Study on direct medical cost of inpatient treatment for gastrointestinal cancers at Hue University of Medicine and Pharmacy Hospital

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Abstract

Background: Gastrointestinal cancers, including liver cancer, colorectal cancer, and stomach cancer, are the most common cancers in the world as well as in Vietnam, posing a leading threat to human health. The cost of treating these cancers is a major problem that burdens not only patients but also healthcare systems. The study aims to analyze treatment costs for the four most common types of gastrointestinal cancer nowadays. **Materials and method**: A cross-sectional study was conducted to collect data from 300 medical records of inpatients with gastrointestinal cancers at the hospital of Hue University of Medicine and Pharmacy in 2021. **Result**s: The average direct medical cost per inpatient admission was 14,239,915 VND (95% CI: 12,502,135 - 15,977,695 VND) in 2021. The cost per inpatient admission for liver cancer treatment was the highest, by 20,267,780 VND (95% CI: 16,036,541- 24,499,018 VND). The cost of drugs accounted for the highest proportion (38.1%), followed by the cost of medical supplies (14.7%). There is a statistically significant difference between the median cost of groups classified by age, metastasis, comorbidity, and length of hospital stay. **Conclusion:** Direct medical costs for patients with four common types of gastrointestinal cancers impose a considerable economic burden on patients and the health system. Further cost analysis studies need to be conducted. Strategies to decrease the economic burden of gastrointestinal, such as screening programs, and improving awareness of the prevention of cancer should be developed in Vietnam.

Keywords: *direct medical costs, gastrointestinal cancer, Hospital of Hue University of Medicine and Pharmacy.*

1. INTRODUCTION

Cancer, including gastrointestinal cancer, is the leading threat to human health in the world nowadays. According to Globocan statistics, colorectal cancer and stomach cancer are among the five most common cancers in the world, with incidence rates of 10% and 5.6% respectively of all new cancer cases in 2020. Regarding males, liver cancer is also one of the five most common cancers besides colorectal cancer and stomach cancer [1]. Similarly, in Vietnam, three types of gastrointestinal cancer, including liver cancer, stomach cancer, and colorectal cancer, were among the five most common types of cancer and accounted for 14.5%, 9.8%, and 9% of total cancer cases, respectively in all sexes. In particular males, liver cancer is the most common cancer, accounting for 20.5% of all new cancer cases [2]. With a large number of patients suffering from gastrointestinal cancers with a long duration of treatment, the cost of treatment for gastrointestinal cancers imposes a great burden on the healthcare systems. According to a study forecasting by macro-level decision analysis the costs of 29 types of cancer in 204 countries and territories from 2020 to 2050, the top five cancers with the largest costs are lung cancer and bronchial cancer (15.4%), colorectal cancer (10.9%); breast cancer (7.7%), liver cancer (6.5%) and blood cancer (6.3%) [3].

The hospital of Hue University of Medicine and Pharmacy is now a Grade I public hospital with 700 beds. Every year, the hospital receives medical examinations and treatment for over 250,000 patients. The oncology department of the hospital has received inpatient treatment for more than 3,200 patients and nearly 14,000 outpatients each year.

With the limit of studies on the cost of gastrointestinal cancer in Vietnam so far, especially at the Hospital of Hue University of Medicine and Pharmacy, this study aims to provide patient-level information on the economic burden of some types of gastrointestinal cancer, which contribute to

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indicate the magnitude of gastrointestinal cancer. The objectives of this study are to estimate the cost per inpatient admission and identify some associated factors.

2. METHODOLOGY

2.1. Study design

A cross-sectional study was designed to analyze the cost of treatment for patients with four common types of gastrointestinal cancers, including liver cancer, stomach cancer, rectal and colon cancer in the year 2021 at Hue University of Medicine and Pharmacy Hospital. Direct medical costs per inpatient admission were estimated from the perspective of healthcare payers, including public health insurance and patients. Medical records with medical invoices per inpatient admission were used to select patients and collect data.

2.2. Study subjects

Based on the code list for application in medical examination and treatment management of Vietnam Minister of Health, patients with four types of gastrointestinal cancers were identified by the ICD codes in medical records, including C16 (stomach cancer), C18 (colon cancer), C20 (rectal cancer) and C22 (liver cancer) [4]. The inclusion and exclusion criteria were used to select relevant medical records of inpatient admission.

