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Analysis of Drug Inventory Control Using the ABC Method of Critical Index in Islamic Hospital Ibnu Sina Padang in 2021 for Public Welfare

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Abstract

Hospitals have a very strategic role in an effort to accelerate the improvement of the health status of the Indonesian people. So, the service system must always be reviewed to anticipate competition. The level of efficiency in the use of funds for drug procurement depends on the ability to manage it. Selection of the right method can help achieve good and appropriate drug management. It is known that the Medicines Formulary of the Islamic Hospital of Ibnu Sina Padang has not been updated regularly, pharmacy installations have not implemented more in-depth inventory control methods, and are still experiencing drug shortages. The purpose of this study was to analyze the implementation of drug control using the ABC critical index analysis method at the Islamic Hospital Ibnu Sina Padang in 2021. The research method is quantitative in the form of operational research. The results of this study are group A ABC critical index analysis consists of 9 drug items (18.75%) with an investment value of 14.19% of the total investment value and the number of uses is 54.87% of the total drug use, group B consists of of 34 drug items (70.83%) with an investment value of 80.25% of the total investment value and the number of known uses is 44.87% of the total drug use, group C consists of 5 drug items (10.42%) with an investment value 5.56% of the total investment value and 0.26% of the total use of drugs. It is hoped that the results of this study can be used as input and consideration in managing drug supplies in hospitals. The results of this study are group A ABC critical index analysis consists of 9 drug items (18.75%) with an investment value of 14.19% of the total investment value and the number of uses is 54.87% of the total drug use, group B consists of of 34 drug items (70.83%) with an investment value of 80.25% of the total investment value and the number of known uses is 44.87% of the total drug use, group C consists of 5 drug items (10.42%) with an investment value 5.56% of the total investment value and 0.26% of the total use of drugs. It is hoped that the results of this study can be used as input and consideration in managing drug supplies in hospitals.

Keywords
Management; medicine; ABC critical index

I. Introduction

Regulation of the Minister of Health of the Republic of Indonesia No. 72 of 2016 concerning Pharmaceutical Service Standards in Hospitals, that pharmaceutical services in hospitals are an inseparable part of the hospital health service system, one of which is oriented to the provision of quality and affordable pharmaceutical preparations, medical devices and medical consumables for all. layers of society, including clinical pharmacy services.

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In the implementation of pharmaceutical services, it is known that more than 90% of health services in hospitals use pharmaceutical supplies (drugs, chemicals, radiology materials, consumable medical equipment, medical devices, and medical gases), and 50% of all hospital suppliers comes from the management of pharmaceutical supplies.

The majority in developing countries spending on drugs in hospitals can absorb around 40 to 50% of total hospital expenditures. This amount of cost is quite large which encourages management to be carried out effectively and efficiently. Therefore, there is a need for an analysis to improve optimal inventory management to overcome the problem of the high number of drug items available in the service.

Pharmacy installations have a major contribution to the smooth process of service and are the largest cost component for hospitals, so careful and responsible management of pharmaceutical supplies is needed. The quality of health services in hospitals is supported by effective and efficient management of pharmaceutical supplies. Drug management is inseparable from the general concept of logistics management, which includes elements such as the planning process, procurement process, receiving process, storage process, safe and secure distribution process, and inventory management.

Efficient inventory management according to Andalusia (1999) is the availability of the goods needed in optimum quantities, so that the inventory of goods is not excessive. Circumstances such as the accumulation of goods in the warehouse will result in losses due to stopped investment and cause high holding costs. However, in inventory there should also not be a shortage that can result in loss of income due to delays in the process of the services provided. Thus, inventory management strives so that the amount of available inventory can ensure smooth production, with the minimum total cost possible.

Inventory control technique according to Rangkuti (1996) is a very important action to calculate the optimal level of inventory that must be available and when to reorder. However, before that, it is necessary to know the classification of inventory which is useful for focusing management's attention on the most important types of goods contained in inventory. If the drug cannot be available when needed, the treatment provided to the patient will be hampered, this is due to the process of finding alternative drugs that are in sufficient stock by the medical and pharmaceutical parties.

