DIABETES MELLITUS IN THE RUSSIAN FEDERATION: DYNAMICS OF EPIDEMIOLOGICAL INDICATORS ACCORDING TO THE FEDERAL REGISTER OF DIABETES MELLITUS FOR THE PERIOD 2010–2022

© Ivan I. Dedov, Marina V. Shestakova, Olga K. Vikulova, Anna V. Zheleznyakova, Michail A. Isakov, Daria V. Sazonova, Natalya G. Mokrysheva

Endocrinology Research Centre, Moscow, Russia

BACKGROUND. The clinical and epidemiological characteristics of diabetes mellitus (DM) and the quality of its therapy are the key prognostic dominant that determines the organizational aspects of the diabetic service. The continuous dynamic monitoring of DM has been carried out in the Russian Federation (RF) since 1996 through the activities of the Federal Register of Diabetes Mellitus (FDR).

AIMS. The aim of our study was to analyze the epidemiological characteristics of DM in the RF (prevalence, morbidity, mortality), the prevalence diabetic of complications, the state of carbohydrate metabolism (level of HbA_{1c}) and the dynamics of the structure of glucose-lowering therapy (GLT) according to the FDR.

MATERIALS AND METHODS. The database of FRD (https://www.diaregistry.ru/), 85 regions of the RF. The data are presented as of 01.01.2023 and in dynamics for the period 2010–2022.

RESULTS. The total number of DM patients in the RF as of 01.01.2023 was 4 962 762 (3.31% of the population), including: Type 1 (T1) — 5.58% (277.1 ths), T2 — 92.33% (4.58 million), other DM types —2.08% (103 ths). The dynamics of prevalence over the 13-year period (2010→2022) was 146.0→191.0/100 ths people with T1, and 2036.2→3158.8/100 ths people with T2; morbidity in T1 12.3→8.2/100 ths population, in T2 260.1→191.4/100 ths population; мortality: T1 2.1→2.4/100 ths population, T2 41.2→86.1/100 ths of the population. The main cause of death was cardiovascular: in T1 38.6% cases, in T2 — 50.9%. Life expectancy (average age of death of patients): T1 was 52.7 years, the dynamics in males 50.9 → 50.7 years, females 62.1→56.0 years; in T2 — 74.2 years, males 69.5→70.4 years, females 74.2→76.1 years. The dynamic of DM duration from onset to the death: in T1 15.4→19.9 years; in T2 11→11.4 10.2→11.8 years. The proportion of patients with laboratory-measured HbA_{1c} <7% in the dynamics of 2010–2022: with DM1 24.4%→29%, with DM2 41.5%→42.2%, with HbA_{1c} ≥9.0%: with DM1 29, 4% → 20.4%, with DM2 13.8 → 9.0%.The incidence of diabetic complications as of 01.01.2023 in T1 and T2 patients: neuropathy 41.3% and 23.7%, nephropathy (CKD) 22.8% and 19.1%, retinopathy 28.9% and 12.3%, respectively. The structure GLT in T2 patients as of 01.01.2023: monotherapy — 41.6%; combination of 2 GLM — 30.0%, 3 GLM — 5.8%, insulin therapy in 18.3%.

CONCLUSIONS. The information-analytical system FDR is a key tool for systematizing the most important epidemiological and clinical characteristics of DM based on data from real clinical practice, which allows optimizing the algorithm of patient management and improving the quality of care for diabetes.

KEYWORDS: diabetes mellitus (DM); the register of diabetes mellitus (FDR); diabetes prevalence; mortality in DM; cause of death; glucose-lowering therapy (GLT); diabetic complications

САХАРНЫЙ ДИАБЕТ В РОССИЙСКОЙ ФЕДЕРАЦИИ: ДИНАМИКА ЭПИДЕМИОЛОГИЧЕСКИХ ПОКАЗАТЕЛЕЙ ПО ДАННЫМ ФЕДЕРАЛЬНОГО РЕГИСТРА САХАРНОГО ДИАБЕТА ЗА ПЕРИОД 2010–2022 ГГ.

© И.И. Дедов, М.В. Шестакова, О.К. Викулова, А.В. Железнякова, М.А. Исаков, Д.В. Сазонова, Н.Г. Мокрышева

Национальный медицинский исследовательский центр эндокринологии, Москва

ОБОСНОВАНИЕ. Клинико-эпидемиологические характеристики сахарного диабета (СД) и качество терапии данного заболевания являются ключевой прогностической доминантой, определяющей организационные аспекты диабетологической службы. В Российской Федерации (РФ) непрерывный динамический мониторинг СД осуществляется с 1996 г. посредством деятельности Федерального регистра СД (ФРСД).

ЦЕЛЬ. Провести анализ эпидемиологических характеристик СД в РФ (распространенности, заболеваемости, смертности), распространенности диабетических осложнений, состояния углеводного обмена (по уровню гликированного гемоглобина (HbA_{1c})) и динамики структуры сахароснижающей терапии по данным ФРСД.

МАТЕРИАЛЫ И МЕТОДЫ. Объект исследования: база данных ФРСД (https://www.diaregistry.ru/), 85 регионов РФ. Данные представлены в формате одномоментного среза на 01.01.2023 г. и в динамике за период 2010–2022 гг.

РЕЗУЛЬТАТЫ. Общая численность пациентов с СД в РФ, состоящих на диспансерном учете, на 01.01.2023 г., по данным ФРСД, составила 4 962 762 (3,31% населения РФ), из них: СД1 — 5,58% (277,1 тыс.), СД2 — 92,33% (4,58 млн), другие типы СД — 2,08% (103 тыс.). Динамика распространенности за 13-летний период 2010→2022 г. составила при СД1 146,0→191,0/100 тыс. населения, при СД2 2036,2→3158,8/100 тыс. населения; заболеваемости — при СД1 12,3→8,2/100 тыс. населения, при СД2

Received: 06.04.2023. Accepted: 06.04.2023

260,8→191,4/100 тыс. населения; смертности: СД1 2,1→2,4/100 тыс. населения, СД2 41,2→86,1/100 тыс. населения. Основная доля в структуре смертности приходится на сердечно-сосудистые причины: при СД1 38,6%, при СД2 50,9%. Средний возраст смерти при СД1 составил 52,7 года, в динамике муж. 50,9→50,7 года, жен. 62,1→56,0 года; при СД2 74,2 года, муж. 69,5→70,4 года, жен. 74,2→76,1 года. Длительность СД от дебюта заболевания до смерти пациентов увеличилась: при СД1 15,4→19,9 года; при СД2 10,2→11,8 года. Доля пациентов с лабораторно измеренным HbA_{1c} <7% в динамике 2010–2022 гг.: при СД1 24,4%→29%, при СД2 41,5%→42,2%, с HbA_{1c} ≥9,0%: при СД1 29,4%→20,4%, при СД2 13,8→9,0%. Частота диабетических осложнений на 01.01.2023 г. при СД1 и СД2: нейропатии 41,3 и 23,7%, нефропатии 22,8 и 19,1%, ретинопатии 28,9 и 12,3% соответственно. Структура терапии при СД2 на 01.01.2023 г.: монотерапия — 41,6%; комбинация 2-х сахароснижающих препаратов (ССП) — 30,0%, 3-х ССП — 5,8%, инсулинотерапия —18,3%.

ЗАКЛЮЧЕНИЕ. Информационно-аналитическая система ФРСД является ключевым инструментом систематизации важнейших эпидемиологических и клинических характеристик СД на основе данных реальной клинической практики, что позволяет оптимизировать алгоритм ведения пациента и качество диабетологической помощи.

КЛЮЧЕВЫЕ СЛОВА: сахарный диабет (СД); регистр сахарного диабета (ФРСД); распространенность; заболеваемость; смертность; сахароснижающая терапия; диабетические осложнения

Diabetes mellitus (DM) is a serious non-communicable disease (NCD) and a major public health problem worldwide, it is controlled by the United Nations (UN) and national health systems around the world. [1]. DM is characterized by a steadily increasing prevalence that poses a threat due to early disability and high mortality rate due to fatal vascular events. According to the data of the International Diabetes Federation (IDF), the number of diabetic patients aged 20–79 years reached 537 million worldwide in 2021 (IDF atlas), and this exceeds the previously predicted growth rates by 10–12 years. By 2045, the number of people with diabetes is expected to nearly double to 783 million (by 46%) [2]. The prevalence of diabetes mellitus continues to increase in the Russian Federation (RF) too - since 2000, there has been more than a two-fold increase in the number of diabetic patients [3]. According to the latest data of the Federal State Statistics Service (Rosstat), the number of diabetic patients in the RF at the end of 2021 was 5,168,800 [4].

