

Diabetes treatment cost analysis in Jilin Province in 2016- 2019 using the structural change method

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Abstract

Aim

To analyse the development trend of diabetes treatment costs in Jilin Province and its related factors from 2016–2019 and to provide a theoretical basis for the reform of the health care system in Jilin Province, the reduction of residents' disease burden and the formulation of relevant policies.

Method

Based on the SHA2011 method of health cost accounting, the data on diabetes treatment expenses in Jilin Province were collated. The change trend of diabetes treatment cost and project constitution in Jilin Province was analysed by structural analysis.

Results

The total cost of diabetes treatment increased from 2 billion 348 million yuan in 2016 to 2 billion 833 million yuan in 2019, with an average annual growth rate of 6.46%. The average outpatient expenses for diabetes in Jilin increased from 240.53 yuan to 304.61 yuan, corresponding to an average annual increase of 8.19%. The average hospitalization expenses related to diabetes in Jilin Province decreased from 7280.63 yuan to 6707.33 yuan, a decrease of 2.70%.

Conclusion

The cost of diabetes treatment in Jilin Province showed a rapid growth trend. The increase in hospitalization expenses was mainly due to the increase in the number of outpatients. The increase in outpatient expenses was mainly due to the increase in average outpatient expenses.

Objective

The purpose of this study was to classify the treatment cost of diabetes in Jilin Province in 2016–2019 according to project use (e.g., treatment fee, drug fee, operation fee), compare the change in cost over 4 years, and utilize 3 indices of structural change value, structural change degree and structural change contribution rate to evaluate and analyse to provide references for Jilin with which to rationally allocate medical and health resources.

Background

Diabetes is a metabolic disease characterized by hyperglycaemia caused by defective or impaired insulin secretion. According to the latest data released by the International Diabetes Federation, 463 million people aged 20 to 79 years old had diabetes worldwide in 2019, and 4.2 million people died of diabetes and its complications. The number of diabetic patients in China is the highest in the world. A total of 65.2 million patients do not have a diagnosis of diabetes; the proportion of undiagnosed patients is 56%; and the cure rate of diabetes is relatively low (only 25.8%)^[1]. From the perspective of health expenditure, 10% of the global health expenditure is used for

the treatment of diabetes. According to the prediction of the International Diabetes Federation, the total global diabetes-related health expenditure in 2019 will reach US \$760 billion, with diabetes-related complications being the main driving factors^[2].

Diabetes itself does not cause disability. However, poor control of diabetes can lead to a series of large vessel (cardiovascular and cerebrovascular diseases) and microvascular (nephropathy, diabetic foot and retinopathy) complications. Due to these chronic complications, diabetes is becoming the third largest chronic noncommunicable disease after cardiovascular and cerebrovascular diseases and tumours^[3]. Currently, an increasing number of studies have recognized a variety of causal diseases, including cancer, ageing-related diseases (such as dementia), infection and liver diseases^[4]. These complications further lead to a decline in patients' quality of life, premature death, increased health care demand and large medical expenditures.

As a common chronic noncommunicable disease, diabetes and its complications not only affect the quality of life of patients but also cause significant economic losses to China and the world. If blood sugar is not well controlled, patients may also suffer from blindness, renal failure and gangrene in severe cases, which will aggravate the cost burden of diabetes^[5]. In China, a recent estimate shows that the annual economic burden of diabetes exceeds 17.6 million people, and an annual economic cost of 81% is used to treat diabetic complications^[6-7]. It is estimated that the annual direct medical cost of patients with complications is 13833 yuan, while that of patients without complications is 3726 yuan. At the same time, it is also pointed out that the heavy burden incurred by diabetes is not only a problem in high-income areas but also in low- and middle-income areas, and a significant difference between these areas is that a large proportion of the expenses need to be paid by patients in high-income areas, thus resulting in a more serious burden on patients^[8-9]. Jilin Province is located in northeastern China. It is a typical underdeveloped province. Therefore, it is of great practical significance to analyse the changes in health costs of diabetes in Jilin in recent years. This study was based on the "SHA2011", and the aims were to calculate the changes in the treatment cost of diabetes and complications in Jilin Province in the past 2016–2019 and use the structural change method to analyse the changing trend of the composition of the cost of diabetes treatment.

