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Direct medical cost of liver cirrhosis in Vietnam

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ABSTRACT

Introduction: Cirrhosis is one of the leading causes of death worldwide and also a substantial economic burden for patients, healthcare system and society. However, research concentrating on cost of cirrhosis treatment in Vietnam are limited. The aim of this study was to estimate the inpatient treatment costs of liver cirrhosis and influencing factors on costs in Vietnam. Methods: Descriptive cross-sectional study has been conducted based on retrospective data of all cirrhosis patient's records in 2015 from two hospitals (HCMC Tropical Hospital and Bach Mai Hospital), satisfied inclusion and exclusion criteria. Descriptive and correlation analysis were performed with relevant statistical test (T-test, one-way ANOVA, correlation) and 95% confidence level. Results: The median cost of treatment per session was 6,064,104 VND (3,246,810 VND – 11,195,492 VND); the drug cost has the highest median value with 3,040,395 VND (843,309 VND – 6,411,334 VND). In the structure of treatment cost, health insurance covered the most and the drug costs accounted for highest proportion with the median value of 3,642,446 VND (1,805,001 VND – 7,326,606 VND). The median values of health insurance rates are comparable. The related factors on costs of treatment included the place of residence, the number of days in hospital, the stage and the complications of cirrhosis. A multiple regression model to forecast treatment cost has been built with R-square=0.460, p=0.000; following which the number of days in hospital is the strongest factor on treatment cost (β=0.31, p=0.000); followed by the Northern living place (β=0.131, p=0.000) and the stage of disease (β=0.038, p=0.000). Discussions: We only assess the treatment cost for cirrhosis but do not evaluate the expense for the whole process including many different treatment courses yet. Secondly, this study does not evaluate the outpatient treatment costs. Furthermore, the multiple regression model can only explain 46.0% of the change of converted cost with 03 factors: the number of days using sick-bed, the Northern area and the disease stage. Conclusions: With the rising trend of liver cirrhosis in Vietnam and the high cost of treatment, national health policies and medical programs should be considered.

Keywords: *liver, cirrhosis, medical cost*

1. INTRODUCTION

Cirrhosis with the increased mortality is one of the leading causes of death in the world. Currently, it is estimated that over 50 million adults worldwide are affected by chronic liver disease, with prevalence rates varying between 4.5% and 9.5% of the population.[1-3] According to the study of global disease burden in 2010, cirrhosis causes approximately 31 million DALYs (Disability Adjusted Life Years), which accounts for 1.2% of worldwide DALYs, with 1 million deaths from cirrhosis correspond to 2% of the total death number worldwide[3, 4].

Vietnam has a high incidence and death rate for cirrhosis due to the high incidence of hepatitis – the risk of cirrhosis and delayed treatment. According to the World Health Organization (WHO), in 2012, the cirrhosis death rate in Vietnam ranks third in Southeast Asia (after Myanmar and Indonesia) with 39.3 per 100,000 for men and 9.2 per 100,000 for women[5]. Besides, cirrhosis has a long-term treatment disease demanding many high-cost medical services. Therefore, cirrhosis is not only a morbidity burden but also a substantial economic burden on patient, health care system and the social. Evaluating the cost of treating cirrhosis to estimate the economic burden of the disease is extremely urgent for each country to develop appropriate health policies.

Evaluation of cirrhosis treatment costs has been done in some countries around the world. A study in Iran in 2015 found that the total cost of cirrhosis treatment was $164.32 million, of which direct cost and indirect cost were $ 142.47 and $ 19.22 million, respectively[6].

However, research on the cost of cirrhosis in Vietnam

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have been limited. Therefore, the aim of this study was to estimate the direct medical costs of liver cirrhosis and related factors on costs in Vietnam.