The inclusion criteria involved medical records of patients with a primary diagnosis of stomach cancer, colorectal cancer, or liver cancer, and receiving inpatient treatment at the Hue University of Medicine and Pharmacy Hospital in 2021. Patients diagnosed in the period of pregnancy and medical records with incomplete information were excluded from the study.

2.3. Study sample size:

Convenient sampling was used to collect medical records of patients. The sample size of medical records was identified according to the formula to calculate the sample size for the average cost**:**

With: $n = \frac{Z^2_{1-\frac{\alpha}{2}}\sigma^2}{d^2}$

+ n: minimum sample size;

+ $Z^2_{1-\alpha/2}$: value from the normal distribution, calculated based on statistical significance, $Z^2_{1-\alpha/2}$ = 1.96 with 5% statistical significance.

+ σ: standard deviation (taken from previous studies or exploratory studies)

+ d: acceptable absolute error level

Select the standard deviation value of 6.5 million VND per inpatient admission according to our team's exploratory research results. Choose an error level of 10%, corresponding to the value d = 0.75 million VND. At the 5% level of statistical significance, the expected sample size was calculated as $n = 1.96^2 \times 6.5^2/0.75 \approx 289$. Therefore, the study collected 300 medical records of 300 inpatient admissions in 2021. Merging medical records using patient code, 173 patients were included in this study.

2.4. Data collection

Three types of data (General characteristics, clinical status, and medical cost) were collected from medical records using a case record form. The collected information included the patient demographics (full name, age, gender, occupation, address) as well as information on diagnoses (ICD disease codes, the number of treatment days per inpatient admission, and health insurance benefit rate). In addition, cost data such as costs of medical examination, hospital beds, drugs, surgical procedures, medical supplies, diagnostic imaging, laboratory tests, and total cost per inpatient admission were collected.

2.5. Data processing and analysis:

The collected data were processed and analyzed using SPSS 20.0 software. Several descriptive statistics, such as mean, median, 95% Confidence Interval (95% CI), percentage, minimum – maximum, and interquartile range were calculated to present the results.

Since the cost variable does not follow a normal distribution (Kolmogorov-Smirnov test, $p < 0.05$), non-parametric tests were used to analyze the difference in treatment costs between groups of patients.

+ The Mann-Whitney test was used to determine the statistically significant differences between the two groups.

+ The Kruskal-Wallis test was used to determine the statistical significance of the differences between more than two groups of an independent variable on a continuous dependent variable.

The 95% confidence level was chosen to determine the statistically significant results.

3. RESULTS

Table 1. General characteristics of patients (n = 173)

Features		Results	
		n	%
Gender	Male	120	69.4
	Female	53	30.6
Age group*	< 40	9	5.2
	40 - 49	13	7.5
	50 - 59	48	27.7
	60 - 69	51	29.5
	≥ 70	52	30.1
	Age (Mean ± SD)	62.5 ± 12.6	
Occupation	Housekeeper/working at home	57	32.9
	Farmer	29	16.8
	Retiree	57	32.9
	Employee (worker, office worker, healthcare worker…)	9	5.2
	Others (working freelance)	21	12.2
Residence	Hue city of Thua Thien Hue province	49	28.3
	Other district of Thua Thien Hue province	99	57.2
	Other provinces	25	14.5
Health insurance reimbursement rate	0%	1	0.6
	80%	86	49.7
	95%	10	5.8
	100%	76	43.9

SD: standard deviation

n: number of patients

*Age group classification was based on research on the cost of colorectal cancer in Hue City, Vietnam [5]

As shown in Table 1, most of the study subjects were male (69.4%) and more than 50% (59.6%) were 60 years and above. Retirees and working at home were the main occupations of the patients (32.9%). More than half of the patients lived in Thua Thien Hue province but outside the Hue city area (57.2%). Most of the patients had public health insurance (99,6%) and nearly 50% had an 80% reimbursement rate.

Table 2. Clinical status of patients

Features		Results	
		n	%
Types of cancer (ICD code)	Stomach cancer (C16)	40	23.1
	Colon cancer (C18)	41	23.7
	Rectal cancer (C20)	25	14.5
	Liver cancer (C22)	67	38.7
Metastasis	No	115	66.5
	Yes	58	33.5
Comorbidity	No	24	13.9
	Yes	149	86.1

Number of comorbid diseases*	1	30	17.3
	2	34	19.7
	3	29	16.8
	≥ 4	56	32.4
Length of hospital stay per inpatient admission (days)	Mean ± SD (days)	10.6 ± 9.2	
	Range (Minimum - Maximum)	1 - 44	

*n = 149 patients with comorbidity

Comorbid diseases were identified by the ICD codes in the comorbidity content of medical records

Among the four types of gastrointestinal cancer investigated, liver cancer accounted for the highest proportion (38.7%), followed by colon cancer (23.7%) and stomach cancer (23.1%). In terms of colorectal cancer in general, this cancer type accounted for the second highest rate (38.2%) after liver cancer. Approximately 66% of patients were diagnosed at the non-metastatic stage, and about 32% of patients were identified as advanced/metastatic stage.

