Drug Procurement Analysis of the Ten Biggest Diseases at the Barru District Public Health Center Using the ABC Method

Gemy Nastity Handayany*, Syahrul Basri
Faculty of Medicine and Health Sciences, UIN Alauddin Makassar, South of Sulawesi, Indonesia

Abstract

BACKGROUND: Management of pharmaceutical preparations at the public health center aims to ensure the availability of drugs whenever needed, in sufficient quantities and guaranteed quality, to support quality services at the public health center so that pharmaceutical services can take place effectively and efficiently.

AIM: This study aims to determine the ABC value of medicines at the Barru District public health center based on use, investment, and critical index value in 2020 and to determine, in which medicines are a priority in the procurement of pharmaceutical preparations.

METHODS: In this study, an analysis of pharmaceutical preparations from the ten biggest diseases at the Barru District public health center was conducted using the activity-based costing (ABC) method. This is a quantitative research with a descriptive observational study design to obtain an overview of drug procurement. Data collection was carried out by reviewing documents with purposive sampling technique on quantitative retrospective data in the form of the number of medicines, budgets, and medicines use data that listed on LP-LPO of public health center.

RESULTS: The results showed that the analysis of the critical index value of pharmaceutical preparations at the Barru District public health center resulted in an average percentage of preparations that were included in the ACIV group as much as 16.42%, the BCIV group as much as 16.23% and the CCIV group as much as 67.35%.

CONCLUSION: There are five pharmaceutical preparations that are a priority for the procurement of pharmaceutical preparations at the Barru District public health center with an investment value of Rp. 322,838,650.00 (this represents 18.09% of the total investment).

Introduction

Medicine is an item that is needed by sick people. The importance of drugs in health services has great consequences in the drug budget. Given the importance of budget management and drug procurement in public health center, drug management must be carried out effectively and efficiently so that it can provide the maximum benefit for patients [1].

Good drug management ensures that drugs are always available whenever needed, in sufficient quantities and guaranteed quality, to support quality services at public health center. The drugs needed are drugs that are medically necessary in accordance with the state of the local disease pattern, it has been scientifically proven that these drugs are useful and safe to use in the public health center concerned [2].

To achieve optimal performance, it is necessary to harmonize the duties and functions of the administration of government affairs in the health sector by the Health Office in the district/city. One of the tasks of the district/city Health Office is to report and present health data and information in the district/city area, one of which is the largest disease data in the district/city. The largest disease data collection aims to determine the pattern of diseases that exist in the community every year so that it can be a reference for the formulation and implementation of policies related to public health at the district/city level [3].

In 2020, there are ten biggest diseases in the Barru District public health centers, namely, hypertension in the first place with a percentage of 28.10%, then in the second rank is acute respiratory infections (ARI) with a percentage of 17.82%, followed by gastritis in the third rank with a percentage of 15, 85%, in fourth place is diabetes mellitus with a percentage of 12.02%, then in fifth place is dermatitis with a percentage of 8.31%, in the sixth rank is common cold with a percentage of 5.12%, followed by rheumatism in the seventh rank with a percentage of 4.70%, then in the eighth rank is myalgia with a percentage of 3.32% ranked ninth is diarrhea with a percentage of 2.58%, and in the last rank is cephalgia with a percentage of 2.15% [4].

At present, the planning and procurement of drugs at the public health center are carried out centrally by pharmacists in the pharmacy warehouse of the District Health Office. In pharmacy warehouses, pharmacists are required to be able to manage drugs well so that the drug procurement process at the public health center can...
run effectively and efficiently. In general, the drug supply consists of various types of drugs that are very large in number. Various kinds of drugs have different priority levels, so to find out which drugs need to be prioritized, activity-based costing (ABC) analysis can be used.

ABC analysis is a method of classifying inventory items according to the investment value in a company/institution. Group A items typically range from 15% to 20% of all inventory items and cover between 75% and 80% of the total annual investment value. Class B items typically range from 20% to 30% of all inventory items and account for 20% of the total annual investment value. Class C items usually make up 50% of all inventory items and account for 5–10% of the total annual investment value. ABC analysis tends to measure the significance of each inventory item in terms of value and when ABC analysis is applied to inventory situations, it can show the importance of the item and the level of control placed on the item [5].

