

Cost-Effectiveness Analysis of Immunosuppressant Drug Methylprednisolone at Gembleb Farma Trenggalek Pharmacy Service

Fendy Prasetyawan^{1*}, Yuneke Saristiana², Tsamrotul Ilmi³, Widhi Astutik⁴, Chandra Arifin⁵, Abd Rofiq⁶, Eka Hayati Rhomah⁷

¹⁻³Universitas Kadiri, ⁴IK Bhakti Wiyata, ^{5,6}Akademi Keperawatan Arga Husada, ⁷Universitas Darul Ulum Jombang

*Penulis korespondensi, email: fendy.pra@gmail.com

Abstract— This study aims to evaluate the cost-effectiveness of the immunosuppressant drug methylprednisolone at Gembleb Farma Pharmacy in Trenggalek, East Java, Indonesia. The research was conducted on May 30, 2025, using a descriptive quantitative approach supported by interviews with the responsible pharmacist. Data collection involved daily sales records of methylprednisolone and clinical response outcomes among patients. Each patient typically received five tablets per treatment, and the pharmacy recorded an average daily sale of 250 tablets. Therefore, it was estimated that approximately 50 patients were served per day. From those, 45 patients—equivalent to 90%—experienced favorable clinical responses to methylprednisolone therapy. The cost per tablet was IDR 500, resulting in a total daily cost of IDR 125,000. The calculated Cost-Effectiveness Ratio (CER) per day was IDR 2,777.78 per effectively treated patient. This value remained consistent when scaled to monthly (IDR 3,750,000 for 1,350 effective patients) and annual estimates (IDR 45,625,000 for 16,425 effective patients), yielding the same CER value of IDR 2,777.78. The findings indicate that methylprednisolone provides a stable and predictable cost-effectiveness profile in outpatient pharmacy settings. These results may support decision-making in therapeutic planning, particularly in community pharmacies that aim to deliver effective yet affordable immunosuppressive therapies. Additionally, this cost-efficiency aligns with the goals of rational drug use and sustainable pharmaceutical services at the primary healthcare level.

Kata kunci: Cost-Effectiveness, Methylprednisolone, Pharmacy Services, Economic Evaluation, Immunosuppressant Therapy.

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1. Introduction

In the realm of modern healthcare, the efficiency and effectiveness of therapy are two core pillars in clinical and managerial decision-making. The use of medications is now assessed not only based on their pharmacological effectiveness but also in terms of the costs and benefits that arise, for patients, healthcare providers, and the overall healthcare system [1]. One scientific approach employed to assess the cost-effectiveness of therapy utilization is pharmacoeconomics. Pharmacoeconomics is a field of study that examines the comparison between the costs and benefits derived from a pharmaceutical intervention [2]. Pharmacoeconomic analysis plays a significant role in the selection of therapies that are rational and based on evidence. In this context, cost-effectiveness analysis serves as a primary tool for evaluating whether a medication is worthwhile based on the extent of its benefits compared to the expenses incurred [3].

One category of medications that is frequently studied in pharmacoeconomic analyses is immunosuppressive drugs. Immunosuppressive medications play a crucial role in regulating excessive immune responses, especially in the context of autoimmune diseases, post-organ transplantation, and chronic inflammatory conditions [4]. One medication classified as an immunosuppressant and widely utilized in Indonesia is methylprednisolone. Methylprednisolone is a synthetic glucocorticoid that functions by suppressing inflammation and the immune system throughout the body. This medication is utilized for various indications, including asthma, systemic lupus erythematosus, rheumatoid arthritis, severe allergic reactions, and supportive therapy in cancer treatment. Although this medication is classified as generic and relatively inexpensive, its widespread use should still be assessed in terms of clinical effectiveness and cost efficiency [5].

