



Cost-Effectiveness Analysis of Carboplatin-Paclitaxel, Cisplatin-Pemetrexed, and Carboplatin-Gemcitabine Chemotherapy Regimens in Patients with Non-Small Cell Lung Cancer at Persahabatan Central General Hospital

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Abstract: Platinum-based chemotherapy remains an important treatment option for patients with advanced non-small cell lung cancer (NSCLC), particularly in settings where reimbursement and resource allocation are major considerations. A retrospective observational cost-effectiveness study was conducted using medical records and billing data from adult patients with NSCLC who received carboplatin-paclitaxel, cisplatin-pemetrexed, or carboplatin-gemcitabine in 2023. Effectiveness outcomes included the one-year survival rate (%) and median progression-free survival (PFS). Costs were calculated based on direct medical expenses over six chemotherapy cycles. Cost-effectiveness was assessed using ACER, ICER, and dominance analysis. A total of 101 patients were included: 81 received carboplatin and paclitaxel, 14 received cisplatin and pemetrexed, and 6 received carboplatin and gemcitabine. Mean direct medical costs were IDR 27, 588, 547, IDR 41, 214, 281, and IDR 47, 471, 752, respectively. No statistically significant differences were observed in one-year survival rate or median PFS among the regimens, although interpretation should consider the unequal sample sizes (81 vs. 14 vs. 6), which limit statistical power. Based on one-year survival, carboplatin-paclitaxel had the lowest ACER and dominated the other regimens by providing higher observed survival at lower cost. Based on median PFS, cisplatin-pemetrexed provided longer PFS than carboplatin-paclitaxel but at a higher cost, requiring ICER-based interpretation. Carboplatin-paclitaxel was associated with the lowest direct medical cost and the most favorable cost-effectiveness profile based on one-year survival among the evaluated regimens. However, conclusions should be interpreted cautiously because of the retrospective design, small and unequal group sizes, and potential confounding by baseline clinical characteristics.

Introduction

Lung cancer is a disease that is currently a global concern due to its substantial contribution to illness and death rates worldwide. The World Health Organization (WHO) identifies that lung cancer is the leading cause of death worldwide. Reports from the International Agency for Research on Cancer (IARC) indicated that approximately 2.5 million people were recently reported to have lung cancer in 2022, while over 1.8 million deaths were attributed to the disease after diagnosis (1).

According to the Global Cancer Observatory (GLOBOCAN) in 2022, Indonesia accounts for approximately 9.5% of lung cancer cases in Southeast Asia,

with the majority occurring in males (15.4%) (2). Lung cancer is also included among the five priority cancers targeted for focused management during 2024–2034 (3). These findings underscore the importance of lung cancer management, not only from a clinical perspective but also from a healthcare policy perspective.

In clinical practice, chemotherapy remains one of the primary treatment modalities for lung cancer, particularly in advanced stages. According to the Lung Cancer Management Guidelines, first-line chemotherapy regimens consist of platinum-based agents (cisplatin/carboplatin) combined with non-platinum agents such as gemcitabine, paclitaxel, etoposide, and vinorelbine (4). In patients with good performance status and age below 70 years,

combination therapy is recommended for 4–6 cycles (5). Currently, these combination chemotherapy regimens remain the best therapeutic option for patients with stage IIIB or IV NSCLC (6). Treatment selection is also highly dependent on therapeutic goals and cost-effectiveness considerations (4).

Clinically, cisplatin and carboplatin-based chemotherapy combinations demonstrate relatively comparable effectiveness in improving therapeutic response in lung cancer. However, cisplatin is reported to have high toxicity, which causes nausea, vomiting, alopecia, nephrotoxicity, and ototoxicity, particularly among Asian populations (7). Consequently, carboplatin is more frequently used in clinical practice, including at Persahabatan Central General Hospital, due to its better safety profile while maintaining adequate effectiveness (8).

The use of chemotherapy regimens varies considerably among hospitals in Indonesia. Carboplatin–paclitaxel combination therapy has been reported as the most frequently used regimen at Dr. Moewardi Regional General Hospital and Dr. Soetomo General Academic Hospital (11, 12). Similarly, a study by Wulandari reported that the most common chemotherapy regimen at Persahabatan Central General Hospital was carboplatin–paclitaxel (67.5%), followed by carboplatin–etoposide (12.5%) (7).

