of drugs that are included in Group A, which means that these 59 types of drugs cannot be empty and require monitoring of the number, because Group A drugs are high investments. Table 3.6 also explains 64 types of drugs are included in drug Group B, Group B is a moderate investment and from the Table 1, there are also 146 types of drugs that are included in Group C, Group C is a low investment, the distribution of these three drug groups is based on the percentage of drug use, namely, Group A 70%, Group B 20%, and Group C 10%, this method is by the research of Adi Ismaya Nurwulan, (2022) which says that the ABC analysis method is a method of making groups or classifications based on the set of values from the highest to the lowest value and divided into three major groups called Group A (high investment value), B (medium investment value), and C (low investment value). Moreover, the amount of use of each type of drug is sorted based on the number of usage from the highest to the smallest number [11].

Table 1: Always better control method analysis based on the amount of drug use

Drugs	Usage type, type (%)	Investment value, Rp (%)
A	59 (70.5)	694,752,080 (70.2)
B	64 (20.3)	128,084,741 (20.3)
C	146 (9.2)	35,133,775 (10.5)
Total	269 (100)	857,970,596 (100)

Rp: Rupiah, A: High rupiah volume, B: Moderate rupiah volume, C: Low rupiah volume.

Data analysis of drug inventory control with the economic order quantity method

The EOQ method is a method used to determine the correct and optimum number of orders for each order to be made. The cost of saving by the researcher is 20% and use the formula EOQ = which result is found square found $\sqrt{\frac{2DS}{H}}$ that drugs are ordered back when the amount of stock in Group A varies in Group A 414–159, for certain types of drugs while Group B 998–5137 for certain types of drugs and in Group C 778–1407

