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TREND OF DIABETES COSTS IN CONSTANTA COUNTY

Monica Laura Mihail[1], Viorica Paun[1], Beatrice-Marcela Severin[1], Elena Mocanu[1]

[1] Faculty of Medicine, University "Ovidius" of Constanta

Elena Mocanu

email: elena.mocanu@univ-ovidius.ro

ABSTRACT

Diabetes mellitus is a major public health issue, with the number of cases continuously increasing. This results in significant direct and indirect costs, representing a massive economic burden on the healthcare system. In Romania, costs are covered through the National Diabetes Program, so analyzing the cost trends can help better allocate funds, potentially improving program efficiency in the long term. Using a retrospective descriptive study with data on medication and monitoring costs for diabetes patients in Constanța County from 2018-2022, provided by the National Health Insurance House, it was found that the total number of patients reimbursed for antidiabetic medications steadily increased, with costs in 2022 almost doubling compared to the start of the study period. Non-insulin medication generated the most significant costs, being 4-6 times higher than those for insulin. The results highlight the growing economic challenges associated with proper diabetes management, emphasizing the need for more efficient solutions to reduce costs.

Keywords: diabetes mellitus, national program, costs

Introduction

Worldwide, diabetes mellitus is a rapidly growing public health issue. Its prevalence and incidence continue to rise, with projections indicating a significant global burden in the coming years (1,2). Most cases are type 2 diabetes mellitus, non-insulin-dependent, associated with risk factors such as obesity and sedentary lifestyle. The disease significantly affects individual health and imposes a substantial economic burden globally through both direct costs (medical treatments and hospitalizations) and indirect costs (lost productivity and premature mortality) (3–9)the future economic consequences of the disease remain opaque. We forecast the full global costs of diabetes in adults through the year 2030 and predict the economic consequences of diabetes if global targets under the Sustainable Development Goals (SDG. In Romania, the incidence and prevalence of diabetes mellitus have increased significantly over the past decades, especially for type 2 diabetes, with projections indicating this trend will continue (10–13) prediabetes, overweight, Obesity, dyslipidemia, hyperuricemia and chronic kidney disease in Romania. The costs associated with diabetes represent a significant burden for the healthcare system, including both direct and indirect costs (14–16)type 2, or specific forms. Patients' access

to medication and monitoring is ensured through the National Diabetes Program (17–19). In the context of the year-over-year increase in the number of patients, both in Constanța County and in other parts of the country, naturally associated with more costly care, evaluating this trend at the county level can provide valuable information for optimizing resource management and improving prevention and treatment strategies.

Materials and Methods

The data used in this study were obtained from statistical reports of the National Health Insurance House and the Public Health Directorate of Constanța County, covering the 2018-2022 period, it included information about the number of patients who benefited from treatments and monitoring, the average cost per patient, and the trend of this average cost over the study period, and were processed in Microsoft Excel (20,21). To identify the general cost trend, the costs generated by different types of medication and monitoring were compared.

Results

The evaluation of data collected from Constanța County during the 2018-2022 period showed a significant increase in both the number of patients and associated costs. The most notable increase was observed for non-insulin medication, which generated costs 4-6 times higher than insulin treatment (Figure 1), peaking significantly in 2021 and 2022.

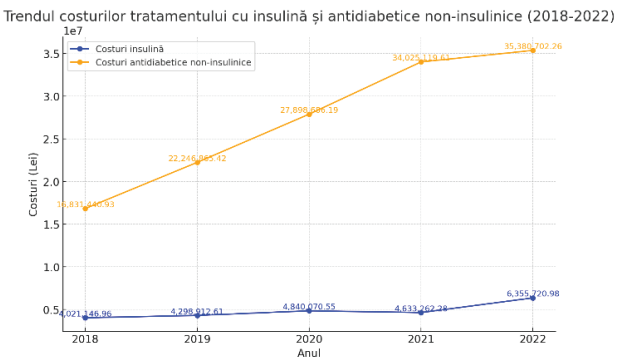

Figure 1. Trend of costs for insulin and non-insulin antidiabetic treatments, comparison