Several studies have demonstrated differences in effectiveness among chemotherapy regimens. For instance, the cisplatin–docetaxel combination was reported to provide better survival outcomes than cisplatin–etoposide (13). However, research by Shunsuke Inage showed that the carboplatin–paclitaxel combination was more cost-effective than cisplatin–docetaxel (14). Previous studies evaluating the effectiveness of carboplatin–paclitaxel have produced inconsistent results. Some studies reported this regimen to be sufficiently effective, while others found less optimal outcomes compared with cisplatin–etoposide combinations (15, 16).

Beyond clinical effectiveness, cancer is categorized as a high-impact disease due to its high cost, high case volume, and high risk, thereby posing a substantial threat to healthcare financing systems (17). Expenditures for cancer treatment covered by BPJS Kesehatan have continued to increase annually, ranking second only to cardiovascular diseases (3). Therefore, a pharmacoeconomic approach is essential in determining therapeutic options that are not only effective but also cost-efficient (18). One approach to addressing this issue is through Cost-Effectiveness Analysis (CEA).

Several studies have demonstrated significant differences in costs among chemotherapy regimens. Carboplatin–paclitaxel combination therapy has been reported to be more expensive than cisplatin–etoposide, reaching costs up to three times higher, and not always meeting the cost-effectiveness threshold (19). In addition, carboplatin–paclitaxel has also been reported to incur the highest cost compared with other regimens such as gemcitabine–cisplatin and vinorelbine–cisplatin (20). Conversely, cisplatin–etoposide has been considered more economical compared with alternative regimens (21).

Persahabatan Central General Hospital is classified as a Type A hospital and serves as Indonesia's national referral hospital for respiratory diseases, thus playing a crucial role in lung cancer management. Cancer treatment

facilities at the hospital are highly comprehensive, including chemotherapy units for both inpatient and outpatient services, as well as a radiotherapy center. Results from the Anatomical Pathology Laboratory at the hospital demonstrated that more than 80% of detected cancer cases were lung cancer cases. Furthermore, the number of newly diagnosed lung cancer cases increased fivefold over the last decade, with the majority classified as stage IIIB or IV disease (22). Most lung cancer patients were categorized as NSCLC. These findings further emphasize the importance of selecting optimal therapies from both clinical and economic perspectives.

Given the aforementioned background, although various chemotherapy regimens with distinct effectiveness profiles are available, cost considerations remain a crucial factor in therapeutic decision-making. At Persahabatan Central General Hospital, the most commonly used chemotherapy regimen is carboplatin–paclitaxel, followed by cisplatin–pemetrexed and carboplatin–gemcitabine. However, significant cost differences exist among these regimens.

To date, no study has specifically compared the cost-effectiveness of chemotherapy regimens among NSCLC patients at Persahabatan Central General Hospital, particularly among the three most frequently used combinations: carboplatin–paclitaxel, cisplatin–pemetrexed, and carboplatin–gemcitabine. Therefore, this study aims to evaluate the cost-effectiveness of chemotherapy use among NSCLC patients at Persahabatan Central General Hospital in 2023 to determine the most cost-effective therapy among the three chemotherapy combinations. The results of this study are expected to provide a basis for clinical decision-making and the development of more efficient and rational drug utilization policies.

Methodology

Type of Research

This research employed a descriptive-analytic, observational approach, using retrospective data collection methods. Information was gathered from medical records and detailed billing documents of patients diagnosed with NSCLC who received chemotherapy with carboplatin–paclitaxel, cisplatin–pemetrexed, or carboplatin–gemcitabine regimens at Persahabatan Central General Hospital throughout 2023.

Population and Research Sample

In this study, the sample comprised all NSCLC patients who received carboplatin–paclitaxel, cisplatin–pemetrexed, or carboplatin–gemcitabine chemotherapy regimens. Sample data were obtained from complete and supportive medical records from the inpatient unit at Persahabatan Central General Hospital that met the inclusion criteria. The sample criteria consisted of inclusion and exclusion criteria.

The inclusion criteria in this study were patients with lung cancer at Persahabatan Central General Hospital aged 18 years or older who underwent chemotherapy during the 2023 period (first/last chemotherapy cycle between January 1 and December 31, 2023); NSCLC patients with negative EGFR status who had never previously undergone chemotherapy; NSCLC chemotherapy patients who

received carboplatin–paclitaxel, cisplatin–pemetrexed, or carboplatin–gemcitabine treatment from the first until the sixth cycle; NSCLC chemotherapy patients covered under the BPJS Kesehatan health insurance system; NSCLC patients with clear diagnoses, well-documented diagnosis

dates and disease progression, and known patient status; and NSCLC chemotherapy patients with complete medical records and collectible treatment cost data. Patients did not complete all six cycles and lacked sufficient outcome data; they were excluded, which may introduce some

Table 1. Distribution of NSCLC chemotherapy patients based on patient demographic characteristics.

