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Analysis of direct medical costs in the inpatient treatment of sepsis at Thong Nhat Dong Nai General Hospital in 2024

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ABSTRACT

Background: Sepsis is a severe, life-threatening condition that imposes a substantial economic burden on both patients and the healthcare system. At Thong Nhat Dong Nai General Hospital, no prior study has evaluated the direct medical costs (DMCs) associated with inpatient treatment of sepsis. Objectives: To analyze the DMCs and identify factors associated with the inpatient treatment among sepsis patients at Thong Nhat Dong Nai General Hospital, in 2024. Methods: A cross-sectional descriptive study was conducted using a retrospective review of electronic billing data from sepsis inpatients who met the inclusion criteria at Thong Nhat Dong Nai General Hospital in 2024. Results: A total of 1,270 treatment episodes were analyzed. The mean patient age was 62.76 ± 16.91 years, with an average hospital stay of 11.91 ± 8.20 days. Most patients (95%) received broad-spectrum antibiotics. The mean DMC per inpatient sepsis episode was 13,440,089 VND (95% CI: 12,332,970 - 14,547,219 VND). Drug costs accounted for the largest proportion (41.51%) of total expenses, and health insurance covered 86.57% of total DMCs. The multivariable regression model demonstrated significant associations between log-transformed DMCs (adjusted $R^2 = 0.661$; $p < 0.05$) and the following predictors: Log(DMC) = 0.656 × "Length of stay" + 0.166 × "ICU admission" + 0.126 × "Other interventions" + 0.100 × "COPD/chronic lung disease" + 0.096 × "Chronic liver disease" + 0.079 × "Mortality" + 0.070 × "Diabetes mellitus" + 0.070 × "Broad-spectrum antibiotic use" + 0.062 × "Age" + 0.047 × "Chronic kidney disease" + 0.042 × "Surgery" + 6.159. Conclusions: The mean DMC per sepsis hospitalization was substantial, approximately one-fifth of Vietnam's estimated average per capita income in 2024. Drug costs represented the largest proportion of expenditures, while health insurance covered the majority of expenses. The multivariable regression identified eleven significant factors associated with DMCs (adjusted $R^2 = 0.661$).

Keywords: *direct medical cost, sepsis, multivariable regression*

1. INTRODUCTION

Sepsis is a severe, life-threatening condition characterized by organ dysfunction due to a dysregulated host immune response to infection [1]. If not treated promptly, sepsis can progress to septic shock, with a mortality rate of up to 40% or higher [2]. The Global Burden of Disease Study estimated that in 2017, there were approximately 48.9 million sepsis cases and 11 million sepsis-related deaths worldwide, accounting for nearly 20% of total global deaths [3]. The U.S. Centers for Disease Control and Prevention reported over one million sepsis cases and 258,000 deaths annually in the United States, with an average hospital cost of 25,891 euros per admission [4]. In Vietnam, the mortality rate from septic shock may reach 60% [5, 6].

Sepsis also imposes a substantial economic burden on both the healthcare system and patients. Treatment, especially in cases of septic shock, requires complex interventions such as intravenous broad-spectrum antibiotics, vasopressors, mechanical ventilation, continuous renal replacement therapy, and intensive care [7], resulting in high medical costs [8]. In Vietnam, the average inpatient cost per sepsis patient is estimated at 724.1 USD (≈18 million VND), equivalent to about one-fifth of the average per capita income in 2024 [9, 10].

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Currently, no study has analyzed the direct medical costs (DMCs) and associated factors for sepsis treatment at Thong Nhat Dong Nai General Hospital. Therefore, this study aims to:

1. Analyze the value and structure of DMCs for inpatient sepsis treatment at Thong Nhat Dong Nai General Hospital, in 2024.
2. Identify factors associated with inpatient sepsis treatment costs at Thong Nhat Dong Nai General Hospital, in 2024.

2. MATERIALS AND METHODS

2.1. Study subjects

2.1.1. Study subjects

The study focused on direct medical costs (DMCs) and factors associated with DMCs in the inpatient treatment of sepsis at Thong Nhat Dong Nai General Hospital, in 2024.

2.1.2. Study population

The study population consisted of electronic billing data from inpatient treatment episodes of patients diagnosed with sepsis at Thong Nhat Dong Nai General Hospital, between January 1, 2024, and December 31, 2024.