Planning and procurement analysis in drug inventory control using the ABC Critical Index method is one option that can be applied. This method can help determine the priority drug groups to be procured according to the available funds and based on their impact on health by considering whether the drug group is vital, essential, or non-essential for the patient. The ABC critical index method is a method developed at the University of Michigan hospital, this method can see the criticality level of a drug which includes the calculation of the number of uses, investment value and the level of criticality of patient care.

PerMenKes No. 58 of 2014 concerning Hospital Pharmacy Service Standards states that in planning activities it is obligatory to consider several things, one of which is the availability of a budget. Monitoring and monitoring activities for types of drugs require high costs which can cost around 20% of drug storage costs.

The initial survey of researchers at the Islamic Hospital Ibnu Sina Padang, it is known that the hospital formulary list has not been updated regularly, the last update was carried out in 2019. Based on Aritonang's 2017 research related to Formulary Analysis at Cimacan Hospital, it is known that updating or maintaining the formulary is important for This is done because it can lead to budget efficiency and also achieve optimal therapy for patients.

Drug vacancies that occurred at the Pharmacy Installation of the Ibnu Sina Islamic Hospital, Padang, were known to have 149 drug items in February, 130 drug items in March, 68 drug items in April, and 57 drug items in May. Then, based on the results of the interview, it was also known that in the pharmacy unit of the Islamic Hospital Ibnu Sina Padang for planning the procurement of health supplies until now using the consumption method that is planned every month based on the use of types of supplies in service. If there is a vacancy for a drug request in a doctor's prescription, an order will be made directly, confirmation to the doctor or patient will be given a drug bill, and of course this will affect the service process and patient treatment. Besides that, the process of recording and reporting administration as well as the implementation of the evaluation has not run optimally on pharmaceutical management. According to research by Ashwini et al at Sri Ramachandra Hospital Chennai India in 2019 and research by Anidita Utari at Zahirah Hospital in 2015, the problem of vacancies that occurred was also caused by the absence of a calculation method for determining drug priority and only based on estimates of usage and experience from officers.

In 2017 and 2019 activities for the elimination of expired/damaged drugs were carried out by the hospital with information that in 2017 there were 955 drug items and in 2019 there were 302 drug items with a total investment for 2019 of RP.55,821,496. Meanwhile, from the implementation of the observation study of the latest data documents, it is known that from December 2020 to February 2021 there are a list of expired and damaged drugs as many as 32 types of drugs with a total of 221 items, with an investment value of Rp. 3,014,860.00.

The occurrence of drugs that have expired or damaged drugs reflects the lack of accuracy in planning and observing drug storage where this occurs due to poor quality control and supervision.

Until now, the Pharmacy Installation of the Ibnu Sina Hospital in Padang has not carried out a method of controlling drug supplies through the classification or ABC analysis method. This needs to be done considering the amount of pharmacy spending and its very large inventory. For hospitals, to maintain efficiency and balance between overstocking and stock-out, they will carry out processes according to their respective criteria.

Based on this, researchers are interested in knowing how to analyze drug supply control using the ABC critical index method at the Islamic Hospital of Ibnu Sina Padang in 2021.

II. Review of Literature

Public welfare in the social field is basically a social condition that makes it possible for every citizen to be able to fulfill the physical, spiritual and social needs of life in accordance with human nature and dignity in order to be able to overcome various social problems faced by themselves, their families and their communities to develop into better. Efforts to raise the degree of social welfare can be seen as part of social investment aimed at improving and developing the quality of Indonesian human resources, so that they are able to carry out life tasks independently in accordance with values worthy of humanity. In this case, the development of social welfare can be one of the solutions to overcome socio-economic disparities as well as various tendencies of primordialism and exclusivism that can threaten the living order of the Indonesian nation. Where such conditions if ignored will lead to horizontal conflicts which in turn will lead to very detrimental social

disintegration. The development of social welfare by the government in all regions of Indonesia requires the existence of a strategy that is in accordance with regional conditions which includes all aspects of the regional potential of an area. The importance of planning and strategy is intended so that the concept of welfare, which is the historical and theoretical basis of social welfare development, can run optimally.