The Endocrinology Research Centre has been carrying out constant clinical and epidemiological monitoring of DM cases since 1996 using the register of diabetes mellitus (FDR), that was organized as part of the Federal Program «Diabetes mellitus» [5]. In 2014, the FDR was transformed into analytical online database with authorized access (https://www.diaregistry.ru/). From the base till now the FDR has become a key tool for analysis the clinical and epidemiological characteristics of DM, diabetic complications, and criteria for the assessment of treatment quality and efficacy [6–11].

The FDR has been used to create a unique dynamic database of diabetic patients from different regions of the RF. This database makes it possible to analyze key clinical and epidemiological parameters of DM at all levels of diabetes care system (from health care facilities to the entire country).

FDR experience of during the pandemic of COVID-19 has shown the benefits of real-time online remote monitoring of diabetic patients in terms of the most effective strategy for reducing the risk of adverse clinical outcomes [12].

Currently, the analytical platform of FRD includes more than 70 automated reports assessing various aspects of diabetes care in each healthcare organization and region. It is equipped with a data quality monitoring system that finds duplicate data, erroneous socio-demographic characteristics, incorrect entry of data regarding the type of diabetes, irrational therapy, etc. In 2022, in order to control the strategic risks of DM, a clinical decision support system (CDSS) was introduced in the FDR, which allows assessing the correctness of diagnostic and therapeutic algorithms in accordance with the current clinical guidelines. Thus, the FRD is a clinical and analytical information platform, and not just a statistical database, the purpose of which is to improve the quality of monitoring and treatment of diabetes patients.

AIM

The aim of our study was to analyze the epidemiological characteristics of DM in the RF (prevalence, morbidity, mortality), the prevalence diabetic of complications, the state of carbohydrate metabolism (level of glycated hemoglobin, HbA1c) and the dynamics of the structure of glucose-lowering therapy (GLT) according to the FDR data.

METHODS

The object of the study was the FDR database as of January 1, 2023 that included data on 85 of 89 regions of the RF (except for new territories).

The prevalence and incidence of DM (per 100,000 population) were calculated based on the data on populations from the Federal State Statistics Service (Rosstat) [13].

The prevalence, incidence and mortality rate of patients with T1DM and T2DM and the frequency of diabetic complications are shown over a period of 13 years from 2010 to 2022.

The analysis of carbohydrate metabolism control parameters is shown for 2010–2022 based on the following data: 1) results of laboratory tests for HbA_{1c} and 2) total HbA_{1c} (laboratory value and surrogate value calculated by the standard formula since the time of minimization of the proportion of patients with unspecified therapy using blood glucose levels reported in the FDR system). Mean values of HbA_{1c} and its values in the ranges of <7%, 7–7.9%, 8–8.9%, ≥9.0% were analyzed. The ratio of the numbers of patients with available laboratory and surrogate values of HbA_{1c} is shown for 2017–2022 (since the implementation of the estimated parameter in the FDR system).

The results of a dynamic analysis of the use of varios classes of GLT agents are shown for 2010–2022. The analysis of GLT regimens is given over 2017–2022. Changes over time in the use of insulin preparations by types of insulins (2010–2022). The analysis of insulin pump therapy in children

and adolescents is given over the period of 2016–2022 (after the start of registration of the insulin pump use in the FDR system).

Terms

Prevalence (all cases) is a parameter evaluating the number of all cases of the disease reported in the current calendar year per 100,000 population of the respective age group.

Incidence (primary; new cases) is a parameter evaluating the number of new cases of the disease reported for the first time during the current calendar year per 100,000 population of the respective age group.

Mortality rate is a parameter evaluating the number of deaths in persons with this disease per 100,000 population of the respective age group.

- Children are persons under 15 years of age (0–<15).
- Adolescents are persons who are 15 to 18 years (15–<18) of age.
- Adults are persons who are over 18 years of age.

Ethical review

The study protocol No.20 dated December 14, 2016 was reviewed by the Local Ethics Committee of the Endocrinology Research Centre and a positive decision was made.

RESULTS

The analysis of DM prevalence in the Russian Federation

As of January 1, 2023, the FDR was receiving data from 85 regions of the RF. As of January 1, 2023, the total number of diabetic patients who were followed up was 4,962,762 persons (3.31% of the population of Russia) including: 5.58% (277,100) with T1DM, 92.33% (4.58 million) with T2DM, 2.08% (104,000) with other types of DM (see Fig. 1).

The prevalence of T1DM and T2DM in the RF in each region as of January 1, 2023 is shown in Fig. 2, 3. The prevalence of DM in different age groups in each of 85 regions is shown in Appendix 1, Tables 1–4: all age groups, children, adolescents and adults, respectively.

The average prevalence of T1DM in the RF is **191.0/100,000** population (see Fig. 2); there is so called «geographical gradient» in the prevalence of T1DM with the highest values observed in the north-western regions of Russia.

The average prevalence of T2DM in the RF is **3158.8/100,000** population (see Fig. 3). There is obvious variability of T2DM prevalence in different regions, which could be due not only to ethnic or genetic population differences. First of all, it is necessary to take into account the influence of organizational factors in the diagnostic and screening of carbohydrate metabolism disorders in the population of the region, efficiency of T2DM detection in risk groups, and data reporting to the register.

There was a steady increase in the prevalence of T1DM and T2DM in the RF over the analyzed 13-year period: from 146 per 100,000 population to 191 per 100,000 (a 1.31-fold increase) and from 2036.2 per 100,000 to 3158.2 per 100,000 population (a 1.55-fold increase), respectively (Fig. 4).

The analysis of DM incidence in the Russian Federation

Dynamics of incidence in T1DM and T2DM in 2010–2022 was 12.3–8.2 per 100,000 population and 260.8–191.4 per 100,000 population, respectively (see Fig. 5). Data for each of the 85 regions are shown in Appendix 2.

The analysis of the registry data showed a decrease in the number of newly revealed cases of DM with the maximum decrease in 2020 due to the COVID-19 pandemic, which has not recovered to the level before the pandemic yet. These tendencies can also be related to the transition of the management of patients with newly diagnosed DM to the responsibility of primary care facilities. Wide variability of the DM incidence in different regions indicates that this effect was influenced by organizational factors: activities related to active screening and detection of DM and the quality of filling out the registry data.

Changes over time in the number of newly revealed cases of T1DM and T2DM relative to the total number of patients are shown in absolute values from 2010 to 2022 in Fig. 6. In the analyzed period, the annual increase in new cases of T1DM and T2DM amounted to 12-17 thousand/year and 280-380 thousand/year, respectively. In absolute values, there was a similar downward trend in the registration of new cases of DM.

The analysis of mortality rate in diabetic patients in the Russian Federation

In 2022, a total of 128,330 deaths of diabetic patients were registered including:

- with T1DM – 3,465 people, that is 2.4 per 100,000 population, of which 36.6% were female (1296) and 63.4% (2169) were male; the average age at the time of death was 53 years (51 and 56 years in male and female patients, respectively);
- with T2DM – 124,865 people, that is 86.1 per 100,000, of which 65.5% were female (81,761) and 34.5% were male (43,104); the average age of the time of death was 74 years (70 and 76 years in male and female patients, respectively).

	T1DM	T2DM	Other types
Children	35,019	1,049	651
Adolescents	13,012	246	214
Adults	229,061	4,580,695	102,815
Total	**277,092**	**4,581,990**	**103,680**
Total number as of January 1, 2023		**4,962,762**	

Figure 1. Total number of patients with diabetes mellitus in the Russian Federation as of January 1, 2023.

