

# COST-EFFECTIVENESS ANALYSIS OF COMBINATION SALBUTAMOL-IPRATROPIUM AND SALBUTAMOL SINGLE IN PATIENTS ASTHMA OF DR. DRADJAT PRAWIRANEGARA SERANG HOSPITAL

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## Abstract

**Background:** The treatment of asthma requires attention to achieve efficient and effective therapeutic outcomes. The most commonly used treatments for managing asthma attacks are single salbutamol therapy and the combination of salbutamol and ipratropium.

**Purpose:** This research aimed to determine which treatment is more cost-effective between single salbutamol therapy and the salbutamol-ipratropium combination therapy for asthma patients at Dr. Dradjat Prawiranegara Hospital.

**Methodology:** The study was conducted from a payer's perspective, with data collection done retrospectively using purposive sampling. Data were extracted from the medical records of asthma patients in the outpatient department of Dr. Dradjat Prawiranegara Serang hospital for the period from January to December 2022. The pharmacoeconomic analysis used the Cost-Effectiveness Analysis (CEA) method.

**Results:** The study included 12 subjects, consisting of 6 patients in the single salbutamol group and 6 patients in the salbutamol-ipratropium combination group. Based on the calculations, the Average Cost-Effectiveness Ratio (ACER) for the single salbutamol group was IDR 10,909, while the combination group was IDR 10,800. This indicates that the salbutamol-ipratropium combination group is more cost-effective compared to the single salbutamol group.

**Keywords:** *asthma; cost-effectiveness; salbutamol; ipratropium*

## I. INTRODUCTION

According to the World Health Organization (WHO) data in December 2016, there were 383,000 asthma-related deaths. In 2015 there was an increase of 0.5%. The results of the Basic Health Research (RISKESDAS) report by the Ministry of Health Agency and Development of the Republic of Indonesia in 2018 showed an increase in the number of asthmas in Indonesia at 2.4%, and in Banten Province reached 2.4% of all age interviews based on medical diagnosis (1).

In the preliminary study stated that there are two therapies for dealing with asthma recurrence most widely used in Indonesia, namely the use of single salbutamol therapy and the combination of Salbutamol-ipratropium. Both therapies are included in the guidelines for asthma treatment (2). The first line in the treatment of asthma in a mild-grade Indonesian hospital is the use of beta-2 rapid-acting inhalation agonists such as salbutamol inhalations (3).

The entire health facility is required to provide the best service to the public with limited health and medicine budgets. Therefore, to optimum therapeutic outcomes it is necessary to strike a balance between budgetary constraints and resources. This can be done by controlling the cost of all aspects of

health care. Health costs can be controlled using pharmacoeconomic analysis studies, such as Cost-Effectiveness Analysis (4).

Cost-effectiveness analysis can determine a more efficient form of health intervention at a cheaper cost and get the best therapeutic outcomes (5). Research on Cost Effectiveness Analysis (CEA) is still rarely done in Indonesia, including in a few hospitals, one of them is the Regional General Hospital dr. Drajat Prawiranegara Serang. Therefore, researchers are interested in researching on the comparison of cost effectiveness in asthma patients in the Hospital, especially in the asthmatic patients treated on the street in dr. drajat Prawiranegara Serang Hospital, so this study can be the consideration of the hospital in making decisions on the treatment options that are more cost effective especially in asthy patients.

The aim of this research is to find out which therapy is more cost-effective than the treatment of asthma patients between a single drug salbutamol and a combination of sulbutamol-ipratropium bromide in the medical facility of dr. Drajat Prawiranegara serang Hospital.

## II. METHODOLOGY

### Research Design

This type of research is non-experimental research conducted observationally. The study conducted an assessment of the effectiveness and calculation of direct medical costs known from the medical record data of asthma patients and the medical cost data taken retrospectively (the data used is the previous data) at the dr. Drajat Prawiranegara Serang Hospital.

### Populations and Samples

The population of this study is the entire medical record data of patients who are treated for asthma and undergo treatment at dr. Drajat Prawiranegara Serang Hospital in the period January – December 2022. Samples in this study are all medical records of asthmatic patients that are included in the inclusion and exclusion criteria that have been determined in this research.

The criteria for inclusion in this study are the complete medical record data of asthma disease treated on the road, the full medical record information on asthmatic disease including patient biodata (age and gender) and biodata of medication (the name of the drug, preparation form and dosage regimen) as well as the data of a single-saltbutamol medication with a combination of salbutamol-ipratropium bromide in a road-treated asthmal patient at dr. Drajat Prawiranegara Serang Hospital in the period January-December 2022.

Exclusion criteria for this study, which is the complete medical record data of asthma disease is incomplete and outside the period of January – December 2022, the data of medical records of patients asthmatic treatment in dr. Drajat Prawiranegara Serang Hospital who did not use a single drug salbutamol or a combination of salbutamole-ipratropium bromide.