2.2. Research methods

2.2.1. Study design

This was a cross-sectional descriptive study employing a retrospective review of electronic billing data.

2.2.2. Study sample

Sampling method: All cases that met the inclusion criteria and did not violate the exclusion criteria were included (total sampling).

Inclusion and exclusion criteria are presented in Table 1.

Table 1. Inclusion and exclusion criteria

Inclusion criteria	Exclusion criteria
- Inpatients treated at Thong Nhat Dong Nai General Hospital, during 2024. - Patients aged 18 years or older. - Patients with at least one principal diagnosis or billing code for sepsis (ICD-10: A40, A41).	- Incomplete or unclear electronic billing data. -Treatment episodes interrupted due to hospital transfer or self-discharge against medical advice. - Rehospitalizations of the same patient occurring within 30 days (to ensure independence between treatment episodes). - Patients who died within ≤ 48 hours of admission.

2.2.3. Study variables

The variables collected and analyzed in this study are summarized in Table 2.

Table 2. Study variables

Variable	Values	Statistical method
Patient characteristics		
Quantitative	Age (years), length of stay (days), number of drugs, number of antibiotics, number of comorbidities	Mean ± SD
Qualitative	Gender (male, female), residence (Dong Nai / other provinces), health insurance coverage (80%, 95%, 100%), broad-spectrum antibiotic use, ICU admission, septic shock**, corticosteroid use, surgery, other interventions*, comorbidities (chronic kidney disease, diabetes mellitus, COPD/chronic lung disease, chronic liver disease/cirrhosis, cardiovascular disease, malignancy, HIV/AIDS, neurological disease/long-term paralysis), treatment outcomes (recovered, improved, unchanged, worsened, deceased)	Frequency (%)
Cost analysis		
Quantitative	Mean DMC (VND), DMC by cost component (VND), DMC by payment source (VND)	Mean (95% CI)

Variable	Values	Statistical method
Analysis of associated factors		
Quantitative	Age, length of stay, number of comorbidities, number of drugs, number of antibiotics	Pearson
Qualitative	Gender, septic shock, ICU admission, broad-spectrum antibiotic use, diabetes mellitus, chronic kidney disease, chronic liver disease/cirrhosis, COPD/chronic lung disease, malignancy (cancer), HIV/AIDS, cardiovascular disease, neurological disease/long-term paralysis, corticosteroid, use, surgery, other interventions, health insurance coverage level, treatment outcome, residence	T-test, ANOVA

Notes: SD: Standard deviation; CI: Confidence interval; DMC: Direct medical cost; VND: Vietnamese dong; ICU: Intensive Care Unit; Other interventions include stent placement, endotracheal intubation, urinary catheterization, and central venous catheter insertion. ICD codes: R57.2; R65.1.

2.2.4. Data analysis

Data were analyzed using SPSS version 26.0. The distribution of DMCs was tested for normality using the Kolmogorov-Smirnov test. For non-normally distributed data, values were transformed into base-10 logarithms for subsequent analyses. A multiple linear regression model (stepwise method) was constructed to identify independent factors associated with log-transformed DMCs (LogDMC). The goodness of fit was assessed using the adjusted R^2, and multicollinearity was examined through the Variance Inflation Factor (VIF) [11].

2.3. Ethics in biomedical research

The study was derived from a research project approved by the Ethics Committee of Thong Nhat Dong Nai General Hospital under Decision No. 05/HĐĐĐ dated March 10, 2025. The study ensured the confidentiality of patient information throughout all research procedures.

3. RESULTS

3.1. Analysis of direct medical costs for inpatient sepsis treatment at Thong Nhat Dong Nai General Hospital, in 2024

3.1.1. Patient characteristics

A total of 1,270 inpatient sepsis treatment episodes were included in the study. The demographic characteristics of the study population are presented in Table 3.

Table 3. Demographic characteristics of the study population (n = 1,270)

Variable		Frequency / Mean (SD)	Percentage / 95% CI
Age (years)		62.76 (16.91)	61.83 - 63.69
Gender	Male	607	47.8%
	Female	663	52.2%
Place of residence	Dong Nai Province	1209	95.2%
	Other provinces	61	4.8%
Health insurance coverage	80%	823	64.8%
	95%	57	4.5%
	100%	390	30.7%

Notes: SD - Standard deviation; CI - Confidence interval

The results in Table 3 indicate that the mean age of patients was 62.76 ± 16.91 years, with a male-to-female ratio of approximately 0.9:1. The majority of patients resided in Dong Nai Province (95.2%), and most had a health insurance coverage level of 80% (64.8%).

