TẠP CHÍ KHOA HỌC VÀ CÔNG NGHỆ ĐẠI HỌC DUY TÂN
DTU Journal of Science and Technology 6(73) (2025) 110-116

ĐẠI HỌC DUY TÂN
DUYTAN UNIVERSITY

Cost of Diabetes Treatment from the Payer's Perspective and Related Factors in the Central Region of Vietnam

Chi phí điều trị đái tháo đường theo quan điểm người chi trả và một số yếu tố liên quan tại khu vực miền Trung, Việt Nam

Nguyen Dac Quynh Anh[a*], Nguyen Song Hieu[b]
Nguyễn Đắc Quỳnh Anh[a*], Nguyễn Song Hiếu[b]

[a]*Faculty of Medicine, Medicine & Pharmacy Division, Duy Tan University, Da Nang, 550000, Viet Nam*
[a]*Khoa Y, Trường Y Dược, Đại học Duy Tân, Đà Nẵng, Việt Nam*
[b]*Duy Tan University, Da Nang, 550000, Viet Nam*
[b]*Đại học Duy Tân, Đà Nẵng, Việt Nam*

(Date of receiving article: 17/11/2025, date of completion of review: 22/12/2025, date of acceptance for posting: 30/12/2025)

Abstract

Diabetes is a chronic, metabolic disease characterized by elevated levels of blood glucose, which not only claims lives and causes disability but also leads to a serious economic burden of diseases. The objective of this study was to estimate the direct costs of diabetes treatment from the payer's perspective and to identify factors related to costs of patients in central region of Vietnam. A cross-sectional descriptive study, and a method of estimating disease costs, were conducted on 1059 diabetes patients being treated at Cam Le District Health Center – Danang city and Hue city Health Center, from January 2022 to April 2023. This study shows that the total direct medical cost was 20.1 billion VND (68.6%), in which, medication costs and subclinical costs accounted for a higher proportion than other costs, with the corresponding values of 58.7% and 27.1%; non-medical direct cost was 9.2 billion VND (31.4%), in which the highest proportion was the cost of meals (31.2%), travel expenses (21.1%) and the cost of dietary supplement (19.5%). Duration of diabetes, hospitalization and complications were identified as statistically significant factors related to the cost of diabetes treatment from the patient's perspective.

Keywords: Cost of treatment, diabetes, payer's perspective

Tóm tắt

Đái tháo đường là bệnh chuyển hóa mạn tính đặc trưng bởi mức glucose máu cao. Bệnh lý này không chỉ gây tử vong và tàn tật mà còn dẫn đến gánh nặng kinh tế nghiêm trọng cho người bệnh và gia đình. Mục tiêu của nghiên cứu này là ước tính chi phí điều trị trực tiếp của bệnh đái tháo đường từ góc nhìn của người chi trả và xác định một số yếu tố liên quan tại khu vực miền Trung Việt Nam. Một nghiên cứu mô tả cắt ngang, phương pháp ước tính chi phí bệnh tật, đã được thực hiện trên 1059 bệnh nhân tiểu đường đang điều trị tại Trung tâm Y tế Quận Cẩm Lệ – thành phố Đà Nẵng và Trung tâm Y tế Thành phố Huế, từ tháng 1/2022 đến tháng 4/2023. Kết quả ghi nhận tổng chi phí y tế trực tiếp là 20,1 tỷ đồng (68,6%), trong đó chi phí thuốc và chi phí cận lâm sàng chiếm tỷ trọng cao hơn so với các chi phí khác, với giá trị tương ứng là 58,7% và 27,1%; chi phí trực tiếp phi y tế là 9,2 tỷ đồng (31,4%), trong đó tỷ trọng cao nhất là chi phí ăn uống (31,2%), chi phí đi lại (21,1%) và chi phí cho thực phẩm chức năng (19,5%). Thời gian mắc bệnh đái tháo đường, việc

[*]*Corresponding author:* Nguyen Dac Quynh Anh
Email: nguyendquynhanh@dtu.edu.vn

điều trị nội trú và biến chứng được xác định là những yếu tố có ý nghĩa thống kê liên quan đến chi phí điều trị đái tháo đường từ quan điểm người bệnh.

Từ khóa: chi phí điều trị, đái tháo đường, quan điểm người chi trả

1. Background

Diabetes is a chronic, metabolic disease characterized by elevated levels of blood glucose, which leads over time to serious damage to the heart, blood vessels, eyes, kidneys and nerves. The most common is type 2 diabetes, usually in adults, which occurs when the body becomes resistant to insulin or does not make enough insulin. In the past 3 decades the prevalence of type 2 diabetes has risen dramatically in countries of all income levels [11]. About 537 million people worldwide have diabetes, the majority living in low-and middle-income countries, and 6.7 million deaths are directly attributed to diabetes in 2021, 1 every 5 seconds. Both the number of cases and the prevalence of diabetes have been steadily increasing over the past few decades [11]. The number of people living with diabetes today is fast approaching the prediction for 2030 and this number is predicted to rise to 783 million by 2045.