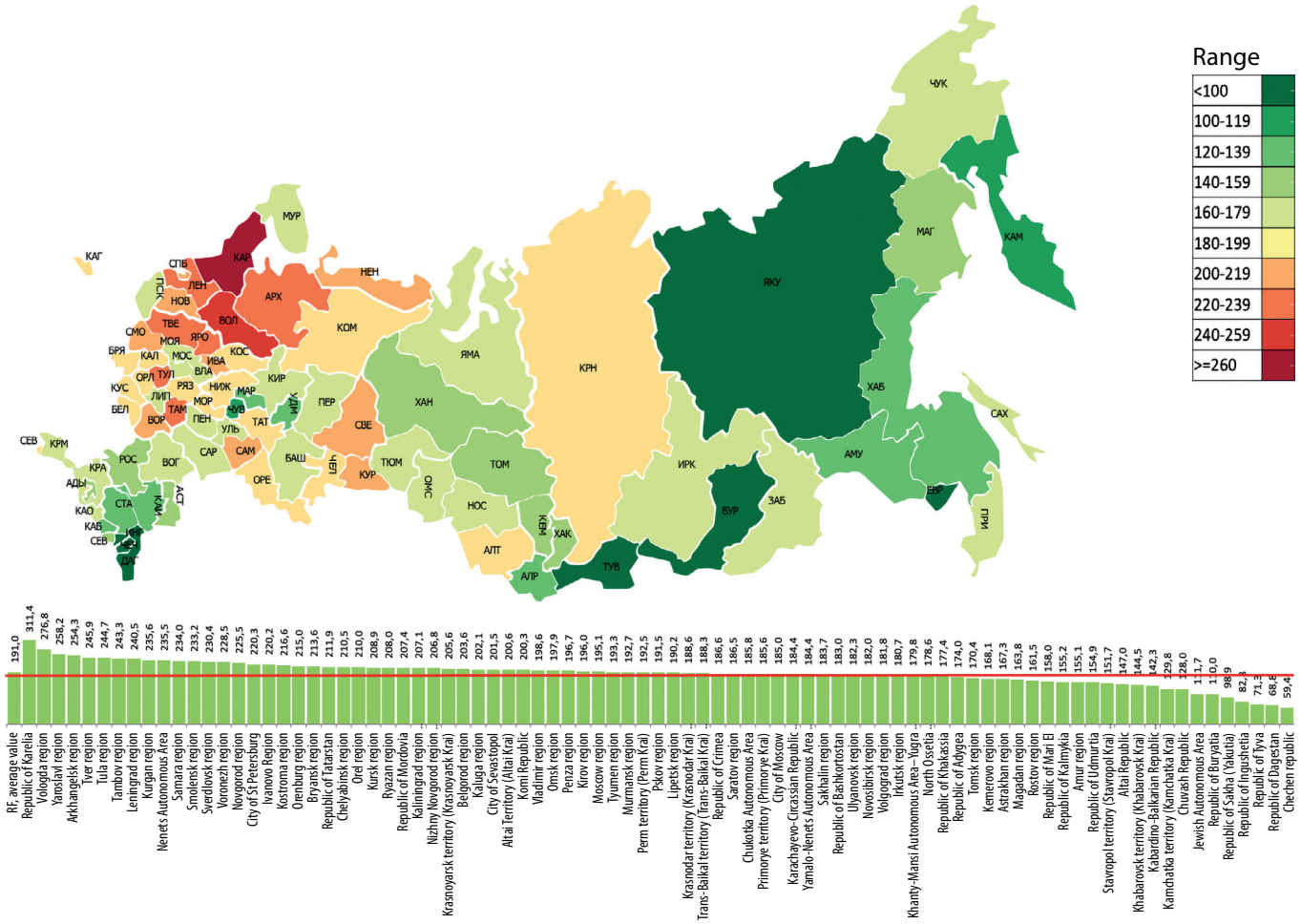

Figure 2. The prevalence of T1DM per 100,000 population, 85 federal constituent entities of the Russian Federation, January 1, 2023

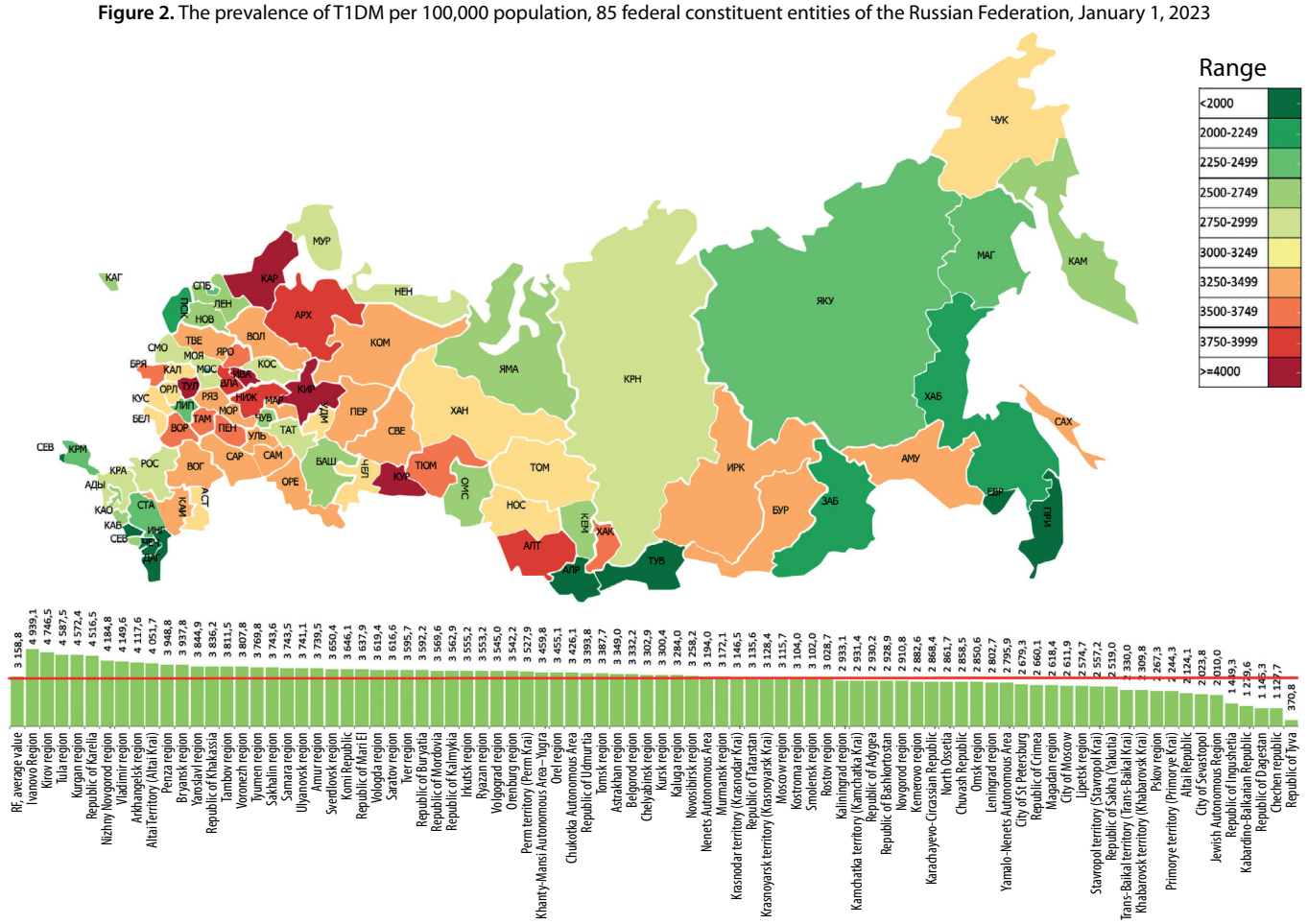

Figure 3. The prevalence of T2DM per 100,000 population, 85 federal constituent entities of the Russian Federation, January 1, 2023