Table 1. Total medication expenditure

Year	Total medication expenses (RON)
2018	39,965,719.86
2019	48,547,115.19
2020	56,977,544.73
2021	64,775,347.14
2022	70,222,767.19

In 2022, there was a significant increase in treatment costs compared to the start of the analyzed period. Therefore, an evaluation of the source of this increase is needed – whether it stems from a rise in the number of patients, higher medication prices, increased utilization per patient, or a combination of these factors. Regarding the total costs associated with insulin treatment, they rose from 4 million RON in 2018 to 6.3 million RON in 2022. This increase can be attributed to both rising prices of different types of insulin and the growing prevalence of diabetes, leading to more extensive long-term treatment. The average cost per patient treated with insulin increased by nearly 40% between 2018 and 2022, from 1,612 RON in 2018 to 2,255 RON in 2022 (Figure 2).

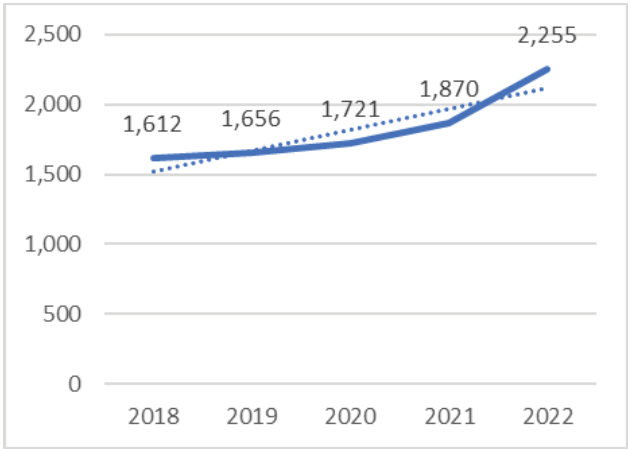

Figure 2. Evolution of average cost per patient with diabetes treated with insulin

The average cost per patient treated with non-insulin antidiabetic medications doubled during the same period, rising from 756 RON in 2018 to 1,447 RON in 2022 and for patients requiring both insulin and non-insulin antidiabetic medications, the average cost per patient rose from 2,956 RON in 2018 to 4,254 RON in 2022 (Figure 3).

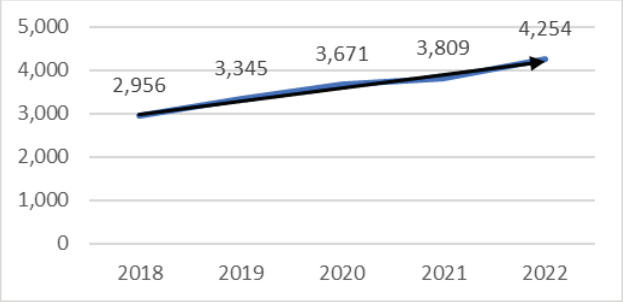

Figure 3. Evolution of the average cost per patient treated with insulin and non-insulin antidiabetic medications

The costs associated with patient self-monitoring (Figures 4 and 5) were below the efficiency indicators of the national program mentioned in Table 2. This difference indicates a more efficient use of resources than anticipated, which can be attributed to individual variations in treatment and monitoring needs but also to external factors such as market price fluctuations.

