Research Article

Analysing the efficacy and cost of antibiotics for children with community-acquired pneumonia at Haji hospital Makassar

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Abstract

Background: CAP is prevalent in children. There is, therefore, a need for cost-effective measures to detect such conditions. antibiotic treatment. However, a gap usually emerges between clinical practice and pharmacoeconomics efficiency. **Objectives:** This research has strived to assess cost-effectiveness of different antibiotic treatment regimens for pediatric CAP patients and compare the findings with those of their actual usage behavior at Haji Makassar Hospital. Study Methods: This was an observational analytic study using a cross-section design. retrospectively. The medical history data from pediatric CAP patients from January to December 2024 was analyzed conducted using purposive sampling (n=60). Information regarding antibiotic combinations, direct medical costs, as well as efficacy was collected. Cost-effectiveness was evaluated using Average Cost Effectiveness Ratio (ACER) and Incremental Cost-Effectiveness Ratio (ICER). **Results:** Cefotaxime and Gentamicin combination was found to the most cost-effective regimen (ACER: IDR 1,276,889.86). Whereas, the triple regimen of ampicillin + Gentamicin had the lowest efficiency (ACER: IDR 2,264,672.61). But, the results of practice which showed that ampicillin + gentamicin was the most commonly used regimen (41 patients), although it was not the costeffective option choice. There was a marked difference found to exist between the pharmacoeconomic-optimal regimen and real-world clinical application. **Conclusion:** There appears to be a considerable disparity between pharmacoeconomic evidence and clinical practice in the management of pediatric CAP at Haji Makassar Hospital. The improvement of antibiotic policies through encouraging a switch to the cost-saving combination therapy cefotaxime and gentamicin is recommended for optimize resource utilization without adversely affecting outcomes.

Keywords: antibiotics evidence, pharmacoeconomics, pediatric community-acquired pneumonia, pneumonia management, healthcare cost efficiency

1 Introduction

Community-acquired pneumonia (CAP) remains a prominent cause of morbidity and international child mortality rates, and particularly in developing countries. The World Health Organization (WHO) declares that pneumonia is responsible for approximately 14% of all deaths occurring in under five-year-old children. of age globally. Pneumonia is one of the leading causes of death among young children in Indonesia, requiring immediate attention by the health care system [1, 2]. The issue of community-acquired childhood pneumonia relies mostly on empirical antibiotic therapy due to the difficulties and time required for identifying the causal culprit. Current national and international recommendations, including those of IDAI and WHO, supporter of different-first line antibiotics like amoxicillin, ampicillin, or third-generation cephalosporins such as ceftriaxone. Nevertheless, the choice of antibiotics influenced by such factors as clinical practices, availability of pharmaceuticals, and cost constraints, which may deviate from the accepted standard [3, 4].

The world faces today a challenge of antimicrobial resistance (AMR) that threatens the efficacy of current treatments. Inappropriate antibiotic prescribing, especially of pediatric community-acquired pneumonia, can contribute significantly Pneumonia, as a major cause, substantially mambers. Among these, HBV, H employed first-line antibiotics against community-acquired pneumonia (CAP) [5]. This raises the question of inquiries regarding the efficacy of antibiotic treatment regimens still widely practiced in various settings, including Indonesian hospitals. Besides efficacy, the cost implications associated with the treatment of CAP have to must not be overlooked. Pharmacoeconomic studies, especially cost-effectiveness analyses, are

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increasingly being used as a crucial tool in hospital decision-making because of financial constraints. The majority of pharmacoeconomic information on antibiotics emerges either from an industrialized country or through models of pharmacoeconomics. may not reflect the real market prices and financing structures for health care within Indonesia. Therefore, there is a major knowledge gap concerning cost comparison among antibiotics. pediatric community-acquired pneumonia treatment regimens in Indonesian hospitals, including that of RSUD Haji Makassar [6, 7, 8].