Clinical Characteristics and Treatment of the Study Sample are presented in Table 4.

Table 4. Clinical characteristics and treatment (n = 1,270)

Variable		Mean (SD) / Frequency	Percentage / 95% CI
Length of stay (days)		11.91 (8.20)	11.46 - 12.36
Number of medications		15.22 (8.16)	14.77 - 15.67
Number of antibiotics		2.72 (1.58)	2.63 - 2.81
Number of comorbidities		8.52 (3.92)	8.30 - 8.74
ICU admission	Yes	281	22.10%
	No	989	77.90%
Broad-spectrum antibiotic use	Yes	1207	95.00%
	No	63	5.00%
Septic shock (severe)	Yes	54	4.30%
	No	1216	95.70%
Corticosteroid use	Yes	461	36.30%
	No	809	63.70%
Surgery	Yes	65	5.10%
	No	1205	94.90%
Other interventions	Yes	139	10.90%
	No	1131	89.10%
Comorbidities	Chronic kidney disease	234	18.40%
	Diabetes mellitus	495	39.00%
	COPD / chronic lung disease	155	12.20%
	Chronic liver disease / cirrhosis	144	11.30%
	Cardiovascular disease	534	41.30%
	Malignancy (cancer)	26	2.00%
	HIV/AIDS	11	0.90%
	Neurological disorder / long-term paralysis	204	16.10%
Treatment outcome	Recovered	951	74.90%
	Improved	288	22.70%
	No change	16	1.30%
	Worsened	5	0.40%
	Death	10	0.80%

Note: SD - standard deviation; CI - confidence interval; ICU - intensive care unit; other interventions include stent placement, endotracheal intubation, urinary catheterization, and central venous catheterization.

Regarding clinical characteristics and treatment (Table 4), the average length of stay per admission was 11.91 ± 8.20 days; the mean number of comorbidities was 8.52 ± 3.92. On average, each patient received 15.22 ± 8.16 medications, including 2.72 ± 1.58 antibiotics. ICU admission was required for 22.1% of patients; 5.1% underwent surgery; 10.9% received other interventions. Broad-spectrum antibiotics were used in 95% of cases, and corticosteroids in 36.3%. The incidence of septic shock was 4.3%. The most common comorbidities were cardiovascular disease (41.3%), diabetes mellitus (39%), chronic kidney disease (18.4%), long-term neurological disorder or paralysis (16.1%), COPD / chronic lung disease (12.2%), and chronic liver disease/cirrhosis (11.3%). The majority of patients recovered (74.9%) or improved (22.7%), and the mortality rate was 0.8%.

3.1.2. Analysis of direct medical costs

The analysis of direct medical costs (DMC) for inpatient treatment of sepsis at Thong Nhat Dong Nai General Hospital in 2024 is presented in Table 5, including costs by component and source of payment.

Table 5. Direct medical costs by component and source of payment (unit: VND)

Cost type	Mean	95% CI	Percentage
By component			
Medications	5,579,568	5,055,915 - 6,103,221	41.51%
Medical supplies	1,321,701	785,594 - 1,857,808	9.83%
Bed - days	3,075,401	2,897,005 - 3,253,798	22.88%
Laboratory tests	1,362,301	1,287,441 - 1,437,162	10.14%
Imaging	721,542	660,295 - 782,789	5.37%
Procedures / Surgery	1,377,881	1,145,598 - 1,610,165	10.25%
Outpatient consultation	1,694	1,201 - 2,187	0.01%
Total DMC	13,440,090	12,332,969 - 14,547,211	100%
By source of payment			
Health insurance	11,635,268	10,921,200 - 12,349,336	SS
Co-payment by the patient	1,641,787	1,420,511 - 1,863,063	12.22%
Out-of-pocket payment	163,035	95,118 - 230,952	1.21%
Total DMC	13,440,090	12,332,969 - 14,547,211	100%

Note: DMC - direct medical cost; CI - confidence interval; VND - Vietnamese Dong

The average DMC per sepsis admission was 13,440,089 VND (95% CI: 12,332,970 - 14,547,219 VND), with medication costs representing the largest proportion (41.51%, 5,579,568 VND). Other significant cost components included bed-days (22.88%), procedures/surgery (10.25%), and laboratory tests (10.14%). Regarding payment sources, health insurance (HI) was the main contributor, accounting for 86.57% of total DMC, while co-payment by patients accounted for 12.22% and out-of-pocket payments 1.21%.