Study Data And Methods

Study Design

The cost of diabetes treatment refers to the currency used by society as a whole in the treatment of diabetes and its complications within 1 year^[10]. The field investigation of this study was mainly based on the treatment records of 2016-2019 cases of diabetes mellitus (including death cases). The basic information of the patient (including age, gender, disease diagnosis, hospital stay, medical treatment and medical institution information) and the direct medical expense information (including outpatient expenses and residential expenses) during the treatment period were obtained from the information system of the investigation institution. Microsoft Excel 2019 was used to standardize the data recovered from the field investigation, establish the database with Stata 15.0 statistical software, and clean, sort out, calculate and analyse the data.

Data sources

The data obtained in this study include total data and sample data. The total data are from the 2017-2020 Jilin Provincial Health Statistics Yearbook, 2017-2020 Jilin Provincial Health Financial Statistics Annual Report and Jilin Provincial Health Statistics Information Center. The sample data were derived from the sampling survey. Using the multistage stratified sampling method, 257 public health institutions at all levels (including 47 hospitals, 42 public health institutions, 43 community health service centres/township health centres, 72 village clinics and 53 clinics) at the provincial level and Jilin City, Tonghua City and Yanbian Korean Autonomous Prefecture were selected as the sample areas. The types of sample institutions include general hospitals, traditional Chinese medicine hospitals, specialized hospitals, grass-roots medical and health institutions, village clinics/community health service stations, outpatient departments/clinics, maternal and child health care institutions and centres for disease prevention and control. The number of sample institutions of the same type was consistent every year. If the investigation could not be continued under extremely special circumstances, it was supplemented with institutions of the same type, and the data collection method was system filling.

Methods

Based on the theory and accounting framework of SHA 2011, the apportionment parameters of the total health expenditure in the whole province were calculated from the top-down statistics, and the apportionment parameters were then calculated according to the distribution of the different disease costs in the field survey sample^[11-12]. Then, we calculate the apportionment parameters of the service function (outpatient or inpatient service) and the service providers (institution type, institutional level) and other expenses, decompose the cost, expand the core dimension of the service function, and further apportion the benefit groups of different genders, ages and diseases to measure the diabetes treatment cost in 2018 in all directions.

Structural change degree analysis is a dynamic data processing method for assessing overall characteristics and structural change trends^[13]. This method was used to analyse the internal composition of diabetes treatment costs in Jilin Province from 2016-2019. Specifically, on the basis of statistical grouping, the proportion of each item included in the determination of the average cost of diabetics is calculated, and the internal structural characteristics, the overall nature and the regularity of the overall internal structure according to the change of time are analysed. It mainly utilises three indicators: structural change value (VSV), structural change degree (DSV) and structural change contribution rate. VSV is the difference between the constituent ratio of the end of a period and the beginning of the period, reflecting the degree of structural change and the direction of change in the cost of diabetes treatment during this period. DSV is the sum of the absolute value of the constituent ratio of the end of a period to the beginning of a period, reflecting the comprehensive changes in the internal composition of the cost of diabetes treatment in this period. The contribution rate of structural change is the proportion of the structural change value of each component of health expenditure in the degree of structural change. It reflects the influence of the constituent ratio of each component of diabetes treatment cost to the structural change of diabetes treatment cost. The calculation formula is as follows:

$$VSV = X_{i1} - X_{i0}$$

$$DSV = \sum |X_{i1} - X_{i0}|$$

$$\text{Contribution rate of structural change} = |X_{i1} - X_{i0}| / \sum |X_{i1} - X_{i0}|$$

Notes: l is the serial number; 0 is the beginning of the period; 1 is the end of the period; X_{i0} is the initial cost component ratio; and X_{i1} is the composition ratio of expenses at the end of the period.