In pharmaceutical management, drug grouping through the ABC method is one of the scientific methods used for the application of policies relevant to drug planning and procurement in health care centers [6]. At present, the planning and procurement of drugs in the pharmacy warehouse of the Health Office of Barru District are still using the consumption method. The consumption method is a method of planning and procuring drugs by looking at data on drug use in the previous period. The consumption method is easier to implement, but the application of this method cannot ensure the use of drugs that come out at the pharmacy installation so that the state of the drug stock cannot be predicted. Therefore, ABC analysis can be used as an analytical method for planning and procuring drugs in pharmacy warehouses, especially for drugs that have the most use so that the use of the budget can be controlled optimally.

Barru District has 12 public health center spread across various areas. Each public health center treats various diseases suffered by the community in its working area. Based on the data for the ten biggest diseases, the pattern of the disease can be determined. The ten biggest diseases listed of with the highest percentage in the Barru District Public Health Center in 2020 consist of Hypertension, ARI, gastritis, diabetes mellitus, dermatitis, common cold, rheumatism, myalgia, diarrhea, and cephalgia.

Methods

Study design
This is a quantitative study with a descriptive observational study design that aims to provide an in-depth description of drug procurement at the Barru District public health center in 2020 using the ABC method. This research was conducted at the Pharmacy Installation of the Barru District Health Office consisting of 12 public health center. This study uses a retrospective research approach, where observations begin at one point before the start of the study so that all observational data are past data obtained from authentic sources [7].

Data collection
Data collection was carried out by conducting a document review using purposive sampling technique on quantitative retrospective data in the form of the number of drugs, budgets, and data on the use of drugs at the Barru District public health center listed in LP-LPO (Statements Use of Drug-Demand) in 2020 [8].

The collection of research subjects was based on inclusion and exclusion criteria, namely, the inclusion criteria of the research subjects were medicines that were available at the Barru District Health Center in 2020. Exclusion criteria for research subjects were medicines which were aid drugs/dropping/grants and medicines whose price is unknown.

Research instruments
Researchers conducted a document review of the research subject. The instruments used in this study were the LP-LPO of the Barru District public health center in 2020, the Pharmacy Warehouse Drug List as of December 31, 2020, clinical practice guidelines for doctors in primary health care facilities, edition I of 2017 as a guide to find out the types of drugs prescribed for the ten biggest diseases at the public health center, Computer Programs, and Calculators.

ABC analysis of value in use
All medicines used are counted in 1 year; then, the medicines are sorted based on the number of uses from the highest usage to the least usage. From this sequence, they are classified into several groups, namely, ANP, BNP, and CNP based on the cumulative percentages of 80%, 15%, and 5%. Then, the classified drugs were given a score of 3 for the ANP group, a score of 2 for the BNP group, and a score of 1 for the CNP group. The following is the formula for determining the percentage of drug use value:

\[
\%NP = \frac{P}{\Sigma P} \times 100\%
\]

Information:
\%NP: Percentage of value in use
P: Number of drug use in a year
\Sigma P: Total number of puskesmas drug use

After the value of drug use is known, data collection on the value of drug use is carried out from
the ten largest diseases at the puskesmas based on the clinical practice guidebook for doctors in the primary health care facilities [9].

**ABC analysis of investment value**

The investment value of all medicines is calculated in 1 year by multiplying the number of uses by the unit price of each drug, then the medicines are sorted based on their investment value from the highest to the lowest investment value. From this sequence, they are classified into several groups, namely, ANI, BNI, and CNI based on the cumulative percentages of 80%, 15%, and 5%. Then, the classified drugs were given a score of 3 for the ANI group, a score of 2 for the BNI group, and a score of 1 for the CNI group. The following is the formula for determining the percentage of drug investment value:

\[
\text{NI} = P \times H
\]

Information:

- NI: Percentage of investment value
- P: Number of drug use in a year
- H: Unit price of medicine

\[
\%\text{NI} = \left( \frac{\sum I}{\Sigma P} \right) \times 100\%
\]

Information:

- %NI: Percentage of investment value
- I: Total value of drug investment in a year
- ΣP: Total investment value of all puskesmas drugs

After the investment value of drugs is known; then, a data collection of the investment value of drugs from the ten largest diseases in the puskesmas is carried out based on the clinical practice guidebook for doctors in the primary health care facilities [9].