3.2. Analysis of factors associated with direct medical costs

The distribution of DMC values was first assessed using the Kolmogorov-Smirnov test, which showed that the DMC was not normally distributed ($p = 0.000 < 0.05$). Therefore, DMC values were log-transformed (base 10, LogDMC). Outliers were handled using the interquartile range (IQR) method. Subsequent testing confirmed that LogDMC was normally distributed ($p = 0.200 > 0.05$), allowing the use of T-tests, one-way ANOVA, and Pearson correlation for analysis at a 95% confidence level.

Univariate analysis was performed on all collected variables. Variables with a significant association at $p < 0.05$ are presented in Table 6.

Table 6. Factors associated with direct medical costs

Categorical variables (T-test/ANOVA)			
Characteristic	**Mean LogDMC difference (95% CI)**	**Cost ratio (95% CI)**	**p-value**
ICU admission	0.322 (0.276 - 0.367)	2.099 (1.888 - 2.328)	< 0.001
Broad-spectrum antibiotics	0.276 (0.195 - 0.358)	1.888 (1.567 - 2.280)	< 0.001
Septic shock	0.101 (0.002 - 0.200)	1.262 (1.005 - 1.585)	0.046
Surgery	0.348 (0.250 - 0.445)	2.228 (1.778 - 2.786)	< 0.001
Diabetes mellitus	0.121 (0.080 - 0.162)	1.321 (1.202 - 1.452)	< 0.001
Chronic kidney disease	0.105 (0.053 - 0.156)	1.274 (1.129 - 1.432)	< 0.001
Chronic liver disease/cirrhosis	0.112 (0.048 - 0.175)	1.294 (1.117 - 1.496)	0.001
COPD / chronic lung disease	0.058 (0.006 - 0.109)	1.143 (1.014 - 1.285)	0.029
Corticosteroid use	0.158 (0.117 - 0.199)	1.439 (1.309 - 1.581)	< 0.001
Cardiovascular disease	0.062 (0.021 - 0.102)	1.153 (1.049 - 1.265)	0.003

Categorical variables (T-test/ANOVA)			
Characteristic	**Mean LogDMC difference (95% CI)**	**Cost ratio (95% CI)**	**p-value**
Neurological disorder/long-term paralysis	0.072 (0.021 - 0.123)	1.180 (1.049 - 1.327)	0.006
Other interventions	0.453 (0.389 - 0.516)	2.838 (2.449 - 3.281)	< 0.001
Insurance coverage (100% vs 80%)	0.095 (0.043 - 0.147)	1.245 (1.104 - 1.403)	< 0.001
Treatment outcome			
Death vs Recovered	0.515 (0.209 - 0.819)	3.273 (1.618 - 6.592)	< 0.001
Death vs Improved	0.344 (0.035 - 0.653)	2.208 (1.084 - 4.498)	0.020
Death vs No change	0.526 (0.129 - 0.923)	3.357 (1.346 - 8.375)	0.003
Improved vs Recovered	0.171 (0.105 - 0.236)	1.483 (1.274 - 1.722)	< 0.001
Continuous variables (Pearson correlation)			
Characteristic	**r**		**p-value**
Length of stay	0.741		< 0.001
Age	0.162		< 0.001
Number of comorbidities	0.256		< 0.001

Note: T-test was used for comparing LogDMC between groups; Pearson correlation for continuous variables; ANOVA with multiple comparisons for treatment outcome. Cost ratio = 10^(LogDMC difference).