A recent literature study of the Scopus database indicates that most are concentrated. focus on one aspect: either the analysis of clinical outcomes or the assessment of costs. The research of will assess the clinical efficacy of the most commonly administered antibiotics. This information will provide an actual representation of the effectiveness of antibiotic regimens in specific populations. The present study will investigate results and compare the treatment failure rate or duration of care with information on bacterial patterns and Antibiotic sensitivity, if available, was also done at Haji Makassar Regional General Hospital. This strategy goes beyond Conventional clinical audits by directly correlating clinical practice with local resistance epidemiology. is a methodology that remains hardly employed in pharmacoeconomic research in Indonesia. This study Then, a real-cost analysis - that is, a direct medical cost of each antibiotic regimen - was performed and matched against its effectiveness. The resulting pharmacoeconomic information from this research would be pertinence to Haji Makassar. Regional General Hospital, which can be used directly in developing the formulary of the hospital and It improves rational decision-making related to antibiotic policies clinically and economically. RSUD Haji Makassar is a Government Referral Hospital in the province of South Sulawesi for about population of pediatric patients. With its limited budget and the varied economic statuses the hospital has to make prudent efforts to optimize the use of antibiotics effectively for the betterment of its community. Efficiency and effectiveness are also ensured. Data from this institution is important in understanding the real challenges in controlling pediatric CAP in eastern Indonesia. This project will fill the gap in evidence-based Medicina y farmacoeconomía a nivel local. Se utilizó una metodología que, mediante Effectiveness and financial assessment: The proposed research will deliver accurate, logical, and implementable recommendations for clinicians and hospital administrators on the choice of antibiotic regimens that This would effectively save lives, optimize the use of resources, and help in controlling antimicrobial resistance.

2 Method

This research employs an analytical observational design in which the used methodology is cross-sectional. Data collection was done retrospectively based on patient medical records and direct medical cost. information. Samples were collected through selective sampling from the population of children. were diagnosed with community-acquired pneumonia and were admitted to Haji Makassar Regional General Hospital. The independent variable in this study is the particular antibiotic medication given to the patient. The dependent variables are the results of physical examinations, findings of ancillary tests, and direct medical expenses [9].

The study population comprises all pediatric patients with community-acquired pneumonia admitted to Haji Makassar Regional General Hospital from January to December 2024. The inclusion criteria established are individuals aged 0 to 18 years, undergoing antibiotic treatment, and possessing sufficient medical records for research purposes. The exclusion criteria encompass CAP patients who concurrently have other infectious illnesses. The calculations indicate that 60 subjects fit the criteria.

3 Research result

Its main etiology in the pediatric population is usually infection with pathogenic microorganisms, mainly bacteria. Thus, the main treatment is delivered through antibiotics. According to the World Health Organi-

zation WHO, the first-line antibiotics for Community-acquired pneumonia in children may be treated with penicillin derivatives such as amoxicillin and Ampicillin, combined with aminoglycosides like gentamicin. Ceftriaxone is used as a second-line Antibiotic and is indicated in cases where first-line treatment has failed to yield the desired results. This study was conducted over a period of six months, using data retrieved from the medical records between June and December 2025. department of Haji Makassar Regional General Hospital. RSUD Haji Makassar was chosen as research site due to the high incidence of pediatric CAP cases. The systematic medical record It is a framework that assists in carrying out retrospective studies, thereby enhancing accuracy and validity of the It is based on findings. This pertains to the research emphasis on the cost-effectiveness of antibiotic administration in pediatric patients with community-acquired pneumonia. Medical Records chronicle the complete healthcare continuum, from patient admission to hospital discharge or death. This review aims to assess the cost-effectiveness of antibiotic therapy in pediatric CAP patients diagnosed at Haji Makassar Regional General

Hospital from January to December 2024. Assuming in the year 2024, the population of pediatric patients with CAP is 192, The data were sourced from medical records of 60 children who met the inclusion criteria during the study period. The research findings indicate that the highest incidence of Community Acquired Pneumonia was occurs in the toddler age group, followed by the newborn and infants, children, and adolescent groups. This study shows that the maximum incidence of the cases of Community Acquired Pneumonia or CAP is recorded. in the 0-5 year age group. This syndrome arises due to the incomplete development of the immune system at that age, rendering youngsters more vulnerable to bacterial infections. The underdevelopment of their immune systems renders children more vulnerable to exposure and infection [11]. The findings of a study identify the 0-2-year age bracket as having most of the CAP patients because immunity is At this stage, the immune system has not been fully developed, and the children still have passive immunity from the mother. This Research confirms earlier findings that children aged 2–3 years are most affected. Demographic by CAP [12, 13]. Table 1 shows the patient distribution by age and gender of admission of CAP patients at Haji Makassar Regional General Hospital.