**ABC analysis of critical index value**

All medicines have a critical index value calculated by adding up the value in use score (SNP) with the investment value score (SNI) for each drug; then, the medicines are sorted based on the highest critical index value to the lowest critical index value. The use value and investment value of Group A gets a score of 3, Group B gets a score of 2, and Group C gets a score of 1. Hence, the range of scores obtained is 2–6. Drugs are then classified into several groups, namely, ANK, BINK, and CINK based on the range of scores obtained. The following is the formula for determining the critical index value:

\[
\text{NIK} = S_{\text{NP}} + S_{\text{NI}}
\]

Information:

- NIK: Critical Index Value

\[
S_{\text{NP}}: \text{Score of drug use value}
\]

\[
S_{\text{NI}}: \text{Score of drug investment value}
\]

The formula for determining the range of scores for the critical index value group:

\[
\text{Score range} = \frac{(\text{Highest Score} - \text{Lowest Score})}{\text{Number of Groups}}
\]

Hence, the range of scores obtained is:

\[
\text{Score range} = \frac{(6-2)}{3} = 1.33
\]

From these calculations, drugs with a score range of 2–3.33 belong to the CNIK group, drugs with a score range of 3.34–4.66 to the BNIK group and drugs with a score range of 4.67–6 to enter the ANIK group.

After the critical index value of the drug is known; then, data on the critical index value of the drug from the ten largest diseases in the puskesmas are carried out based on the clinical practice guidebook for doctors in the primary health care facilities [9].

**Conformity analysis of drug demand and procurement**

All medicines are calculated in total demand and supply in a year. The percentage of suitability of demand and supply of drugs at the Puskesmas is carried out using the formula:

\[
\%\text{KPO} = \left( \frac{A}{M} \right) \times 100\%
\]

Information:

- %KPO: Percentage of suitability of demand – drug procurement
- A: Number of drug procurement in a year
- M: Number of drug requests in a year

The demand and procurement data were then analyzed and tested for significance with SPSS 26.0 for windows using the paired-samples t-test analysis method. Demand and procurement data are also analyzed descriptively to determine their suitability. Data are said to be appropriate if it meets ±10% of the comparisons made. Furthermore, the data are presented in the form of tables and figures [10].

**Results**

This research based on Pareto ABC was carried out at the Barru District Health Center in 2020 by utilizing Pareto law in its analysis. The ABC critical index method is done by combining 2 Pareto, namely, Pareto ABC value in use and Pareto ABC investment value. This method is a method that can be used to describe the state of management of pharmaceutical
preparations that are effective and efficient. This analysis aims to determine the critical index value of pharmaceutical preparations at the Barru District Health Center in 2020 (Tables 1-5).

Discussion

Availability of drugs in treatment is a sensitive and needs to be timely for its implementation [11]. Therefore, the availability of medicines is important to be maintained and planned properly. One analysis that is widely used is the ABC analysis [12], [13], [14]. ABC analysis can be useful to assist procurement-related activities such as determining sourcing to ensure products are priced more, procurement is consistent with public health priorities, and assessing how often orders are overall [15].

Critical index value analysis is calculated by combining two analytical values, namely, value in use and value of investment [16]. Each analysis contributes to 50% of the value of the analysis. In general, most pharmaceutical preparations are in Group C and the least are preparations in Group A. Based on the data that has been obtained, the inventory that is a priority in procurement at the public health center is the inventory item that is included in the ANIK and BNIK groups, while the inventory items that are included in the CNIK group need to be controlled in the procurement in the following