In practice, numerous pharmacies serve as key distribution points for methylprednisolone to outpatient patients. One example is Gembleb Farma Pharmacy, located in Trenggalek, East Java. This pharmacy serves the general public and has a considerable number of customers, particularly among patients with chronic and autoimmune diseases [6]. Methylprednisolone has become one of the most commonly purchased medications by patients at that pharmacy. Therefore, it is essential to understand the extent to which the use of methylprednisolone at Apotek Gembleb Farma can be considered cost-effective [7]. Such analysis will provide the pharmaceutical staff with an understanding of the economic impact of the administered therapy and assist in making more informed service decisions.

The pharmacy service plays a crucial role in the healthcare system, especially as the final point in the distribution chain of medicines and as an initial consultation place for patients. With the growing awareness of treatment costs within the community, it is increasingly important for pharmacists to consider not only the effectiveness of medications but also their economic value [8]. In such circumstances, the pharmacoeconomic approach offers an objective framework for comparing various therapy options based on costs and the outcomes achieved [9]. On the other hand, patients demand more complete and transparent information regarding the medications they take, including potential benefits, risks, and associated costs. This positions pharmacists as the primary source for providing information and education to the community, while also serving as data-driven decision-makers through analysis [10].

The analysis of cost-effectiveness is particularly important in the context of using generic medications such as methylprednisolone. Although the price is relatively low, the high volume of its use results in significant total expenses over the long term [11]. If the therapy does not yield optimal clinical results, then the seemingly small expense actually constitutes a waste of healthcare resources. Therefore, a thorough study on the ratio of cost to effectiveness has become an urgent necessity, especially in community pharmacy services such as pharmacies [12]. This research aims to assess the economic effectiveness of methylprednisolone therapy in real-world practice, specifically at Gembleb Farma Pharmacy in Trenggalek.

By examining the average daily and annual sales data, it is possible to calculate the total expenses incurred in providing this medication to the community. Next, it is necessary to conduct observations or estimates regarding the clinical outcomes achieved by patients after consuming methylprednisolone [13]. This can be observed from the level of improvement in symptoms, a reduction in referral rates to secondary services, or patient satisfaction reports. From the gathered data, the cost-effectiveness ratio (CER) can be calculated, reflecting the costs required to achieve one unit of clinical success [14]. A low CER value indicates that the medication is cost-effective, whereas a high value suggests the need to reevaluate the treatment choice. Thus, the findings of this research will not only benefit pharmacy managers and pharmaceutical staff but also patients and local policymakers [15].

Furthermore, the results of this analysis can serve as a reference for the development of micro-level pharmaceutical policy formulation, such as the procurement of medications, the creation of essential medicine lists for pharmacies, and the advancement of data-driven clinical pharmacy services [16]. In the

long term, a pharmacoeconomic approach can also encourage more rational, efficient, and sustainable management of pharmacies [17]. This is particularly important, especially in areas like Trenggalek, which has limited access to healthcare and resources compared to larger cities. By conducting a comprehensive evaluation of the effectiveness and cost-efficiency of methylprednisolone usage, Apotek Gembleb Farma can serve as a model for value-based pharmacy practices. This effort aligns with the direction of the national health system transformation, which focuses on effectiveness, efficiency, and equitable access to services [18].

2. Method

This research is a quantitative descriptive study employing a pharmacoeconomic approach aimed at analyzing the cost-effectiveness of the immunosuppressive medication Methylprednisolone at Gembleb Farma Pharmacy in Trenggalek. The research was conducted on May 30, 2025, involving data collection derived from pharmacy sales records and in-depth interviews with the responsible pharmacists. This study integrates secondary data, which includes the number of medication sales over a specified period, the selling price per unit, and an estimate of the number of patients receiving Methylprednisolone therapy, with primary data obtained through direct interviews to gather contextual information regarding the policies on drug selection, assessment of clinical effectiveness, and pharmaceutical service practices at the pharmacy.