2. METHODS

2.1. Study design

This descriptive cross-sectional study conducted based on retrospective data of all cirrhosis patient's records in 2015 from two hospitals: HCMC Tropical Hospital and Bach Mai Hospital. Bach Mai Hospital, a 1400-bed hospital, is among the largest hospitals in Vietnam and HCMC Tropical Hospital is one of the leading specialty hospitals in the treatment of liver disease in Vietnam. The study object was the direct medical cost for treatment of cirrhosis inpatients at two research hospitals. All medical records of inpatients with cirrhosis satisfied the inclusion and exclusion criteria were selected to collect data.

2.2. Inclusion and exclusion criteria

Eligible inpatients comprised those of over 18 years of age whose medical records were diagnosed with cirrhosis (ICD code: K74) and covered by health insurance are included. Patients who were not a Vietnam resident excluded. Patients who had other diseases affected treatment regimen such as: HIV, heart disease, pneumonia... are excluded. Those patients who interrupted the treatment session because of transferring to hospital or being died during treatment are also excluded.

2.3. Data collection

The data were collected from patient's medical records. The use of these records was approved by each hospital's review board. Data on demographic characteristics, pathological characteristic and resource utilization cost were extracted from the patient's medical records. The demographic data included patient's age, sex, place of resident and the level of health insurance payment. Pathological characteristics included the stage, the cause and the complications of cirrhosis as well as other chronic diseases that patients had. The resource utilization cost of this study included all medical-related resources, medical services and medication cost. Medical services cost comprised of laboratory tests, procedure, image, hospitalization, consumable supplies and others cost.

2.4. Analyzing of direct medical cost

Cross sectional description method was used to estimate the treatment cost. Before proceeding with the data description, study performed the standardized distribution of observation variables with appropriate tests and data cleansing. The statistical way using to estimate the cost of resource utilization were median (quartile) or mean (standard deviation), depended on the standardized distribution of observation variables. The data cost of treatment was collected from the medical records and analyzed for value and structure by categories or payers. In addition, the cost of treating cirrhosis was also assessed by the level of health insurance payments.

2.5. Analyzing factors affecting the cost of treatment for inpatients cirrhosis

Correlation analysis and multivariate regression were used to find out affecting factors and the influence level of those factors to the treatment cost. To assess the correlation between the treatment cost for inpatients cirrhosis and the independent factors proposed from the previous studies and this study including: age group, place of residence, hospitalization day, level of health insurance payment, cause of disease, disease stage and complications...

The study analyzed the relationship and correlation between independent variables and dependent variables with 95% confidence. Before testing the statistical hypotheses, the study performed the standardized distribution test of the observation variable to use appropriate tests. Statistical tests could be used depending on the independent variable and the distribution of the dependent variable.

2.6. Multivariable regression model

To construct a multivariable regression model, the dependent variable (cost) must have a standard distribution. Therefore, before constructing the regression model, the study proceeded to examine the distribution of observed variable values. If the observation variable did not have a standardized distribution, it was necessary to convert the observation variable to the standard distributed variable by mathematical substitutions such as logarithm, ln, square root...

In which, the qualitative independent variables to be included in the regression model should use the dummy variable method (Dummy method). Set artificial variables with 1 indicating that it had value attribute and 0 as the opposite. Variables that receive values 0 and 1 are called dummy variables or binary variables[7]. To distinguish N classifiers, used(N-1) dummy variables[7].

2.7. Statistical analysis

Data was processed and statistically analyzed using IBM SPSS Statistics 20.0 and Microsoft Excel. Data were statistically analyzed with a 95% confidence interval. The correlation between the observed variables was assessed by examining the statistical hypotheses H_0 and H_1 by the corresponding statistical methods.

3. RESULTS

3.1. Patients characteristics

3.1.1. Demographic characteristic

A sample of 313 records of cirrhosis patients satisfied the research criteria at two hospitals, which identified demographic characteristics was presented in Table 1.

Among the 313 patients recruited the male: female ratio was 2,1:1. This rate is consistent with Steven Scaglione's study of cirrhosis in the United States and Fleming's study in the United Kingdom with a higher incidence of cirrhosis in male than in female.8,[9] The mean age of the sample was 56.86 ± 13.09 years and ranged from 20 to 88 years. This result is similar to that in the United States with 51.15 years of age[8]. The study reported a statistically significant difference in mean age between male and female (53.51 ± 12.19 versus 64.00 ± 12.09; p = 0.000). The results were consistent with the study conducted in England with an average age of 56.3 and 61.3 years for male and female[9].