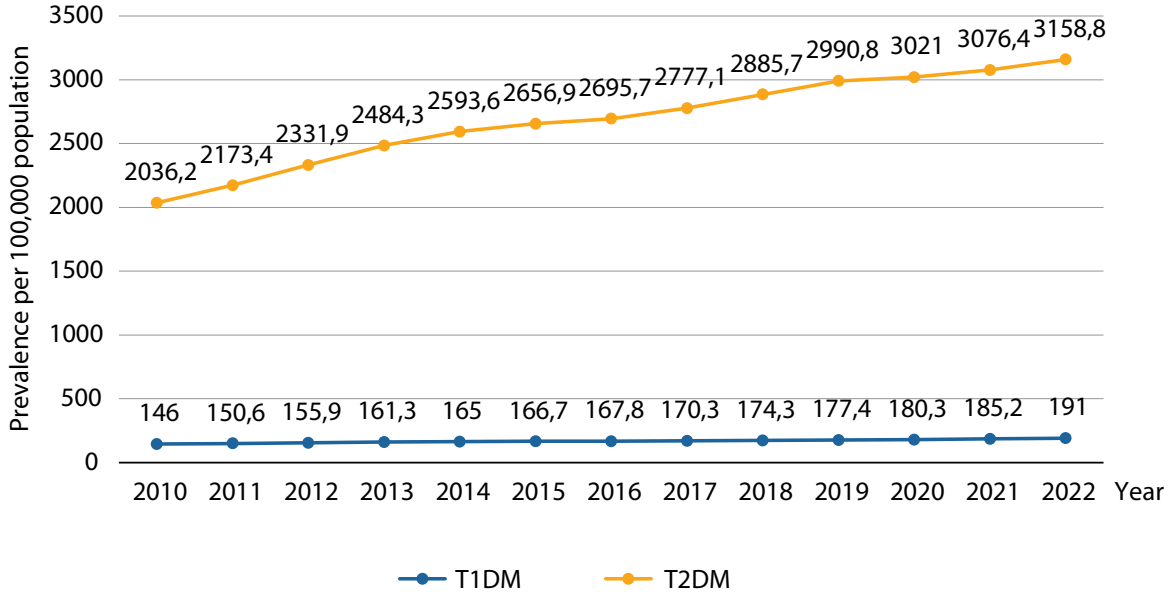

Figure 4. Dynamics of prevalence in patients with T1DM and T2DM per 100,000 population, 85 federal constituent entities of the Russian Federation in 2010–2022.

The mortality rates in diabetic patients of all age groups assessed based on the FDR data in each of 85 regions in 2022, are shown in Appendix 3, Table 1.

During the analyzed 13-year period, there was a gradual increase in the mortality rate since 2013 (after the end of the Federal Program «Diabetes mellitus»), both in the absolute number of deaths (see Fig. 7) and the value per 100,000 (see Fig. 8); the maximal increase in this parameter was in 2020-2021 during the COVID-19 pandemic. The differences in the mortality rates according to the official statistical data of the Federal State Statistics Service (Rosstat) [4] are due to different approaches to registration: in the Rosstat the deaths are accounted due to direct causes of death «diabetes mellitus», while the FDR records deaths of diabetic patients with all causes (resulting in a higher number of deaths compared to the Rosstat data).

The proportions of different causes of death in diabetic patients according to the FDR data are shown in Fig. 9. Cardiovascular diseases (CVD) continue to be the main cause of death in patients with DM [7, 8], with chronic cardiovascular insufficiency (CVI) being the most common, followed by atherosclerotic cardiovascular diseases (ACVD), including coronary artery disease (CAD), myocardial infarction (MI), cerebrovascular diseases, and acute cardiovascular events (rhythm disturbances, pulmonary embolism, thrombosis, sudden cardiovascular death, cardiogenic shock, and cerebral edema), which cumulatively caused death in 38.6% of patients with T1DM and 50.9% of patients with T2DM.

Among the causes of death not directly related to diabetes the second place after CVD was taken by cancer (10.6% and 5.25%) and COVID-19 (7.7% and 7.0% in patients with T2DM and T1DM, respectively) (see Fig. 9).

At the same time, diabetes-related causes directly associated with acute and chronic diabetic complications (coma, gangrene, end-stage diabetic kidney disease) account for a significantly lower proportion of cases in the cumulative mortality structure: a total of 7.3% in patients with T1DM and only 2.5% in patients with T2DM.

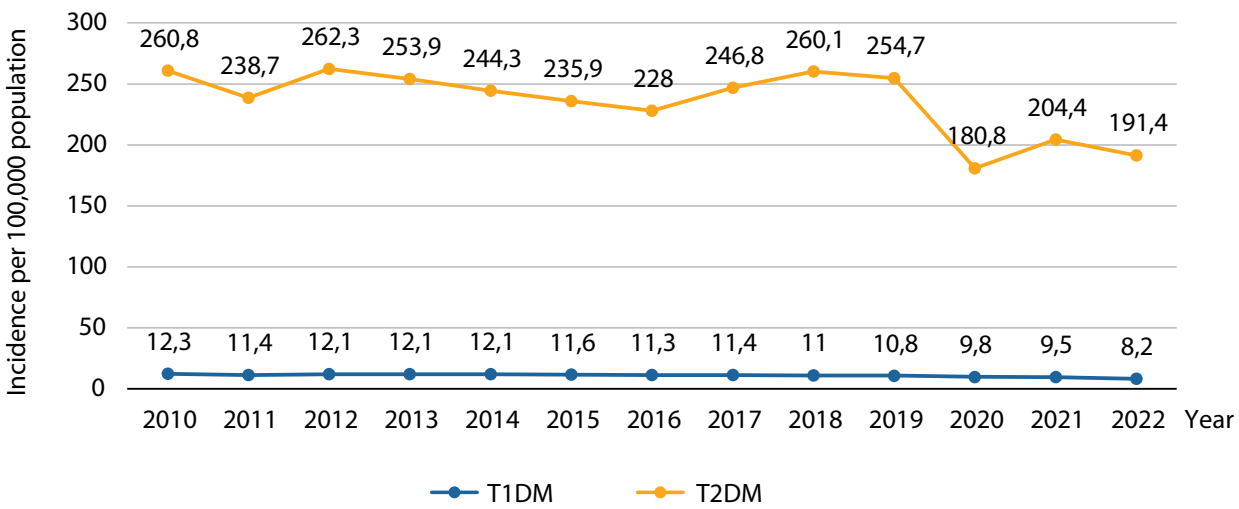

Figure 5. Dynamics of incidence in patients with T1DM and T2DM per 100,000 population, 85 federal constituent entities of the Russian Federation in 2010–2022.

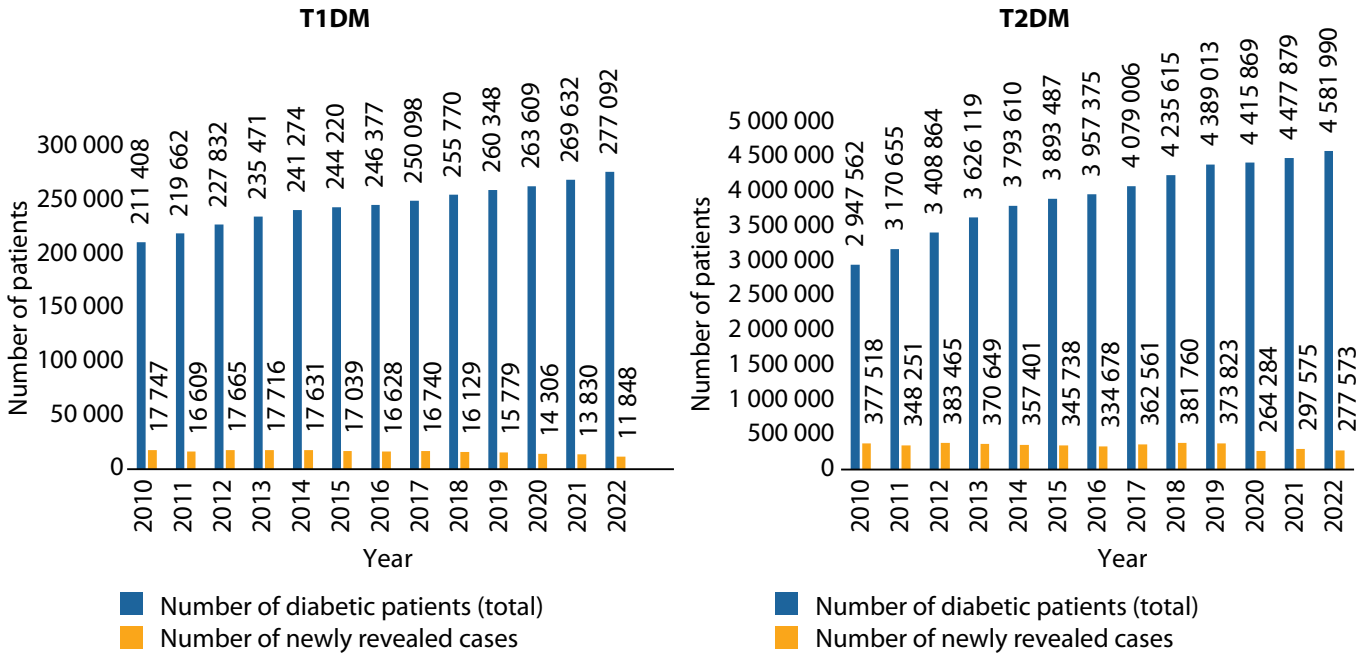

Figure 6. Dynamics in the number of patients with T1DM and T2DM in the Russian Federation in 2010–2022, absolute values