Patient Characteristic	Carboplatin- Paclitaxel		Cisplatin- Pemetrexed		Carboplatin- Gemcitabine		Number of Patients (n=101)	Percentage (%)
	n	%	n	%	n	%		
Age (Years)								
17-25	1	1.3	0	0	0	0	1	1.0
26-35	0	0	1	7.1	0	0	1	1.0
36-45	6	7.4	3	21.4	2	33.3	11	10.9
46-55	18	22.2	2	14.3	0	0	20	19.8
> 56	56	69.1	8	57.1	4	66.7	68	67.3
Gender								
Male	60	74.1	10	71.4	4	66.7	74	73.3
Female	21	25.9	4	28.6	2	33.3	27	26.7
Social Status								
Married	71	87.7	13	92.9	6	100	90	89.1
Single	6	7.4	0	0	0	0	6	5.9
Divorce	4	4.9	1	7.1	0	0	5	5.0
Education								
Kindergarten	1	1.2	1	7.1	0	0	2	2.0
Primary School	2	2.5	0	0	0	0	2	2.0
Junior High School	13	16.1	0	0	2	33.3	15	14.9
Senior High School	49	60.5	9	64.4	3	50.0	61	60.4
Diploma	4	4.9	1	7.1	0	0	5	5.0
Bachelor's Degree	7	8.6	2	14.3	0	0	9	8.9
Master's Degree	5	6.2	1	7.1	1	16.7	7	6.9
Cancer Cell Type								
Non-Small Cell Lung Cancer (NSCLC) Not Otherwise Specified	5	6.2	0	0	0	0	5	5.0
Adenocarcinoma	50	61.7	14	100	2	33.3	66	65.3
Squamous Cell Carcinoma	25	30.9	0	0	4	66.7	29	28.7
Large Cell Carcinoma	1	1.2	0	0	0	0	1	1.0
Cancer Stage								
IIIA	10	12.3	0	0	0	0	10	9.9
IIIB	3	3.7	2	14.3	1	16.7	6	6.0
IIIC	5	6.2	0	0	1	16.7	6	6.0
IVA	47	58.0	8	57.1	4	66.6	59	58.4
IVB	16	19.8	4	28.6	0	0	20	19.8
Comorbidity								
Yes	67	82.7	7	50	5	83.3	79	78.2
No	14	17.3	7	50	1	16.7	22	21.8
Note: The percentage is calculated based on the total number of patients (n = 101).								

selection bias contrary to the initial intent. Exclusion criteria included patients with incomplete or unreadable medical records, and those for whom treatment costs could not be collected.

Research Procedure

Data collection involved documenting all data related to the variables studied. The collected data consisted of patients' medical records and total direct medical costs. This study received ethical approval from the Health Research Ethics Committee of Persahabatan Central General Hospital, Jakarta, under approval number 0089/KEPK-RSUPP/04/2025. This study has obtained permission from the Clinical Research Unit Installation and the Director of HR, Education, and Research at Persahabatan Central General Hospital, Jakarta, number DP.04.03/1/1463/2025.

Data Analysis

The data obtained were analyzed descriptively and displayed in tabular form. After data collection was completed, direct medical costs for each patient were calculated. The costs were then grouped by chemotherapy regimen and averaged. Chemotherapy effectiveness was analyzed by assessing the One-Year Survival Rate and median PFS. Data was analyzed using IBM SPSS version 30.0.

Cost-effectiveness was assessed using ACER, ICER, and dominance analysis. ACER was calculated by dividing the mean direct medical cost by the effectiveness outcome. Incremental analysis was performed by comparing each regimen with the next least costly non-dominated alternative. A regimen was considered dominant when it had a lower cost and higher effectiveness than its comparator. ICER was calculated when a regimen provided greater effectiveness at a higher cost or lower effectiveness at a lower cost.

Potential Confounding

Because this study used a retrospective observational design, potential confounding by baseline clinical characteristics could not be excluded. Baseline characteristics were compared across treatment groups, and the findings were interpreted with caution because treatment selection may have been influenced by cancer stage, histology, comorbidities, performance status, renal function, and physician preference.

