Zahrotul Habibah, Purwadhi, Nining Handayani

THE EFFECT OF COMPLIANCE IN THE USE OF CLINICAL PATHWAY (CP) AND DURATION OF CARE ON COST EFFICIENCY IN PATIENTS WITH CAESARIAN SECTION (SC)

Zahrotul Habibah*[1], Purwadhi[2], Nining Handayani[3]

[1,2,3] Postgraduate program in Master of Management, Adhirajasa Reswara Sanjaya University
*Corespondence email zahrotul.habibah94@gmail.com

ABSTRAK : PENGARUH KEPATUHAN PADA PEMANFAATAN *CLINICAL PATHWAY* (CP) DAN LAMA PERAWATAN TERHADAP EFISIENSI BIAYA PADA PASIEN OPERASI *CAESARIA* (SC)

Clinical Pathway (CP) penting untuk mengurangi biaya, lama perawatan serta dapat meningkatkan mutu pelayanan pasien, terutama pada era asuransi Jaminan Kesehatan Nasional (JKN). Tujuan studi ini adalah untuk mengetahui pengaruh angka kepatuhan terhadap CP dan lama perawatan terhadap efisiensi biaya perawatan pasien *sectio cesarean* (SC). Studi *cross sectional* menggunakan data primer di RS Edelweiss bulan Juli-September 2024. Tingkat kepatuhan CP berkorelasi positif secara signifikan terhadap GPM (r=0.558, p<0.001), dan lama perawatan berkorelasi secara negatif secara signifikan terhadap GPM (r=-0.467, p<0.001). Hasil analisa regresi linier didapatkan tingkat kepatuhan CP dan lama perawatan secara simultan mempengaruhi GPM (F=10,221, p<0.001). Kepatuhan terhadap penggunaan *Clinical Pathway* serta pengelolaan lama perawatan memiliki pengaruh yang signifikan terhadap efisiensi biaya pada pasien *sectio caesarean* (SC). Keunggulan dari penelitian ini yaitu relevansi topik yang diteliti dengan situasi manajemen RS saat ini dan menggunakan metode kuantitatif memungkinkan pengukuran yang objektif terhadap variabel-variabel yang diteliti, seperti biaya, lama perawatan, dan tingkat kepatuhan.

Kata Kunci: kepatuhan terhadap *clinical pathway*, lama perawatan, efisiensi biaya

ABSTRACT

Clinical Pathways (CP) are crucial for reducing costs and length of stay while improving patient service quality, especially in the era of the National Health Insurance (JKN). This study aims to determine the effect of compliance rates with CP and length of stay on cost efficiency for patients undergoing cesarean section (CS). A cross-sectional study was conducted using primary data at Edelweiss Hospital from July to September 2024. A significant positive correlation was found between CP compliance and GPM (r=0.558, p<0.001), while length of stay had a significant negative correlation with GPM (r=-0.467, p<0.001). Linear regression analysis showed that both CP compliance and length of stay significantly influenced GPM (F=10.221, p<0.001). Compliance with the use of Clinical Pathways and management of length of stay significantly affects cost efficiency for patients undergoing cesarean section (CS) at Edelweiss Hospital Bandung. The excellence of this research is the relevance of the topic studied to the current hospital management situation and uses quantitative methods allowing objective measurements of the variables studied, such as costs, length of treatment, and level of compliance .

Keywords: compliance of the use of clinical pathway, length of stay, cost efficiency

INTRODUCTION

In the era of globalization, hospitals strive to provide the best service despite cost and facility constraints, especially for JKN patients. Doctors also strive to provide maximum service according to their knowledge, but clinical variations can trigger uncontrolled costs. Therefore, the implementation of Clinical Pathway (CP) is important to reduce costs, accelerate treatment, and improve service quality and patient satisfaction (Firmansyah et al., 2022). In addition, this *clinical pathway model* is designed to increase the efficiency and effectiveness of health services, which is ultimately expected to increase the number of claims approved by BPJS (Sunarjo et al., 2024) and aims to improve the quality of health services and cost control, two main pillars in the health insurance system. (Nurdin et al, 2023) The cost efficiency of health services, especially in hospitals, is very important given the limited budget and increasing need for care. The main factors that influence costs are the length of hospitalization and the medical team's compliance with evidence-based protocols such as clinical pathways (CP) (JAMA Network, 2021; McKinsey, 2023). The 2025 BPJS

Kesehatan budget deficit projection and the INACBGs JKN tariff polemic worsen the situation. Edelweiss Bandung Hospital, which has not yet achieved its cost efficiency target, needs to prepare and implement CP to serve JKN patients while maintaining service quality. Based on research by Arbey, et al., it was also concluded that the better the facility dimension in service quality, the higher the patient satisfaction, especially BPJS patients (Arbey, 2024)

Clinical Pathway (CP) is a multidisciplinary guideline that organizes health care from admission to discharge, aimed at improving patient safety, reducing costs, and improving quality and patient satisfaction (Bai et al., 2018). CP integrates elements of clinical care and standard procedures to reduce variation in medical practice and improve efficiency and patient outcomes (Vanhaecht et al., 2012). Studies have shown that well-implemented CP can improve clinical outcomes, reduce costs, and accelerate patient recovery (AAP, 2023; Cochrane, 2023).

Compliance with CP is essential in reducing the cost of care, by reducing the length of stay and unnecessary medical procedures (Siddique et al., 2021; Ghaferi et al., 2021). Hospitals that consistently implement CP experience significant reductions in costs and length of stay, as well as improved quality of medical documentation that helps monitor costs and care (Neliti, 2019). Several studies have shown that CP can reduce the cost of care in patients with acute ischemic stroke and heart disease (Stenly Iroth et al., 2016; Pahriyani et al., 2014).

CP is also important in managing the cost of care, especially in common procedures such as caesarean section (CS). The length of care after caesarean section has a direct effect on hospital costs, so the effect of compliance with CP in reducing the duration of hospitalization can increase cost efficiency. This study focuses on the effect of compliance with CP and length of care on cost efficiency at Edelweiss Hospital Bandung, especially in the context of CS patient care.