The majority of patients had comorbidities, accounting for 86%. The average length of hospital stay per inpatient admission was 10.6 days, with the shortest duration being 1 day and the longest up to 44 days, see Table 2.

Table 3. Direct medical cost per inpatient admission covered by health insurance and patients (n = 300)

Cost category	Mean (95%CI)	Median (Interquartile range)	Min - Max
Total direct medical cost per inpatient admission (VND)	14,239,915 (12,502,135 - 15,977,695)	7,405,102 (4,576,448 - 18,536,009)	281,154 - 89,669,732
Direct medical cost per inpatient admission paid by health insurance (VND)	12,803,839 (11,210,385 - 14,397,294)	6,534,623 (4,058,966 - 16,585,802)	0 - 80,870,994
Direct medical cost per inpatient admission paid by the patient. (VND)	1,454,227 (1,152,104 - 1,756,349)	406,359 (0 - 1,504,909)	0 - 17,933,946

Min: Minimum value. *Max:* Maximum value. *VND:* Vietnam Dong

Table 3 demonstrated that the average direct medical cost per inpatient admission was 14.2 million VND, of which, public health insurance reimbursed an average of 12.8 million VND, accounting for 89.9% of the total cost per inpatient admission. Patients paid an average of VND 1.4 million, accounting for 11.1%. The highest total cost per inpatient admission was VND 89.7 million. The highest reimbursed by health insurance was VND 80.8 million and the highest paid by patients was VND 17.9 million.

Table 4. Direct medical costs per inpatient admission for types of gastrointestinal cancer (n = 300)

Type of cancer	Direct medical costs per inpatient admission (VND)		
	Mean	95% CI	Min - Max
Stomach cancer (C16) (n = 82)	14,233,947	10,727,562 - 17,740,331	1,592,829 - 89,669,732
Colon cancer (C18) (n = 83)	9,717,605	7,697,034 - 11,738,177	1,440,982 - 44,651,499
Rectal cancer (C20) (n = 53)	12,005,126	8,735,351 - 15,274,901	281,154 - 47,120,048
Liver cancer (C22) (n = 82)	20,267,780	16,036,541 - 24,499,018	963,332 - 80,870,994

n: number of inpatient admissions

Table 4 showed that liver cancer had the highest average cost per inpatient admission, with a cost of 20.3 million VND (95% CI, 16 - 24.5 million VND). Stomach cancer had the second highest average cost per inpatient admission, at 14.2 million VND (95% CI: 10.7 - 17.7 million VND). The cost per inpatient admission for colorectal cancer treatment is from 9.7 million to 12 million VND.

Table 5. Cost components of direct medical costs per inpatient admission for gastrointestinal cancer

Cost category	Mean (VND)	95%CI (VND)
Drug cost	5,421,186	4,628,766 - 6,213,607
Medical supply cost	2,095,328	1,361,804 - 2,828,853
Hospital bed cost	1,829,641	1,621,105 - 2,038,176
Diagnostic imaging cost	1,750,437	1,161,218 - 2,339,657
Laboratory test cost	972,174	850,029 - 1,094,319
Surgery and procedure cost	860,270	648,276 - 1,072,264
Other costs*	1,310,876	1,201,270 - 1,420,481

*Other costs include the cost of medical examination, functional exploration, rehabilitation, blood, and blood products.