Quantitative data in the form of daily sales figures is collected to understand the distribution volume of Methylprednisolone, both in tablet form and other formulations, over a specific period. Calculations are performed by taking the average of daily sales that are recorded electronically in the pharmacy management information system. From the data, an analysis was conducted on the total expenses incurred by both the patients and third parties to obtain Methylprednisolone therapy. Meanwhile, the effectiveness data is estimated based on the number of patients who receive clinical benefits, which is determined through the pharmacists' regular observations of the patients' complaints and follow-ups during their return visits to the pharmacy, along with input from the responsible pharmacist through interviews.

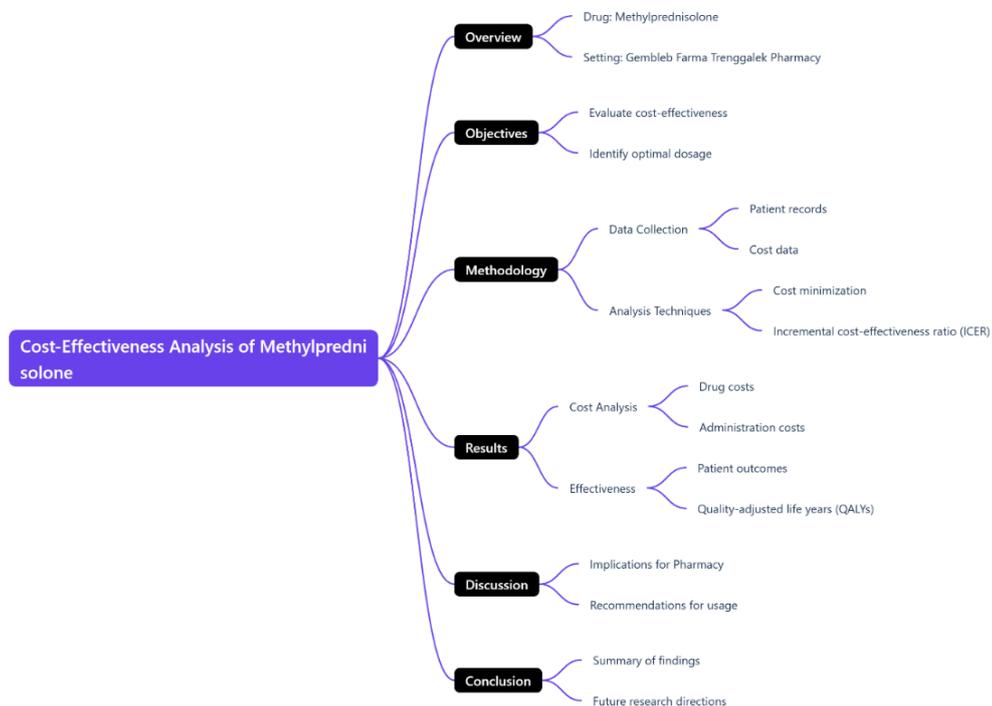


Figure 1. Mind Maps

The interview was conducted using a semi-structured approach, employing a previously developed list of questions, while also allowing for further exploration based on the informant's responses. The responsible pharmacist interviewed is an individual who directly oversees the medication distribution system, prescription services, and patient education at Apotek Gembleb Farma. The interview process lasts approximately 60 minutes, is recorded with permission, and is analyzed thematically to support the interpretation of quantitative data. The results of the interviews are utilized to clarify the rationale behind the use of Methylprednisolone, the reasons for selecting this formulation, the impact of pricing on patient accessibility, and the challenges faced in providing immunosuppressive therapy at the pharmacy level.

This research also takes into account ethical considerations by ensuring that all information gathered does not include any personal data of patients and that the respondents have given their consent to be interviewed. The identities of the pharmacist and other parties involved are kept confidential. Data analysis is conducted by calculating the cost-effectiveness ratio, which is determined by dividing the total therapy costs by the number of patients who exhibit positive therapy outcomes. This ratio is then compared to the ideal cost standard for therapy, which is based on literature and national guidelines.