Diabetes not only claims lives and causes disability but also leads to a serious economic burden of diseases. Diabetes caused at least USD 966 billion in health expenditure–a 316% increase over the last 15 years [4]. On average, people with diagnosed diabetes have medical expenditures approximately 2.3 times higher than what expenditures would be in the absence of diabetes [2]. In Vietnam, the prevalence of diabetes is increasing at an alarming rate and has almost doubled in the last ten years. Prolonged hospital stay may affect household activities and expenses. According to International Diabetes Federation, spending related to diabetes in Vietnam was an average of 162.7 USD/ patients/year in 2015, which was higher than the average monthly salary at that time (150 USD).

Diabetes treatment is a long process, requiring patient compliance. Economic conditions have been shown to be a factor that directly affects the quality of treatment.

Cost analysis is one of the medical economic evaluation tools and provides useful information for planning interventions and treatment for patients. The study of cost analysis allows to estimate all costs incurred due to illness or condition including direct costs and indirect costs. Studying the cost of disease was the first economic technique to be applied in the medical field. The basic purpose of a disease cost study is to identify the categories, determine the cost of each item, and the total cost of that health problem [10].

The objective of this study was to estimate the direct costs of diabetes treatment from the payer's perspective and to identify factors related to costs of patients in central region of Vietnam from 2022 to 2023.

2. Methodology

A cross-sectional descriptive study, and a method of estimating disease costs were conducted on 1059 diabetes patients being treated (inpatient and outpatient) at Cam Le District Health Center – Danang city and Hue city Health Center, from January 2022 to April 2023.

In this study, we focus on the cost of diabetes treatment from the payer's perspective, particularly the direct costs of an inpatient or outpatient treatment course at the time of the study. Total direct costs include direct medical and non-medical costs. The direct medical costs include the medication costs, cost of laboratory investigations, cost of consultation and cost of hospitalization. The direct non-medical costs

include the transportation cost to hospital and cost of food during the hospitalization. All the relevant and necessary data was collected from patient's treatment bill, interviewing patients or patient caretakers. Data pertaining to the cost of extra medications and administration devices was collected from the patients (interviewing).

Observational data was analyzed to calculate the average cost incurred throughout the treatment process for a diabetic patient, based on the total amount paid per patient compared to the total number of patients, where the number of outpatient treatment days with prescription medication is 4 weeks and the number of inpatient treatment days is calculated based on the actual hospital stay of each patient.

Data was entered by Epidata 3.1 and processed by SPSS 20.0. Descriptive statistics (mean, median, and standard deviation) were used to describe quantitative variables. Multivariate linear regression analysis was used to identify related factors.

3. Results

A total of 1059 patients were enrolled during the study period. Out of 1059 patients, 501 (47.31%) were males and 558 were females (52.69%); 43.25% were treated in Hue city Health Center and 56.75% were treated in Danang; 12.3% of patients had diabetes complications and 13.7% were hospitalized. The other demographic details such as age, occupational status, family history, duration of diabetes, BMI and co-morbidities were summarized in Table 1.

Table 1. Demographic details of studied patients

Demographic details		**Amount (n)**	**Percentage (%)**
Age Mean: 51.5±4.3	18 - 59	534	50.42
	≥ 60	525	49.58
Occupational Status	Income generation	612	57.79
	No income generation	447	42.21
Body mass index	Under weight (<18.5)	9	0.85
	Normal weight (18.5-22.9)	379	35.79
	Over weight (≥23)	673	63.55
Family history of diabetes	Yes	593	56
	No	466	44
Duration of diabetes	≤1 year	241	22.76
	>1 year	818	77.24
Co-morbidities	Hypertension	230	21.72
	Ischemic stroke	35	3.31
	Cellulitis	10	0.94
	Ischemic heart disease	27	2.55
	Chronic renal failure	14	1.32
	Urinary tract infection	7	0.66

The individual total direct cost components from the payer’s perspective (n = 1059) were summarized in the Table 2.