Results

Total cost and change in diabetes treatment cost

This study included 1863485 patients with diabetes in Jilin Province in 2016-2019 and 1690972 outpatients and 172513 hospitalized patients. The total cost of diabetes treatment increased from 2.348 billion yuan in 2016 to 2.833 billion yuan in 2019, with an average annual growth rate of 6.46%. The proportion of the total treatment cost increased from 4.26% to 7.14%. Among them, outpatient expenses increased from 1.574 billion yuan to 1.711 billion yuan, and hospitalization expenses increased from 774 million yuan to 1.122 billion yuan (see Table 1).

Table 1 Total change in diabetes treatment costs in Jilin Province from 2016-2019

		Number of visits	Diabetes treatment cost (ten million yuan)	Total treatment cost (ten million yuan)	Percent of Total treatment cost (%)
2016	Outpatient	603342	15.74	202.34	7.78
	Hospitalization	23174	7.74	348.59	2.22
	Total	626516	23.48	550.93	4.26
2017	Outpatient	396091	24.97	218.00	11.45
	Hospitalization	72713	9.03	375.64	2.40
	Total	468804	34.00	593.64	5.73
2018	Outpatient	404012	22.83	236.77	9.64
	Hospitalization	36416	10.89	423.64	2.57
	Total	440428	33.72	660.41	5.11
2019	Outpatient	287527	17.11	676.98	2.53
	Hospitalization	40210	11.22	280.36	4.00
	Total	327737	28.33	396.62	7.14

The total cost of diabetes treatment in Jilin is grouped by age

The treatment cost of diabetes is grouped according to the age of the patients. After 45 years of age, the cost of diabetes treatment is obviously increased, the treatment cost of the 60- to 64-year-old age group is the highest, and the outpatient expenses are much higher than the hospitalization expenses. Outpatient expenses increased gradually from 2016 to 2019. However, according to age group, the cost of outpatient treatment for patients over the age of 55 increased annually, and the outpatient treatment cost of 0-54-year-old diabetic patients showed a downward trend. This result demonstrates that the trend of diabetes outpatient treatment has become an ageing trend in recent years and indirectly reflects the weakening trend of diabetes among the younger population. From

the perspective of hospitalization expenses, the cost of hospitalization for diabetes in all age groups showed a slow upward trend (see Table 2).

Table 2 Diabetes treatment cost by age (ten million yuan)

	2016		2017		2018		2019	
	Outpatient	Hospitalization	Outpatient	Hospitalization	Outpatient	Hospitalization	Outpatient	Hospitalization
0-4	0.09	0.04	0.03	0.02	0.03	0.03	0.07	0.07
5-9	0.01	0.01	0.02	0.01	0.01	0.01	0.01	0.02
10-14	0.03	0.02	0.04	0.02	0.02	0.04	0.02	0.04
15-19	0.04	0.03	0.05	0.04	0.03	0.05	0.02	0.05
20-24	0.04	0.06	0.05	0.09	0.03	0.07	0.04	0.11
25-29	0.12	0.17	0.22	0.15	0.40	0.22	0.10	0.33
30-34	0.20	0.22	0.33	0.23	0.30	0.31	0.24	0.51
35-39	0.38	0.28	0.55	0.31	0.52	0.46	0.34	0.47
40-44	0.70	0.40	0.79	0.42	0.71	0.52	0.56	0.52
45-49	2.03	0.70	2.00	0.86	1.77	1.08	1.07	0.99
50-54	2.25	1.13	3.25	1.29	2.80	1.47	1.86	1.33
55-59	2.60	1.12	4.26	1.35	3.89	1.73	2.94	1.76
60-64	2.88	1.26	4.79	1.47	4.44	1.72	3.33	1.66
65-69	2.02	0.94	4.18	1.17	3.93	1.50	3.08	1.49
70-74	1.03	0.62	2.24	0.71	2.17	0.85	1.71	0.91
75-79	0.90	0.41	1.29	0.42	1.06	0.47	0.90	0.51
80+	0.44	0.33	0.88	0.46	0.72	0.38	0.83	0.44
	15.74	7.74	24.97	9.03	22.83	10.89	17.11	11.21