Table 1: Grouping of pharmaceutical preparations based on value in use in 2020

<table>
<thead>
<tr>
<th>Public Health Center</th>
<th>Group</th>
<th>Number of preparation items</th>
<th>Number of items per group</th>
<th>Percentage of number of items per group</th>
<th>Number of use per group</th>
<th>Percentage of number of use per group</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bojo Baru A</td>
<td>25</td>
<td>14.79</td>
<td>231.210</td>
<td>78.91</td>
<td>56.300</td>
<td>15.80</td>
</tr>
<tr>
<td>B</td>
<td>20</td>
<td>11.83</td>
<td>56.300</td>
<td>15.80</td>
<td>18.859</td>
<td>5.29</td>
</tr>
<tr>
<td>C</td>
<td>175</td>
<td>73.37</td>
<td>8.520</td>
<td>2.63</td>
<td>13.90</td>
<td>4.02</td>
</tr>
<tr>
<td>Total</td>
<td>169</td>
<td>100.00</td>
<td>356.396</td>
<td>100.00</td>
<td>100.00</td>
<td>100.00</td>
</tr>
<tr>
<td>Doi-Doi A</td>
<td>22</td>
<td>19.03</td>
<td>97.630</td>
<td>79.17</td>
<td>11.93</td>
<td>10.02</td>
</tr>
<tr>
<td>B</td>
<td>18</td>
<td>11.39</td>
<td>3.260</td>
<td>10.02</td>
<td>9.98</td>
<td>1.02</td>
</tr>
<tr>
<td>C</td>
<td>121</td>
<td>76.58</td>
<td>3.132</td>
<td>10.81</td>
<td>13.32</td>
<td>10.81</td>
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<tr>
<td>Total</td>
<td>158</td>
<td>100.00</td>
<td>123.322</td>
<td>100.00</td>
<td>100.00</td>
<td>100.00</td>
</tr>
<tr>
<td>Pekkae A</td>
<td>22</td>
<td>14.01</td>
<td>248.680</td>
<td>78.89</td>
<td>14.01</td>
<td>6.08</td>
</tr>
<tr>
<td>B</td>
<td>22</td>
<td>14.01</td>
<td>248.680</td>
<td>78.89</td>
<td>14.01</td>
<td>6.08</td>
</tr>
<tr>
<td>C</td>
<td>113</td>
<td>71.97</td>
<td>15.881</td>
<td>5.04</td>
<td>15.88</td>
<td>5.04</td>
</tr>
<tr>
<td>Total</td>
<td>157</td>
<td>100.00</td>
<td>315.241</td>
<td>100.00</td>
<td>100.00</td>
<td>100.00</td>
</tr>
</tbody>
</table>

Table 2: Grouping of pharmaceutical preparations based on investment value in 2020

<table>
<thead>
<tr>
<th>Public Health Center</th>
<th>Group</th>
<th>Number of preparation items</th>
<th>Number of items per group</th>
<th>Percentage of number of items per group</th>
<th>Number of investment per group</th>
<th>Percentage of number of investment per group</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bojo Baru A</td>
<td>42</td>
<td>24.85</td>
<td>106.173</td>
<td>79.98</td>
<td>Rp. 26.44</td>
<td>15.01</td>
</tr>
<tr>
<td>B</td>
<td>43</td>
<td>25.44</td>
<td>19.931</td>
<td>12.12</td>
<td>Rp. 26.44</td>
<td>15.01</td>
</tr>
<tr>
<td>C</td>
<td>37</td>
<td>49.70</td>
<td>6.145</td>
<td>3.36</td>
<td>Rp. 7.47</td>
<td>3.98</td>
</tr>
<tr>
<td>Total</td>
<td>102</td>
<td>100.00</td>
<td>106.173</td>
<td>100.00</td>
<td>100.00</td>
<td>100.00</td>
</tr>
<tr>
<td>Doi-Doi A</td>
<td>27</td>
<td>17.09</td>
<td>132.749</td>
<td>79.37</td>
<td>Rp. 27.02</td>
<td>15.73</td>
</tr>
<tr>
<td>B</td>
<td>28</td>
<td>17.09</td>
<td>20.720</td>
<td>12.12</td>
<td>Rp. 27.02</td>
<td>15.73</td>
</tr>
<tr>
<td>C</td>
<td>19</td>
<td>43.97</td>
<td>5.678</td>
<td>3.36</td>
<td>Rp. 7.03</td>
<td>3.98</td>
</tr>
<tr>
<td>Total</td>
<td>54</td>
<td>100.00</td>
<td>132.749</td>
<td>100.00</td>
<td>100.00</td>
<td>100.00</td>
</tr>
<tr>
<td>Pekkae A</td>
<td>33</td>
<td>21.02</td>
<td>108.580</td>
<td>79.39</td>
<td>Rp. 24.20</td>
<td>15.59</td>
</tr>
<tr>
<td>B</td>
<td>38</td>
<td>24.20</td>
<td>21.327</td>
<td>13.32</td>
<td>Rp. 24.20</td>
<td>15.59</td>
</tr>
<tr>
<td>C</td>
<td>86</td>
<td>54.78</td>
<td>6.853</td>
<td>4.28</td>
<td>Rp. 7.17</td>
<td>4.28</td>
</tr>
<tr>
<td>Total</td>
<td>127</td>
<td>100.00</td>
<td>108.580</td>
<td>100.00</td>
<td>100.00</td>
<td>100.00</td>
</tr>
</tbody>
</table>