THEORITICAL REVIEW
Theory Description
Clinical pathway (CP) is an evidence-based tool used since the 1980s to guide clinical care, aimed at improving patient safety, clinical efficiency, and reducing costs. CP is a multidisciplinary guideline with minimal service standards that govern care from admission to discharge. Its goals include improving quality of care, reducing risk, and patient satisfaction. CP can be developed from previous research and clinical practice guidelines to streamline the care of patients with specific diagnoses or procedures. CP can be applied in various health fields, including prevention and acute, chronic, and palliative care. Several important factors that influence the success of *clinical pathway implementation* include medical staff compliance, communication between medical teams, and information system support (Sunarjo et al., 2024).

The main goal of implementing a Clinical Pathway (CP) is to align clinical practice with approved guidelines to provide high-quality care, reduce variation in clinical practice, and improve efficiency. CP reduces complications and medication errors by providing a specific service pathway for patients with a particular diagnosis or procedure. CP also implements clinical guidelines in local practice, making it a tool to improve evidence-based care. Studies have shown that CP reduces complications and hospital costs, although the initial implementation costs can be high. CP is important to implement in hospitals to meet the demands of cost efficiency and quality management set by health insurance systems such as BPJS Kesehatan.

The implementation of CP as a form of strategy in an organization is carried out based on a perspective on what is expected in the future. (Purwadhi, 2020) helps ensure that the health services provided are in accordance with evidence-based guidelines, which can ultimately improve operational efficiency, reduce variation in care, and ensure better clinical outcomes for patients. (Wijaya Nurdin & Wiseto Agung, 2023)

RESEARCH METHODS
This study used a quantitative design with a cross-sectional approach to collect data on cost efficiency in JKN CS patients at Edelweiss Hospital Bandung between July and September 2024. The data collected included the calculation of Gross Profit Margin (GPM) and Cost of Goods Sold (HPP), as well as information related to the length of treatment and compliance with the Clinical Pathway (CP). The population studied were all JKN patients who underwent CS by DPJP Obstetrics and Gynecology during that period. The sample of this study was taken using a total sampling technique with inclusion criteria that included patients who underwent CS treatment without complications, while exclusion criteria included patients with procedures outside of CS or who experienced complications.

Data collection was conducted using secondary data obtained from the finance team for GPM and HPP, the JKN team for length of care, and the quality team for the level of compliance with CP.

The data collected were then analyzed descriptively using SPSS software. This analysis includes frequency and percentage distributions, as well as statistical tests such as the unpaired t-test and the Mann-Whitney test to compare groups. In addition, multivariate linear regression was conducted to measure the effect between the independent variables (compliance with CP and length of care) on the dependent variable, namely cost efficiency.

This study also tested the hypothesis stating that there is an influence between compliance with CP, length of care, and both on cost efficiency. Simple regression tests were conducted to test the influence of each independent variable on the dependent variable, while multiple regression tests were conducted to test the influence of the combination of the two independent variables on cost efficiency. Decisions regarding the significance of hypothesis testing are based on a comparison of calculated values with table values, with a significance level of $p < 0.05$.

Implementation of Clinical Pathway (CP) requires good planning by involving medical personnel and overcoming resistance, as well as using an implementation team and identifying practice gaps. Compliance with CP can affect the cost efficiency of hospital care. Length of stay , which is influenced by patient conditions and hospital facilities, is an indicator of efficiency and quality of care. Implementation of CP, coordination of medical teams , and health technology can accelerate recovery, reduce complications, and lower costs. Cost efficiency involves resource management, implementation of CP, and medical technology to improve the quality of care without waste. Gross Profit Margin (GPM) and Cost of Goods Sold (COGS) are used to assess the cost efficiency of care, with the aim of reducing costs and increasing efficiency without sacrificing service quality.

Framework
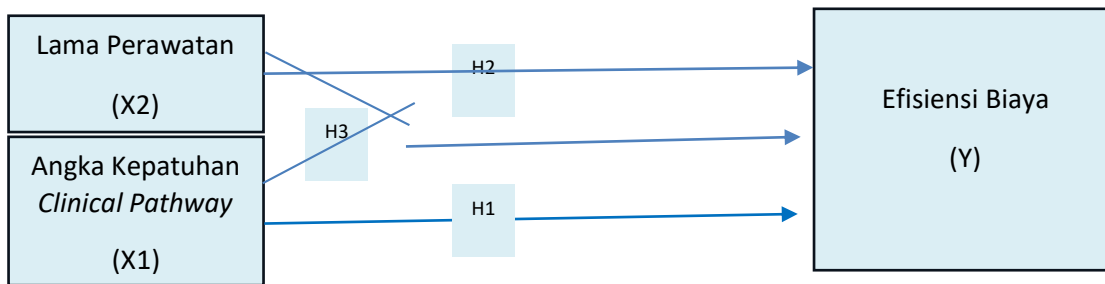
Gambar 1 Kerangka Pemikiran

RESEARCH RESULT
Data Processing and Analysis Results

This research was conducted at Edelweiss Hospital in Bandung City in July-September 2024. Edelweiss Hospital is a group of companies providing health services in West Java. Edelweiss Hospital was first opened on August 14, 2020 in Bandung, when the Covid-19 pandemic was ongoing. Edelweiss Hospital is one of the best private hospitals in Bandung City located at Jl. Soekarno Hatta No. 550. The building area reaches 15,986 M2 and the land area is 5,141 M2, with 8 floors. This type C hospital has a capacity of 124 beds with an initial activation of 60 beds. In 2021, Edelweiss Hospital Bandung received 35,487 outpatients and 3,034 inpatients (Bandung City Health Profile, 2021). In 2022, Edelweiss joined BPJS Kesehatan. Initially, the collaboration was limited to 4 services. However, it has now been developed into 8 services.