Table 2. Efficiency indicators for the national diabetes program

Year	Average cost per patient with diabetes treated/year	Average cost per child with Type 1 diabetes self-monitored/year	Average cost per adult with Type 1 diabetes self-monitored/year	HbA1c testing cost (RON)
2018	1,076	1,860	480	20
2019	1,076	1,860	960	20
2020	1,076	1,860	960	20
2021	1,076	1,860	960	20
2022	1,699	1,920	960	38

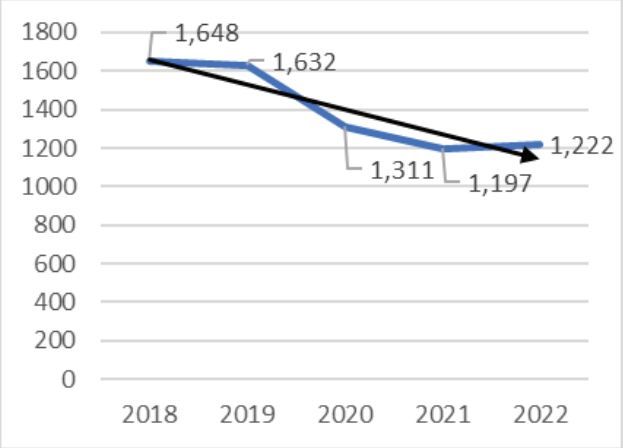

Figure 4. Evolution of the average cost per child with diabetes treated with insulin and self-monitored

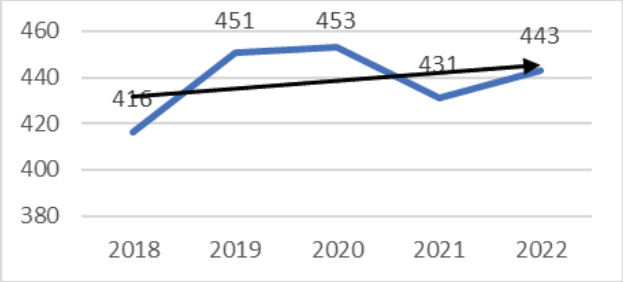

Figure 5. Evolution of the average cost per adult with diabetes treated with insulin and self-monitored

Discussion. Conclusions.

This evaluation shows a consistent increase in the costs associated with insulin and non-insulin antidiabetic treatment in Constanța County, reflecting both the rising prevalence of diabetes and the complexity of the treatment, which becomes more and more expensive. The differences between estimated and actual costs highlight the importance of periodic budget adjustments and effective resource monitoring. This trend aligns with global tendencies, where diabetes-related costs continue to grow significantly. In 2017, 451 million people had diabetes (2), and in 2019, the global prevalence of diabetes was estimated at 9.3% of the adult population, which accounts for approximately 463 million people. By 2021, 529 million people of all ages were living with diabetes worldwide. Projections suggest a potential doubling of this figure, reaching 1.31 billion diabetics by 2050 (1,2,22)published between 1990 and 2018 and representing 138 countries were identified. For countries without high quality in-country data, estimates were extrapolated from similar countries matched by economy, ethnicity, geography and language. Logistic regression was used to generate smoothed age-specific diabetes prevalence estimates (including previously undiagnosed diabetes. This increase highlights the need for more effective strategies to manage costs and improve the quality of care for diabetes patients. The introduction of new therapies and improved diagnostic algorithms are necessary steps, but it is essential to allocate sufficient resources to prevention and education in order to reduce the incidence of this disease.

In Romania, the national PREDATORR

study, the first study to analyze the prevalence of diabetes and prediabetes in detail, associating data with cardiometabolic, demographic, and lifestyle risk factors, estimated the prevalence of diabetes at 11.6% of the adult population (10). For Bucharest, studies indicated a prevalence of 7.83%, showing notable differences between counties, with higher values in urban regions, and among older individuals. Regarding incidence, in 2011, there were 358.63 new cases per 100,000 people nationally, with significant regional variations. The lowest incidence was in Giurgiu (91.15/100,000), and the highest in Arad (718.94/100,000) (12)Nutrition and Metabolic Diseases (RSDNMD. For type 1 diabetes in children, the incidence increased from 4.7 cases per 100,000 in 1996 to 11.0 cases per 100,000 in 2015, with an estimated annual growth rate of 5.1% (11). In Transylvania, the incidence of type 1 diabetes is higher than in Muntenia and Moldova, being influenced by ethnic and lifestyle factors (23). Socio-economic factors, such as average income, urbanization, and female population density, influence the incidence of diabetes in Romania, particularly in urban populations (13).