Results and Discussion

Patients Characteristic

Based on the patient characteristics presented in **Table 1**, the majority of NSCLC chemotherapy patients at Persahabatan Central General Hospital were aged 56 years or older, accounting for 68 patients (67.3%), followed by the 46–55 years age group with 20 patients (19.8%). The results of this study are consistent with a previous study reporting that lung cancer patients were predominantly in the 51–60 years age group (32.6%) (23). This phenomenon occurs due to the accumulation of genetic alterations caused by continuous exposure to carcinogenic substances from a young age, combined with declining immune defense mechanisms associated with aging, thereby facilitating carcinogenesis (24).

Male patients were the predominant sex among NSCLC patients at Persahabatan Central General Hospital, accounting for 74 patients (73.3%), while female patients accounted for 27 patients (26.7%). A study conducted by Suraya in 2020 also demonstrated that males (62.8%) were more likely to develop lung cancer compared with females (37.2%) (25). The predominance of males in lung cancer incidence worldwide, including in Indonesia, is associated with the greater tendency of males to smoke compared with females (24).

Most NSCLC patients undergoing chemotherapy at Persahabatan Central General Hospital were married, accounting for 90 patients (89.1%), whereas unmarried patients accounted for 6 patients (5.9%). This study result is related to the fact that NSCLC predominantly occurs in older adults, in whom marriage is generally common.

The most common educational level among NSCLC patients at Persahabatan Central General Hospital was senior high school or equivalent, accounting for 61 patients (60.4%). These findings are comparable to those of the study by Cempaka, which reported that the highest proportion of cancer patients had a senior high school education (50%) (26). Educational level is associated with emotional intelligence and the ability to choose appropriate coping strategies when dealing with stress, thereby influencing an individual's understanding of information that may affect health-related decision-making (26).

Distribution of NSCLC Chemotherapy Patients

Some patients undergoing chemotherapy for NSCLC at Persahabatan Central General Hospital, adenocarcinoma was identified as the predominant histopathological subtype, occurring in 66 patients (65.3%). Squamous cell carcinoma was the second most frequent type, found in 29 patients (28.7%). Similar results were reported by Sathiyabalan Sivabalan, who observed that adenocarcinoma represented the majority of lung cancer histopathology cases, reaching 74.6% (27). Earlier investigations have also suggested that the development of adenocarcinoma is strongly linked to molecular and genetic abnormalities, including mutations in KRAS and EGFR, which play important roles in tumor formation and progression (28).

Many lung cancer patients also experienced comorbidities. The obtained data showed that the most common comorbidity among NSCLC chemotherapy patients at Persahabatan Central General Hospital was hypertension, occurring in 36 patients (35.6%). The carboplatin–paclitaxel group dominated this comorbidity category, while the second most common comorbidity was type 2 diabetes mellitus, accounting for 18 patients (17.8%). These study results are associated with the fact that most NSCLC patients were older than 50 years, an age group that constitutes a risk factor for hypertension and type 2 diabetes mellitus (29).

The highest incidence of side effects occurred in the carboplatin–paclitaxel group, partly due to the unequal sample sizes across the treatment groups. The carboplatin–paclitaxel group included more patients than the cisplatin–pemetrexed and carboplatin–gemcitabine groups. But it's worth noting that the adverse events in **Table 2** should be reported as absolute numbers, not as rate comparisons between groups, because the sample

sizes differ substantially.

A previous study investigating toxicity in the carboplatin–paclitaxel and carboplatin–pemetrexed chemotherapy groups reported that the most common toxicities included nausea, vomiting, alopecia, and neuropathy, with a higher incidence observed in the carboplatin–paclitaxel group (30). Wulandari also stated that carboplatin and cisplatin have comparable effectiveness; however, carboplatin toxicity is more tolerable than cisplatin because cisplatin is associated with greater toxic effects, such as nausea/vomiting and alopecia (7). These results are consistent with the present study, in which the most common adverse effects in the cisplatin–pemetrexed group were nausea/vomiting, followed by alopecia.

Chemotherapy drugs not only attack cancer cells but also affect other cells in the body, including hair follicle cells, thereby causing hair loss (31). Meanwhile, nausea and vomiting occur due to signals originating in the chemoreceptor trigger zone (CTZ), which responds to chemicals present in chemotherapy agents (32).