Patient Characteristics

Data collection at Edelweiss Hospital in Bandung City was carried out consecutively during the study period, and 59 patient data were obtained that were *eligible* for analysis. The average age of patients who underwent CS without complications was 30.68 years, with an age range of 22 to 43 years. There were 49 patients under 35 years old, and only 10 patients were in the high-risk age range (≥ 35 years). Most patients were high school graduates, and almost 40% were D3/S1/S2 graduates. Less than 10% of patients were elementary or junior high school graduates. A description of patient characteristics is listed in Table IV.1.

Table 1
Patient Characteristics

Characteristics	Mean ± SD or median (minimum-maximum)
Age	30.68 ± 4.51
Education	
SD	1 (1.7%)
JUNIOR HIGH SCHOOL	4 (6.8%)
High School/Senior High School	30 (50.9%)
D3	2 (3.4%)
S1	18 (30.5%)
S2	4 (6.8%)
Gross Profit Margin (GPM)	17.26 % (-58.65 % to 33.39%)
Cost of Goods Sold (COGS)	5,604,064.38 (4,069,509.72 to 11,676,278.67)
Treatment Duration	
≤ 3 days (N(%))	47 (79.7%)
> 3 days (N(%))	12 (20.3%)
Level of compliance with CP	
< 80%	51 (86.4%)
≥ 80%	8 (13.6%)

Gross Profit Margin (GPM)

Gross Profit Margin (GPM) data were not normally distributed, so they were reported in median (minimum ─ maximum). The range of GPM ranged from -58.65 % to 33.39%. Approximately 10 patients had negative GPM, and all of these negative GPM patients had CP compliance levels of less than 80%.
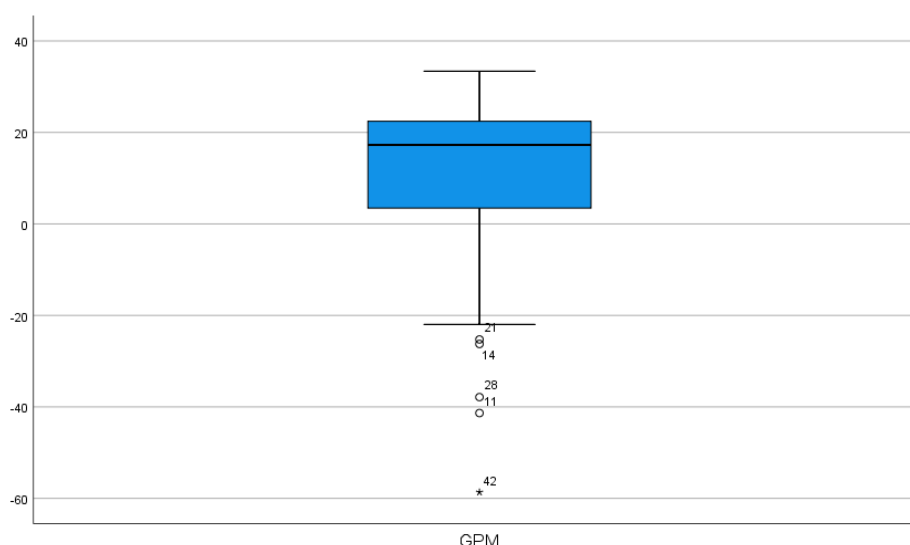

Figure. 1 *Gross Profit Margin* (GPM) Distribution Data

Cost of goods sold (COGS)

Cost of goods sold (COGS), in this case the SC action and its treatment at Edelweiss Hospital Bandung cost the lowest cost of Rp. 4,069,509, with a treatment duration of 3 days and GPM 22%, and the highest cost was Rp. 11,676,278 with a treatment duration of 4 days and GPM -59%.
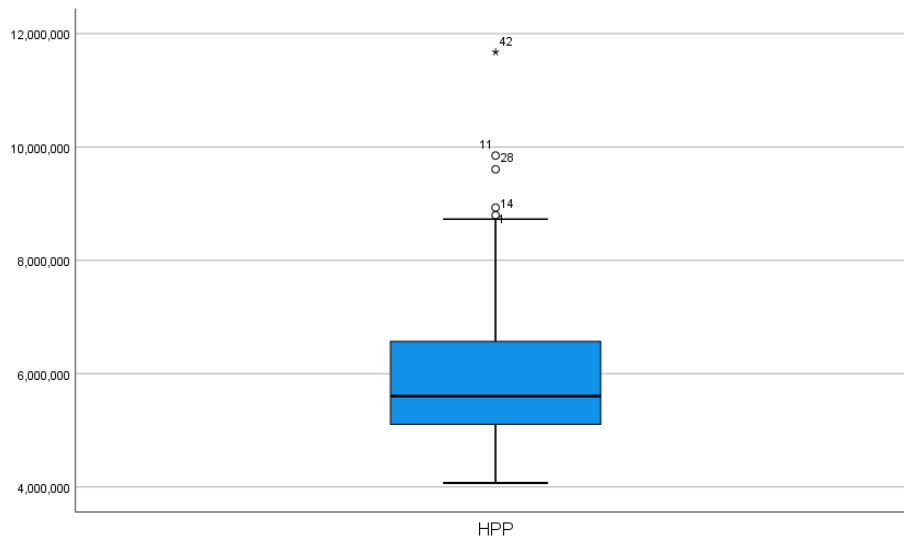
Figure 2 Distribution Data of Cost of Goods Sold (HPP)

Length of Treatment and Level of Compliance of *Clinical Pathway* (CP)

The majority of patients were treated for ≤ 3 days, with a range of treatment duration of 2 to 4 days. Most of the CS procedures only complied with < 80% CP, and only 8/59 cases complied with CP ≥ 80%. All patients with a CS compliance rate of ≥ 80% had a treatment duration of ≤ 3 days (N(%)).