Table 1: Patient distribution by age and gender of admission of CAP patients at Haji Makassar Regional General Hospital

Variable	Classification	n	Percentage (%)
Aged	Newborn	14	23.3
	Infant	10	16.6
	Toddler	33	55.7
	Kids/Children	2	3.3
	Teenager/Youth	1	1.7
Sex	Man	31	51.7
	Woman	29	48.3
	Total	60	100

Children below the age of five years are more susceptible to pneumonia, partly for biologically reasons. At this age, lung maturation is still occurring and the immune system is also still underdeveloped, leading to suboptimal infection-fighting abilities. This syndrome makes children more susceptible to respiratory infections. This finding confirms previous research evidence that the incidence of respiratory rate of CAP in said population.

The distribution of pediatric patients suffering from Community Acquired Pneumonia (CAP) by Gender in The data for RSUD Haji Makassar are shown below. It was found that the data collected resulted in the conclusion that 51.7% of the 48.3% were females. From previous studies conducted at the NTB Provincial General Hospital, it was revealed that patients Males accounted for 66% whereas females accounted for

34%, thus supporting earlier literature [14]. In addition, the study showed findings indicating: Moreover, a study revealed that male patients comprised 60%, and female patients comprised 40 [15]. The respiratory illnesses in children were prevalent amongst boys compared to girls. This is because anatomical differences existing between the respiratory systems of men and women. These disparities are as is evidenced by the fact that their respiratory tract is smaller compared to that of girls, thereby leading to an increased incidence of respiratory tract disorders [16]. The research under discussion falls in line with other works which have found that "The percentage of male pediatric cases is higher, at 66%, relative to females, who comprise 34% of cases. Boys" usually have smaller diameters of the respiratory tract than girls. This disease may cause an increase in respiratory infections on account of possible obstruction, promoting the growth of pathogens such as bacteria and viruses. In addition, discrepancies in immunological reactions between males and

Females contribute towards the vulnerability to pneumonia in males [17]. Table 2 represents ten patients received monotherapy, while fifty patients were given combinations of antibiotics. The literature reveals that the average rank for the monotherapy group is 5.50, This is much lower than the mean rank of 35.50 for the combination group. The result of the Mann-Whitney test is providing the significance value as 0.000, indicating the p-value ¡ 0.001, which shows the difference in temperature reduction between the Combination Therapy group and the Monotherapy group to be statistically significant.

Table 2: Mann-Whitney analysis of patients according to therapeutic regimen in CAP patients at Haji Makassar Regional General Hospital

Regimen	Antibiotic	Patient	Mean Rank	P-Value
Monotherapy	Ampicillin	9	5.5	<0.001
	Gentamicin	1		
Therapy Combination	Ampicillin + Gentamicin	41	35.5	<0.001
	Cefotaxime + Gentamicin	2		
	Ceftazidime + Gentamicin	1		
	Ampicillin + Cefotaxime + Gentamicin	2		
	Ampicillin + Ceftriaxone + Sagestam	1		
	Ampicillin + Cefixime + Gentamicin	3		

The result of the Mann-Whitney test Showed a huge difference. Body temperature is a clinical indication of antibiotic success, as the presence of fever often indicates an immune system response to bacterial infections. The results of this study are consistent with other research showing that the effectiveness of antibiotic therapy can be assessed by means of the improvement of clinical criteria such as reduction body temperature. Thus, the combined treatment protocol has been considered more effective in promoting the treatment of pediatric patients with CAP in Haji Makassar Regional general Hospital, presumably because of its larger activity range, making it easier and faster to treat an infection. The WHO guidelines on pediatric Pneumonia treatment recommendation includes the use of ampicillin and gentamicin.