Table 3: Number of items and percentage of pharmacy inventory of Barru district health center in 2020 based on critical index value

<table>
<thead>
<tr>
<th>Public Health Center</th>
<th>Group</th>
<th>Number of items per group</th>
<th>Percentage of number of items per group</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bojo Baru A</td>
<td>38</td>
<td>25.50</td>
<td>71.52</td>
</tr>
<tr>
<td>B</td>
<td>35</td>
<td>25.50</td>
<td>67.52</td>
</tr>
<tr>
<td>C</td>
<td>35</td>
<td>25.50</td>
<td>71.52</td>
</tr>
<tr>
<td>Total</td>
<td>108</td>
<td>100.00</td>
<td>71.52</td>
</tr>
<tr>
<td>Doi-Doi A</td>
<td>36</td>
<td>25.50</td>
<td>71.52</td>
</tr>
<tr>
<td>B</td>
<td>36</td>
<td>25.50</td>
<td>71.52</td>
</tr>
<tr>
<td>C</td>
<td>36</td>
<td>25.50</td>
<td>71.52</td>
</tr>
<tr>
<td>Total</td>
<td>108</td>
<td>100.00</td>
<td>71.52</td>
</tr>
<tr>
<td>Pekkae A</td>
<td>37</td>
<td>25.50</td>
<td>71.52</td>
</tr>
<tr>
<td>B</td>
<td>37</td>
<td>25.50</td>
<td>71.52</td>
</tr>
<tr>
<td>C</td>
<td>37</td>
<td>25.50</td>
<td>71.52</td>
</tr>
<tr>
<td>Total</td>
<td>108</td>
<td>100.00</td>
<td>71.52</td>
</tr>
<tr>
<td>Pekkae A</td>
<td>37</td>
<td>25.50</td>
<td>71.52</td>
</tr>
<tr>
<td>B</td>
<td>37</td>
<td>25.50</td>
<td>71.52</td>
</tr>
<tr>
<td>C</td>
<td>37</td>
<td>25.50</td>
<td>71.52</td>
</tr>
<tr>
<td>Total</td>
<td>108</td>
<td>100.00</td>
<td>71.52</td>
</tr>
</tbody>
</table>

year. This is because the CNIK group is a group with low use of preparations, so it is necessary to control the management to avoid the accumulation of the number of preparations at the public health center and prevent the wastage of preparations due to expiration [1], [17]. For Group C preparations that have little or no level of use, it should not be held in the following year or when the public health center needs these preparations, the procurement can be done on a cito basis. Meanwhile, the procurement of preparations for Group A is carried out routinely but in small quantities to minimize ordering and storage costs, but still needs to be monitored to avoid vacancies at the public health center.

### Conclusion

Analysis of the value of use of pharmaceutical preparations at the Barru District Health Center resulted in an average percentage of preparations that were included in the ANIK group as much as 13.45%, the BNP group as much as 13.59%, and the CNP group as much as 48.26%. The percentage of conformity that is more than 100% is caused by the District Pharmacy Warehouse distributing pharmaceutical preparations that sometimes distribute pharmaceutical preparations more than demand or without demand which causes excess pharmaceutical preparations at the public health center.