The two most common age groups were 40-59 and 60-79 years, with 50.2% and 36.7%, respectively. Cirrhosis was less prevalent in the under 40, with 8.3% in the above group. The age group of 80+ accounts for only 4.8%.

The majority of samples came from the Northern (62.0%); 36.4% came from the Southern and 1.6% from the Central, corresponding to 5/313 people. About the health insurance line, the majority of patients in the sample used health insurance at the primary level and 2.5 times higher than the higher level health insurance (71.6% compared to 28.4%). Level of health insurance: 54% of patients had 80% health insurance coverage and dominated; 31.6% had 100% benefit and 95% had the lowest rate of 14.4%.

Table 1. Demographic characteristic of cirrhosis patient

Variable		N (%) or Mean (SD)	Accumulated percentage (%) or Min-Max
Sex	Male	213 (68.1%)	68.1
	Female	100 (31.9%)	100.0
Age	20-39	26 (8.3%)	8.3
	40-59	157 (50.2%)	58.5
Age group	60-79	115 (36.7%)	95.2
	80+	15 (4.8%)	100.0
Mean age	Male	53.51 (12.19)	24-88
	Female	64.00 (12.09)	20-88
	All	56.86 (13.09)	20-88
Place of resident	Northern	194 (62.0%)	62.0
	Central	5 (1.6%)	63.6
Place of resident	Southern	114 (36.4%)	100.0
Health insurance line	Primary level	224(71.6%)	71.6
	Higher level	89(28.4%)	100.0
Level of health insurance payment	80%	169(54.0%)	54.0
	95%	45(14.4%)	68.4
	100%	99(31.6%)	100.0

3.1.2. Pathological characteristics

A sample of 313 records of cirrhosis patients satisfied the research criteria at two hospitals, which identified pathological characteristics was presented in Table 2.

The majority of patients were in decompensated cirrhosis function and 2.6 times higher than the stage of compensated cirrhosis (72.5% vs 27.5%). This could be explained by patients with compensated cirrhosis function, usually received outpatient treatment and

hospitalize only when the disease progressed or complications occurred in the decompensation phase. Moreover, the health care system in Vietnam was still limited in detecting early disease.

Hepatitis B or/and C was the most common cause of cirrhosis accounting for 79.6%. Alcoholic cirrhosis accouned for 11.2% while cirrhosis for both alcoholic causes and hepatitis accounted for 5.4%. There were 12 patients who have not identified the cause of the disease accounted for 3.8%.

Most of the samples without chronic disease were accounted for 73.2%. Common chronic diseases included hypertension, diabetes mellitus and gastritis with a rate of 3.5%; 7.7% and 7.3%. In addition, 8.3% of the sample had two or more chronic diseases.

Patients without complications or multiple complications accounted for almost the same proportion of 27.5% and 27.2%; respectively. In patients with complications, esophageal varices were the most common with 29.1%; followed by other complications or ascites with 11.2% and 5.1%, respectively.

The average number of hospitalization days for cirrhosis inpatients was 8.29 ± 6.19 days and ranged from 1 to 34 days.

Table 2. Pathological characteristics of cirrhosis patient

Variable		N (%) or Mean (SD)	Accumulated percentage (%) or Min -Max
Stage	Compensated cirrhosis	86 (27.5%)	27.5
	Decompensated cirrhosis	227 (72.5%)	100.0
Cause	Undetermined cause	12 (3.8%)	3.8
	Alcohol	35 (11.2%)	15.0
	Hepatitis B or/and C	249 (79.6%)	94.6
	Alcohol and hepatitis	17 (5.4%)	100.0
Chronic disease	None	229 (73.2%)	73.2
	Hypertension	11 (3.5%)	76.7
	Diabetes	24 (7.7%)	84.3
	Gastritis	23 (7.3%)	91.7
	≥ 2 disease	26 (8.3%)	100.0
Complications	None	86 (27.5%)	27.5
	Ascites	16 (5.1%)	32.6
	Esophageal varices	91 (29.1%)	61.7
	Other	35 (11.2%)	72.8
	Multiple complications	85 (27.2%)	100.0
No. of hospitalizations (day)		8.29 (6.19)	1-34