According to Table 6, significant factors associated with LogDMC included length of stay, age, number of comorbidities, diabetes mellitus, chronic kidney disease, chronic liver disease, chronic lung disease, cardiovascular disease, neurological disorder/long-term paralysis, ICU admission, broad-spectrum antibiotic use, septic shock, surgery, corticosteroid use, other interventions, and treatment outcome. The mortality group had a mean cost 3.273 times higher than the recovered group (95% CI: 1.618-6.592), 2.208 times higher than the improved group (95% CI: 1.084-4.498), and 3.357 times higher than the no change group (95% CI: 1.346-8.375). Patients receiving other interventions (2.838 times, 95% CI: 2.449-3.281), ICU admission (2.099 times, 95% CI: 1.888-2.328), surgery (2.228 times, 95% CI: 1.778-2.786), and broad-spectrum antibiotics (1.888 times, 95% CI: 1.567-2.280) had higher costs. Length of stay showed a strong positive correlation with LogDMC ($r = 0.741$, $p < 0.001$).

Stepwise multivariate linear regression was performed by sequentially entering and removing independent variables based on p-values. Variables were included in the model if the F-value $p \leq 0.05$. The final model is presented in Table 7.

Table 7. Multivariate regression model (adjusted $R^2 = 0.661$; $p < 0.05$)

Dependent variable	Independent variable	Unstandardized β	SE	Standardized β	t	p	VIF
LogDMC	Constant	6.159	0.036	-	169.431	< 0.001	-
	Length of stay	0.038	0.001	0.656	37.187	< 0.001	1.139
	ICU admission	0.145	0.016	0.166	8.921	< 0.001	1.262
	Other Interventions	0.154	0.026	0.126	6.024	< 0.001	1.609
	COPD / chronic lung disease	0.109	0.019	0.100	5.759	< 0.001	1.095
	Chronic liver disease	0.109	0.019	0.096	5.725	< 0.001	1.023
	Diabetes mellitus	0.052	0.013	0.070	4.101	< 0.001	1.073

Dependent variable	Independent variable	Unstandar-dized β	SE	Standar-dized β	t	p	VIF
LogDMC	Death	0.319	0.071	0.079	4.515	< 0.001	1.119
	Broad-spectrum antibiotics	0.116	0.028	0.070	4.152	< 0.001	1.028
	Age	0.001	0.000	0.062	3.531	< 0.001	1.136
	Chronic kidney disease	0.043	0.016	0.047	2.747	0.006	1.053
	Surgery	0.075	0.033	0.042	2.242	0.025	1.285

Note: DMC - direct medical cost; ICU - intensive care unit

According to Table 7, the model indicated that LogDMC was most strongly influenced by length of stay (βk = 0.656), followed by ICU admission (βk = 0.166), other interventions (βk = 0.126), COPD / chronic lung disease (βk = 0.100), chronic liver disease (βk = 0.096), death (βk = 0.079), diabetes mellitus (βk = 0.070), broad-spectrum antibiotics (βk = 0.070), age (βk = 0.062), chronic kidney disease (βk = 0.047), and surgery (βk = 0.042). Corresponding cost increases were: 1.09-fold per day of treatment, 1.40-fold for ICU admission, 1.43-fold for other interventions, 1.29-fold for COPD/chronic lung disease, 1.29-fold for chronic liver disease, 2.08-fold for death, 1.13-fold for diabetes mellitus, 1.31-fold for broad-spectrum antibiotics, 1.10-fold for chronic kidney disease, 1.19-fold for surgery, and 1.002-fold per year of age increase. The final multivariate regression model describing the relationship between LogDMC and associated factors is: LogDMC = 0.656 × Length of stay + 0.166 × ICU admission + 0.126 × Other interventions + 0.100 × COPD / chronic lung disease + 0.096 × Chronic liver disease + 0.079 × Death + 0.070 × Diabetes mellitus + 0.070 × Broad-spectrum antibiotics + 0.062 × Age + 0.047 × Chronic kidney disease + 0.042 × Surgery + 6.159.

Our regression model (adjusted R^2 = 0.661) explains 66.1% of the variability in treatment costs and demonstrates that length of stay (β = 0.656) exerts a substantially stronger impact compared with other important factors such as ICU admission (β = 0.166).

Therefore, the use of a regression model is essential to transform descriptive cost data into a predictive and decision-support tool, enabling clear identification of priority factors for managing the direct medical costs of sepsis treatment.