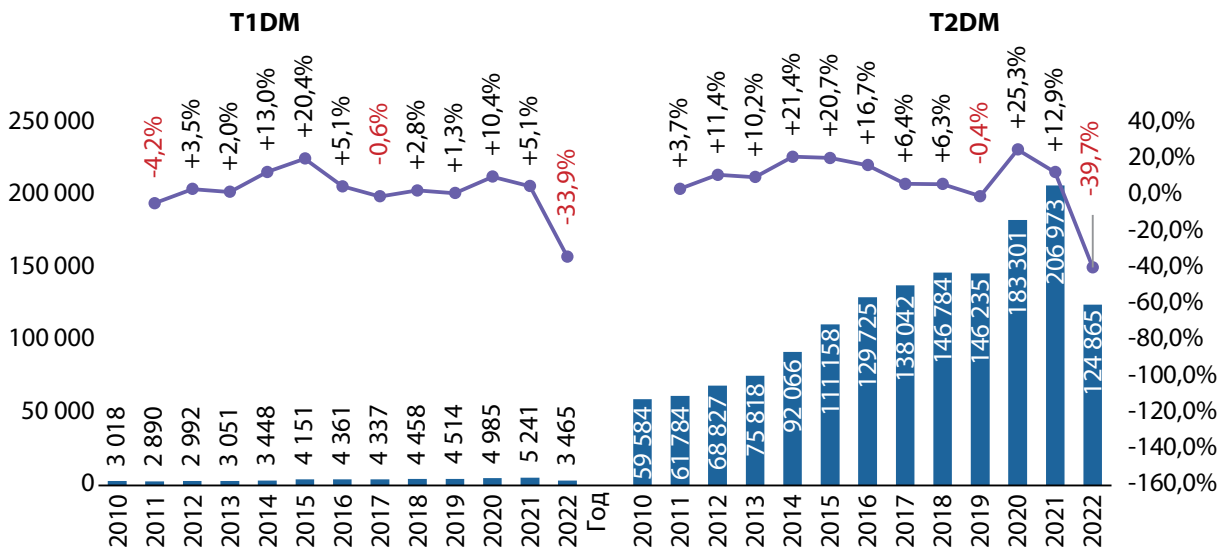

Figure 7. Dynamics of mortality rates in patients with T1DM and T2DM in 85 regions of the Russian Federation in 2010–2022, absolute values

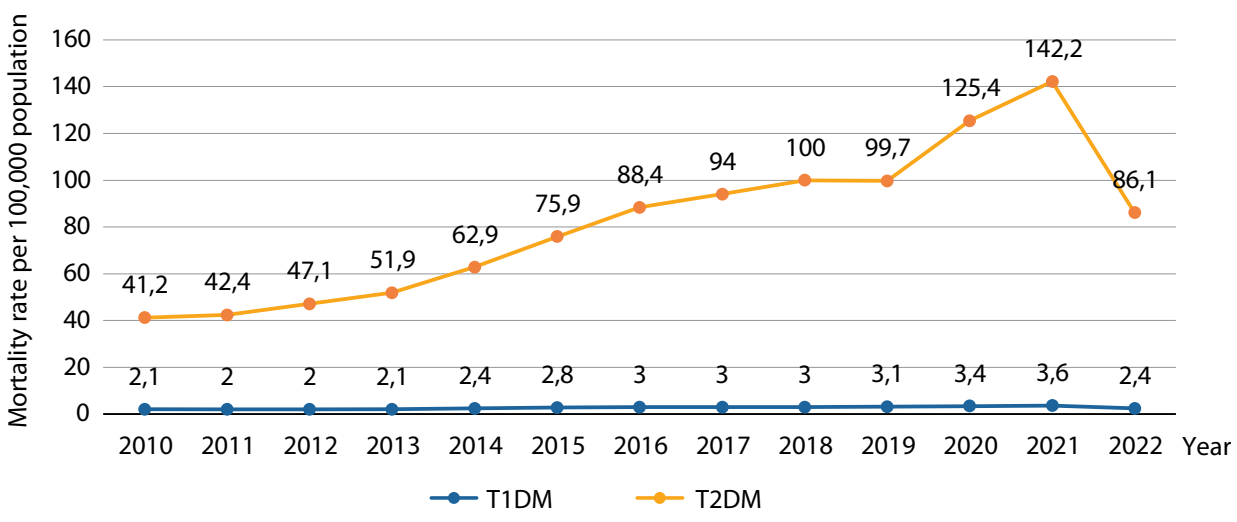

Figure 8. Dynamics in the mortality rates in patients with T1DM and T2DM per 100,000 population in 85 regions of the Russian Federation in 2010–2022