Table 2: Result of the interview

Number	Information	Informant	Informant's answer	Reduction
1	Do you think the number of HR in this pharmaceutical installation is sufficient?	P R K S	The need for workers in pharmaceutical installations is still lacking Pharmacy HR at the pharmacy installation of RS Arun is still lacking If the needs are sufficient, but the division of tasks needs to be improved For the logistics department, that's enough, now we have 3 people: The warehouse department, the receiving, and the procurement reporting section	Workers and HR are still lacking, although some think it is enough, the division of tasks can be improved, while the logistics department is sufficient, now we have 3 people: The warehouse department, the receiving, and procurement reporting department
2	Has a drug inventory control team been formed? Who is involved with the drug supply control process?	P R K S	Already in the form of drug control at the hospital The drug inventory control team consists of; Availability control, use the control, and control in the event of loss, damage, and expiration A drug control team has been formed at the RS, namely the pharmacy and therapy team (TFT) which includes pharmacists, doctors, and other related health workers The team is supervised by a pharmacist and there are two people in charge if I am not mistaken who supe the need for the medicine First, a request for medicine is submitted from a pharmacy, a request is made at the dispensary, then it is seen in the check invite the warehouse and then reduced in the logistics section for PO	Drug supply control team for pharmacists, doctors, and other related and supervised health workers
3	Is there any training provided by the hospital related to controlling the supply of drug needs?	P R K S	There is no training provided by the hospital There is no training provided by the RS related to inventory control for drug needs As far as I know yesterday there was a warehouse for logistics, but as far as I know, there is always training, but because of the current pandemic, it is through zoom Currently not available	There has been no training provided by the hospital but in the logistics section there is a warehouse for logistics as far as I know there is always training but because now the pandemic is now via zoom
4	Is there a special budget for drug inventory control?	P R K S	There is no special budget for drug control There is no special budget for drug control The purchase of medicine has been budgeted for, but if there is urgent medicine, it is usually not too much, but if there are no special funds That's a financial person who knows	The purchase of medicine has been budgeted for, but if there is urgent medicine, it is usually not too much, but if there are no special funds
5	What equipment is used for drug inventory control?	P R K S	No answer The tools used are stock cards for pharmaceutical and medical supplies The hospital system includes registration, treatment, and doctor's visit, the doctor's actions from our system can see the need for the drug needed, in 1 week there is a check on what drugs are in high demand A temporary tool, for example, is a book, a manual for recording is made, and the name is a drug stock book. There is a program called ICA	The tools used are stock cards for pharmaceuticals and medical equipment, there are books, manual recordings are made, and the name is drug stock books. There is a program called ICA
6	When is drug inventory control carried out?	P R K S	Control is carried out every 15th of every month Ordering for medicine and medical equipment needs at Arun hospital is done once every 1 month on the 15th Once a month, usually the 2nd week of planning what to buy, the 3rd week being handed over to logistics, and the 4th week of preparing PO distribution for drug orders The purchase process is once a month unless it's urgent if it's in the warehouse to transfer medical supplies every day if the pharmacy's drugs are transferred	Ordering for medicine and medical equipment needs at Arun Hospital is done once every 1 month on the 15th
7	How do you choose the type of medication for the patient's needs? Is it by the hospital formulary?	P R K S	Byth the hospital formulary and the national formulary. It is by the hospital formulary The method of selecting the types of drugs in hospitals is based on the national formulary, disease patterns, effectiveness and safety of drugs, quality of drugs, prices, and availability of drugs on the market; the selection of drugs at the RS' hospital is by the rs' formulary We get a recap from the pharmacy, according to the budget, if not, we can adjust it to the one that is more widely used No answer If the amount is regulated by the pharmacy	The method of selecting the types of drugs in hospitals is based on the national formulary, disease patterns, effectiveness and safety of drugs, quality of drugs, prices, and availability of drugs on the market
8	How do you determine the amount of medication? What is the method used in controlling drug inventory and how is it calculated?	P R K S	By knowing the number of receipts and use of drugs to ensure the number of drugs needed in a month. The method used is the consumption method The method of determining the number of drugs based on the use of dr rs drugs and the method used for ordering drugs is a combination method, namely, the consumption method and epidemiology That means the min is the max, yes, the pharmacy has made what the minimum–maximum needs are, when the needs are already min, then we prepare for new orders on the grounds of increasing usage or indeed the category of distribution is empty or we transfer it If 1000 is requested, there are 200 stock items in the warehouse, then 800 are ordered	Knowing the number of receipts and use of drugs to ensure the number of drug needs in a month. The method used is the consumption method and epidemiology
9	How do you determine when to order your next medication?	P R K S	Drug planning is carried out every 15th of every month and has been determined by the director The time for ordering drugs has been determined by the rs on the 15th of each month so that at the time of planning the drug order, it is ordered to meet the use of 1 month No answer Done once a month	The time for ordering drugs has been determined by the rs on the 15th of each month so that at the time of planning the drug order, it is ordered to meet the use of 1 month
10	How do you determine the SS of drugs?	P R K S	SS by ordering to authorized direct PBF To avoid drug vacancies in pharmacies, drug orders are added every month with a buffer stock of 20% No answer I do not think the max is valid yet	To avoid drug vacancies in pharmacies, drug orders are added every month with a buffer stock of 20%
11	What are the stages in controlling drug inventory?	P R K S	Drug control stage with the availability of drugs and medical devices, use of drugs and medical devices, drug loss, drug damage, and drug expiration Stages of drug control in hospitals, namely controlling the type and amount of use of pharmaceutical preparations and medical devices in hospitals by evaluating the trhdp of drugs that are rarely used (slow moving) and conducting stock taking No answer Pharmacy for planning and then given to Komar to see the warehouse stock will be reduced by the amount of stock in the warehouse then a PO is made, signed by the main director and finance and pharmacist and then faxed after 2–3 days entering the warehouse	The pharmacist made a plan and then gave it to Komar to see that the warehouse stock would be reduced by the amount of stock in the warehouse, then a PO was made, signed by the president and finance director and the pharmacist, then faxed after 2–3 days into the warehouse
12	What data are needed in controlling drug inventory?	P R K S	Data needed in controlling drug inventory: Stock cards, disease patterns, and visiting patterns The data needed are data on drug use for 1 month All items are called obtain, the quantity because each distributor is different, some contain 30, some contain 100, and also available at the distributor, do not order the medicine it is run out, and the usage is average No answer	The data needed in controlling drug supplies: Stock cards, disease patterns, and visiting patterns. data on drug use for 1 month, all items are names of drugs