### Research Instruments

The data on this study are secondary data from the medical records of asthma patients during the period January – December 2022 that have met the criteria of the study.

### Data Analysis

The data analysis is done using the calculation of the Average Cost-Effectiveness Ratio (ACER). The data processed using Microsoft Excel can be calculated using the ACER formula. In addition, to see how much extra cost the patient has to incur in order to obtain the highest efficiency results then the ICER value is required.

## III. RESULTS AND DISCUSSION

Based on the data collection of asthma patients, dr. Drajat Prawiranegara Serang Hospital during January-December 2022 found 12 patients meeting the inclusion and exclusion criteria. Characteristics of patients in this study, depending on age, gender and length of street care. Characteristics of asthma patients can be seen in table 1.

**Table 1. Characteristics of asthma patients**

No	Characteristics		N	
			n	%
1.	Sex			
	a.	Male	4	33%
	b.	Female	8	67%
2.	Age			
	a.	18-24 Years	1	8%
	b.	25-31 Years	1	8%
	c.	32-39 Years	2	17%
	d.	40-47 Years	2	17%
	e.	48-54 Years	4	33%
	f.	55-60 Years	2	17%
3.	Number of visits			
	a.	One visit	5	42%
	b.	More than one visit	7	58%

Based on the gender characteristics in table 1 shows that the number of asthma patients treated on the street in dr. Drajat Prawiranegara Serang Hospital period January-December 2022 consisted of 8 patients (67%) of the female type and 4 patients or (33%) of the male type. The results of this study can be stated that female patients are more than male patients. This study is based on data from a study by Alotia et al., (2020) the number of female asthma patients is higher than that of males (6).

There are hormonal differences between women and men, as well as differences in the size of the respiratory caliber. Women have smaller calibers of respiration than men, causing more women than men to suffer from asthma (7). Causes of asthma recurrence in women are also associated with the reproductive cycle. Hormonal changes occurring during women's menstruation that can play a role in the pathophysiology of asthma which can lead to worsening of the symptoms (8).

Patient characteristics by age, in this study were grouped into 6 age groups with the results showing the most age in the age group 48-54 years 4 patients (33%), followed by the age groups 32-39 years, 40-47 years and 55-60 years respectively 2 patients (17%), age group 18-24 years and age group 25-31 years had the same number i.e. only 1 patient (8%). This study is consistent with the study Putri et al., (2022) which showed that the most asthma sufferers occurred in adult age is 34-57 years (9). Age becomes one of the factors that can cause asthma. It is influenced by a number of factors such as hormonal changes in adulthood can contribute to the disease. Hormonal changes occur in steroid sex hormones that affect the inflammatory response in the lungs (10).

Table 1 shows that the total number of patients with only one visit is 5 (42%), while the number of people with more than one visits is 7 (58%). This is influenced by the worsening of the patient's condition and the increasing number of visitors, which affects the duration of treatment (11).

In this study, the researchers assumed that the parameters of effectiveness are seen from the number of visits. The assessment of the effectiveness of asthma therapy is that in the period of one year patients do not make return visits to the hospital either Road Care, Inpatient Care and Emergency Care Unit (UGD) (11). Based on a study conducted by Putri et al. (2022), patients who only do 1 visit to the Hospital in one year are declared already free of symptoms so can be declared effective, while patients who do more than 1 visit in a year is declared ineffective (9).

**Table 2. Therapeutic Effectiveness of Asthma Drugs**

Group	Efficiency					
	Efektive	%	Tidak Efektive	%	Total	%
Salbutamol Single	2	33%	4	67%	6	100%
Salbutamol-Ipratropium combination	3	50%	3	50%	6	100%

Based on table 2, the use of single salbutamol therapy has lower treatment effectiveness values compared to the treatment of the group of drugs combination salbutamole-ipratropium. The effective values of use of group of combination Salbutamol-ipratropium are 3 patients (50%) and the ineffective is three patients (50%), while the declared effective of single use of salbutamol is 2 patients (33%) and the stated inefficient is 4 patients (67%).

The primary treatment of asthma is shown only to control symptoms so as to prevent attacks (12). Asthma is an incurable disease. Its implementation is only aimed at alleviating and controlling asthma attacks (13).

In this study, the cost calculation is based on two aspects of the cost, namely the therapy package and the unit price. The cost of the package on each therapy is both single salbutamol therapy and combination therapy of salbutamole-ipratropium, which amounts to 180.000 IDR each time visit to dr. Dradjat Prawiranegara Serang Hospital. In addition, the unit price of the single use of salbutamol is 3.609 IDR/ampoule, while the use of combination therapy of Salbutamol-ipratropium of 5.550 IDR/ampoule.