The effectiveness of ampicillin and gentamicin, according to study, was higher. in minimizing the hospital stay of patients. It is the synergistic combination of the two drugs that is responsible For this purpose, ampicillin, a β-lactamase antibiotic, acts by interfering with bacterial cell walls, while aminoglycoside, inhibits the process of bacterial protein synthesis, therefore improving their antibacterial action The Mann-Whitney test results in this study support previous studies, which found that the selection of combination antibiotic therapies is a significant factor in the accelerated rate of clinical care of pediatric patients with CAP. The non-parametric statistical test revealed a great variation in antibiotic treatment trends comparison between monotherapy and combination therapy for pediatric patients with community-acquired infections, pneumonia (CAP). In the monotherapy arm, the prevalent selection pressures were: highest average rating, followed by Ampicillin in the second position. The most noticeable difference is that allocation of patients between

the two groups. There were 50 patients in the combination therapy group. of responding patients or patients' families and offering successful treatment through support groups and charities. With the prevalent "ampicillin + gent individuals. In contrast, the monotherapy group only consisted of a total of 10 individuals. The p-value <0.001 in both tests means that these differences are statistically significant and could not have occurred by mere chance. by chance. This research proves that in clinical settings, in Haji Makassar Regional General Hospital, there There is a preference for combination therapy over monotherapy in the management of paediatric CAP. Superiority of the Ampicillin + Gentamicin treatment indicates that the Amoxicillin + Clindamycin treatment and is perceived to be "the primary empirical selection made by clinicians." This trend corresponds to treatment recommendations for the combination treatment of severe or complicated cases of community-acquired pneumonia (CAP), have their own specific risk factors. It would seem that the named individuals may have a pronounced

pattern of combination therapy use that has taken into account the pharmacoeconomic factors, as will show in the subsequent CEA that there are combinations with questionable cost-effectiveness in comparison to other treatment modalities. In this research, a cost-effectiveness analysis approach is used, beginning with the estimation of direct medical costs. Direct medical costs include costs related to drugs, physician consultations, nursing interventions, use of hospital amenities including rooms and equipment, lab tests, unofficial payments, and other expenses directly related to healthcare services. This study examines the total spending that resulted from the information offered by Haji Makassar Regional General Hospital; especially concerning direct medical charges for reimbursement during the time of hospitalization of patients. The study includes expenditure elements of hospital administrative expenses, cost of physician consultations, laboratory tests, and cost of drugs spent during the treatment period. The result obtained indicates that Gentamicin + Ceftazidime combination causes the highest average cost of Rp4,659,506.53, while the treatment of Ampicillin monotherapy is recorded as the lowest atRp2,209,832.24. The most commonly used antibiotic pair isAmpicillin The price of Gentamicin, being Rp3,115,447.36, makes it a drug in the medium cost category. This shows that the complexity of antibiotic combinations, especially third-generation, is higher than that for other drug combinations. Figure 1 shows the direct cost using antibiotics for CAP pediatric patients (Currency in IDR) in CAP patients at Haji Makassar Regional General Hospital.

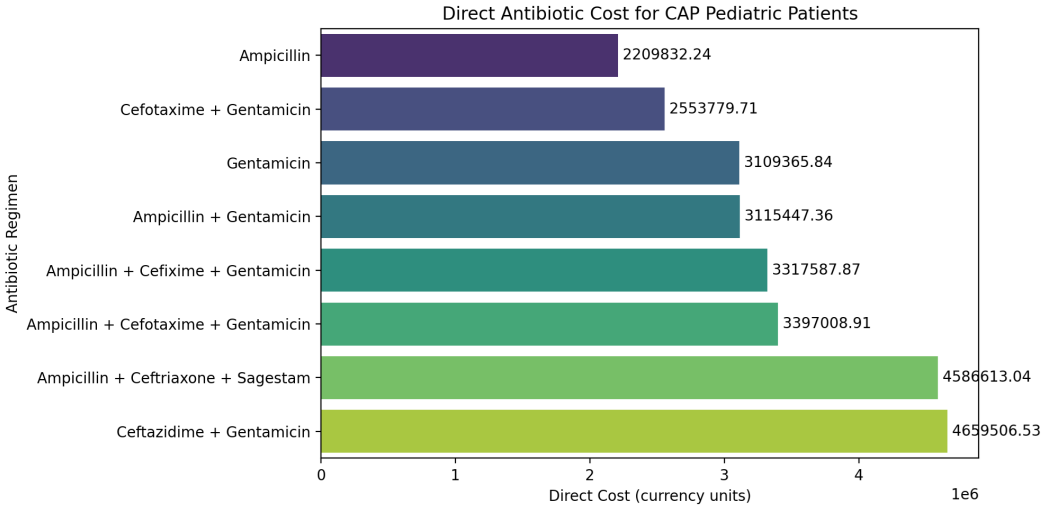

Figure 1: Direct cost using antibiotics for CAP pediatric patients (Currency in IDR) in CAP patients at Haji Makassar Regional General Hospital