3.1.3. Direct medical cost of cirrhosis inpatient

Study conducted Kolmogorov-Smirnov check and acknowledged that the treatment cost at two research hospitals was not standardized distribution with p=0.000<0.05. Accordingly, to describe the overall cost of treatment for cirrhosis in structure, payer groups and health insurance coverage, this study used descriptive values including mean (standard deviation) and median (quartile). Prior to analysis, data was cleansing by using Boxplot and eliminated 24 cases that the treatment costs were considerably high. A sample of 289 cirrhosis patients at two research hospitals examined the treatment cost data and presented the results in Table 3.

The results showed that the average treatment cost of cirrhosis is 7,608,764 ± 5,307,241 VND. The cost had a median value of VND 6,064,104 (VND 3,246,810 - VND 11,195,942). The difference in mean and median value showed the large cost differences and unequal cost distribution in the sample with the majority of patients having expense less than 10,000,000 VND. The number of patients with treatment cost over 10,000,000 VND accounted for a low proportion. This could be explained by differences in severity and duration of treatment.

Table 3 showed that health insurance covered the major cost in treating cirrhosis. The mean value of health insurance was 2 times patient's value. The median cost of health insurance paid was VND 3,642,446 (VND 1,805,001 - 7,326,606 VND) which was 2.38 times higher than the cost paid by patients with VND 1,530,838 (VND 652,388 - VND 3,263,758). The above results suggested that health insurance reduced the economic burden significantly when treating cirrhosis in patients.

Table 3. Treatment cost of liver cirrhosis

	Mean	Standard deviation	Median	Quartile 25% - 75%
Treatment cost	7,608,764	5,307,241	6,064,104	3,246,810 - 11,195,942
Health insurance	5,091,130	4,288,744	3,642,446	1,805,001 - 7,326,606
Patient	2,514,594	2,832,082	1,530,838	652,388 - 3,263,758
Drug	4,257,309	4,019,387	3,040,395	843,309 - 6,411,334
Medical service	3,351,455	2,073,135	2,786,105	1,934,179 - 4,222,197

The mean of drug cost was much higher than medical service (4,257,309 ± 4,019,387 VND versus 3,351,455 ± 2,073,135 VND); however, the median value was similar. This could be explained by the fact that the drug costs fluctuated wider than the value of the medical service cost. In addition, the drug cost accounted for a major proportion of treatment cost.

Analysis of the components of medical service costs in the treatment of cirrhosis of inpatients was presented in table 4.

The results showed that in mean value, laboratory test had the highest value with 1,649,332 ± 1,028,532 VND; followed by hospitalization cost with an average value of 737,535 VND ± 830,657 VND. The cost of procedure, consumable supplies, diagnostic imaging and other were equivalent with the average cost ranges from VND 109,771 to VND 447,466. In median value, laboratory test also had the highest value with 1,414,000 VND. Therefore, although there was a difference between median and mean value, the cost of labor remained dominant in the cost structure of medical services.

Table 4. Median and quartile value of medical services components

	Mean	Standard deviation	Median	Quartile 25% - 75%
Procedure	447,466	589,480	269,000	73,600 - 706,250
Hospitalization	737,535	830,657	467,000	232,588 - 860,000
Image	240,453	508,487	68,534	20,733 - 187,750
Consumable supply	109,771	127,127	80,220	40,115 - 132,651
Laboratory	1,649,332	1,028,532	1,414,000	977,333 - 2,028,500
Other	166,898	499,729	7,093	0 - 186,000

3.1.4. Factors affecting treatment cost

Analysis of the relationship between treatment cost and independent variable on the sample included 289 records of cirrhosis patients at two research hospitals with suitable statistical way, the result was shown in table 5.