All costs were calculated per medical record of inpatient admission

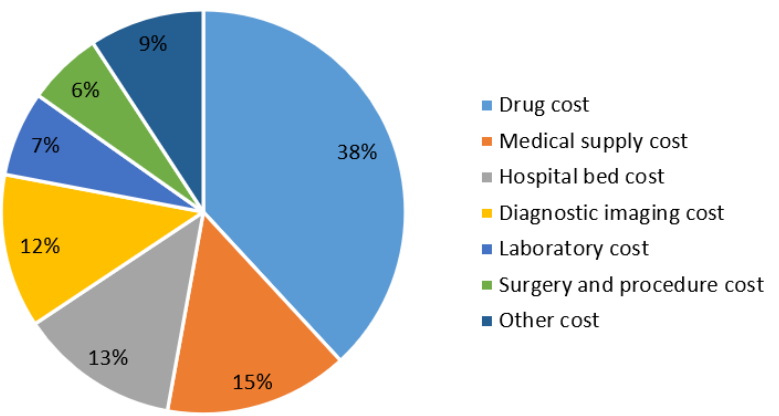

Figure 1. Cost components of direct medical cost per inpatient admission

Drug costs accounted for the highest proportion (38.1%) of the direct medical costs per inpatient admission, followed by the cost of medical supplies (14.7%) and the cost of hospital bed cost (12.8%), see Table 5 and Figure 1.

Table 6. Direct medical costs per inpatient admission of groups stratified by patient general characteristics

	Group	Median (VND)	Interquartile range	P value
Gender	Male (n = 206)	6,872,549	4,663,122 - 18,812,424	P = 0.792
	Female (n = 94)	7,698,554	4,424,395 - 18,388,724	
Age groups	< 40 (n = 14)	6,400,760	3,814,366 - 8,986,188	P = 0.015
	40 - 49 (n = 23)	5,724,736	4,413,800 - 13,689,836	
	50 - 59 (n = 95)	6,656,781	4,548,715 - 16,251,880	
	60 - 69 (n = 99)	6,794,022	4,346,299 - 13,592,309	
	≥ 70 (n= 69)	11,002,414	5,214,311 - 35,944,591	

Occupation	Housekeeper/working at home (n = 95)	6,962,034	4,547,510 - 12,121,548	P = 0.274
	Farmer (n = 44)	7,892,417	4,677,554 - 26,916,946	
	Retiree/(n = 96)	9,449,790	4,395,059 - 29,750,284	
	Employee (worker, office worker, healthcare worker…) (n = 21)	6,245,800	5,126,624 - 8,131,711	
	Others (working freelance) (n = 44)	6,178,727	4,423,981 - 10,810,053	
Residence	Hue city of Thua Thien Hue province (n=86)	6,400,760	4,610,696 - 18,890,264	P = 0.931
	Other district of Thua Thien Hue province (n = 180)	7,608,401	4,590,180 - 18,050,298	
	Other provinces (n = 34)	7,816,097	4,344,856 - 22,573,420	
Health insurance reimbursement rate	0% and 80% (n = 148)	7,068,450	4,449,408 - 15,332,866	P = 0.602
	95% (n = 17)	8,087,696	4,296,778 - 18,892,979	
	100% (n = 135)	7,605,709	4,926,336 - 20,449,825	

Table 6 indicated that there was a statistically significant difference in direct medical costs per inpatient admission between age groups ($p < 0.05$), in which the cost of the patients aged 70 and older was the highest (median cost was 11.0 million VND). Gender, occupational group, residence, and health insurance reimbursement rate were not associated with direct medical costs per inpatient admission ($p > 0.05$).

Table 7. Direct medical costs per inpatient admission of groups stratified by patient clinical status

Group		Median (VND)	Interquartile range	P value
Types of cancer	Stomach cancer (C16) (n = 82)	8,131,711	4,354,081 - 17,878,694	P = 0.025
	Colon cancer (C18) (n = 83)	6,067,173	4,444,239 - 9,219,059	
	Rectal cancer (C20) (n = 53)	6,794,022	5,228,823 - 12,982,267	
	Liver cancer (C22) (n = 82)	11,784,215	4,472,942 - 33,533,496	
Metastasis	Non- metastasis (n = 160)	8,484,405	4,453,998 - 29,785,852	P = 0.023
	Metastasis (n = 140)	6,823,862	4,799,329 - 10,709,685	
Comorbidities	Non- comorbidities (n = 51)	5,179,209	4,378,666 - 7,786,015	P = 0.001
	Comorbidities (n = 249)	8,197,217	4,707,000 - 20,608,210	
Number of comorbid diseases	1 (n = 66)	6,081,621	4,383,499 - 10,742,064	P = 0.000
	2 (n = 67)	6,891,395	4,453,823 - 18,640,529	
	3 (n = 47)	8,257,562	4,329,128 - 24,816,533	
	≥ 4 (n = 69)	13,445,009	7,534,660 - 31,799,148	