Table 2
Length of Treatment and Level of Compliance with *Clinical Pathway* (CP) by Age and Gender

Characteristics	Treatment Duration		CP compliance level	
	≤ 3 days	>3 days	< 80%	≥ 80%
Age				
20-35 years	41 (69.5)	10 (16.9)	44 (74.6)	7 (11.9)
>35 years	6 (10.2)	2 (3,4)	7 (11.9)	1 (1.7)
Education				
SD	1 (1.7)	0 (0)	1 (1.7)	0 (0)
Junior High School	4 (6.8)	0 (0)	4 (6.8)	0 (0)
High School/Senior High School	24 (40.7)	6 (10.2)	28 (47.5)	2 (3,4)
D3	0 (0)	2 (3.4)	2 (3,4)	0 (0)
S1	15 (25.4)	3 (5.1)	14 (23.7)	4 (6.8)
S2	3 (5.1)	1 (1.7)	2 (3,4)	2 (3,4)

Hypothesis Test Results

The hypothesis will be tested using the T test for hypothesis 1 (X_1 Y) and hypothesis 2 (X_2 Y). However, because the distribution of data on length of care and level of CP compliance with GPM was not normal, a Mann -Whitney test was conducted to test the hypothesis (X_1 Y) and hypothesis 2 (X_2 Y).

There was a significant difference between the length of treatment (p<0.001) and the level of CP compliance (p<0.001) to GPM. Patients who were treated ≤ 3 days had a higher median GPM of 20.94%, compared to patients who were treated > 3 days, which was 2.39%. The difference in median GPM reached 18.55%. The median GPM was also higher in the CP compliance group ≥ 80% compared to the CP compliance group < 80%, which was 29.17% vs 15.23%. The difference in median GPM between the CP compliance group < 80% and ≥ 80% reached 13.94%.

Next, hypothesis 3 (H1 + H2Y) will be tested using the F test with linear regression. The variables that will be included in the linear regression analysis are variables that in the bivariate analysis have a p value <0.25. The parameter of the strength of the relationship used for bivariate analysis is the correlation coefficient, so the Pearson test is carried out to find the r value and p value. However, because the data is not normally distributed, the Spearman correlation test is carried out as in Table IV.4.

Table 3
Relationship between Length of Treatment and Level of *Clinical Pathway Compliance* with *Gross Profit Margin* (GPM)

Characteristics	Gross Profit Margin (GPM) (median (minimum-maximum))	p- value
Treatment Duration		<0.001
≤ 3 days (N(%))	20.94 % (-37.87 % to 33.39%)	
> 3 days (N(%))	2.39 % (-58.65% to 17.10%)	
Level of compliance with CP		<0.001
< 80%	15.23 % (-58.65 % to 29.9%)	
≥ 80%	29.17 % (23.51% to 33.39%)	

Table 4
Correlation of Length of Treatment and Level of Compliance of *Clinical Pathway* (CP) to *Gross Profit Margin* (GPM)

Characteristics	r value	p- value
Treatment Duration	-0.467	<0.001
Level of compliance with CP	0.558	<0.001

Length of treatment and level of CP compliance have a significant correlation with GPM (p <0.001). Length of treatment has a moderate negative correlation with GPM (r = -0.467). While the level of compliance with CP has a moderate positive correlation with GPM (r = 0.558). Furthermore, these two variables were analyzed using linear regression to determine the value of determining the most influential variables and determining the F value.

Table 5
Multivariate Linear Regression Analysis

Characteristics	Coefficient	Correlation coefficient	p- value
Constants	14,447		
Treatment Duration	-18,071	-0.378	0.002
Level of compliance with CP	16,036	0.285	0.018

From the linear regression analysis, it was found that the length of treatment (p < 0.002) and the level of CP compliance (p < 0.018) were statistically significant predictors of GPM. From the coefficients obtained, an equation can be formulated to predict GPM:

GPM = 14,447 – 18,071 (length of treatment) + 16,036 (CP compliance level)

Constant (k)   : 14.447
Duration of treatment   : (1) if ≤ 3 days, and (2) if > 3 days

CP compliance level   : (1) if <80%, and (2) if ≥ 80%

Furthermore, the F test is used to determine whether the independent variables (duration of treatment and level of CP compliance) simultaneously affect the dependent variable (GPM). The F test is conducted by comparing the $_{calculated F}$ and the F $_{table}$. For the F table value at a significance level of 0.05 with a numerator degree of freedom of 1 (k-1 = 2-1) and a denominator degree of freedom of 58 (nk = 59-1) (Pratisto, 2009) the result is 0.0172.

Table 6
F Test Analysis

ANOVA [a]					
Model	Sum of Squares	df	Mean Square	F	Sig
1 Regression	5842,974	2	2921,487	10,221	<0.001 [b]
Residual	16007,270	56	285,844		

a. Dependent variable: *Gross Profit Margin* (GPM)
b. Predictors: (Constant), Level of *clinical pathway* (CP) compliance, Length of treatment

The F test results have proven that independent variables simultaneously affect the dependent variable (F = 10.221; p <0.001). For the coefficient of determination, obtained from the R Square test, which is 0.241 or 24.1%. This means that the independent variables consisting of the length of care and the level of CP compliance are able to explain GPM by 24.1%. The remaining 75.9% is explained by other variables that are not studied or not included in the regression model.

So from the results of the analysis, it can be interpreted:

1. Hypothesis 1 (H_1)
    calculated t value > t_{table} then H_0 is rejected and H_1 is accepted or significant. The results of the statistical analysis show that the *p value* of the t test of the CP compliance rate against GPM is <0.001, and is less than the significance limit of p <0.05, meaning that there is an influence of the *CP* compliance rate (X_1) on cost efficiency (Y).

2. Hypothesis 2 (H_2)
    calculated t value > t_{table} then H_0 is rejected and H_2 is accepted or significant. The results of the statistical analysis show that the *p value* of the t test of the length of care on GPM is <0.001, and less than the significance limit of p <0.05, meaning that there is an effect of the length of care (X_2) on cost efficiency (Y) .