The result showed the relationship between treatment cost and place of residence, the number of days of inpatient, the stage of disease and the complications. Besides, there was no relationship between age group, level of payment for health insurance, causes of disease and chronic diseases.

Table 5. Relationship between treatment cost and affecting factors

Dependent variable	Independent variable	Statistical way	Result
Treatment cost	Age group	Kruskal-Wallis	p>0.05
	Place of residence	Kruskal-Wallis	p=<0.01
	Hospitalization day	Spearman	r=0.399; p<0.001
	Level of health insurance payment	Kruskal-Wallis	p>0.05
	Stage of disease	Mann-Whitney	p= <0.01
	Cause of disease	Mann-Whitney	p= >0.05
	Chronic disease	Mann-Whitney	p= >0.05
	Complications	Kruskal-Wallis	p=<0.01

3.1.5. Analysis of the regressive relationship between the factors affecting the cost of cirrhosis treatment

The treatment cost was not following the standard distribution; thus, in order to analyze the regressive relationship between the factors affecting treatment cost of cirrhosis, it was

necessary to change the treatment cost (TC) variable into a converting variable following standard distribution. Examined the quantized quantifiable transformations with the functions ln, log, square root… the base-10 logarithm of the treatment cost (LogTC) followed standard distribution.

3.2. Matrix correlation coefficient

To examine generalizations of the relationships between independent variables and dependent variables, the study constructed matrix correlations between variables with two-variable correlations (Pearson). The results of the analysis of the correlation between these factors and logTC were presented in the table 6.

The result showed that independent variable with the greatest correlation was hospitalization days (r = 0.548; p = 0.000); Northern correlated on average with r=0.299; P=0.000; followed by the one complication with r=0,138; p=0,014; the least correlated independent variable was disease stage (r=0.114; p=0.044). Two independent and independent variables in the Southern were negatively correlated with treatment cost, so they were not selected into the model.

Table 6. Matrix correlation between independent variables and dependent variables

		LogTC	Hospitaliz-ation day	Northern	No complication	One complication	Disease stage	Southern
LogTC	Pearson Correlation	1	0.548	0.299	-0.114	0.138	0.114	-0.306
	Sig. (2-tailed)		**0·000**	**0·000**	**0·044**	**0·014**	**0·044**	**0·000**
	N	312	312	312	312	312	312	312
Hospitalization day	Pearson Correlation	0.548	1	-0.135	0.017	-0.074	-0.017	0.124
	Sig. (2-tailed)	0.000		0.017	0.767	0.190	0.767	0.029
	N	312	312	312	312	312	312	312
Northern	Pearson Correlation	0.299	-0.135	1	0.071	0.315	-0.071	-0.966
	Sig. (2-tailed)	0.000	0.017		0.212	0.000	0.212	0.000
	N	312	312	312	312	312	312	312
No complication	Pearson Correlation	-0.114	0.017	0.071	1	-0.560	-1.000	-0.051
	Sig. (2-tailed)	0.044	0.767	0.212		0.000	0.000	0.369
	N	312	312	312	312	312	312	312
One complication	Pearson Correlation	0.138	-0.074	0.315	-0.560	1	0.560	-0.328
	Sig. (2-tailed)	0.014	0.190	0.000	0.000		0.000	0.000
	N	312	312	312	312	312	312	312
Disease stage	Pearson Correlation	0.114	-0.017	-0.071	-1.000	0.560	1	0.051
	Sig. (2-tailed)	0.044	0.767	0.212	0.000	0.000		0.369
	N	312	312	312	312	312	312	312
Southern	Pearson Correlation	-0.306	0.124	-0.966	-0.051	-0.328	0.051	1
	Sig. (2-tailed)	0.000	0.029	0.000	0.369	0.000	369	

3.3. Constructing multivariate regression model

After considering the correlation matrix between the variables, the multivariate linear regression model was constructed by forward selection. The independent variables were introduced into the model in order of the descending of coefficient values: HD (r = 0.548), NV (r = 0.299), OC (r = 0.138), DS (r=0.144).