**Table 3. Calculation of Package Costs**

Group	Number of Effective Visits	One-time visit cost	Total Costs
Salbutamol Single	2	IDR 180.000	IDR 360.000
Salbutamol-Ipratropium combination	3	IDR 180.000	IDR 540.000

Based on Table 3, we can see the number of effective visits from each different therapeutic group. The number of effective visits of the single salbutamol group was twice, whereas the salbutrol-ipratropium combination group was three times. The cost of each package of asthma therapy in dr. Dradjat Prawiranegara Serang Hospital is the same, that is 180.000 IDR. The total cost of a single salbutamol group is 360.000 IDR; whereas the combination group of Salbutamol-ipratropium has a total cost amounting to 540.000 IDR.

**Table 4. Unit Cost Calculation**

Group	Number of Effective Visits	One-time visit cost	Total Cost
Salbutamol Single	2	IDR 3.609	IDR 7.218
Salbutamol-Ipratropium combination	3	IDR 5.550	IDR 16.650

Based on Table 4, it can be seen that the number of effective visits from each therapeutic group is different. The number of effective visits of the single salbutamol group was 2 times, while the group of combination Salbutamol-ipratropium was 3 times. If you see from each unit cost that has been issued for each therapy, that is, the single therapeutic group of Salbutrol amounted to 3.609 IDR and the combination group of salbutrol-ipratropium of 5.550 IDR, so the total unit cost obtained from the

number of patients that are effective in the single group of Salmutamol is 7.218 IDR, whereas the group combination of Saldutamol-Ipratropioium has a total unit costs of 16.650 IDR.

**Table 5. ACER calculations based on package prices**

Group	Total Cost	Efficiency	ACER
Salbutamol Single	IDR 360.000,-	33%	IDR 10.909
Salbutamol-Ipratropium combination	IDR 540.000,-	50%	IDR 10.800

Based on the table 5 therapies on the treatment of the most cost effective package in asthma patients dr. Dradjat Prawiranegara Serang Hospital railway facilities Attack year 2022 is a group of salbutamol-ipratropium combination with an ACER value of 10.800 IDR. This study is in accordance with the study Lorensia & Bahari, (2020), which shows that one of the hospitals in Surabaya, the use of the group Salbutamol -ipratropiumum is more cost effective compared to use of single salbutamole which is based on the results of long-term improvement of treatment in hospitals with an Acer value of 3.709 IDR (7).

Based on the cost-effectiveness quadrant, the salbutamol-ipratropium combination therapy group versus the single salbutamole group, indicates that the combination group of Salbutamol-ipratropium has a higher total cost with a higher effectiveness (quadrant I) and vice versa. (kuadran III). Therefore, it can be done at the next stage, that is, with the calculation of ICER (5).

**Table 6. ICER calculations per package**

Group	Cost	Efficiency	ICER
Salbutamol Single-Salbutamol-Ipratropium combination	IDR 180.000,-	17%	IDR 10.588,-

The calculation of ICER is required to determine the additional costs incurred so as to obtain the highest efficiency results with a change of one unit of asthma patient efficiency. Based on the results of table 6, it can be stated that to improve the effectiveness of single salbutamol therapy group with a group of combination salbutamole-ipratropium based on the cost per package required an additional cost of 10.588 IDR.

**Table 7. ACER calculations based on unit prices**

Group	Total Cost	Efficiency	ACER
Salbutamol Single	IDR 7.218,-	33%	IDR 219
Salbutamol-Ipratropium combination	IDR 16.650,-	50%	IDR 333

Table 7 shows the results of the calculation of ACER values based on the price of each unit in this study, that is, the single salbutamol group is more cost effective than the group of the Salbutamol-ipratropium combination.

**Table 8. ICER calculations per unit proses**

Group	Cost	Efficiency	ICER
Salbutamol Single-Salbutamol-Ipratropium combination	IDR 9.432,-	17%	IDR 555,-

In the analysis of the cost-effectiveness quadrant, the salbutamol-ipratropium combination group is in Quadrant I, because it has a higher total cost and higher efficiency. whereas the single salbutamol group is on Quad III, because its total cost is lower with a lower efficiency (kuadran III). Based on these results, an ICER calculation can be made to find out the additional costs incurred to obtain higher effectiveness (14). Based on table 8, it can be stated that to improve the effectiveness of single-salbutamol therapy groups with salbutamol-ipratropium combination groups required an additional cost of 555 IDR.

#### IV. CONCLUSIONS AND NEWNESS

Based on the cost of the package, the salbutamol-ipratropium combination group is more cost-effective compared to the Single-salbutamol group with an ICER value of 10.588 IDR. However, based on the unit cost, the single salbutamol group is more cost-effective compared to the combination group of salbutrol-ipratropium with an ICER value of IDR 555.

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