3. Hypothesis 3
    calculated F value > F_{table} then H_0 is rejected and H_3 is accepted or significant. This means that there is an influence of the *CP* compliance rate (X_1) and length of treatment (X_2) on cost efficiency (Y).

DISCUSSION

Clinical Pathway (CP) is an evidence-based tool that integrates clinical practice guidelines into the care process, aiming to standardize health services. CP is important to improve the quality of care by reducing length of stay, costs, and improving patient outcomes. Compliance with CP is an indicator of its implementation, showing the extent to which medical personnel follow established protocols. In the context of JKN, hospital cost efficiency is very important because the payment system is shifting from fee-for-service to prospective payment system.

This study found that compliance with CP in CS patients was positively correlated with Gross Profit Margin (GPM), with a difference in cost efficiency reaching 13.94%. Several studies support this finding, such as Fitria's (2018) study which showed that CP reduces the length of stay and hospital costs. The implementation of CP at the NU Demak Islamic Hospital also showed a decrease in treatment days and cost efficiency. Other studies have shown that compliance with CP can reduce the length of stay and hospital costs, as well as increase cost efficiency as reported by Firdaus et al. (2023) and Hertler (2020).

In Sunarjo's research, it was also found that the implementation of *clinical pathways* can reduce variations in clinical practice, accelerate the diagnosis and treatment process, and reduce hospital operational costs. (Sunarjo et al, 2024) Likewise, a study by Nugraha et al, stated that with better service quality, patient satisfaction and loyalty increase. This efficiency is achieved through clinical pathways that regulate treatment procedures more optimally, shorten the length of treatment, and ultimately reduce overall hospital costs . (Nugraha, AC , et al, 2023

Meta-analysis by Rotter et al. (2018) showed that the implementation of Clinical Pathway (CP) can reduce complications in the hospital, which has the potential to reduce treatment costs. A study at Bethesda Hospital Yogyakarta found that the cost of treatment in acute ischemic stroke patients was significantly reduced after the implementation of CP, with savings reaching IDR 2,446,961.70 . Another study by Panella et al. (2003) also showed that CP increases care efficiency and reduces costs, because it standardizes care steps and avoids unnecessary procedures. Likewise, a study by Vanhaecht (2006) found that compliance with CP can reduce resource waste and result in cost savings.

However, there are also studies that show that CP does not always contribute significantly to

cost efficiency. Studies by James et al. (2011) and Grimshaw et al. (2004) stated that other factors such as case complexity or the severity of the patient's condition affect cost efficiency more than compliance with CP itself. This study shows that additional procedures required in complex cases can actually increase the cost of care.

This study also found that length of stay was negatively correlated with Gross Profit Margin (GPM), meaning that the longer the stay, the lower the GPM obtained. This study supports other studies showing that longer stays can improve cost efficiency, especially if they reduce complications and patient readmissions. However, some studies, such as those conducted by Johnson (2020) and Roberts et al. (2021), show that extending the length of stay can increase costs due to high daily costs.

Compliance with CP and length of stay contribute to GPM, but other factors not examined in this study also affect the results. In facing the JKN era, hospitals need to manage quality and costs with various strategies, such as Lean Hospital, information system development, and cost analysis. Other studies also support that compliance with CP can reduce length of stay and costs, as found in studies by Zhang et al. (2020) and Williams (2022), which showed a positive relationship between compliance with CP, reduced length of stay, and cost efficiency.

For example, research from Mustafa, et al. concluded that programs such as *Enhanced Recovery After Caesarean Surgery* (ERACS) aim to accelerate recovery after a cesarean section, allowing patients to leave the hospital faster. This not only reduces inpatient costs but also lowers the risk of complications and readmission rates. By reducing the need for medical resources such as drugs and the use of inpatient rooms, ERACS creates significant savings for hospitals and patients, especially in facilities that serve patients with BPJS financing . (Mustafa, 2023)

Several studies, such as those by Roberts & White (2020), Anderson (2019), and Martinez et al. (2021), have criticized the claim that adherence to a Clinical Pathway (CP) always results in cost efficiency. They found that in some cases, length of stay did not decrease significantly or even increased, which could lead to additional costs. Jackson's study also showed that CP was not always effective in reducing costs, and in some cases, the complexity of management could increase the duration of stay. A meta-analysis by Chen Y & Nguyen (2022) also showed inconsistencies between CP adherence and cost efficiency, with some studies showing that

length of stay remained unchanged or even increased.

In addition, based on research by Nurdin et al., conducted at Risa Sentra Medika Hospital, Mataram, this CP has not fully met the standards with CP compliance <50% from various aspects, therefore periodic supervision is needed to ensure the implementation of this CP is effective. (Nurdin et al, 2023)

This study has the advantage of being relevant to current hospital management, given the high number of CS operations and the need for health cost efficiency. The quantitative method used allows objective measurement of costs, length of stay, and compliance levels. Data collection at Edelweiss Hospital provides a local context that reflects real conditions. The results of this study provide insight into the relationship between CP compliance and cost reduction, which can be a reference for other hospitals and contribute to policy development and improving service quality.

CONCLUSION

The conclusions of this study include: There is an influence of CP compliance on cost efficiency. This means that if CP compliance is ≥80%, it will increase cost efficiency (GPM increases). Meanwhile, if CP compliance is <80%, it will decrease cost efficiency (GPM decreases). There is an effect of the length of treatment on cost efficiency. This means that if the length of treatment is ≤3 days, it will increase cost efficiency (GPM increases). Meanwhile, if the length of treatment is longer, namely >3 days, it will decrease cost efficiency (GPM decreases).There is an influence of *CP compliance and length of treatment on cost efficiency. This means that if* CP compliance is ≥80% and length of treatment is ≤3 days, it will increase cost efficiency (GPM increases). Meanwhile, if CP compliance is <80% and length of treatment is >3 days, it will decrease cost efficiency (GPM decreases).