Table 2. The individual direct cost component from the payer's perspective

Unit: million VND

Components of cost		**Average cost per patient**	**% of total cost**
Direct medical cost	*Total*	*18.98* ± 2.65	*68.6*
	Investigations/lab tests	5.28 ± 1.3	19.1
	Medication for diabetes	8.19 ± 1.98	29.6
	Medication for co-morbidity condition	2.24 ± 0.51	8.1
	Hospitalization	1.27 ± 0.23	4.6
	Doctor consultation	1.99 ± 0.02	7.2
Direct non-medical cost	*Total*	*8.69* ± 2.52	*31.4*
	Meals for patient	3.07 ± 1.05	11.1
	Travel expenses for patient	2.52 ± 0.81	9.1
	Dietary supplement	2.1 ± 0.64	7.6
	Meals for carer	0.66 ± 0.21	2.4
	Travel expenses for carer	0.33 ± 0.17	1.2

The average total direct cost per diabetes inpatient was 4,124,219±1,015,987VND, outpatient was 612,597±154,931VND. The total direct medical cost was 20.1 billion VND (68.6%), in which, medication costs and subclinical costs accounted for a higher proportion than other costs, with the corresponding values of 58.7% and 27.1%; direct non-medical cost was 9.2 billion VND (31.4%), in which the highest proportion is the cost of meals (31.2%), travel expenses (21.1%) and the cost of dietary supplement (19.5%).

The average total cost for the treatment of diabetes with co-morbidities per patient was found to be 6,154,397±2,157,679VND. Direct medical cost reached 72.3%.

Table 3. Treatment costs from the payer's perspective according to the characteristics

Characteristics		**Average cost per patient**	**p**
Age	18 - 59	12.61 ± 1.25	1.578
	≥ 60	15.32 ± 2.06	
Gender	Male	19.65 ± 0.79	0.719
	Female	12.41 ± 1.57	
Hospitalization	Inpatient	4.13 ± 1.01	<0.001
	Outpatient	0.61 ± 0.15	
Co-morbidities	Hypertension	5.15 ± 2.15	0.127
	Ischemic stroke	4.78 ± 5.67	
	Cellulitis	6.57 ±1.95	
	Ischemic heart disease	3.25 ± 1.14	
	Chronic renal failure	2.58 ± 1.58	
	Urinary tract infection	1.85 ± 1.03	
Complications	Yes	5.57 ± 2.05	<0.001
	No	1.31 ± 0.61	

The relationship between treatment costs and patient's characteristics was summarized in Table 3. Out of 1059 patients, the patients who received inpatient treatment and had complications were found to spend more health care costs compared with others.

Table 4. Multivariate regression analysis of factors related to diabetes treatment costs from the payers's perspective

Characteristics	Coef	SE	P > |z|	95%CI
Age	0.6	1.2	0.21	-0.6 – 1.3
Occupational Status	18.1	30.5	1.51	-6.2 – 12.9
Duration of diabetes	21.1	17.3	0.025	0.9 – 55.3
Hospitalization	2.5	0.6	<0.001	1.6 – 107.2
Co-morbidities	3.2	0.6	0.518	6.2 – 32.7
Complications	60.2	24.2	<0.001	1.7 – 126

Multivariate regression analysis showed that duration of diabetes, hospitalization and complications are factors related to treatment costs from the payers's perspective.

4. Discussion

The study was carried out on 1059 diabetes patients, of which 13.7% were inpatients. The average age of the study subjects was 51.5±4.3 years old, notably the proportion of patients under 60 participating in the study was higher than the elderly group. This distribution is consistent with many recent records in which diabetes is tending to younger people and is no longer a health risk for the elderly [8, 9]. 77.24% of patients in our study had been treated for diabetes for more than 1 year. Diabetes is a chronic disease and the treatment process is always long. This is one of the reasons why the diabetes treatment process can create a great economic burden for patients and their families. The most co-morbiditie is hypertension (21.72%) and 12.3% had diabetes complications. This rate is lower than the statistics of the Ministry of Health of Vietnam in 2022, more than 55% of diabetic patients have complications, of which 34% have cardiovascular complications, 39.5% have eye complications. and neurological complications, kidney complications 24% [3]. This difference can be explained because our study was conducted at the primary health care system, which is a treatment facility for moderate and mild patients. Most patients with severe complications will be treated at higher levels of health. However, the influence of comorbidities and complications on treatment costs cannot be denied.

The total direct cost of medical examination and treatment of diabetic patients was recorded at VND 20.1 billion and the direct cost outside of medical examination and treatment was VND 9.2 billion; in which, the average cost for outpatient treatment is 612,597±154,931 VND and inpatient is 4,124,219±1,015,987 VND. This result is higher than William R. Rowley's prediction, by 2030, the average total cost of diabetes treatment will be $96.9/year, of which the direct health related cost is $73. and Non-Medical Expenses $23.9 [8], higher than that recorded in 2021 at Tien Giang General Hospital, the average direct cost of outpatient treatment of diabetes patients is 726,477±502,813 VND for a medical examination [5], higher than the research of Nguyen Thi Anh Thu in 2021, in which the average treatment cost per inpatient treatment is 2,081,000±1,131,000 VND [6]. It can be seen that the cost of diabetes treatment is increasing very rapidly, which is explained by the development of new diagnostic and treatment

strategies along with the rejuvenation of the patient's age. Besides the undeniable impacts, this development can entail many economic consequences, namely an increase in the disease burden.