Average time of diabetes treatment change by age

The average treatment cost for each age group did not significantly differ, but the hospitalization cost was much higher than the outpatient cost. According to the average cost of treatment for each outpatient clinic, the cost for the 0-30-year-old age group remained basically unchanged, and the cost for the 30-year-old age group showed a slow upward trend. The average cost of diabetes treatment decreased annually (see Table 3).

Table 3 Average time of diabetes treatment by age (ten thousand yuan)

	2016		2017		2018		2019	
	Outpa tient	Hospitali zation	Outpa tient	Hospitali zation	Outpa tient	Hospitali zation	Outpa tient	Hospitali zation
0-4	0.76	2.64	0.10	1.89	0.73	2.23	0.19	2.89
5-9	0.19	2.12	0.39	1.60	0.28	1.69	0.16	1.67
10-14	0.43	2.13	0.65	1.87	0.67	2.03	0.22	1.78
15-19	0.61	2.54	0.57	2.37	0.52	2.03	0.29	2.06
20-24	0.32	3.27	0.38	1.19	0.48	2.24	0.31	2.87
25-29	0.31	2.71	0.55	1.54	1.58	2.11	0.29	2.77
30-34	0.33	2.68	0.50	1.41	0.55	2.17	0.39	2.89
35-39	0.34	2.77	0.55	1.38	0.57	2.66	0.42	2.60
40-44	0.37	3.00	0.59	1.45	0.54	2.65	0.52	2.55
45-49	0.15	3.05	0.62	1.36	0.58	2.96	0.56	2.65
50-54	0.37	3.15	0.64	1.28	0.58	2.98	0.61	2.68
55-59	0.37	3.36	0.66	1.13	0.57	3.00	0.63	2.70
60-64	0.36	3.48	0.65	1.17	0.57	3.18	0.66	2.86
65-69	0.37	3.69	0.66	1.20	0.56	3.26	0.65	2.91
70-74	0.36	3.95	0.64	1.12	0.55	3.46	0.62	3.07
75-79	0.08	3.80	0.62	1.21	0.48	3.17	0.56	2.89
80+	0.35	4.38	0.57	1.47	0.46	3.56	0.58	3.35
	0.26	3.34	0.63	1.24	0.57	2.99	0.60	2.79

Changes in average cost composition

In 2016-2019, the average outpatient expenses for diabetes in Jilin increased from 240.53 yuan to 304.61 yuan, corresponding to an average annual increase of 8.19%, and all expenses showed an upward trend. From the perspective of cost composition, the costs primarily consisted of drug, laboratory and treatment costs. The proportion of drug cost decreased from 95.32% to 87.15%, the laboratory cost increased from 2.07% to 5.20%, and the treatment cost increased from 1.30% to 3.76% over this period. Despite the rapid growth of other expenses, the proportion remained low (see Table 4).

Table 4 Average outpatient expenses for diabetic patients in Jilin (yuan)

	2016	2017	2018	2019	Average annual growth rate
Average outpatient expenses	240.53	278.72	343.45	304.61	8.19
Treatment fee	3.12	5.65	8.50	11.44	54.21
Drug cost	229.26	261.62	313.53	265.48	5.01
Inspection fee	1.18	2.02	6.07	5.38	65.54
Examination fee	1.41	1.94	2.06	4.65	48.84
Operation cost	0.18	0.24	0.36	0.59	49.66
Assay fee	4.97	6.48	12.25	15.83	47.09
Registration fee	0.40	0.76	0.66	1.25	45.92

In 2016-2019, the average hospitalization expenses associated with diabetes in Jilin Province decreased from 7280.63 yuan to 6707.33 yuan, corresponding to a decrease of 2.70%. The proportion of drug and treatment fees also decreased by 6.20% and 10.29%, respectively, while that for all other constituent items increased. However, the proportion of the average cost still decreased as a result of the small proportion (see Table 5).