A cost-effectiveness analysis was conducted to estimate the direct medical cost, including drug costs, as compared with therapeutic efficacy. The methodologies used included Average Cost-Effectiveness Ratio (ACER), which compares total costs to levels of effectiveness, and the Cost-Benefit Incremental Cost-Effectiveness Ratio (ICER) that calculates the incremental cost that needs to be expended for obtain one unit of therapeutic effect. Both approaches were used to examine costeffectiveness with respect to clinical outcomes [18]. As a result, information regarding direct medical costs was used as the base for calculation of ACER and ICER to reveal which is the most cost-effective antibiotic treatment alternative.

Visualization makes it clear that uncomplicated regimes, including monotherapy, usually entail a lower expenses, but more complex combinations are related to a significant increase in prices. In order to making an intuitive comparison, I created a forest plot that showed the estimated cost of each regimen by points, with a nominal uncertainty range (5%) indicated by a horizontal line, thus making clear the differences regimens and organizes them in order from least costly to most costly. By analyzing cost hierarchies, as well as any redundancy that exists among the regimens, which are relevant, among other things, financial factors. The currency format can change if required, along with such other analysis as identifying the three least and most expensive regimens or calculating the difference and relative percentage in comparison to the reference regimen. The forest-Plot analysis for CAP pediatric patients (Currency in IDR) in CAP patients at Haji Makassar Regional General Hospital is shown in Figure 2.

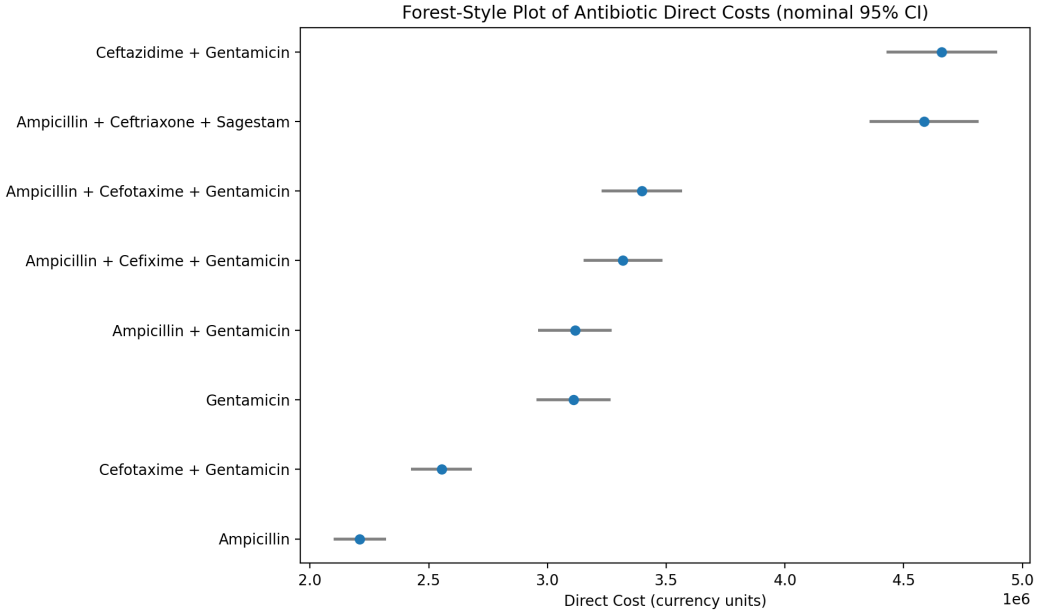

Figure 2: Forest-Plot analysis for CAP pediatric patients (Currency in IDR) in CAP patients at Haji Makassar Regional General Hospital