The choice of using a quantitative descriptive method is based on its ability to provide a clear representation of the relationship between sales volume, the effectiveness of medications, and the total costs incurred by patients. The choice of Methylprednisolone as the focus of this research is based on its significant role in the treatment of various inflammatory and autoimmune conditions, along with its relatively high prevalence of use at the primary care level. Furthermore, the relatively affordable price of this medication often makes it the first choice at pharmacies.

The analysis is carried out by calculating the cost per effective outcome, which involves dividing the total therapy costs over a specific period by the number of patients who have shown symptom improvement or met clinical targets. If one patient requires five tablets for a single therapy session, then the total cost per patient amounts to Rp 2,500 (with a price of Rp 500 per tablet). Assuming a 90% effectiveness based on pharmacist reports, the cost ratio per effective patient can be calculated and compared within the context of efficient pharmaceutical services. The results of this analysis will be utilized to provide an overview to pharmacy managers regarding the efficiency of using Methylprednisolone in daily practice.

This study is cross-sectional because data collection occurred at a single point in time, specifically on May 30, 2025. Although this data is a snapshot, it is considered sufficiently representative because the pharmacy has a stable electronic recording system that has been operating consistently. This study does not include direct interventions with patients or the medication administration process, which minimizes the risk of bias and allows the analysis to concentrate on the naturally available data from pharmacy activities.

In the data analysis stage, a tabulation is performed combining the total sales, price per unit, and effectiveness estimates. This study also employs a triangulation approach that combines quantitative sales data and qualitative data from interviews to enhance the validity of the conclusions drawn. By utilizing these two types of data, it is anticipated that the research findings will not only reflect numerical conditions but also offer a deep understanding of the reality of pharmacy services in the field. The selection of this mixed method is considered the most appropriate to address the research question regarding the efficiency of Methylprednisolone use at Gembleb Farma Pharmacy in Trenggalek.

3. Result and Discussion

Estimated Sales and Total Cost of Methylprednisolone

Based on the data collection conducted on May 30, 2025, it was noted that the average sales of the immunosuppressive drug Methylprednisolone at Gembleb Farma Pharmacy in Trenggalek reached 250 tablets per day.

Table 1. Estimated Sales and Total Cost of Methylprednisolone

Period	Sales (Tablets)	Price per Tablet (IDR)	Total Cost (IDR)
Per Day	250	500	125,000
Per Month (30d)	7,500	500	3,750,000
Per Year (365d)	91,250	500	45,625,000

With a price of Rp 500 per tablet, the total daily sales amount to Rp 125,000. Within a period of one month (30 days), the estimated sales amount to 7,500 tablets, with a total cost of Rp 3,750,000. In the course of one year (365 days), the projected sales may reach 91,250 tablets, totaling an amount of Rp 45,625,000. This data reflects the high demand for Methylprednisolone as a component of immunosuppressive therapy commonly recommended by physicians for various inflammatory and autoimmune conditions.

The interview conducted with the responsible pharmacist at Gembleb Farma Pharmacy provided significant insights regarding the usage patterns of Methylprednisolone. Based on the information obtained, patients who acquire Methylprednisolone typically receive prescriptions with a daily dosage ranging from 8 mg to 16 mg, depending on the patient's clinical condition and age. On average, one patient takes approximately 5 tablets per prescription.

Cost-Effectiveness Ratio (CER) of Methylprednisolone at Gembleb Farma Pharmacy

Assumptions:

1. Daily tablet sales: 250 tablets
2. 1 patient receives an average of 5 tablets per therapy
3. Thus, 50 patients are treated per day
4. Out of these, 45 patients show a good clinical response (effectiveness = 90%)
5. Price per tablet: IDR 500

With daily sales reaching 250 tablets, it can be estimated that approximately 50 patients are treated each day using Methylprednisolone. Of the total, based on the records and observations of the pharmacist, approximately 90% of patients reported an improvement in symptoms or demonstrated a favorable therapeutic response following the use of the medication.