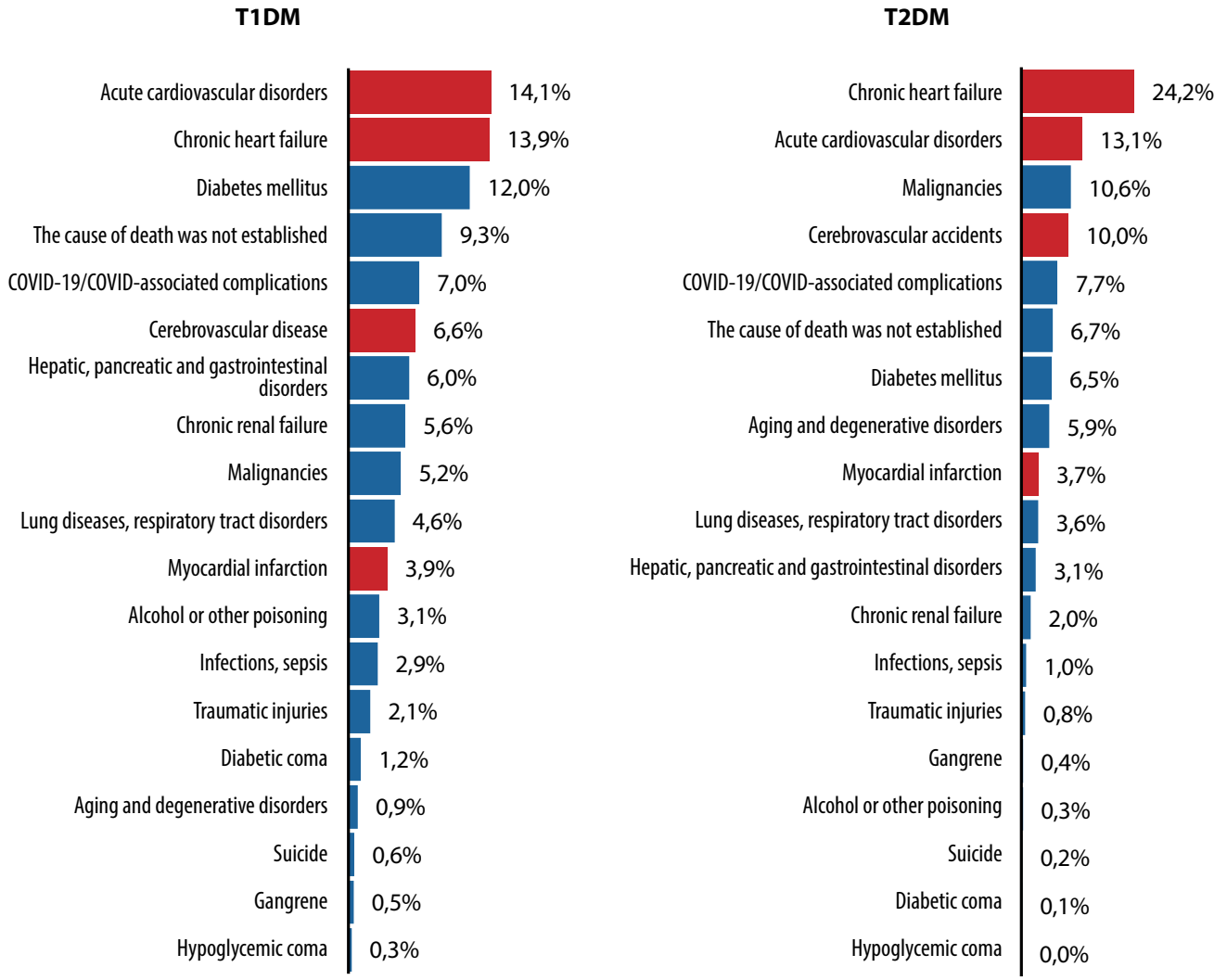

Figure 9. Structure of death in patients with T1DM and T2DM in the Russian Federation (direct causes of death) according to the FDR data, 2022. Cardiovascular diseases are marked in red, other causes are marked in blue.

Unfortunately, failure to specify the exact cause of death instead of a non-structured term «diabetes mellitus» remains to be common: 12% in patients with T1DM and 6.5% in patients with T2DM, which makes it difficult to analyze the direct causes of death in such cases. Coding of causes of death in diabetic patients in the Russian Federation is one of the long-discussed issues due to the comorbidity of DM and CVD and a number of contradictions in key regulatory documents that regulate the mortality statistics. According to the provisions of the «Consensus statement» of endocrinologists and pathologists on coding causes of death [14], the immediate cause of death in a patient with DM should be indicated as a complication of the underlying disease that directly led to death. Thus, indicating the diagnosis of DM without specifying the exact complication is a violation of the key principles of encoding the causes of death and must not be used.

Dynamics of the age of death in patients with T1DM and T2DM demonstrating actual life expectancy in 2010–2022 are shown in Fig. 10.

It should be noted that there is a steady upward trend in respect of life expectancy in diabetic patients, comparable with the increase in this parameter in the general population: by 1.4 years in patients with T2DM (1.9 years and 0.9 years in female and male patients, respectively). The parameters assessed in T1DM patients are not as favorable: there is a decrease in life expectancy in patients with T1DM by an average of 3 years, due to a decrease in life expectancy in female patients (from 62.1 years to 56 years), with a steady level in male patients (50.9–50.7 years).

One of the criteria demonstrating the effectiveness of measures aimed at improving the quality of diabetic care is the indicator of life expectancy in a diabetic patient, i.e. the duration from the onset of DM to the age of the patient's death. In the analyzed period, there is a steady increase in this parameter in patients with both types of diabetes, even despite the effects of the COVID-19 pandemic: in patients with T1DM - by 4.5 years (from 15.4 to 19.9 years): in male patients - by 4.2 years (from 13.6 to 17.8 years); in female patients - by 5.9 years (from 17.6 to 23.5 years); in patients with T2DM - by 1.6 years (from 10.2 to 11.8 years): in male patients - by 1.5 years (from 8.5 to 10.0 years), in female patients - by 1.9 years (from 10.9 to 12.8 years) (see Fig. 11).

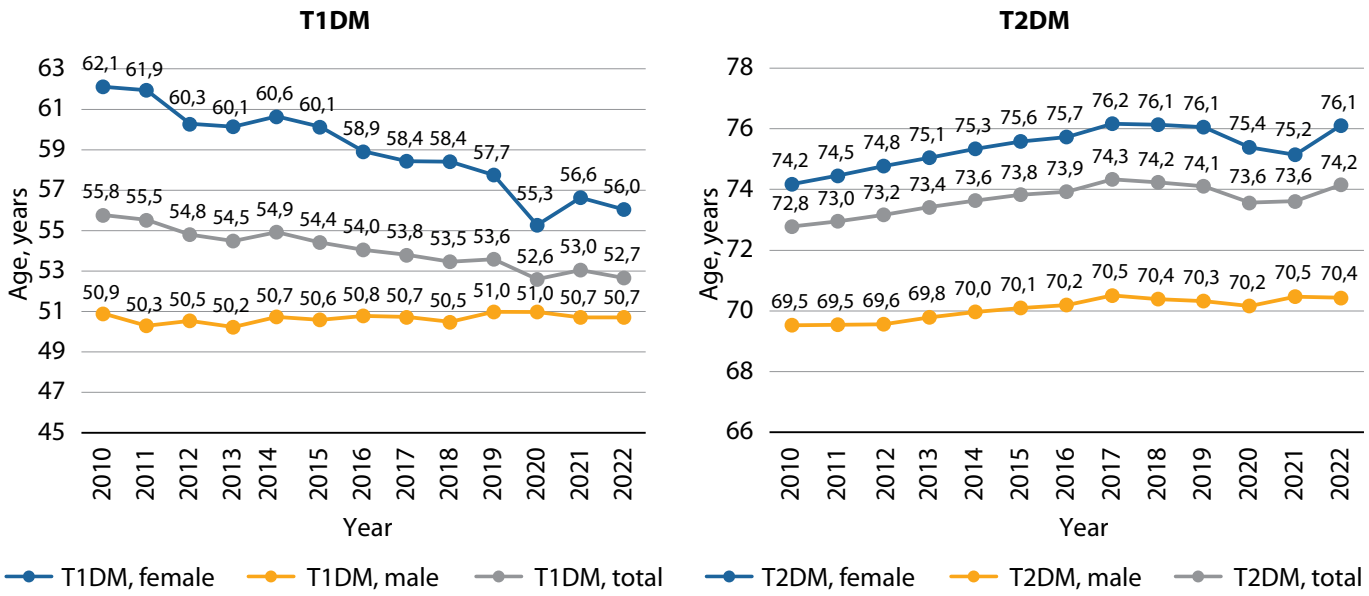

Figure 10. Actual age of death and life expectancy; mean age of death in patients with T1DM and T2DM according to the FDR data in 2010–2022 (actual data from 84 regions) as of January 1, 2023

The analysis of carbohydrate metabolism control parameters (HbA_{1c})

Despite the possibilities of modern methods of carbohydrate metabolism control with the help of continuous monitoring, which makes it possible to assess the parameters of glycemic variability and more accurately monitor the achievement of treatment goals, HbA_{1c} remains a universal indicator of the quality of management of diabetic patients that can be used in routine clinical practice. HbA_{1c} is a key marker of the treatment effectiveness and a fundamental parameter associated with the risk of complications and the long-term prognosis of diabetic patients [15].

The results of the analysis of laboratory values of HbA_{1c} in patients with T1DM and T2DM in 2010–2022 have shown improvement in the mean values of HbA_{1c} in both types of DM: in patients with T1DM - from 8.3 to 7.9%; in patients with T2DM - from 7.5 to 7.3% (see Fig. 12). The analysis of distribution of patients by different HbA_{1c} ranges showed a similar trend: the proportion of patients with HbA_{1c} <7% has increased, while the proportion of patients with HbA_{1c} ≥10% has decreased in both types of DM (see Fig. 12).

Since 2017, it has become possible to calculate the surrogate level of HbA_{1c} in the FDR system based on the mean daily glycemic profile in order to control carbohydrate metabolism in cases when actual laboratory measurement of HbA_{1c} in a healthcare facility is not possible. However, the analysis of obtained results showed that the estimated values of HbA_{1c} were significantly lower compared to the actual laboratory values (see Fig. 13), which limits the use of this parameter in the assessment of the effectiveness of therapy or its intensification.