Regarding costs, regions with lower incomes generally allocate a smaller share of their healthcare budgets to diabetes compared to wealthier regions. In low- and middle-income countries, patients often bear the costs directly, and the expenses are significant and difficult for many to sustain (8). In 2014, the average cost per person with diabetes ranged from $92 in Southeast Asia to $7,984 in North America (7). In 2015, global diabetes costs were estimated at $1.31 trillion, equivalent to 1.8% of global GDP. Approximately 34.7% of these costs were indirect, associated with reduced productivity and economic losses due to morbidity and premature mortality (5). Estimates indicate that the economic burden of diabetes could reach $2.2 trillion, or 2.2% of global GDP, by 2030. Even with the implementation of diabetes control measures, global costs are not expected to decrease significantly (3)the future economic consequences of the disease remain opaque. We forecast the full global costs of diabetes in adults through the year 2030 and predict the economic consequences of diabetes if global targets under the Sustainable Development Goals (SDG. In 2019, direct global expenditures for diabetes reached $760 billion and are projected to grow to $825 billion by 2030 and $845 billion by 2045. The United States, China, and Brazil have the highest expenditures, and the 60-69 age group accounts for the highest annual spending (6).

Between 2000 and 2017, funds allocated for diabetes treatment in Romania increased more than 14 times, although the number of patients only grew by 2.5 times. During this period, the average annual funding was approximately €181 million, representing 21.3% of total health program funds (16). According to an official statement from the Romanian Society of Diabetes, Nutrition, and Metabolic Diseases and the Center for Strategies for Public Health Policy in Diabetes, in 2023, direct expenditures for diabetes care in Romania, covered by the National Diabetes Program (excluding hospitalization costs), amounted to approximately 2.6 billion RON, with the majority of it, 92.13%, being allocated to medications (24). A study conducted in a public hospital in Romania showed that between 2015 and 2018, the total adjusted cost of hospitalizations for diabetes patients was €26.4 million, with a median cost per hospitalization episode of €596.5. The main factors driving these costs include advanced age, the presence of cardiovascular diseases, chronic kidney diseases, and diabetic foot ulcers (14). The average costs of hospitalization for diabetic ulcers and amputations are 40% higher than other diabetes-related admissions, reaching approximately €724 per episode compared to €517. The duration of hospitalization and the level of glycated haemoglobin (HbA1c) significantly influence these costs (15)Romania, we assessed the effect of ulcerations/amputations on hospitalization costs of patients with diabetes. Patients with (Group 1. The presence of major depression in diabetes patients significantly increases the total treatment costs, having additional direct and indirect economic implications. Expenses for informal care and time dedicated by unpaid caregivers contribute to the economic burden, and depression is associated with a significant increase in overall costs (25).

An additional aspect worth mentioning is the legislative change introduced through CNAS Order No. 1068/627/2021 (26), which, starting

with 2022, allows family physicians to prescribe Metformin (an oral antidiabetic) for patients newly diagnosed with type 2 diabetes by the physician. In the short term, this change has not generated a significant increase in costs due to the adaptation period, but close monitoring of cost evolution in the coming years could reveal a notable impact. Expanding access to treatment would lead to an increase in the number of treated patients, and earlier initiation of therapy could help reduce long-term complications, although it might initially raise direct costs.

Data on the incidence and prevalence of diabetes and the costs of treating it in Romania continue to rise, representing a major challenge for the public health system's budget. Adopting efficient prevention and management strategies is essential. In the long term, integrated diabetes management that combines innovative modern therapies, essential for patients, with prevention and education through strong programs, inspired by successful models, such as the Finnish FIN-D2D program, focused on identifying high-risk patients and introducing targeted lifestyle interventions (promoting healthy eating, increasing physical activity, and weight management) (27,28), could help reduce costs and improve the quality of life for patients.

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