Length of hospital stay per inpatient admission	1 - 9 days (n = 169)	5,255,072	4,208,873 - 7,608,401	P = 0.000
	10 - 19 days (n = 78)	11,261,047	6,593,143 - 28,232,758	
	20 - 29 days (n = 41)	20,449,825	11,906,939 - 40,184,665	
	30 days and above (n = 12)	34,513,310	26,431,752 - 45,833,809	

n: number of inpatient admissions

Table 7 showed that there is a statistically significant difference in direct medical costs per inpatient admission among groups stratified by cancer types, metastatic status, comorbidities, and length of hospital stay ($p < 0.05$). In terms of cancer types, the median cost of liver cancer patients was the highest (11.7 million VND). The median direct medical cost per inpatient admission of non-metastatic patients was 1.2 times as much as that of metastatic patients. Similarly, the median direct medical costs per inpatient admission of patients with comorbidities was 1.5 times as much as that of patients without comorbidities, and the more comorbid diseases the patients had, the more their cost per inpatient admission was. In addition, the increase in cost per inpatient admission was accompanied by the increase in the number of treatment days per inpatient admission, in which, the median cost of an admission lasted at least 30 days (34.5 million VND) was 6.5 times as much as that of the admission lasted less than 10 days (5.2 million VND).

4. DISCUSSION

In the sample of the study, male patients accounted for 69.4%, higher than female patients (30.6%), this result is similar to the current statistics that the gastrointestinal cancer incidence of males was higher than that of females both in the world and in Vietnam [2]. The average age of study patients was quite high, 62.5 years old, and more than 59% of patients aged 60 years and older. A study on the direct costs of treatment for gastric cancer patients in Iran in 2015 also showed quite similar results in 160 patients, with male patients accounting for 65%, and the average age of patients was 65 years old [6]. However, the results on gender and age of this study were higher than the results of two studies on the cost of liver and colorectal cancer treatment at Hanoi K Hospital, with the proportion of patients older than 60 years old accounting for only 34% and 36% respectively, but the study samples of those two studies were smaller (90 and 89 patients respectively) [7], [8]. Among the four types of cancer investigated, liver cancer had a high proportion of patients (38.7%), this is similar to the leading rate of liver cancer in males, and it can be explained by the high prevalence of liver diseases such as hepatitis B and C and the common use of alcoholic drinks in Vietnam. The prevalence of hepatitis B infection in Vietnamese adults is about 8.2 to 19%, and the rate of HBV and HCV co-infection is 2.7%. Besides, about 68.6% of patients have used alcoholic drinks in a total of 1617 liver cancer patients [9].

Our study found that the average cost per inpatient admission for patients with gastrointestinal cancers was 14.2 million VND with an average duration of 10.6 days of treatment. According to the press release surveying the population living standards of the Vietnam General Statistics Office in 2021, the average income per capita in 2021 at current prices is 4,205 million VND per month. In particular, the average income per person per month in 2021 in urban areas reached 5.3 million VND, while 3,486 million VND was in rural areas [10]. Thus, the average cost of an inpatient admission was 3.3 times as much as the average income per capita per month in 2021, which is a significant burden for patients who do not have health insurance as well as for patients in rural areas with co-payment. In addition, the treatment cost was also a challenge to the health insurance that covered nearly 90% of the total cost per inpatient admission with 94% of patients participating in health insurance. According to a study conducted with 531 patients at Hue Central Hospital, the average annual medical cost of colorectal cancer per patient in 2018 was 43,277,000 VND, of which health insurance covered 96.8% total cost [5]. Another study of the direct costs of treatment for gastric cancer patients conducted in the Iranian city of Kerman in 2015 showed that the average treatment cost per patient in a public health facility was estimated at 74.705,158 IRR, of which health insurance covered 80.5%, and the patient

paid for 19.5% of total cost in the sample of 160 patients [6].

The average cost paid by the patient is 1.4 million VND per inpatient admission, equal to 1/3 of the average income per capita per month and approximately accounted for 41% of the average income in rural areas. With a large proportion of patients in the study sample being housewives or working at home, farming, and self-employed (62%), and more than 57% of patients living in the district outside Hue city, the treatment cost imposed a considerable burden on those patients. In particular, liver cancer had the highest treatment cost of 20.2 million VND, that being 5 times as much as the average income per capita per month. Therefore, to reduce the economic challenge of liver cancer and other gastrointestinal cancers, it is necessary to improve screening programs or prevent risk factors such as vaccination against hepatitis B... and other programs to increase awareness of limiting alcoholic drink use as well as healthy lifestyles in the community. The two studies at the K hospital on the direct costs of liver cancer and colorectal cancer in 2019 showed that the average cost per admission ranged from 32.4 million to 61.2 million VND for colorectal cancer, and the cost ranged from 31.0 to 58.1 million VND for liver cancer [7], [8]. Compared with these studies, the cost results of our study are lower, this might be due to the difference in the type of estimated costs. Studies at K Hospital estimated direct costs, including direct medical costs and non-medical direct costs (such as cost of accommodation, transportation, food, caregivers, etc…), while in our study, we only estimated direct medical costs based on the patient's medical invoice for each inpatient admission. In addition, the cost analysis perspective in the studies at K hospital is from many stakeholders such as health facilities or government, health insurance, patients, and families, while our study only analyzed from the perspective of healthcare payers, including health insurance and patients.