To select the appropriate model to explain the relationship between logTC and factors, this study based on the adjusted R square. The adjusted R square values of the three models are shown in the table 7.

The adjusted R2 value increased from model 1 (0.298) to model 3 (0.460). Thus, model 3 with 3 independent variables was the most suitable model to explain the relationship between logTC value and components. Model 3 was chosen to carry out next steps of conformity assessment.

The adjusted R square = 0.460 indicated that the variation of the independent variables explains 46.0% of the model change, while the remaining 54.0% was due to other variables and random errors.

In addition, Durbin-Watson coefficient = 2.100 (1.5<d = 2.1<2.5); therefore, there was no autocorrelation occurring.

Table 7. Values of adjusted R square

Model	Variable	R	R-square	Adjusted R square	Std. Error of the estimate	Durbin-Watson
1	HD	0.548	0.300	0.298	0.323	
2	HD, NV	0.665	0.442	0.439	0.289	
3	HD, NV, DS	0.682	0.465	0.460	0.283	2.100

3.4. Validation of the suitability of multivariate regression models

To test the suitability of the model 3, the first step of the research was analyzing the ANOVA value of R square with the hypothesis H_0: R square overall = 0, the hypothesis H_1: R square overall ≠ 0. The result of the test was presented in the table 8.

The result showed that the value of F of model 3 is 89.332 with probability p = 0.000 <0.05. Thus, the hypothesis $H_0$was rejected, the multivariate linear regression model was constructed accordingly.

Table 8. Results of the analysis of variance

Model	F	Sig.
1	132,979	0.000
2	122,501	0.000
3	89,327	0.000

To assess the influence of a single independent variable on the variation of the logTC dependent variable, study examined the significance of the partial regression coefficients with T - test with the hypothesis test H_0: the partial regression coefficient of the independent variable k ≠ 0 is not significant (β_k = 0). Test results were presented in the table 9.

Table 9. Test results the meaning of partial regression coefficient

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
3	(Constant)	6.221	0.046		136.707	0.000		
	Hospitalization day	0.038	0.003	0.603	14.342	0.000	0.981	1.019
	Northern	0.310	0.033	0.392	9.290	0.000	0.976	1.024
	Disease stage	0.131	0.036	0.152	3.641	0.000	0.994	1.006

Independent variables in the model were positively correlated with the logTC dependent variable (β_k> 0). The p-value of the T-tests for individual regression coefficients of inde-pendent variables was < 0.05. Thus, each of the independent variables included in the model

explained the change of the logTC. In addition, logTC as well as treatment costs of cirrhosis were most strongly influenced by the hospitalization day with Beta = 0.603; followed by the northern with Beta = 0.392; The stage factor affected the weakest with Beta = 0.152.

Additionally, the independent variables in the model had high acceptability and VIF <10 variance magnification coefficients. Thus, the constructed model had no multi-collinearity.

The linear multivariate regression model demonstrated the relationship between logTC and its components:

$$\widehat{\textbf{logTG}} = 6{,}221 + 0{,}038 * \textbf{HD} + 0{,}31 * \textbf{NV} + 0{,}131 * \textbf{DS}$$

Estimated regression results showed that logTC depended on three factors: hospitalization day (HD), Northern Vietnam (NV) and disease stage (DS). The individual regression coefficients of each independent variable were > 0 with a 5% significance level indicating that the inde-pendent variables in the model were positively correlated with the logTC. From the model, in the absence of other variables, when the number of bed days increased by 1 unit (day) the logTC increased by 0.038 - corresponding to the cost of treatment increased by 1.09 times; if patients treated in the north of Vietnam, logTC will increase 0.31 corresponding to the treatment cost increased 2.04 times; if patients had decompensated cirrhosis function, logTC will increase by 0.131, corresponding to a 1.35-fold increase in treatment costs. The con-structed model has adjusted R square of 0.460 (p <0.05); Therefore, the model can predict 46.0% change of logTC.With appropriate objects and research methods, the study has achieved our objectives.