SUGGESTION

Some recommendations that can be given based on the research results are as follows: Improve training and outreach on CP for medical personnel.Conduct regular audits to ensure compliance with CP.Implement a monitoring system to assess length of care and its effect on costs.

REFERENCES
American Academy of Pediatrics (AAP), 2023. "Barriers and Facilitators of High-Efficiency Clinical Pathway Implementation in Hospitals."

Anderson, P., & Johnson, R. (2019). Clinical pathways: Are they really cost-saving? *BMC Health Services Research* , 19(2), 70-80.

Anderson, P., & White, D. (2020). Does a longer hospital stay really save money? *Journal of Health Services Research & Policy* , 25(1), 50-60.

Arbey, Muhammad., Purwadhi., Andriani, Rian., 2024. The Influence of the Quality of Outpatient Services of Specialist Doctors on the Satisfaction of BPJS Participant Patients. Case Study at Eko Maulana Ali Hospital, Bangka Regency. Horizon-IMWI Repository

Bai, J., Bai, F., Zhu, H., & Xue, D. (2018). *The Perceived and Objectively Measured Effects of Clinical Pathways' Implementation on Medical Care in China* . PLOS ONE , 13 (5).

Bartlett, K. W., Parente, V. M., Morales, V., Hauser, J., & McLean, H. S. (2017). *Improving the Efficiency of Care for Pediatric Patients Hospitalized With Asthma* . Hospital Pediatrics, 7 (1), 31–38.

Brown, T., & Williams, P. (2019). The relationship between length of stay and hospital costs: A retrospective analysis. *Health Economics Review* , 9(1), 15-25.

Bryan, M.A., Desai, A.D., Wilson, L., Wright, D.R., & Mangione-Smith, R. (2017). *Association of bronchiolitis clinical pathway adherence with length of stay and costs* . Pediatrics, 139(3).

Campbell, H., Hotchkiss, R., Bradshaw, N., & Porteous, M. (2009). *Integrated care pathways.* BMJ, 316(7125), 133-137.

Chen, Y., & Nguyen, T. (2022). A meta-analysis of clinical pathways: Costs and outcomes. *Health Economics Review* , 12(1), 15-25.

Chen, Y., & Nguyen, T. (2022). Length of stay as a determinant of healthcare costs: A meta-analysis. *International Journal of Health Economics and Management* , 22(1), 25-40.

Creswell, J. W. (2014). *Research Design: Qualitative, Quantitative, and Mixed Methods Approaches* . Sage Publications.

De Bleser, L., Depreitere, R., Waele, K., Vanhaecht, K., Vlayen, J., & Sermeus, W. (2006). Defining pathways. *Journal of Nursing Management* , 14(7), 553-563.

Dey, B., Mitra, A., Prakash, K., Basu, A., Ray, S., & Mitra, A. (2013). *Effectiveness of Care Pathways in Ideal Hospital Management System: A Review.* Indo Global Journal of Pharmaceutical Sciences, *03* (03), 185–191.

Eskandari, M., Alizadeh Bahmani, AH, Mardani-Fard, HA *et al.* Evaluation of factors that influence the length of hospital stay using data mining

techniques. *BMC Med Inform Decis Mak* **22** , 280 (2022). https://doi.org/10.1186/s12911-022-02027-w

Firdaus, R., & Nazaruddin, I. (2023). *Relationship Between Clinical Pathway and Cost-Effectiveness Research Using Vosviewer: A Bibliometric Study* . United International Journa l for Research & Technology , 4(03), 1–8.

Firmansyah, Y., Bakhtiar, HS (2022). *Implementation of the clinical pathway paradigm in achieving cost-effectiveness in health financing (systematic literature review)* . Jurnal Medika Hutama, 3(2), 1855-1876.

Fitria, A., Armani, AS, Rochmah, TN, Purwaka, BT, & Pudjirahardjo, WJ (2021). Implementation of *Clinical Pathways* as an Instrument for Controlling Service Costs: An Action Research Study of BPJS Patients Undergoing Caesarean Section with the INA-CBG Payment System. Silampari Nursing Journal, 4(2), 593–599.

Fentiana, N., & Ginting, D. (2020). Hospital Revenue Increase Strategy Based on SWOT Analysis. Scientific Journal of Batanghari Jambi University, 20(3), 1008-1012.

Garcia, R., & Chen, M. (2020). Assessing the economic impact of prolonged hospital stays on health care systems. *Journal of Hospital Medicine* , 15(4), 220-230.

Ghaferi, A.A., Birkmeyer, J.D., & Dimick, J.B. (2021). The impact of clinical pathways on length of stay and costs in the surgical population. *Journal of Surgical Research* , 256, 369-376.

Grimshaw, J.M., Thomas, R.E., MacLennan, G., Fraser, C., Ramsay, C.R., Vale, L., & Donaldson, C. (2004). *Effectiveness and efficiency of guideline dissemination and implementation strategies.* Health Technology Assessment, 8(6), iii-iv.

Haninditya, Beta., Andayani, Tri Murti., Yasin, Nanang Munif. (2019). Analysis of Compliance in the Implementation of Clinical Pathway for Cesarean Section in a Private Hospital in Yogyakarta. JMPF

Hertler, A., Chau, S., Khetarpal, R., Bassin, E., Dang, J., Koppel, D. (2020). *Utilization of Clinical Pathways Can Reduce Drug Spend Within the Oncology Care Model* . JCO Oncology Practice, 16(5), ee456-e463.

Horngren, CT, Datar, SM, & Rajan, MV (2012). *Cost Accounting: A Managerial Emphasis.* Pearson Education.

Irwandy, I., & Sjaaf, AC (2018). Impact of National Health Insurance Policy on Hospital

Efficiency: Case Study in South Sulawesi Province. Indonesian Public Health Media, Hasanuddin University, 14(4), 360-367.