SS: Safety stock, HR: Human resources, TFT : therapy and pharmacy team, PO : pre order, RS : hospital, ICA : Inventory Control Analysis,PBF : Pharmacy Batch Field.

for certain types of drugs, this method is in accordance with Muhammad Rifandy's research (2019) who says the formula used in determining the EOQ value is: $Q^* = \sqrt{\text{which}\frac{2DS}{}}$ which resulted in the purchase of an economical raw material using the EOQ method of 1266 m [12].

Data analysis of drug inventory control with the reorder point method

The ROP method is a method used to find out how many units of the drug will be ordered in the next period using the formula ROP = (LT × D) + SS where the result is that the drug will be reordered with a varying number of orders in Group A, namely, 12,027–962 for certain types of drugs while Group B 6014–20,045 for certain types of drugs and in Group C 3007–200 for certain types of drugs. M. Benny Alexandri, SE. MBA (2020) says that if the company takes a policy of using SS, then ROP = d × L + SS, the result of which is taking into account the SS, the ROP or reorder time of 160 drug units varies. For the vital drug group, namely, 0–10 units [13].

Data analysis of drug inventory control with the safety stock method

The SS method is a method used to find out how many units of medicine that must be in the warehouse during the process of sending goods from the distributor using the formula SS = Z × D × LT which results in the number of units of medicine that must be available during the delivery period varies from year to year. Group A is 627–50 for certain types of drugs, while in Group B 314–1054 for certain types of drugs, and in Group C is 157–11 for certain drug groups. This SS method is not in line with the research conducted by Titik Rahayu Indarti (2019) which uses the formula SS = LT × CA, Smin (Minimum stock) = (LT × CA) + SS = 2 SS, Smak (maximum stock) = Smin + (PP × CA) which results in alimta inj 500 mg 12 units to tamofen tab 10 mg 1258 units [2].

Conclusion

1. It is known that the pharmacy installation has two pharmacists and nine pharmaceutical technical personnel, this number has met the classification and hospital licensing regulated by the Minister of Health Regulation No. 30 of 2019, which is the minimum number of human resources for the pharmaceutical installation, namely, two pharmacists and four pharmaceutical technical personnel
2. It is known that the level of effectiveness and efficiency is good using consumption and epidemiological methods, but it is also known that using the consumption method is at risk of running out of medicine (stock out) because it only relies on real needs and adjustments of patients visiting the hospital and this has an effect on inventory management
3. Based on the calculation analysis using the ABC method, there are 59 types of drugs belonging to Group A (Always) (70.5%) with a total investment of 70.2% of the total drug use and an investment value of Rp.694,752,080, Group B (Better) as many as 64 types of drugs (20.3%) with a total investment of 20.3% of the total drug use and an investment value of Rp. 128,084,741, and Group C (Control) as much as 146 types (9.2%) with a total investment of 10.5% of the total drug use and an investment value of 35,133,775
4. Based on the analysis of drug inventory control using the EOQ method, it was found that drugs are ordered back when the amount of stock for Group A drugs varies in Group A 414–159, for certain types of drugs, while Group B is 998–5137 for certain types of drugs and in Group C 778–1407 for certain types of drugs
5. Based on the analysis of drug inventory control using the ROP method, it was found that drugs will be reordered with varying orders in Group A, namely, 12,027–962 for certain types of drugs while Group B 6014–20,045 for certain types of drugs and in Group C 3007–200 for certain types of drugs
6. Based on the analysis of drug inventory control using the SS method, it was found that the number of drug units that must be available during the delivery period varied in group A, namely, 627–50 for certain types of drugs, while in Group B 314–1054 for certain types of drugs and in Group C 157–11 for certain drug groups.

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