Table 2. CER Calculation

Period	Total Tablets Used	Total Cost (IDR)	Effective Patients	CER (IDR/Effective Patient)
Per Day	250 tablets	125,000	45 patients	
Per Month (30d)	7,500 tablets	3,750,000	1,350 patients	2,777.78
Per Year (365d)	91,250 tablets	45,625,000	16,425 patients	

The analysis of cost-effectiveness is carried out using the fundamental formula of CER (Cost-Effectiveness Ratio), which compares the total costs to the number of patients who show a positive response to the therapy. In this case, the total daily cost of Rp 125,000 is divided by 45 patients who showed improvement (which is 90% of the 50 patients), resulting in a CER value of Rp 2,777.78 per effective patient. This value indicates that each effective therapy outcome requires a cost of less than Rp 3,000, which is considered efficient in the context of modern pharmacological treatment. Upon conducting a more detailed monthly analysis, the effective CER per patient amounts to Rp 3,750,000 divided by 1,350 effective patients, which results in Rp 2,777.78. The same value is obtained from the annual calculations, indicating consistent cost efficiency.

The discussion of these results indicates that the use of Methylprednisolone at Gembleb Farma Pharmacy is considered cost-effective, particularly when associated with high clinical effectiveness and low costs per effective patient. This reinforces the role of Methylprednisolone as a primary option in managing

inflammatory diseases, particularly in situations that necessitate prompt and cost-effective immunosuppressive treatment. Furthermore, Methylprednisolone is widely available in pharmacies and has a relatively stable price, making it one of the most trusted medications by both doctors and patients.

Furthermore, the responsible pharmacist also stated that most patients who purchase Methylprednisolone are referrals from primary healthcare facilities, particularly community health centers and private clinics. This indicates that the presence of Apotek Gembleb Farma is not merely as a provider of medications, but also serves as a crucial distribution point within the healthcare service network in the Trenggalek area. Pharmacists also play a role in educating patients about the rational use of medication, including explaining side effects, duration of use, and the significance of not abruptly discontinuing treatment.

From a pharmacoeconomic perspective, these results can serve as a basis for decision-making in pharmacy management, particularly in stock provision, purchasing planning, and educational promotion strategies. In addition, these results are also valuable as a reference in broader discussions regarding drug pricing policies and the management of treatment costs. For instance, if the local government or health department seeks to assess the budget efficiency for corticosteroid-based treatments, this data can offer a clear picture from the field.

However, it is important to note that these cost-effectiveness results are local and depend on market prices, physician preferences, and patient characteristics in specific regions. Therefore, further studies are necessary that include various types of other immunosuppressive drugs, comparisons among different brands, as well as non-clinical factors such as patient adherence and the influence of pharmaceutical promotions. Therefore, the results of this research not only serve as a statistical overview but also encourage the establishment of more efficient policies that support patients.

4. Conclusion

Based on the analysis of sales data and the clinical effectiveness of the immunosuppressive medication Methylprednisolone at Gembleb Farma Pharmacy in Trenggalek, it has been determined that the expenditure incurred to achieve one patient with a positive clinical response amounts to Rp 2,777.78 per effective patient. The values remain consistent in daily, monthly, and yearly calculations because they are based on a stable distribution pattern and patient response, specifically reflecting 90% clinical effectiveness from the total number of patients served. With an average of 50 patients per day and a total usage of 250 tablets each day, the total daily cost amounts to Rp 125,000. In the context of pharmacoeconomics, this result indicates that the use of Methylprednisolone at that pharmacy has a good and efficient cost-effectiveness value, considering the high clinical benefits achieved at a relatively low cost. Therefore, Methylprednisolone can be recommended as an effective and cost-efficient treatment option for conditions requiring immunosuppressive therapy at the pharmacy service level.

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