One of the causes of lung cancer is exposure to carcinogenic substances, including nicotine contained in cigarettes. **Table 3** shows that most NSCLC chemotherapy patients at Persahabatan Central General Hospital had a history of smoking (54.5%). A previous review study analyzing several journals reported that smoking history was more commonly found among lung cancer patients than non-smokers, as mentioned in 7 out of 11 reviewed

journals. These findings are consistent with the theory that smoking is the primary risk factor for lung cancer (24). This is also associated with the patient characteristics observed in this study, where the majority of NSCLC patients were male, a population generally associated with smoking habits.

The distribution of cancer stages among NSCLC chemotherapy patients at Persahabatan Central General Hospital was predominantly stage IVA, accounting for 59 patients (58.4%), followed by stage IVB with 20 patients (19.8%). These findings are consistent with previous studies showing that NSCLC patients are commonly diagnosed at advanced stages, particularly stage IVA, accounting for 25.6% of cases (32). Larger nodule size increases the likelihood of detecting lung nodules; therefore, many early-stage nodules remain undetected during examination (32).

The most frequently used chemotherapy regimen among NSCLC patients at Persahabatan Central General Hospital during the 2023 period was the carboplatin–paclitaxel combination (see **Table 4**). This finding is consistent with the study by Wulandari (2016), which reported that the most commonly used chemotherapy regimen in the hospital's inpatient setting was carboplatin–paclitaxel (67.5%) (7). Similar findings were also reported at Dr. Moewardi Regional General Hospital, where the carboplatin–paclitaxel regimen accounted for 29.55% of chemotherapy use (11), and at Dr. Soetomo General Academic Hospital, where carboplatin–paclitaxel

Table 2. Distribution of adverse event episodes among NSCLC patients receiving chemotherapy.

Adverse event	Carboplatin-Paclitaxel		Cisplatin-Pemetrexed		Carboplatin-Gemcitabine		Total (n=223)	Percentage Total (%)
	n	%	n	%	n	%		
Alopecia	68	30.5	3	1.3	1	0.4	72	32.3
Neuropathy	55	24.7	1	0.4	4	1.8	60	26.9
Nausea/Vomiting	29	13.0	12	5.4	5	2.2	46	20.6
Myalgia	26	11.7	0	0	1	0.4	27	12.1
Diarrhea	8	3.6	0	0	0	0	8	3.6
Dermatitis, Skin Rash	2	0.9	0	0	2	0.9	4	1.8
Paronychia	2	0.9	0	0	0	0	2	0.9
Anemia	2	0.9	0	0	0	0	2	0.9
Mucositis	1	0.4	0	0	0	0	1	0.4
Tremor	0	0.0	1	0.4	0	0	1	0.4
Total	193	86.6	17	7.6	13	5.8	223	100

Note: One patient experienced more than one adverse event.

Table 3. Distribution of NSCLC chemotherapy patients based on smoking history.

Smoking Habits	Number of Patients (n=101)	Percentage (%)
Yes	55	54.5
No	46	45.5

Note: Smoking history is recorded as one of the important risk factors in the development of lung cancer, particularly adenocarcinoma and squamous cell carcinoma.

therapy accounted for 65% of cases (12).

Currently, platinum-based combination therapy is strongly recommended. Chemotherapy combinations using third-generation agents such as paclitaxel, gemcitabine, docetaxel, and vinorelbine have demonstrated favorable therapeutic responses and significant improvements in survival outcomes (28).

Cost-Effectiveness Analysis

Cost-effectiveness was assessed using ACER, ICER, and dominance analysis. ACER was calculated by dividing the mean direct medical cost by the effectiveness outcome. These metrics facilitate a comparative economic evaluation. Incremental analysis was performed by comparing each regimen with the next least costly non-dominated alternative. A regimen was considered dominant when it had a lower cost and higher effectiveness than its comparator. ICER was calculated when a regimen provided greater effectiveness at a higher cost or lower effectiveness at a lower cost, serving as a crucial indicator for determining the incremental value of the treatment.

Cost-Effectiveness Analysis of Chemotherapy Use in NSCLC Patients at Persahabatan Central General Hospital Based on One-Year Survival Rate

Table 5 shows that the carboplatin–paclitaxel combination incurred lower direct medical costs while demonstrating no significant difference in effectiveness. Consequently, the carboplatin–paclitaxel combination also produced the lowest Average Cost-Effectiveness Ratio (ACER) compared with cisplatin–pemetrexed and carboplatin–gemcitabine. These findings are consistent with a study by Robert Klein, which reported that the carboplatin–paclitaxel chemotherapy group was more cost-effective than the cisplatin–pemetrexed and cisplatin–gemcitabine groups (30).