Table 5 Average hospitalization expenses for diabetic patients in Jilin (yuan)

	2016	2017	2018	2019	Average annual growth rate
Average hospitalization expenses	7280.63	6334.69	7071.47	6707.33	-2.70
Treatment fee	1042.86	1165.12	1783.29	860.72	-6.20
Drug cost	3443.22	2927.58	2781.16	2486.26	-10.29
Inspection fee	814.09	501.36	613.94	837.39	0.94
Consultation fee	59.20	175.40	134.96	170.97	42.41
Operation cost	186.63	90.05	208.43	399.71	28.90
Bed fee	307.53	388.98	320.91	374.30	6.77
Nursing fee	123.79	173.16	350.14	204.55	18.22
Assay fee	1303.31	913.03	878.65	1373.44	1.76

Analysis of the average cost of diabetes in Jilin based on the structural change method

From 2016 to 2019, the structural change degree of average outpatient expenses was 16.32%. From the structural change direction of each expense item, the absolute value of the structural change value of drug expenses from 2016-2019 was the highest, indicating that drug expenses had the greatest impact on the structural change of average outpatient expenses. The structural change value of the second average drug cost was negative, indicating that its proportion had decreased, and the structural change values of other items were positive, indicating that their proportion had increased (see Table 6).

Table 6 VSV and DSV in the average outpatient cost for diabetic patients in Jilin Province

	VSV(%)							DSV (%)
	Treatment fee	Drug cost	Inspection fee	Examination fee	Operation cost	Assay fee	Registration fee	
2016-2017	0.73	-1.45	0.23	0.11	0.01	0.26	0.11	2.90
2017-2018	0.45	-2.57	1.04	-0.10	0.02	1.24	-0.08	5.50
2018-2019	1.28	-4.14	0.00	0.93	0.09	1.63	0.22	8.29
2016-2019	2.46	-8.16	1.27	0.94	0.12	3.13	0.24	16.32

From 2016-2019, the subaverage drug cost was the main item causing the change in the subaverage outpatient cost structure, with a contribution rate of 50.2%, followed by the laboratory and treatment fees, with contribution rates of 19.17% and 15.7%, respectively (see Table 7).

Table 7 Contribution rate of structural change (%)

	Treatment fee	Drug cost	Inspection fee	Examination fee	Operation cost	Assay fee	Registration fee
2016-2017	25.22	50.02	8.00	3.79	0.46	8.91	3.65
2017-2018	8.13	46.82	18.97	1.74	0.36	22.54	1.44
2018-2019	15.45	49.91	0.04	11.17	1.06	19.67	2.61
2016-2019	15.07	50.02	7.79	5.76	0.74	19.17	1.49

From 2016-2019, the average hospitalization cost structure changed greatly, accounting for 23.45%, which was mainly due to the change in the average drug cost structure, indicating that the average drug cost is the main driving factor causing the change in the average cost structure. The second are the average operation and laboratory fees, with structural change values of 3.4% and 2.58%, respectively. In the direction of structural change, the average drug cost over time has been trending in a negative direction, indicating that the proportion of average drug cost over time has decreased annually. Other expense items show positive changes, indicating that the proportion has increased (see Table 8).