4. DISCUSSION

This study analyzed treatment costs for 1,270 inpatient episodes of sepsis at Thong Nhat Dong Nai General Hospital, revealing that the condition primarily affects elderly patients, with a mean age of 62.76 ± 16.91 years and a male-to-female ratio of approximately 0.9:1. These findings are consistent with domestic studies, such as Nguyen Viet Phuong et al. (2025), reporting a mean age of 65.86 ± 18.03 years and 56.8% male [12], and Luu Thi Thanh Duyen et al. (2023), with a mean age of 66.2 ± 16.6 years and 55.6% male [13]. The average length of hospital stay was 11.91 ± 8.20 days, similar to the results of Trieu Quoc Dung et al. (2023), in which most patients were hospitalized for fewer than 14 days [14]. The observed mortality rate was 0.8%, lower than that reported in a systematic review by Nguyen Thanh Luan et al. (2025) on septic shock patients in Vietnam (40-70%) [15] and lower than that reported by Nguyen Viet Phuong (2025) in severe sepsis patients at Military Hospital 103 (23.4%) [12]. This discrepancy may be attributed to the fact that comparative studies mostly focused on severely ill patients, highlighting that prognosis and treatment burden heavily depend on disease severity. These findings emphasize the importance of early infection control before progression to septic shock to improve clinical outcomes and reduce treatment costs.

The average DMC per sepsis admission in this study was 13,440,089 VND (95% CI: 12,332,970 - 14,547,219 VND), comparable to Bui My Hanh et al. (2022), who reported an average incremental cost related to postoperative sepsis of 724.1 USD (≈18 million VND, 95% CI: 553.7 - 891.7 USD) [9], equivalent to approximately one-fifth of the average per capita income in Vietnam in 2024 (64.8 million VND) [10], indicating a substantial financial

burden on patients and the healthcare system. The DMC observed in this study was lower than reported in high-income countries. A systematic review by M. van den Berg et al. (2022) indicated that the mean cost per sepsis patient ranged from €1,101 to €91,951 (≈30 million to 2.5 billion VND) [16]. This difference can be explained by the lower healthcare service prices and costs in Vietnam.

Regarding cost structure, medications accounted for the largest proportion (41.51%), followed by bed-days (22.88%) and procedures/surgery (10.25%), reflecting hospitalization duration and the complexity of interventions. This structure aligns with the findings of Nguyen Thi Thu Thuy et al. (2025) on invasive fungal infection inpatients, where medications contributed 48.7%, surgery 19.6%, and bed-days 16.2% [17]. High intravenous broad-spectrum antibiotic use (95% of patients) was required for sepsis treatment. Antibiotic resistance, as reported by Trieu Quoc Dung et al. (2023), with multidrug-resistant bacteria at 52.7% and extensively drug-resistant at 28.1% [14], likely necessitated the use of newer, more expensive antibiotics, contributing to higher medication costs. Health insurance (HI) covered 86.57% of the total DMC, underscoring its critical role in alleviating the direct financial burden on patients.

Multivariable regression was applied to determine the independent effect of each factor on treatment costs after adjustment. Unlike descriptive statistics, this approach identifies which factors remain significant when assessed simultaneously, providing essential evidence for cost-control prioritization. Multivariate regression analysis identified 11 independent factors influencing LogDMC, with length of stay exerting the strongest effect (βk = 0.656). Interventions aimed at reducing hospitalization duration through early diagnosis, optimized initial antibiotic therapy, and effective comorbidity management are key to controlling costs and improving prognosis. Other important factors included ICU admission (βk = 0.166) and other interventions (βk = 0.126). The multivariate model showed a relatively high fit (adjusted $R^2 = 0.661$), indicating that the model explained 66.1% of the variance in LogDMC through the included independent variables. The study analyzed all collected variables and found no statistically significant association between direct medical costs and certain patient characteristics such as: gender, place of residence, malignancy(cancer), and HIV/AIDS. This result can be explained as follows: the disease severity and treatment regimen were similar between males and females; the additional costs incurred for patients from other provinces receiving treatment at Thong Nhat Dong Nai General Hospital were insignificant compared to the total treatment cost; the prevalence of malignancy/cancer and HIV/AIDS in the study sample was very low, resulting in insufficient statistical power to detect a significant association. Length of stay was the strongest predictor of direct medical costs; therefore, strategies to safely reduce hospitalization duration such as early diagnosis, optimized initial antibiotic therapy, and effective patient management, are essential for improving cost efficiency in sepsis care.