Among components of direct medical cost, drug costs account for the highest proportion (38.1%). Therefore, drug selection and drug cost management will significantly impact total treatment costs. Besides, the second highest cost of medical supplies should also be considered. The treatment process of liver cancer, stomach cancer, and colorectal cancer requires intensive intervention techniques such as surgery, transcatheter arterial chemoembolization (TACE) for liver cancer, etc… Thus, the cost of medical supplies specificity for each intervention accounted for a significant proportion. The selection of materials of appropriate quality and price also plays an important role in managing treatment costs for patients.

The results of our study demonstrated that there was a statistically significant difference in the direct medical costs per inpatient admission between age groups. Of which, the cost for elderly patients, aged 70 and over, was the highest with a median cost of 11.0 million VND. The elderly are more likely to encounter diseases related to aging, such as advanced chronic conditions like diabetes and heart disease. Moreover, the elderly have different and specific healthcare requirements compared to other age groups. More than 59% of patients in this study aged 60 years and older and 86% of patients with comorbidities, showed difficulties in the treatment of this group. Therefore, it is necessary to have programs that fully meet the medical examination and treatment needs of the elderly with increasing quality, appropriate costs, and types of medical services.

Furthermore, the analysis results showed a statistically significant difference in direct medical costs per inpatient admission in cancer types, metastatic status, comorbidity, and length of hospital stay ($p < 0.05$). Of these, the treatment cost for patients with liver cancer was the highest (median value is 11.7 million VND). Notably, the median direct medical cost per inpatient admission of non-metastatic patients was 1.2 times as much as that of patients with metastasis. This might be explained by the use of high-technology medical equipment in interventions and surgery for patients in the early stages of cancer. For example, some patients who need to undergo hepatic embolization or laparoscopic surgery in the treatment of stomach cancer..., need to use a lot of medical supplies and supportive drugs. The comorbidity factor also significantly increased the cost of treatment, with the median direct medical cost per inpatient admission being 1.5 times as much as that of patients without comorbidities. With the results of the differences in the groups above, some programs like screening, early diagnosis, and improving awareness of cancer prevention of cancer should be strengthened.

Our study provides insights into the cost burden of the four most common types of gastrointestinal cancer, including liver cancer, stomach cancer, and colon-rectal cancer at the hospital of Hue University of Medicine and Pharmacy. This is a class I general hospital, and the results of this study contribute to providing valuable data on the economic burden of

gastrointestinal cancer treatment and found some factors that may be related to cancer treatment costs such as age group, cancer type, metastatic status, comorbidities and length of hospital stay. However, our study only took a convenient sample with 300 medical records, corresponding to 300 inpatient admissions of 173 patients. Therefore, the study only analyzed the cost for each patient in a short time. In addition, the cost analyzed was only the direct medical cost from the healthcare payer, so it did not illustrate the entire economic burden of gastrointestinal cancer. Hence, it is important to conduct further studies with a longer study period (minimum 1 year), a larger sample size, and an expanded category of costs, involving non-medical and indirect costs, for a more comprehensive analysis of the economic burden of gastrointestinal cancers.

5. CONCLUSION

The average direct medical cost per inpatient admission for gastrointestinal cancer is substantial (14,239,915 VND, 95% CI: 12,502,135 - 15,977,695 VND) in 2021. The cost of liver cancer treatment is the highest (20,267,780 VND, 95% CI: 16,036,541 - 24,499,018). The cost of drugs accounted for the highest proportion (38,1%), followed by the cost of medical supplies (14.7%). There is a statistically significant difference in direct medical costs per inpatient admission by the following factors: age group, metastatic status, comorbidities, and length of hospital stay. Strategies to decrease the economic burden of gastrointestinal, such as screening programs, and improving awareness of cancer prevention should be developed in Vietnam.

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