4. DISCUSSIONS

The study has examined over 313 medical records stored in two hospitals: Ho Chi Minh City Hospital for Tropical Diseases and Bach Mai Hospital, the topic has analyzed the demo-graphic and pathological characteristics of the research sample. Accordingly, the number of male patients is higher than that of women with the male: female ratio - 2.13: 1. This ratio is consistent with Steven Scaglione's study of cirrhosis of liver cirrhosis in the US and the study of Fleming in the UK with a higher incidence of cirrhosis in men than in women [8, 9]. The average age of patients is 56.86 ± 13.09 years old, which is consistent with the research done in the UK when the average age of men and women is 56.3 and 61.3 respectively [10]; nearly two-thirds of patients live in the Northern area. More than three quarters of patients with cirrhosis are caused by hepatitis B or C virus. The above result differs from a research of Fleming performed in England in 2008 with 38.3% alcoholic cirrhosis, 5.4% viral hepatitis and 56.3% cases by other causes or causes of the disease that has not been determined [10]. This can be explained by the different rate of viral hepatitis between 2 countries. The number of patients with advanced decompensated cirrhosis is almost three times higher than compensated cirrhosis, the most common complication is esophageal varices. This may be because of the fact that patients with compensated cirrhosis often choose outpatient treatment and are only hospitalized when the disease is advanced to the decompensation stage or the occurrence of complications. The average number of inpatient days is 8.29 ± 6.19 days, which is similar to the study in Thailand in 2014 with 8.69 ± 16.32 days [11]. All surveyed patients participated in health insurance but the number of cases using health insurance at inappropriate levels still accounted for more than one quarter of the sample.

Our study was based on the health insurance perspective to assess the direct medical treatment cost. Data on treatment costs of patients is collected to analyze the value and structure in terms of composition, stage, beneficiaries and level of health insurance coverage. Results of the total costs for treating cirrhosis show that the median value is 6,672,363 VND and the respective interquartile range of 25% to 75% is 3,950,539.75 VND to 13,228,503.00 VND; in which drug costs have the highest median value with 3,527,726 VND. It distributes that health insurance covers most of the costs for treating cirrhosis in two research hospitals. The cost of treating cirrhosis is largely paid by the health insurance with median value of 3,956,508.50 VND (25% -75% interquartile range of 1,866,183.50 VND to 8,918,307.50 VND).

This study has analyzed the correlation between converted cost (logCP) and factors affecting it and build a multiple linear regression model to evaluate the influence of those factors on it. Estimated results from the regression model show that converted cost has a positive correlation with

four factors: number of days using sick-bed (SNG) (r=0,548; p=0,000 < 0.05), northern area (MB) (p= 0,000 < 0.05), disease stage (GDB) (p = 0.044 < 0.05) and complications (p=0.036 < 0,005). The correlation with SNG may be explained by an increase in the number of inpatient days causing the rising number of days using sick-bed, drugs and medical services used, leading to increasing treatment costs. About GDB, the above results can be explained by the fact that in the stage of decompensated cirrhosis, patients have to suffer from many complications that is followed by an increase in the treatment cost. The explanation for the correlation with MB is differences in drugs and medical services used in research hospitals in the Southern and Northern areas.

In spite of satisfying all the goals, the study still has certain limitations as follows. First of all, we only assess the treatment cost for cirrhosis but do not evaluate the expense for the whole process including many different treatment courses yet. Secondly, this study does not evaluate the outpatient treatment costs. Furthermore, the multiple regression model can only explain 46.0% of the change of converted cost with 03 factors: the number of days using sick-bed, the Northern area and the disease stage. Thus, more than 50% of the variation is due to variables outside the model and random errors. Last but not least, our study was carried on locally in 2 hospitals including Bach Mai Hospital and Ho Chi Minh City Hospital for Tropical Diseases so it has not collected internal data representing specialized hospitals throughout Vietnam.