The graph showed that the cost burden incurred by the antibiotics varied greatly. This can be seen in the forest plot graph below, which shows that regimens. Ceftazidime-Gentamicin regimen has been found to be the regimen that incurs the costs of the following The biggest financial strain was followed by the combination of Ampicillin, Ceftriaxone, and Sagestam: Both regimens had estimated costs of over 4.5 million rupiah. Monotherapy using ampicillin costed the least financially demanding, while the combination of cefotaxime and gentamicin was proven to be the most cost-effective regimen. The large variability reflects

the importance of pharmacoeconomic considerations in the selection of antibiotic therapies, as there could be high costs associated with some combinations; however, it is important to conduct a comprehensive evaluation of efficacy in order to determine the most effective therapeutic option. These results emphasize the importance of the need for appropriate antibiotic policies because deserve consideration for both efficacy and cost-effectiveness, particularly within the healthcare setting operating within limited resources. Outcomes of the analysis cost-effectiveness concerning antibiotic therapy regimens and clinical parameters is given in Table 3.

Table 3: Outcomes of the analysis cost-effectiveness concerning antibiotic therapy regimens and clinical parameters

Jenis terapi antibiotik	Direct medical cost (Rp) (C)	Effectiveness (E)	ACER (IDR) (C/E)	ICER (IDR)
Ampicillin	2.209.832,24	1.4	1.578.451,6	1.811.230,24
Gentamicin	3.109.365,84	2	1.554.682,92	-60.815,2
Ampicillin + Gentamicin	3.115.447,36	1.9	1.639.709,14	Compared
Cefotaxime + Gentamicin	2.553.779,71	2	1.276.889,86	-5.616.676,5
Ceftazidime + Gentamicin	4.659.506,53	3	1.528.871,01	1.403.690,15
Ampicillin + Cefotaxime + Gentamicin	3.397.008,91	1.5	2.264.672,61	-703.903,87
Ampicillin + Ceftriaxone + Sagestam	4.586.613,04	3	1.528.871,01	1.337,423,35
Ampicillin + Cefixime + Gentamicin	3.317.587,87	2.3	1.442.429,51	3.343.558,38

The result obtained suggests that the combination of Cefotaxime and Gentamicin gives the lowest ACER value: of Rp 1,276,889.86 per unit of effectiveness, proving the efficacy of fever reduction on day 2. This score indicates that this combination is the most effective way of treating patients' body was the lowest in terms of cost per unit of effectiveness relative to other treatment combinations. Compared to ampicillin + gentamicin, the most successful ACER treatment was the combination of ampicillin + cefotaxime + gentamicin, giving the result of Rp 2,264,672.61. Previous research has proved the existence The combination of ceftriaxone and gentamicin is more effective in antibiotic therapy. Ceftria has potent antibacterial action, broad-spectrum antimicrobial activity against both Gram-negative and Gram-positive bacteria, and low toxicity. Differences in efficacy are also impacted by ampicillin's Its half-life is 1–1.5 hours, which compares to ceftriaxone at 6–9 hours. The half-life is withdrawal of the drug. An extended drug half-life will result in a longer time that takes for the body to remove the substance fully [19]. The results of analysis affect the cost-efficiency of treatment. The most cost-effective therapeutic regimen consists of cefotaxime and gentamicin, providing significant clinical effectiveness at a relatively lower cost.

The results of the pharmacoeconomic analysis yield different strategic inputs into the clinical decision process and hospital policy. The regimen consisting of cefotaxime and gentamicin should be considered as the preferred empirical regimen for paediatric patients with community-acquired pneumonia (CAP) at Haji Makassar Regional General Hospital, as it has shown considerable efficacy and is the most cost-effective alternative with the lowest ACER value. It was found that the set comprising three antibiotics

(Ampicillin + Cefotaxime + Gentamicin) had the lowest efficacy and deserves special attention as it suggests the potential of incorrect antibiotic polypharmacy to increase expenditures without a significant increase in outcomes. Third, although the Gentamicin monotherapy and Cefotaxime + Gentamicin treatment regimens having negative values of ICER, indicating highly effective medication, their in clinical implementation, careful consideration of bacterial prevalence in the region is needed. individual patient clinical circumstances.