III. Research Method

This study uses a quantitative design in the form of operational research carried out in February 2021 - March 2022. This study uses two populations. The first population is drugs available at the Pharmacy Unit of the Ibnu Sina Hospital, Padang, where the sample used is data on drug use during the period January 2020 to February 2021. The second population is 16 (sixteen) polyclinic doctors who are included in the user category (doctors). who use investment category A drugs, as well as those who frequently prescribe investment category A drugs in their services.

Data analysis is carried out through the following steps:

3.1 Calculating value in use

1. Determine total drug use.
2. Group the data on drug use based on the number of uses.
3. Order the usage from largest to smallest.
4. Group A with the use of 70% of the total drug use.
5. Group B with the use of 20% of the total drug use.
6. Group C with the use of 10% of the total drug use.

3.2 Calculating investment value

1. Determine the total investment for each type of drug.
2. Group by drug investment value.
3. Sort the value of the largest investment to the smallest.
   - Group A, the investment value is 70% of the total investment of the entire drug.
   - Group B, the investment value is 20% of the total investment in the drug.
   - Group C, the investment value is 10% of the total investment of the entire drug.

3.3 Determine the critical value of the drug

1. Arrange the criteria for the critical value of the drug.
2. Distribution of drug list questionnaires to users to obtain critical drug values, according to specified criteria.
3. Doctors who fill out the questionnaire are the ones who influence the prescribing and use of drugs.

The assessment of the inventory value criteria will be assessed by:

- Group X, the vital group, that is, if the goods cannot be replaced and must always be in the service process.
- Group Y, the essential group, that is, if the goods can be substituted with others, even though they are not as satisfactory as the original and the absence of goods for less than 48 hours can be tolerated.
- Group Z, the non-essential group, ie if the goods can be replaced and the vacancy of the goods for more than 48 hours can be tolerated.
- Group O, if the goods do not belong to the classification of groups X,Y,Z

Perform group weighting based on the results of filling out the questionnaire, namely: X = 3, Y = 2, Z = 1, and O is not weighted / 0.

Determine the critical index value (NIK) of the drug.

$$\text{Critical index} = 2W1 + W2 + W3$$

Where,
2W1= critical value, weight 2
W2= investment value, weight 1
W3= usage value, weight 1

Classification of Drugs in ABC Criteria Critical Index

- Group A has a critical index value: 9.5 – 12
- Group B has a critical index value: 6.5 – 9.4
- Group C has a critical index value: 4.0 – 6.4

IV. Result and Discussion

4.1 ABC Usage Analysis

Based on the results of a document review in the form of data on drug use during the period January 2020 to February 2021, drugs were obtained that were classified into groups A, B, and C. The following is the result of grouping drugs based on the ABC analysis of usage.

Table 1. Grouping of Drugs Based on ABC Analysis of Use for the Period January 2020 to February 2021

Drug Group	Medicine Supplies		Usage	
	Number of Items	Percentage (%)	Amount	Percentage (%)
A	86	5.67	6,742,610	69.93
B	153	10.09	1,934,517	20.07
C	1,277	84.24	964,178	10.00
Total	**1.516**	**100**	**9,641,305**	**100**

From the table above it is known that:

1. Group A
   It is a drug with a high usage (fast moving), which is 6,742,610 or 69.93% of the total drug use in the hospital with a total of 86 items or 5.67% of the total existing drugs.
2. Group B
   It is a drug with moderate use, which is 1,934,517 or 20.07% of the total drug use in the hospital with a total of 153 items or 10.09% of the total existing drugs.
3. Group C
   It is a drug with a low usage (slow moving), which is 964,178 or 10% of the total drug use in the entire hospital with 1,277 items or 84.24% of the total existing drugs.

4.2 Investment ABC Analysis

The following are the results of the drug grouping process based on the ABC investment analysis.

Table 2. Grouping of Drugs Based on ABC Investment Analysis Period January 2020 to February 2021

Drug Group	Medicine Supplies		Investation	
	Number of Items	Percentage (%)	Value (Rp)	Percentage (%)
A	48	3.17	34,080,603,570	69.98
B	176	11.61	9,744,697,112	20.01
C	1,292	85.22	4,875,827,581	10.01
Total	**1.516**	**100**	**48,701,128,263**	**100**

From the table above it is known that:

1. Group A
   Consisting of 48 drug items or 3.17% of the total existing drug items with an investment value of IDR34,080,603,570 or 69,98% of the total investment value for drugs.
2. Group B
   Consists of 176 drug items or 11.61% of the total existing drug items with an investment value of Rp9,744,697,112 or 20.01% of the total investment value for drugs.
3. Group C
   Consisting of 1,292 drug items or 85.22% of the total existing drug items with an investment value of Rp 4,875,827,581or take a portion of 10.01% of the total investment value of the drug.