The highest suitability of demand and procurement in 2020 was obtained by Lisu Health Center with a percentage of 115.82% followed by Padongko Health Center in second place with a percentage of 107.23%. Meanwhile, the public health center with the lowest level of suitability for demand and procurement was Bojo Baru Health Center with a percentage of 48.26%. The percentage of conformity that is more than 100% is caused by the District Pharmacy Warehouse distributing pharmaceutical preparations that sometimes distribute pharmaceutical preparations more than demand or without demand which causes excess pharmaceutical preparations at the public health center.

The discrepancy between demand and procurement itself occurs, because not all pharmaceutical preparations submitted by the public health center in the LP-LPO are available and can be provided by the District Pharmacy Warehouse. This is because the availability of pharmaceutical preparations in the District Pharmacy Warehouse is uncertain so that it becomes an obstacle to the fulfillment of pharmaceutical preparations at the public health center. If the drug proposed by the public health center is available, the District Pharmacy Warehouse will provide it according to the amount listed. However, if the amount is insufficient or not available at all, the District Pharmacy Warehouse will provide partial or no fulfillment of the request for the public health center. The demand for pharmaceutical preparations by the public health center is carried out based on usage in the previous month, this is done with the hope that the need for pharmaceutical preparations at the public health center can be met and avoid drug shortages. The total demand for pharmaceutical preparations by the Barru District Health Center in 2020 is 7,364,699 with a total procurement of 5,613,246. The percentage of fulfillment of the demand for supplies by the District Pharmacy Warehouse is 76.19%.

### Table 5: Analysis for drug demand and procurement at the Barru district public health center

<table>
<thead>
<tr>
<th>Public Health Center</th>
<th>df</th>
<th>Sig. (2-tailed)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bojo baru</td>
<td>16</td>
<td>0.001</td>
</tr>
<tr>
<td>Pujananting</td>
<td>16</td>
<td>0.082</td>
</tr>
<tr>
<td>Palakka</td>
<td>16</td>
<td>0.092</td>
</tr>
<tr>
<td>Pekkae</td>
<td>16</td>
<td>0.012</td>
</tr>
</tbody>
</table>

Level of significant: 5% (0.05).

Based on the analysis of critical index values, not all types of preparation items for therapeutic management of the ten biggest diseases in Barru District are included in the ANIK group. This can be influenced by various factors in the public health center such as the number of cases and the number of preparation items. Therapeutic preparations included in the CNIK group should be strictly controlled. This is done to avoid the possibility of losses in each public health center due to uncontrolled CNIK supplies which have an impact on the high risk of damage due to expiration and high inventory storage costs.

In contrast to the preparations of the CNIK group, the preparations that are included in the ANIK group must receive supervision over the preparations to avoid vacancies. Procurement of preparations in the ANIK group must be carried out as well as possible with the right method. This is because the preparations in this group have a relatively high turnover, so it is hoped that the right procurement can provide benefits for the District Pharmacy Warehouse with the right method will provide benefits for the Public Health Center. One of the advantages that may be obtained is the advantage in the form of a much cheaper preparation price. In addition, because these preparations are often used in the management of therapy, these preparations will not require large storage costs so that the risk of damage due to expiration is also minimal.
resulted in an average percentage of preparations that were included in the ANI group as much as 22.34%, the BNI group as much as 24.71%, and the CNI group as much as 52.95%. The total investment of the Barru District Public Health Center in 2020 is IDR 178,371,949,020.

The critical index value of pharmaceutical preparations at the Barru District Health Center resulted in an average percentage of preparations that were included in the ANIK group as much as 16.42%, the BNIK group as much as 16.23%, and the CNIK group as much as 67.35%. The total demand for pharmaceutical preparations by the Barru District public health center in 2020 was 7,364,699 with a total procurement of 5,613,246. The percentage of fulfillment of the demand for supplies by the District Pharmacy Warehouse is 76.19%.

References