Table 8 VSV and DSV in the average hospitalization cost for diabetic patients in Jilin Province

	VSV(%)								DSV
	Treatment fee	Drug cost	Inspection fee	Consultation fee	Operation cost	Bed fee	Nursing fee	Assay fee	(%)
2016-2017	4.07	-1.08	-3.27	1.96	-1.14	1.92	1.03	-3.49	17.96
2017-2018	6.83	-6.89	0.77	-0.86	1.53	-1.60	2.22	-1.99	22.69
2018-2019	-12.39	-2.26	3.80	0.64	3.01	1.04	-1.90	8.05	33.09
2016-2019	-1.49	-10.23	1.30	1.74	3.40	1.36	1.35	2.58	23.45

From 2016-2019, the average drug cost was the main factor causing the change in the average hospitalization cost structure, with a contribution rate of 43.6%, followed by the average operation and laboratory costs, with contribution rates of 14.48% and 1.98%, respectively. (see Table 9)

Table 9 Contribution rate of structural change (%)

	Treatment fee	Drug cost	Inspection fee	Consultation fee	Operation cost	Bed fee	Nursing fee	Assay fee
2016-2017	22.66	6.00	18.19	10.89	6.36	10.67	5.75	19.42
2017-2018	30.08	30.35	3.38	3.79	6.72	7.06	9.77	8.76
2018-2019	37.43	6.83	11.49	1.94	9.10	3.15	5.75	24.33
2016-2019	6.36	43.60	5.56	7.40	14.48	5.78	5.75	10.98

Discussion

Analysis of the growth trend and main characteristics of diabetes mellitus

The research on the cost of diabetes treatment in Jilin Province based on SHA2011 shows that in 2016-2019, the cost exhibited a rapid growth trend, with an average annual growth rate of 6.46%, which is much higher than the growth rate of GDP in Jilin Province (3.99%). This further aggravated the economic burden on society and patients and was a key area in which to control medical expenses in the subsequent period. According to the Jilin provincial statistical yearbook and the 2020 China Health Statistical Yearbook, the population over 65 years old in Jilin Province has increased annually, accounting for 13.29% in 2019 from 10.85% in 2016, which is higher than the proportion of the national population over 65 years old in the same period (10.8% in 2016 and 12.6% in 2019) [14-15]. With the aggravation of the ageing population, the burden of diabetes mellitus in Jilin will become increasingly greater.

The cost of treatment in the Jilin Diabetes Outpatient Clinic is decreasing year by year. After the implementation of the zero drug policy, the overall cost of drugs declined. The average outpatient and hospitalization expenses of diabetic patients have been well controlled. Under this premise, the cost of treatment of diabetes remains so high that the situation of prevention and control of the disease is severe. The sustained increase in the consumption of health resources by diabetes has posed a challenge to the sustainability of health financing in China. Research shows that in 2018, the total cost of diabetes treatment in the country reached 115.400 billion yuan, accounting for 3.3% of the total cost of disease treatment. Based on the current epidemic trend of diabetes and the level of service utilization, "if we do not take effective measures in time, the cost of treating diabetes in China will be more than 430 billion yuan by 2030, which will seriously impact the sustainability of health financing and medical insurance funds"^[16-17]. More significantly, if diabetes is not well controlled, it may lead to many acute and chronic complications, including diabetes, cardiovascular and cerebrovascular diseases, diabetic nephropathy, diabetic retinopathy, and diabetic foot, which will further increase the economic burden of related diseases^[18]. Studies have shown that over 80% of the cost of diabetes treatment is related to the treatment of related complications. Therefore, we should strengthen the early diagnosis and treatment of diabetes and reduce the incidence of diabetic complications as much as possible to reduce the total cost of treatment and the burden on patients.

Analysis of factors associated with an increased cost of diabetes treatment

From the perspective of hospitalization and outpatient expenses, the factors related to the growth of diabetes treatment cost were analysed. Over the years 2016-2019, although the increase in the cost of outpatient treatment was higher than the increase in hospitalization expenses, the increase in the cost of treatment for diabetes in Jilin was still mainly driven by the increase in hospitalization expenses. The average outpatient expenses increased each year, and the average hospitalization expenses decreased each year. Total hospitalization expenses increased annually, while average hospitalization expenses decreased annually. The increase in the number of inpatients should be given sufficient attention by relevant departments.