4.3 Critical Index ABC Analysis

In this study, the ABC analysis of the critical index was calculated using the criteria for drugs included in the ABC investment analysis group category A, namely as many as 48 drug items. After obtaining the critical value of the drug, then the critical value, investment value and usage value are combined to produce an ABC critical index analysis.

Table 3. Grouping of Investment Group A Drugs Based on ABC Analysis of Critical Index Period January 2020 to February 2021.

	Drug		Investation		Usage	
	Number of Items	Percentage %	Score (Rp)	Percentage %	Amount	Percentage %
A	9	18.75	4,835,967,190	14.19	1,035,960	54.87
B	34	70.83	27,350,072,380	80.25	847,221	44.87
C	5	10.42	1,894,564,000	5.56	5,000	0.26
Total	48	100	34,080,603,570	100.00	1.888.181	100.00

From the table above, it can be seen that:

1. Group A ABC critical index analysis consisted of 9 drug items or18.75% of the total drug items with an investment value of Rp4,835,967,190 or 14.19% of the total investment value and the number of known uses is 1,035,960 or 54.87% of the total use of the drug.
2. Group B ABC critical index analysis consisted of 34 drug items or70.83% of the total drug items with an investment value of Rp.27,350,072,380 or 80.25% of the total investment value and the number of known uses was 847,221 or 44.87% of the total use of the drug.

3. Group C ABC critical index analysis consisted of 5 drug items or 10.42% of the total drug items with an investment value of IDR 1,894,564,000 or 5.56% of the total investment value and the number of known uses is 5,000 or 0.26% of the total use of the entire drug.

4.4 Discussion

a. ABC Usage Analysis

Based on the results of the ABC analysis of drug use which has been presented in table 1, the results of the ABC analysis of the use of 1,516 available drug items, namely drugs belonging to group A type (fast moving) were only 5.67% or 86 items of all available drugs. and requested by pharmacies, but this drug is the most requested by pharmacies in meeting drug needs for patients, which is 69.93% or 6,742,601 times of the total drug use as a whole. As is the case according to Seto (2004) group A is a type of preparation that sells quickly. Although there are only a few group A preparations in stock, but because this group is in very high demand, it represents a rapidly rotating drug[19].

Group B according to Seto (2004), has average sales and inventory turnover(19). In the Pharmacy unit of the Ibnu Sina Islamic Hospital, Padang, the types of drugs included in group B (moderate) are moderate types of drugs, namely 10.09% or 153 items of all types of drugs available and requested, with moderate use of 20.07% or 1,934,517 times of the total drug use as a whole.

Meanwhile, drugs that are included in the category of group C (slow moving), are the most common types of drugs, namely 84.24% or 1,277 items from all types of drugs available and requested by pharmacies, with low usage of 10.00% or 964,178 times of total drug use. Control activities, including planning for slow-moving drug supplies, need to be carried out in order to reduce the stock of the number of drugs in storage warehouses and reduce the risk of these drugs being expired before being used in service.[20]. Further handling for the efficiency of drug supply of this class must be carried out. The risk of an increase in losses for hospitals, one of which can be caused by an increase in slow-moving drugs[21].The results of the ABC usage analysis can be described as follows:

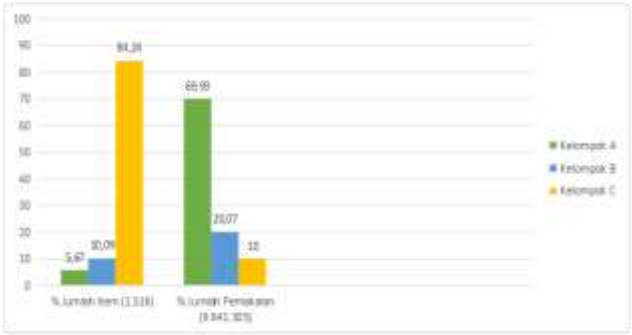

Figure 2. *Grouping of Drugs Based on ABC Investment Analysis Period January 2020 to February 2021*

Based on the picture above, it can be seen that the number of drugs belonging to group A is the least in stock, but has the highest total usage value, which is 69.93%. Meanwhile, the highest number of drug items was in group C but only had the smallest usage value of 10.00%.