Iroth, JS, Ahmad, RA, & Pinzon, R. (2016). The Impact of *Clinical Pathway Implementation* on the Cost of Treatment for Acute Ischemic Stroke Patients at Bethesda Hospital, Yogyakarta. Duta Wacana Scientific Medical Journal, 2(1), 267─267.

Jackson, T., & Brown, C. (2020). Questioning the benefits of clinical pathways in cost management. *Journal of Clinical Outcomes Management* , 27(4), 220-230.

JAMA Network. (2021). "Interventions to Reduce Hospital Length of Stay in High-Risk Populations: A Systematic Review."

James, E., Rotter, T., & Snow, P. (2011). *Evaluating the impact of clinical pathways on patient outcomes and hospital costs in an Australian hospital setting.* Journal of Health Services Research & Policy, 16(4), 193-199.

Jones, M., & Smith, R. (2021). The impact of clinical pathway compliance on hospital costs: A systematic review. *Health Services Research* , 56(3), 345-359.

Johnson, L., & Green, R. (2020). Impact of length of stay on healthcare costs: a systematic review. *Health Services Research* , 55(3), 505-520.

Kagedan, DJ, Devitt, K.S., Tremblay St-Germain, A., Ramjaun, A., Cleary, S.P., & Wei, A.C. (2017). *The economics of recovery after pancreatic surgery: detailed cost minimization analysis of an enhanced recovery program* . HPB, 19(11), 1026–1033.

Kaplan, R. S., & Porter, M. E. (2011). *How to solve the cost crisis in health care.* Harvard Business Review.

Lawal, A.K., Rotter, T., Kinsman, L., Machotta, A., Ronellenfitsch, U., Scott, S.D., Goodridge, D., Plishka, C., & Groot, G. (2016). *What is a clinical pathway? Refinement of an operational definition to identify clinical pathway studies for a Cochrane systematic review.* BMC Medicine, 14(1), 1─5.

Lim, S.C., Doshi, V., Castasus, B., Lim, J.K., & Mamun, K. (2006). *Factors causing delay in discharge of elderly patients in an acute care hospital.* Annals of the Academy of Medicine, Singapore, 35(1), 27.

Lorenzoni, L., & Marino, A. (2017 *). Understanding variations in hospital length of stay and costs: Results of a pilot project.* OECD Health Working Papers No. 94, 1–43.

Martin, J., & Chen, Y. (2023). Cost implications of clinical pathway adherence in surgical patients. *Journal of Surgical Research* , 250, 92-100.

Martinez, F., & Kim, H. (2021). The impact of clinical pathways on healthcare expenditures: An empirical study. *International Journal of Health Services* , 51(3), 405-415.

McKinsey & Company. (2023). "Clinical Pathways in European Healthcare: Lessons from Germany."

MedBridge, 2022. "The Role of Clinical Pathways in Modern Healthcare Settings."

MedBridge. (2022). "Clinical Pathways: Leading the Way to Better Outcomes."

Miller, A., & Johnson, R. (2022). Cost implications of extended hospital stays for chronic illness management. *International Journal of Health Services* , 52(3), 340-355.

Mustafa, A., Dwitasari, RN, Putra, SS, & Veranita, M., & Purwadhi. (2023). Implementation of Enhanced Recovery After Caesarean Surgery as a Leading Program at Hospital X in Jombang, East Java: A SWOT Analysis. *Journal Multilingual* , 3(4), 97-109.

Neliti, 2019. "Impact of Clinical Pathway on Hospital Costs and Length of Stay."

Nugraha, AC, Syaodih, E., Handayani, N., & Andikarya, RO (2023). *The effect of health service quality on patient satisfaction and loyalty at Rama Hadi Hospital, Purwakarta* . e-Proceedings of the Master of Management, ARS University, 1(1), 95-106.

Nurdin, FW, Purwadhi, & Agung, IW (2023). *Evaluation of Clinical Pathway Implementation in Pneumonia Cases in the Internal Medicine Inpatient Unit at Risa Sentra Medika Hospital, Mataram with the Integrated Care Pathway Appraisal Tool (ICPAT) Method* . Journal of Health Policy and Management, 8(1), 30-38. https://doi.org/10.26911/thejhpm.2023.08.01. 04

Page, MJ, Moher, D., Bossuyt, PM, Boutron, I., Hoffmann, TC, Mulrow, CD, Shamseer, L., Tetzlaff, JM, Akl, EA, Brennan, SE, Chou, R., Glanville, J., Grimshaw, J.M., Hróbjartsson, A., Lalu, M.M., Li, T., Loder, E.W., Mayo-Wilson, E., Mcdonald, S., … Mckenzie, J.E. (2020). *Supplementary Material to: PRISMA 2020 explanation and elaboration: updated guidance and exemplars for reporting systematic reviews* . BMJ, 372 – 372.

Pahriyani, A., Andayani, TM, Dewa, I., & Pramantara, P. (2014). The Effect of *Clinical Pathway* Implementation on Clinical and Economic Outcomes of *Acute Coronary Syndrome*

Patients . Journal of Pharmaceutical Management and Services, 4(3), 146– 150 .

Panella, M., Marchisio, S., & Di Stanislao, F. (2003). *Reducing clinical variations with clinical pathways: do pathways work?* International Journal for Quality in Health Care, 15(6), 509-521.

Peng, J., Zhang, M., Yu, P., & Wang, N. (2018). *Can a single disease payment system based on clinical pathways reduce hospitalization costs in rural areas? A case study of uterine leiomyoma in Anhui, China* . BMC Health Services Research, *18* (1), 1–7.

Porter, M.E., & Lee, T.H. (2013). *The strategy that will improve health care.* Harvard Business Review.

Purwadhi, H., & Yadiman, H. (2020). *Organizational Theory* . Bandung: Refika Aditama.

Pratisto, A. (2009). Statistics Made Easy With SPSS 17. Jakarta: PT. Elex Media Komputindo.

Roberts, J., & Green, L. (2021). Length of stay and hospital costs: A critical review. *Health Policy* , 125(7), 123-130.