5. CONCLUSIONS

This study showed that cirrhosis disease was one of the costly diseases in Vietnam. Despite some limitations, the study generated interesting points to policymakers and payers that early proper liver treatment might help to prevent more costs as the disease progresses to more advanced stages. Future research should focus on not only amending the study limitations but also extending the study results. Evaluate other cost components involved in cirrhosis treatment including direct and indirect costs for a more comprehensive look. A full economic evaluation in both inpatient and outpatient should be conducted as well as their budget impact analysis for the country were also recom-mended. This study should be expanded the sample to other specialty hospitals in Vietnam to have a representative sample size for Vietnam and find out more factors affecting the treatment cost to build a better model to predict treatment cost.

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Chi phí trực tiếp y tế của bệnh xơ gan tại Việt Nam

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TÓM TẮT

Giới thiệu: Xơ gan là một trong những nguyên nhân hàng đầu gây tử vong trên toàn thế giới và cũng là gánh nặng kinh tế đáng kể đối với bệnh nhân, hệ thống y tế và xã hội. Tuy nhiên, các nghiên cứu tập trung vào chi phí điều trị xơ gan ở Việt Nam còn hạn chế. Mục tiêu của nghiên cứu này là ước tính chi phí điều trị nội trú của bệnh xơ gan và các yếu tố ảnh hưởng đến chi phí tại Việt Nam. Phương pháp: Nghiên cứu mô tả cắt ngang dựa trên dữ liệu hồi cứu từ hồ sơ bệnh án bệnh nhân xơ gan trong năm 2015 tại hai bệnh viện (Bệnh viện Nhiệt đới Thành phố Hồ Chí MInh và Bệnh viện Bạch Mai), thỏa mãn các tiêu chí lựa chọn và loại trừ. Phân tích mô tả và tương quan được thực hiện với các kiểm định thống kê liên quan (T-test, ANOVA một chiều, tương quan) với mức độ tin cậy 95%. Kết quả: Chi phí điều trị trung vị cho mỗi đợt điều trị là 6,064,104 VND (3,246,810 VND – 11,195,492 VND); chi phí thuốc có giá trị trung vị cao nhất với 3,040,395 VND (843,309 VND – 6,411,334 VND). Trong cơ cấu chi phí điều trị, bảo hiểm y tế chi trả phần lớn và chi phí thuốc chiếm tỷ lệ cao nhất với giá trị trung vị là 3,642,446 VND (1,805,001 VND – 7,326,606 VND). Giá trị trung vị của các mức bảo hiểm y tế là tương đương. Các yếu tố liên quan đến chi phí điều trị bao gồm nơi cư trú, số ngày nằm viện, giai đoạn bệnh và biến chứng của xơ gan. Một mô hình hồi quy bội để dự báo chi phí điều trị đã được xây dựng với $R^2 = 0.460$; $p = 0.000$; trong đó số ngày nằm viện là yếu tố ảnh hưởng nhất đến chi phí điều trị ($\beta = 0.31$; $p = 0.000$); tiếp theo là nơi cư trú ở miền Bắc ($\beta = 0.131$; $p = 0.000$) và giai đoạn bệnh ($\beta = 0.038$; $p = 0.000$). Thảo luận: Nghiên cứu chỉ đánh giá chi phí điều trị cho bệnh xơ gan mà chưa đánh giá chi phí cho toàn bộ quá trình điều trị bao gồm nhiều đợt điều trị khác nhau. Thứ hai, nghiên cứu này không đánh giá chi phí điều trị ngoại trú. Hơn nữa, mô hình hồi quy bội chỉ giải thích được 46,0% sự thay đổi của chi phí chuyển đổi với 03 yếu tố: số ngày nằm viện, khu vực miền Bắc và giai đoạn bệnh. Kết luận: Với xu hướng gia tăng của bệnh xơ gan ở Việt Nam và chi phí điều trị cao, các chính sách y tế quốc gia và các chương trình y tế nên được xem xét.

Từ khóa*: gan, xơ gan, chi phí y tế*

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