This study is in line with the results of research by Vera Reski et al, regarding the Analysis of Drug Planning Based on the Critical Index ABC Method at the Kandai Health Center in 2016, namely group A had the few types of drugs but had the highest usage

value. In group B, the type of drug is in the moderate category and in group C, the type of drug is large but the number of usage is the least when compared to other types of drugs.[22]. This is in accordance with the Pareto principle, namely that a small number of types of goods represent the majority of the total inventory value

According to Heizer and Render in Mega Dewanty (2012), the types of goods in group A are very important types of goods because they have the greatest use value, so they require strict attention in controlling their inventory, where control can be carried out with a fixed period of time as well as tight, for example. such as every month using the Economic Order Quantity ordering model. It is different with group B, the attention given is not as strict as group A. Evaluation can be carried out at intervals of 3 (three) months or every 6 (six) months. In group C, inventory control for this group can be carried out very loosely when compared to group A and group B, evaluation can be carried out within a period of 6 (six) months or 1 (one) year[6].

Steps that can be taken by decision makers in reducing the number of group C drugs are to pay attention to the drug content, especially for drugs that have the same ingredients, this is done to reduce variations in drugs and to anticipate drugs that do not work.[23].

b. Investment ABC Analysis

Based on the results of the ABC analysis of drug investments that have been presented in table 2, the results of the ABC investment analysis of 1,516 available drug items are obtained. The results of the ABC investment analysis can be described as follows:

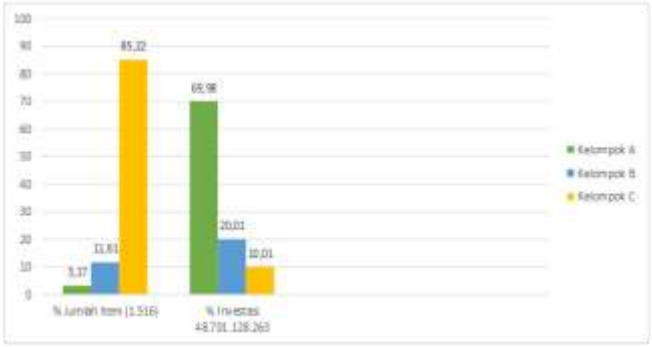

Figure 3. *Grouping of Drugs Based on ABC Investment Analysis Period January 2020 to February 2021*

The idea of ABC analysis is to make various inventory policies by focusing inventory on parts of critical inventory with small quantities not on large but not critical parts. Monitoring very expensive items with inexpensive items with the same intensity includes unrealistic actions[24]. This analysis in its use will allow the identification of categories of goods that really affect inventory performance, so that effective management can focus on categories of goods with a small number of items without ignoring the others.[25].

Therefore, the controls that can be carried out in each group are:

1) Group A

Category A group is goods with a low or small number of physical units but has a high amount of rupiah[26]. In the supply of drugs at the Islamic Hospital of Ibnu Sina Padang, taking into account the availability of 48 types of drugs belonging to category A, it can optimize the supply and use of the budget by 69.98%. So based on Heizer and Render (2010), these drugs must have tighter inventory control, with more frequently

verified recording accuracy. Physical supervision can be carried out more strictly and periodically every month.

2) Group B

Category B group are goods with a moderate number of physical units and the amount of rupiah[26]. In the supply of drugs in the drug supply at the Islamic Hospital of Ibnu Sina Padang, by paying attention to 176 types of drugs belonging to category B, it can optimize the supply and use of the budget by 20.01%. So that drugs that are included in the group B category need attention that is quite important after group A. It is necessary to carry out periodic physical supervision. According to Heizer and Render (2010), inventories belonging to group B category can be counted every 3 months.