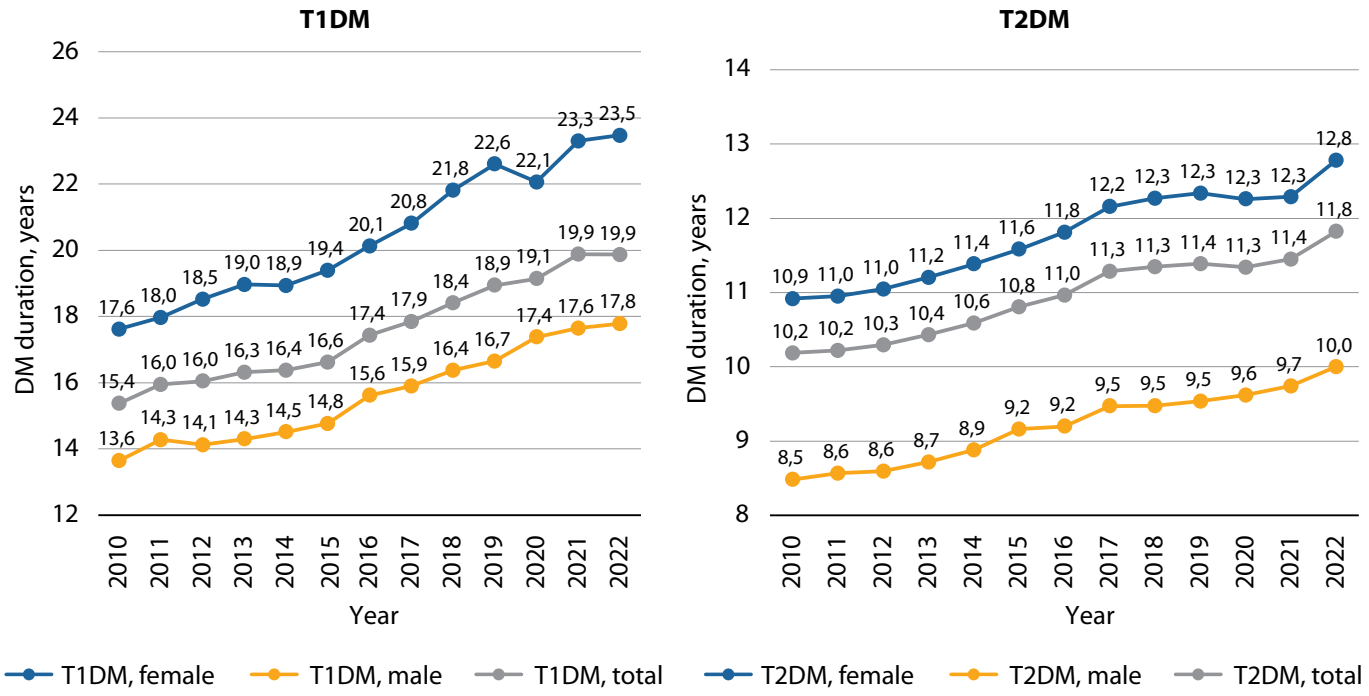

Figure 11. The duration of diabetes mellitus from the onset of the disease until the average age of death.

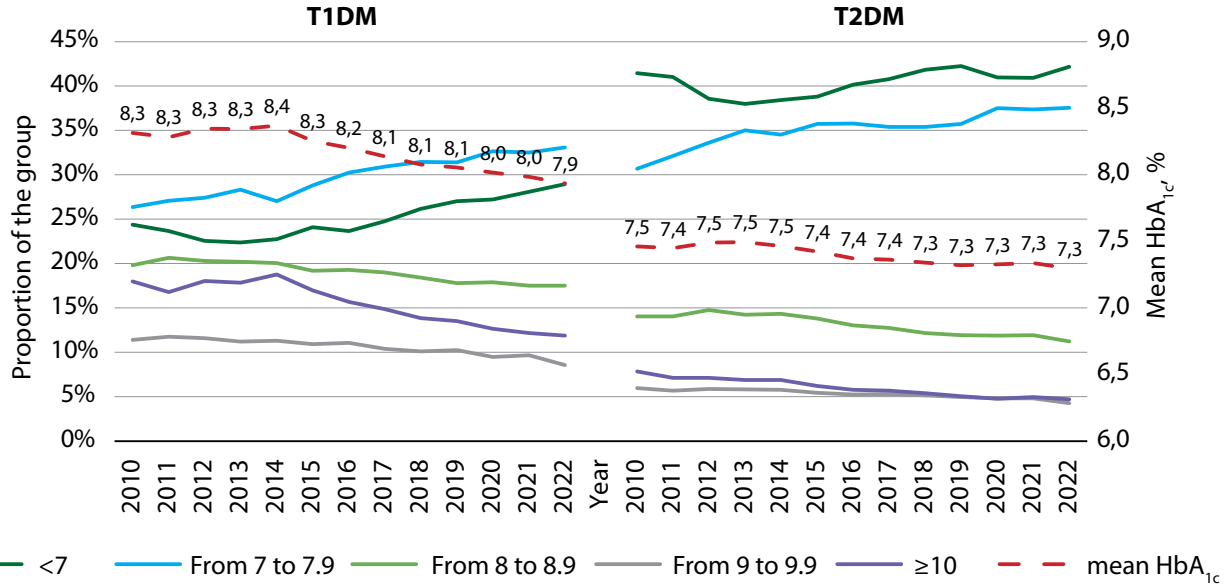

Figure 12. Dynamics in the level of glycated hemoglobin (HbA_{1c}) in diabetic patients according to the FDR data in the Russian Federation in 2010–2022

Thus, the proportion of patients who have achieved the targeted value of carbohydrate metabolism control (HbA_{1c}<7%) was one half of that value if the laboratory value of HbA_{1c} was used instead of the estimated/surrogate parameter (see Fig. 13, A and B, respectively).

According to the data of the Diamodule, if the standard of diagnostics with mandatory laboratory testing for HbA_{1c} is applied, the number of patients with HbA_{1c} >7% is almost twice as high as this parameter estimated based on the registry data: 86.3%–88.3% of patients with T1DM and 72–75% of patients with T2DM [16].

Thus, it is preferable to evaluate this parameter in a laboratory using a procedure standardized according to the DCCT (Diabetes Control and Complications Trial) and NGSP (The National Glycohemoglobin Standardization Programme) [15]. Automated calculation of surrogate HbA_{1c}