Direct medical costs accounted for the majority (68.6%) of the total costs, in which medication and laboratory costs accounted for the highest proportion, and hospitalization costs accounted for the lowest proportion. Non-medical direct expenses accounted for 31.4% of the total costs, the most distributed was meals expenses (31.2%), travel expenses (21.1%). Similar results have also been observed in many previous studies [1, 5, 7-9]. This is consistent with the characteristics of chronic diseases the most expensive costs are often related to medications and testing. Remarkably, our study recorded that many patients invested a large amount of money for dietary supplement, with the average cost at 2,100,000 ± 640,000 VND, accounting for 19.5% of the total direct cost non-medical surveillance, and the highest value was up to 36,000,000 VND. The behavior of using dietary supplement to control blood sugar or limit complications of diabetes is increasingly common. However, if not controlled and quality assured, this trend can create unpredictable consequences for both physical, mental and social health of patients.

In this study, the average total cost for the treatment of diabetes with co-morbidities per patient was found to be 6,154,397±2,157,679VND. Sadanandam Akari et all had show that the average costs per diabetic patient with and without co-morbidities were found to be USD 314.15 and USD 29.91, respectively. The average cost for those with diabetic complications was USD 125.01 for macrovascular complications, USD 90.43 for microvascular complications and USD 142.01 for other infections. Out of USD 314.15, the average total direct medical cost was USD 290.04, the average direct non-medical cost was USD 3.75 and the average total indirect cost was USD 20.34 [7]. Diabetes with co-morbidities and complications are always a matter of concern. Most patients with these diseases require hospitalization and use specialized, expensive treatment regimens. To optimize treatment costs and ensure the best health for patients, doctors need to control comorbidities and minimize complications in diabetic patients.

Our study showed that duration of diabetes, hospitalization and complications are factors related to treatment costs from the payers's perspective. Patients with diabetes for more than 1 year, receiving inpatient treatment and complications tend to spend more on health than the other group. Similar results were also recorded [1, 2, 7-9].

Our study is a cross-sectional study, so it can only describe the direct costs of a single expense episode and does not provide an overall cost picture. Further longitudinal studies are needed to clarify the comprehensive picture.

5. Conclusion

Direct cost of diabetes treatment in this study was relatively high. The cost of medication and tests still accounts for the majority, but patients tend to spend more money on functional foods to support the treatment process. Some treatment cost related factors are duration of diabetes, hospitalization and complications. It is necessary to control diabetes complications, comorbidities and develop personalized treatment regimens to improve treatment efficiency and optimize costs.

References

[1] Alberto, B. (2020). "The cost of diabetes in Latin America and the Caribbean", *Bulletin of the World Health Organization* 81(1).

[2] American Diabetes Association. (2018). *The Cost of Diabetes*.

[3] Bộ Y tế Việt Nam. (2022). *Khoảng 5 triệu người Việt đang mắc căn bệnh gây nhiều biến chứng về tim mạch, thần kinh, cắt cụt chi*, Hà Nội, truy cập ngày-2023.

[4] International Diabetes Federation. (2022). *IDF Diabetes Atlas 10th edition*.

[5] Phó, L.V, Hà, T.N, Trầm, T.V. (2021). "Chi phí điều trị trực tiếp cho người bệnh đái tháo đường ngoại trú tại Phòng khám Nội tiết Bệnh viện Đa khoa Trung tâm Tiền Giang năm 2021", *Tạp chí Y học Việt Nam*, 508(2).

[6] Thư, N.T.A, Nhật, P.Đ, Linh,T.H. (2021). "Chi phí điều trị nội trú của người bệnh đái tháo đường típ 2 tại Bệnh viện Quận 6 Thành phố Hồ Chí Minh", *Tạp chí Nghiên cứu Y học*, 142(6).

[7] Sadanandam, A. Uday,V.M Buchi, R.K. (2013). "Health-care cost of diabetes in South India: A cost of illness study", *J Res Pharm Pract*, 2(3), tr. 114-117.

[8] William, R.R. (2017). "Diabetes 2030: Insights from Yesterday, Today, and Future Trends", *Population Health Management*, 20(1).

[9] Xiling,L. Yufeng,X. Xiaowen, P. (2020). *Global, regional, and national burden and trend of diabetes in 195 countries and territories: an analysis from 1990 to 2025*, Sicientific Reports.

[10] Corral J. (2015). "Estimation of lung cancer diagnosis and treatment costs based on a patient-level analysis in Catalonia (Spain)", *BMC Health services research*, 15(1), tr. 1-10.

[11] WHO. (2022). *Diabetes*