According to the structure of the cost of treating diabetes in Jilin Province, the overall trend of the proportion of drug expenses to total medical expenses in 2016-2019 has been declining. The cost of drugs and the average cost of medications for hospitalized patients have been decreasing yearly, but the outpatient expenses of drugs and the average drug use have increased annually. This result demonstrates that the increase in drug costs is controllable, especially the average inpatient drug costs, which decreased by 10.29%, while the control of average drug costs of outpatients still needs to be strengthened. In our follow-up study, we plan to focus on the drug costs of outpatients. The contribution rates of drug expenses to outpatient and hospitalization expenses are the largest, with contribution rates of 50.02% and 43.60%, respectively, and the overall drug expenses show a downward trend, which is due to the implementation of policies and measures such as the government's "zero mark up of drugs", centralized bidding and quantity procurement of drugs, and the reform of the medical insurance payment method. Drug expense control has achieved remarkable results, and the purpose of policy design has been preliminarily achieved^[19-21].

Among the subaverage outpatient expenses, the average annual growth rate of the subaverage drug expenses is lower than that of the subaverage outpatient expenses, while among the subaverage inpatient expenses, the average annual decline rate of the subaverage drug expenses is much higher than that of the subaverage inpatient expenses, which shows that in the process of public hospital reform with breaking the breakthrough of

supplementing medicine with medicine, China's medical institutions have increased testing, examination and To optimize the price system of medical services, the government has raised the price of labour-related items of medical services. The rapid growth of health care material costs is an important reason for the rise in medical costs^[22]. In 2016-2019, the average cost associated with diabetic patients in Jilin Province showed positive changes with respect to nursing expenses, operative fees and treatment fees, but the proportion was still low. One of the key objectives of deepening the reform of the medical and health system is to optimize the charging structure of medical institutions, refine the price comparison relationship of medical services, and gradually increase the proportion of technical labour income, such as diagnosis and treatment, nursing and operative fees^[23]. It can be seen from the analysis that the proportion of labour income in the average hospitalization expenses increased from 19.40% in 2016 to 24.39% in 2019. Although it is increasing annually, the proportion is still low. The unreasonable structure of hospitalization expenses will not only affect the work enthusiasm of medical staff but also induce unreasonable medical behaviours such as "big prescription and big examination" for patients to improve their income^[24-25]. Therefore, relevant departments should formulate relevant performance incentive systems, medical service pricing mechanisms and corresponding payment systems; reasonably adjust the prices of surgery, nursing and other medical services; and appropriately improve the technical labour value of medical personnel.

Conclusion

Based on the SHA2011 accounting system, this study analysed the related factors of the growth trend and main characteristics of diabetes treatment expenses in Jilin Province through structural analysis. It was found that the cost of treatment of diabetes in Jilin Province showed a rapid growth trend. The increase in hospitalization expenses was mainly due to the increase in the number of outpatients. The increase in outpatient expenses was mainly due to the increase in average outpatient expenses. The average drug cost has been well controlled in the hospitalization cost, but there is still room for cost reduction. Overall, the prevention and control of diabetes in Jilin Province have demonstrating promising results.

Abbreviations

SHA2011: System of Health Accounts 2011; VSV: Value of Structure Variation;

DSV: Degree of Structure Variation; GDP: Gross domestic product;

Declarations

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Availability of data and materials

The datasets analysed during the current study are available from the corresponding author on reasonable request, and permission was given for the access.

Authors' contributions

ZhengZhou conceived the study, and handled data collection, undertook the analytical work and drafted the manuscript. Jianxing Yu implemented the method. Xihe Yu provided overall guidance. All authors contributed to interpretation of the data and read and approved the final manuscript.

Competing interests

The authors declare that they have no competing interests.

Consent for publication

Not applicable.

Ethics approval and consent to participate

Not applicable.

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