This study represents the first effort at Thong Nhat Dong Nai General Hospital to construct a multivariate regression model to analyze DMC and identify influencing factors in sepsis treatment. Although the retrospective design based on single-site payment data may not fully capture correlations with some clinical indicators, the findings provide practical insights. Further prospective and multicenter studies incorporating detailed clinical variables are warranted to validate and refine the model. The results offer valuable evidence for management, highlighting the importance of early and accurate diagnosis, effective and timely treatment, and appropriate care and nutrition to shorten hospitalization.

5. CONCLUSION

Direct medical costs per sepsis admission at Thong Nhat Dong Nai General Hospital were high, equivalent to approximately one-fifth of the average per capita income in Vietnam in 2024, with medication costs representing the largest proportion and health insurance as the main payer. The study developed a multivariate regression model (adjusted $R^2 = 0.661$) identifying 11 independent factors affecting costs, with length of stay exerting the greatest impact. These findings provide essential evidence for hospital managers and policymakers,

emphasizing strategies to optimize hospitalization duration, enhance treatment efficiency, and rationally utilize healthcare resources, particularly for severely ill patients.

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Phân tích chi phí trực tiếp y tế trong điều trị nội trú nhiễm khuẩn huyết tại Bệnh viện Đa khoa Thống Nhất tỉnh Đồng Nai năm 2024

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TÓM TẮT

*Đặt vấn đề: Nhiễm khuẩn huyết (NKH) là tình trạng nhiễm trùng nặng, đe dọa tính mạng, gây ra gánh nặng kinh tế đáng kể cho người bệnh và hệ thống y tế. Tại Bệnh viện Đa khoa Thống Nhất tỉnh Đồng Nai, chưa có nghiên cứu nào phân tích về chi phí trực tiếp y tế (CPTTYT) cho điều trị NKH. Mục tiêu: Phân tích CPTTYT và xác định các yếu tố liên quan đến chi phí điều trị nội trú cho bệnh nhân NKH tại Tại Bệnh viện Đa khoa Thống Nhất tỉnh Đồng Nai năm 2024. Đối tượng và Phương pháp nghiên cứu: Nghiên cứu mô tả cắt ngang được thực hiện bằng phương pháp hồi cứu trên dữ liệu thanh toán điện tử của bệnh nhân NKH thoả tiêu chí chọn mẫu tại Tại Bệnh viện Đa khoa Thống Nhất tỉnh Đồng Nai năm 2024. Kết quả: Khảo sát 1270 đợt điều trị với tuổi trung bình 62.76 ± 16.91; thời gian điều trị trung bình 11.91 ± 8.20 ngày; đa số bệnh nhân (95%) có sử dụng kháng sinh phổ rộng, nghiên cứu ghi nhận CPTTYT trung bình một đợt điều trị nội trú NKH có giá trị 13,440,089 VND (KTC 95%: 12,332,970 - 14,547,219 VND), trong đó, chi phí thuốc chiếm tỷ trọng cao nhất (41.51%), và bảo hiểm y tế (BHYT) là nguồn chi trả chính, chiếm 86.57% tổng CPTTYT. Mô hình hồi quy đa biến thể hiện mối quan hệ giữa LogCPTTYT với các yếu tố liên quan có dạng (R^2 hiệu chỉnh = 0.661; p < 0.050): LogCPTTYT = 0.656 * "Số ngày điều trị" + 0.166 * "Điều trị tại ICU" + 0.126 * "Can thiệp khác" + 0.100 * "COPD/bệnh phổi mạn"+ 0.096 * "Bệnh gan mạn" + 0.079 * "Tử vong" + 0.070 * "Đái tháo đường" + 0.070 * "Kháng sinh phổ rộng" + 0.062 * "Tuổi" + 0.047 * "Bệnh thận mạn" + 0.042 * "Phẫu thuật" + 6.159. Kết luận: CPTTYT cho một đợt điều trị NKH có giá trị cao, bằng 1/5 thu nhập bình quân đầu người Việt Nam năm 2024 với chi phí thuốc chiếm đa số và BHYT chi trả phần lớn. Phân tích hồi quy đa biến ghi nhận 11 yếu tố liên quan đến CPTTYT với R^2 hiệu chỉnh = 0.661.*

Từ khóa: *chi phí trực tiếp y tế, nhiễm khuẩn huyết, hồi quy đa biến*

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