3) Group C

Category C group is goods with a large or high number of physical units, but has a low or small amount of rupiah[26]. In the supply of drugs at the Islamic Hospital of Ibnu Sina Padang, by paying attention to 1,292 types of drugs belonging to category C, it can optimize the supply and use of the budget by 10.01%.

It is necessary to pay attention to the types of drugs that do not work so that variations can be reduced, because these drugs have a small effect on sales and out-of-stock costs. This is in line with the opinion of Seto (2004), namely the manager should periodically monitor group C to determine whether the drug should be removed from the inventory. Eliminating slow-performing Group C inventory types is a practical method of reducing drug quantity and investment in inventory, but has little effect on sales and stockout costs.

Therefore, drugs belonging to the group C category do not require strict control as in group A and group B. The results of the ABC analysis based on the investment value are also in line with the research of Yuniar et al in 2016 that this is also in accordance with the Pareto principle where the percentage of the number of items medicine is inversely proportional to the amount of investment[27].

However, if the hospital does not have a calculation, it is sufficient to determine the safety stock/buffer stock as the minimum amount of stock in the pharmacy logistics warehouse. The supervision carried out is also not like the categories of group A and group B. According to Heizer and Render (2010), inventories belonging to the category C group can be counted every 6 months.

In line with the opinion of Satibi (2014), based on the ABC analysis that has been carried out, the drug supply procurement activity can be controlled by determining the frequency of orders, i.e. item A must be ordered more carefully, more often, and in fewer quantities to minimize costs. procurement, safety stock is low, item B is controlled with optimal frequency and quantity of procurement, and item C has minimum control effort[28].

c. Critical Index ABC Analysis

Based on the results of research with the criteria for drugs that are included in the ABC group Investment category A, it can be seen as follows:

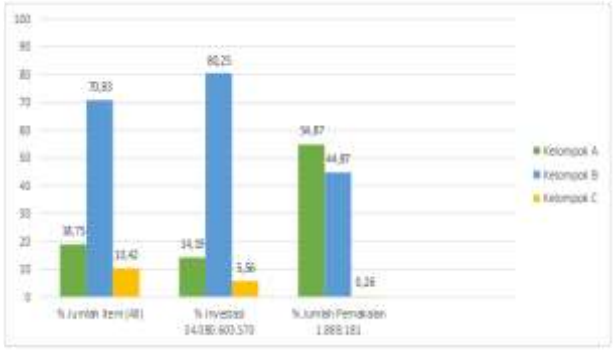

Figure 4. *Grouping of Drugs Based on ABC Analysis of Critical Index Period January 2020 to February 2021*

Group A has the number of items, the average investment value is between group B and group C and has the highest usage value. Group B has the number of items, the highest investment value and the average usage value is between group A and group C. Meanwhile, group C has the lowest number of items, investment value and usage value from other groups.

ABC analysis of this critical index is obtained by combining the acquisition of the critical value from the user, the value of the investment and the value of usage, where the critical value has a weight twice that of the other values. By carrying out critical index ABC analysis, drug behavior can be known based on the level of criticality, amount of use, and investment value so that it will be easier to monitor. Based on the data processing, the Pharmaceutical Installation of Ibnu Sina Hospital Padang should provide strict supervision of 48 drug items that are included in groups A, B and C better in the future. This is because in group A the ABC analysis of the critical index, by providing supervision to 18.75% of drug items indirectly supervises 14.19% of the investment value and 54.87% of the use value. And in group B, namely by providing supervision to 70.83% of drug items indirectly supervise 80.25% of the investment value and 44.87% of the use value. The grouping of drugs based on the ABC critical index is used to improve the efficiency of the use of funds, especially on drugs based on their impact on health[(29)]. In other words, success in the procurement system will require the existence of a strong and adequate information and administrative system[(30)].

V. Conclusion

Based on the results of the research conducted, group A ABC critical index analysis consisted of 9 drug items (18.75%) with an investment value of 14.19% of the total investment value and the total use of 54.87% of the total drug use, group B consists of 34 drug items (70.83%) with an investment value of 80.25% of the total investment value and the number of known uses is 44.87% of the total drug use, and group C consists of 5 drug items (10.42%) with the investment value is 5.56% of the total investment value and the total usage is 0.26% of the total drug use. It is hoped that the results of this study can be used as input and consideration in managing drug supplies in hospitals.

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