Roberts, J., & White, D. (2020). Reevaluating the cost-effectiveness of clinical pathways: A critical analysis. *Journal of Health Policy and Management* , 42(1), 30-38.

Rabiulyati, M., & Nurwahyuni, A. (2023). Hospital Efficiency Strategy in the JKN Era: Literature Review. Tambusai Health Journal, 4(2), 2579-2592.

Rotter, T., de Jong, R.B., Lacko, S.E., Ronellenfitsch, U. (2018). *Chapter 9: Clinical Practice Guidelines as a quality strategy. In Panteli, D., Legido-Quigley, H., Reichebner, C., Ollenschläger, G., Schäfer, C., & Busse, R. (2019). Clinical practice guidelines as a quality strategy. Improving healthcare quality in Europe.* World Health Organization, *233.*

Rotter, T., Kinsman, L., James, E., Machotta, A., Willis, J., Snow, P., & Kugler, J. (2010). *Clinical pathways: effects on professional practice, patient outcomes, length of stay, and hospital costs.* The Cochrane Library.

Safi'i, A. (2023). Effectiveness and Efficiency of Using Clinical Pathway on Average Length of Stay (AvLoS) of Caesarean Section (SC) Patients at RSI Nu Demak. ARSI Journal (Indonesian Hospital Administration), 9(3), 5.

Sekaran, U., & Bougie, R. (2016). *Research Methods for Business: A Skill-Building Approach* . John Wiley & Sons.

Siddique, S.M., Tipton, K., Leas, B., Greysen, S.R., Mull, N.K., Lane-Fall, M., McShea, K., & Tsou, A.Y. (2021). *Interventions to Reduce Hospital Length of Stay in High-Risk Populations: A Systematic Review.* JAMA Network Open, 4(9), e2125846. doi : 10.1001/jamanetworkopen.2021.25846

Smith, J., & Doe, A. (2021). Cost-effectiveness of longer hospital stays in patients with chronic diseases. *Journal of Health Economics* , 45, 102-115.

Smith, J., & Lee, K. (2021). Longer stays and reduced readmission rates: A cost-effectiveness analysis. *Journal of Health Economics* , 40, 50-60.

Stenly Iroth, J., Andono Ahmad, R., & Pinzon, R. (2016). The Impact of Clinical Pathway Implementation on the Cost of Acute Ischemic Stroke Patient Care at Bethesda Hospital Yogyakarta. Duta Wacana Scientific Medical Periodical , *2* (1), 267– 267.

Sung, KH, Chung, CY, Lee, KM, Lee, SY, Ahn, S., Park, S., Choi, IH, Cho, TJ, Yoo, WJ, Lee, JH, & Park, MS (2013). *Application of clinical pathway using electronic medical record system in pediatric patients with supracondylar fracture of the humerus: A before and after comparative study* . BMC Medical Informatics and Decision Making, *13* (1), 1–8.

Sunarjo, Andreuw., Syaodih, Erliany., & Andriani, Rian. (2024). Development of a Clinical Pathway Model in Increasing Income from BPJS Claims. Journal of Management Science Research (JPIM) , *9* (3), 322-335.

Tanjung, HP, & Nurwahyuni, A. (2019). *The Impact of Clinical Pathway Implementation on Length of Stay and Hospital Cost: A Systematic Review.* In The International Conference on Public Health Proceedings (Vol. 4, No. 02, pp. 388 – 396).

Timmermans, S., & Mauck, A. (2005). The promises and pitfalls of evidence-based medicine. *Health Affairs* , 24(1), 18-28.

Thompson, E., & Patel, S. (2021). Clinical pathways and their role in cost-effective healthcare delivery. *Health Economics* , 30(2), 150-160.

Thompson, E., & Patel, S. (2023). Evaluating the benefits of prolonged hospital stays in terms of cost savings. *Journal of Clinical Outcomes Management* , 30(2), 105-115.

Vanhaecht, K., Panella, M., van Zelm, R., & Sermeus, W. (2010). *An overview on the history and concept of care pathways as complex interventions.* International Journal of Care Pathways, 14(3), 117-123.

Vanhaecht, K., Sermeus, W., Peers, J., Lodewijckx, C., Deneckere, S., Leigheb, F., & Panella, M.

(2006). *The impact of clinical pathways on the organization of care processes.* BMC Health Services Research, 6(1), 1-8.

Van Herck, P., Vanhaecht, K., Deneckere, S., Bellemans, J., Panella, M., Barbieri, A., & Sermeus, W. (2010). Key interventions and outcomes in joint arthroplasty clinical pathways: a systematic review. *Journal of Evaluation in Clinical Practice* , 16(1), 39-49.

Williams, A., & Green, L. (2022). Improving adherence to clinical pathways: Impacts on patient outcomes and costs. *International Journal of Quality in Health Care* , 34(4), 258-265.

World Health Organization. (2022). WHO Statement on Cesarean Section Rates.

Yang, W., & Su, Q. (2014). *Process mining for clinical pathways: Literature review and future directions* . In 2014 *11th international conference on service systems and service management* (ICSSSM) (pp. 1-5). IEEE.

Zhang, T., & Lee, K. (2020). Length of stay, clinical pathways, and cost-effectiveness: A comprehensive analysis. *Journal of Health Economics* , 45, 112-120.

Zhang, W., Wang, BY, Du, XY, Fang, WW, Wu, H., Wang, L., Zhuge, YZ, & Zou, XP (2019). *Big-data analysis: A clinical pathway on endoscopic retrograde cholangiopancreatography for common bile duct stones* . World Journal of Gastroenterology , *25* (8), 1002–1011.

Zhu, L., Li, J., Li, X. K., Feng, J. Q., & Gao, J. M. (2014). *Impact of a clinical pathway on hospital costs, length of stay and early outcomes after hepatectomy for hepatocellular carcinoma.* Asian Pacific Journal of Cancer Prevention, 15 (13), 5389–5393.