Further, it is evident from the findings of the research that there is a need for a holistic evaluation of hospital antibiotic drug usage. The finding that some drug combinations show reduced antibiotic Resistance and some drug combinations show comparable efficacy with varying costs is quite remarkable, such as that

of ceftazidime + gentamicin and combinations of ampicillin, ceftriaxone, and sagestam, having the same efficacy performance (efficacy = 3 Each possesses different cost structures. This offers the potential for budgetary improvements and the preservation of "care quality. It is recommended that a follow-up study on this issue should employ a prospective design and assess" such specific clinical outcomes like treatment duration, time to defervescence, treatment failure rates, and further integrating the indirect costs considered in order to obtain a more comprehensive analysis. of health economics.

4 Disscussion

This pharmacoeconomic study makes it possible to determine that the cefotaxime+gentamicin antibiotic combination is the most cost-effective drug, with the lowest Average Cost-efficacy Ratio (ACER) of Rp 1,276,889.86 per unit of efficacy. This represents that for every one-unit improvement in medical effectiveness, the cost of this treatment is Rp 1.28 million. A regimen of ampicillin, cefixime, and gentamicin came in as the runner-up and had an ACER value of Rp 1,442,429.51, followed by ce in combination with gentamicin and in combination with ceftriaxone and sagestam both showed similar to those of ACER, of Rp 1,528,871.01. However, the combination including amp and gentamicin were the least cost-effective, which was evident by the Highest Average Cost- Effectiveness Ratio (ACER) of Rp 2,264,672.61, indicating that the role of a third antibiotic in protecting the efficacy will not yield proportional benefits of effectiveness relative to costs over those additional costs spent. The Incremental Cost-Effectiveness Ratio Analysis where ampicillin/gentamicin is used as the reference shows: more complex dynamics [20]. The gentamicin monotherapy and cefotaxime + gentamicin treatment regimens had negative ICER values (-60,815.20 and -5,616,676.50, respectively), paradoxically achieved greater effectiveness at reduced costs relative to the comparator. This phenomenon makes both therapeutic approaches highly effective. Treatment with ampicillin monotherapy, even being the least effective way, leads It's an expensive option, and the incremental cost difference for each unit of effectiveness when this TAT and the other one are compared amounts to Rp comparatively to the comparator, making the latter less favorable. Ceftazidime + gentamicin and ampicillin, + ceftriaxone + sagestam, although achieving maximal efficacy 20, suffer such substantial additional costs for each unit of enhanced effectiveness, specifically Rp 1,403,690.15 and Rp 1,337.

This discovery relates well with researches conducted by Surabaya Regional General Hospital, which indicated that the combination of third-generation cephalosporins and aminoglycosides showed optimal cost-effectiveness in treating severe cases of pediatric community-acquired pneumonia. Additionally, The emphasized that despite increased costs of drug acquisition, there are enhanced clinical outcomes and reduced hospital durations ultimately result in decreased treatment cost. These findings support the results of the cefotaxime+ gentamicin regimen in this study. On the contrary, studies conducted was against superfluous polypharmacy wherein antibiotics (particular ampicillin, cefotaxime, and gentamicin in this trial) was found to be increase costs without providing major efficacy advances in clinical terms, supporting the highest ACER results of this regimen. This study Recommends cefotaxime and gentamicin combination therapy over other regimens, including amoxicillin, due pharmacoeconomic factors, inasmuch as it has significant clinical efficacy in combination with maximum cost-effectiveness. This proposal becomes particularly relevant within healthcare Organizations facing limited resources, where cost Distribution needs to be optimized without hampering the quality of care. A more comprehensive study is required for the purpose of subsequent research, accounting for more specific clinical outcomes and indirect cost drivers.

5 Conclusion

In "Quality of Care in Hospitals in Ontario: Patient Volume, Hospital Operating Costs, and Specialist however, is not the most commonly used regimen in clinical practice. Ampicillin plus gentamicin is used in the

treatment regimens, while the other two interactors, although less beneficial, are used as well because Thus, it can be hypothesized that variables such as medical practices, specialist knowledge, and drug availability could affect more weight than strictly pharmacoeconomic considerations in terms of treatment. The use of is especially limited. This is consistent with the results of many pharmacoeconomic studies that show that a evidence showing that the additional cost required per unit when employing ampicillin monotherapy is substantial of effectiveness (high ICER) when compared to the alternative combination therapy. This information supports the evidence-based rationale for no longer administering ampicillin as the sole drug for pediatrics CAP at that hospital.

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