Cost-Effectiveness Analysis of Chemotherapy Use in NSCLC Patients at Persahabatan Central General Hospital Based on Progression-Free Survival (PFS)

All patients had complete progression data, and no patients were censored. PFS was defined as the time from chemotherapy initiation to documented disease progression or death, whichever occurred first. The median

Table 4. Distribution of chemotherapy utilization patterns among non-small cell lung cancer patients at persahabatan central general hospital.

No	Drug Name	Number of Patient (n= 101)	Percentage (%)
1	Carboplatin-Paclitaxel	81	80.20
2	Cisplatin-Pemetrexed	14	13.86
3	Carboplatin-Gemcitabine	6	5.94

Table 5. ACER analysis based on one-year survival rate.

Drug Name	Total Cost (6 Cycles) (Rp)	One Year Survival Rate (%)	ACER (Rp)
Carboplatin-Paclitaxel (n=81)	27,588,547	82.72	333,517
Cisplatin-Pemetrexed (n= 14)	41,214,281	71.43	576,988
p-value	0.001*	0.320**	
Carboplatin-Paclitaxel (n=81)	27,588,547	82.72	333,517
Carboplatin-Gemcitabine (n=6)	47,471,752	66.66	712,147
p-value	0.001*	0.328**	
Cisplatin-Pemetrexed (n= 14)	41,214,281	71.43	576,988
Carboplatin-Gemcitabine (n=6)	47,471,752	66.66	712,147
p-value	0.032*	0.831**	

Note: p-value < 0.05; *Mann Whitney test and **Chi-Square test.

Table 6. ACER & ICER analysis based on median progression-free survival.

Drug Name	Total Cost (6 Cycles) (Rp)	Median PFS (Month)	ACER (Rp)	ICER
Carboplatin-Paclitaxel (n=81)	27,588,547	7	3,941,221	5,450,293
Cisplatin-Pemetrexed (n= 14)	41,214,281	9.5	4,338,346	
p-value	0.001	0.156		
Carboplatin-Paclitaxel (n=81)	27,588,547	7	3,941,221	
Carboplatin-Gemcitabine (n=6)	47,471,752	6	7,911,959	
p-value	0.001	0.288		
Cisplatin-Pemetrexed (n= 14)	41,214,281	9.5	4,338,346	
Carboplatin-Gemcitabine (n=6)	47,471,752	6	7,911,959	
p-value	0.032	0.115		

Note: P-value < 0.05; Mann Whitney test.

PFS for each drug group was analyzed using descriptive statistics, and the Mann-Whitney test was then used to compare median PFS between the two chemotherapy groups.

Table 6 shows that the carboplatin–paclitaxel combination incurred lower direct medical costs while demonstrating no statistically significant difference in effectiveness compared with cisplatin–pemetrexed and carboplatin–gemcitabine. Based on the reported median PFS, cisplatin–pemetrexed had longer PFS than carboplatin–paclitaxel but also a higher cost. Therefore, this comparison requires ICER-based interpretation rather than solely ACER-based interpretation; however, based on statistical tests of the one-year survival rate and median PFS, there was no significant difference. Based on these ACER results, it can be concluded that carboplatin–paclitaxel was more cost-effective than cisplatin–pemetrexed and carboplatin–gemcitabine, as it provided comparable effectiveness at a lower cost.

These findings are consistent with previous studies showing that the carboplatin–paclitaxel chemotherapy group had a lower ACER value of \$59,318 than the cisplatin–pemetrexed group (\$70,056) and the cisplatin–gemcitabine group (\$66,953) (30). Shunsuke Inage also reported that carboplatin–paclitaxel was more cost-effective than cisplatin–docetaxel (14).

However, these findings differ from those reported by Mario Eandi, who stated that the carboplatin–paclitaxel chemotherapy group was more expensive than the cisplatin–gemcitabine group but demonstrated better effectiveness. Therefore, the ICER between the two drug combinations was calculated at 52,326 euros/YOL, which remained below the maximum acceptable willingness-to-pay (WTP) threshold (7).

In the study by Barate, the median PFS in the carboplatin–paclitaxel group was longer than in the cisplatin–pemetrexed group, whereas the present study found the opposite. However, the costs incurred by the cisplatin–pemetrexed group remained higher than those of the carboplatin–paclitaxel group (34).

No statistically significant difference in one-year survival rate or median PFS was observed among the three chemotherapy regimens. However, this finding should be interpreted cautiously due to unequal sample sizes and the small number of patients in the cisplatin–pemetrexed and carboplatin–gemcitabine groups.

These findings are consistent with the study conducted by Rianya, which demonstrated that

carboplatin–paclitaxel and carboplatin–pemetrexed had comparable effectiveness; however, the carboplatin–paclitaxel group required lower costs (33).

The analysis demonstrated that the carboplatin–paclitaxel combination incurred lower direct medical costs, with no statistically significant difference in effectiveness compared with cisplatin–pemetrexed or carboplatin–gemcitabine. Based on these ACER results, it can be concluded that carboplatin–paclitaxel was more cost-effective than cisplatin–pemetrexed and carboplatin–gemcitabine, as it provided similar effectiveness at a lower cost.

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Although carboplatin–paclitaxel was identified as the most cost-effective regimen based on ACER and dominated the alternatives in one-year survival, an incremental analysis was also conducted to compare regimens when one was more effective but also more costly. **Table 7** presents an ICER of 5,450,293 IDR for the comparison between carboplatin–paclitaxel and cisplatin–pemetrexed, indicating that an incremental analysis was required because cisplatin–pemetrexed demonstrated longer median PFS at a higher cost.

The carboplatin–gemcitabine group was not recommended compared with the cisplatin–pemetrexed group because it incurred higher treatment costs. The higher costs in the carboplatin–gemcitabine group were attributed to gemcitabine chemotherapy, which required two treatment administrations per chemotherapy cycle,

Table 7. Cost-effectiveness based on dominance analysis.

Comparison	Cost difference	Effect difference	Economic interpretation
Carboplatin–paclitaxel vs cisplatin–pemetrexed using one-year survival	Lower cost	Higher observed survival	Carboplatin–paclitaxel dominant
Carboplatin–paclitaxel vs cisplatin–pemetrexed using PFS	Lower cost	Lower PFS	ICER required
Carboplatin–paclitaxel vs carboplatin–gemcitabine	Lower cost	Higher or similar effectiveness	Carboplatin–paclitaxel dominant
Cisplatin–pemetrexed vs carboplatin–gemcitabine	Lower cost	Higher PFS	Cisplatin–pemetrexed dominant

resulting in nearly double the treatment cost

Conclusion

In this retrospective study of BPJS-insured NSCLC patients at Persahabatan Central General Hospital, carboplatin–paclitaxel was associated with the lowest direct medical cost among the three evaluated chemotherapy regimens. Based on one-year survival rate, carboplatin–paclitaxel showed the most favorable cost-effectiveness profile and dominated cisplatin–pemetrexed and carboplatin–gemcitabine. However, cisplatin–pemetrexed demonstrated a longer median PFS than carboplatin–paclitaxel, albeit at a higher cost, necessitating ICER analysis to evaluate the additional cost per unit of effectiveness gained. The ICER for cisplatin–pemetrexed *versus* carboplatin–paclitaxel was 5, 450, 293 IDR per additional month of PFS, indicating that the choice of regimen should balance both average and incremental cost-effectiveness, as well as clinical priorities. Statistical analysis showed no significant differences in one-year survival rate or median PFS, and the findings should be interpreted with caution due to the retrospective design, unequal group sizes, and potential confounding factors.

Abbreviations

SCLC = Small Cell Lung Cancer; NSCLC = Non-Small Cell Lung Cancer; ACER = Average Cost-Effectiveness Ratio; ICER = Incremental Cost-Effectiveness Ratio; PFS = progression-free survival.

Declaration

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Contribution: Data Curation, Validation, Supervision, Resources.

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Conflict of Interest

The authors declare no conflict of interest.

Data Availability

The data used in this study are stored securely by the researchers and cannot be published publicly to maintain the confidentiality of patient information and comply with the principles of research ethics. Access to data can only be given to authorized parties in accordance with ethical approval and related institutional policies.

Ethics Statement

This research has obtained ethical feasibility permit from RSUP Persahabatan Health Research Ethic Committee (Approval No [0089KEPK-RSUPP/04/2025]).

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