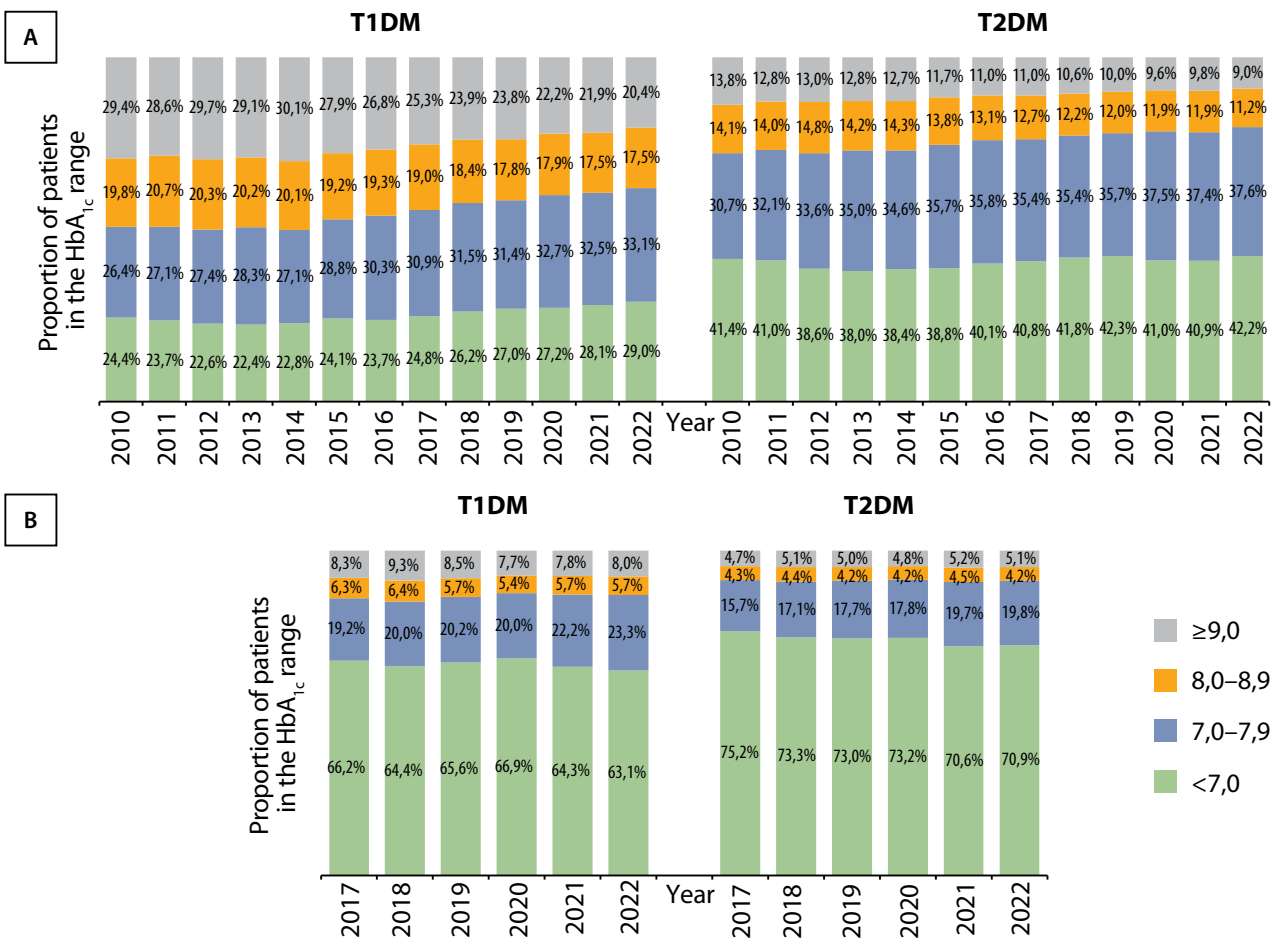

Figure 13. Ranges of distribution based on the glycated hemoglobin levels in diabetic patients in 85 regions of the RF (all age groups).
A - laboratory value of HbA_{1c} 2010–2022; B - surrogate value of HbA_{1c} 2017–2022.

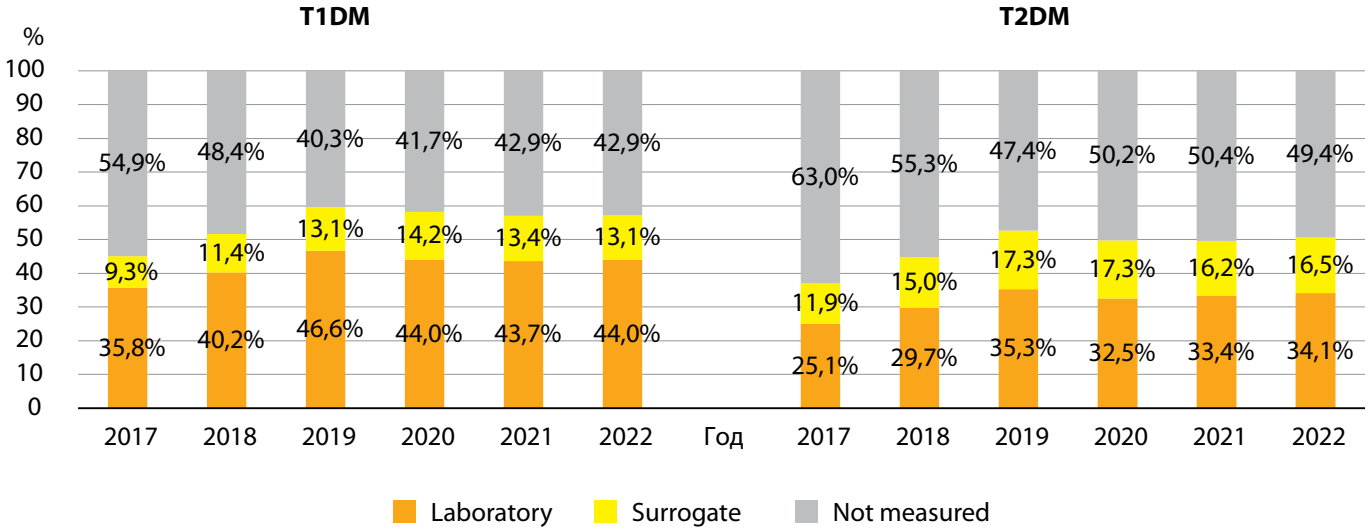

Figure 14. The ratio of distribution of laboratory and surrogate values of glycated hemoglobin (HbA_{1c}) in patients with T1DM and T2DM in 85 regions of the RF in 2017–2022 (all age groups).

values based on the mean daily glycemic profile is still available in the registry system, but it will not be taken into account when estimating the proportion of patients who have achieved target values.

Currently, when analyzing the coverage of patients with HbA_{1c} tests, it becomes obvious that there is insufficient availability of laboratory HbA_{1c} tests, as well as an assessment of this parameter in general. Thus, the analysis of the ratio of methods for the measurement of HbA_{1c} has shown that the proportion of laboratory testing of HbA_{1c} has not reached 50% for both types of DM (44% for T1DM and 34% for T2DM) and practically has not changed over the past 6 years (Fig. 14). Currently, this parameter is not measured almost in every second diabetic patient: in 43% of patients with T1DM and 49% of patients with T2DM, despite the relatively low cost of the test and sufficient availability of laboratory equipment (see Fig. 14).

In the Federal Project «Fighting against Diabetes Mellitus» starting in 2023, laboratory HbA_{1c} assessment is declared one of the key target indicators for preventing the risk of complications. Therefore, one of the priority measures to be implemented in clinical practice is performing laboratory tests for HbA_{1c} in 100% of patients at least once a year depending on the type of DM and the type of therapy used [15].

The analysis of the structure of drug therapy for DM

The quality of medical care for diabetic patients in long-term perspective depends on the antidiabetic drug therapy used. Currently, the registry allows seeing the distribution of various groups of drugs, the algorithm and the rate of intensification of treatment and assessing the structure of GLT prescriptions from the standpoint of compliance with current clinical guidelines [17, 18].

The analysis of the types of GLT agents used in patients with T2DM in 2017–2022 showed that oral GLT remained to be the most commonly used type of treatment, mainly as monotherapy (45.3–41.6%), with a gradual increase in the proportion of the use of double (from 25.8 to 30.0%) and triple combinations of GLT agents (from 1.3 to 5.8%) and a steady number of patients with T2DM on insulin therapy: in combination with GLT (10.1–11.6%) or as insulin monotherapy (7.5%–6.7%) (see Fig. 15). Despite the increased percentage of the use of combination treatment regimens, it is obvious that intensification of GLT remains both insufficient and delayed. Thus, a significant decrease in the proportion of the use of monotherapy (from 53 to 45%) is observed only in patients with the duration of diabetes of 6-8 years from the time of the disease onset (Fig. 16), which reflects not only the economic issues and drug availability, but also the fact of clinical inertia in terms of delayed transition to combination therapy without following the recommendations indicating the need to move to the next stage of intensification if the HbA_{1c} target is not achieved after 3-6 months of therapy [15, 18].

The observed trends in the types of used GLT continue demonstrating the predominant use of conventional GLP regimens (as monotherapy or as two-drug or three-drug combinations) and a lower percentage of the use of innovative drugs that have been shown to reduce cardiovascular and renal risks. In 2010-2022, the use of sulfonylureas (SU) decreased by 25.8% (from 69.0 to 43.2%), and the percentage of the metformin (Met) use increased by 32.5% (from 44.6% to 77.0%). The share of dipeptidyl peptidase-4 inhibitors (DPP4i) has increased most noticeably among the new classes of GLT agents - up to 13.3%; while these parameters for sodium-glucose cotransporter-2 inhibitors (SGLT2i) and glucagon-like peptide-1 receptor agonists (GLP-1 RA) reached 8.7% and 1.0%, respectively (Fig. 17).

The analysis of the single-time cut-off data as of January 1, 2023 showed that the drugs most commonly used in monotherapy were: Met - 71.9% and SU - 22.4%, while the other groups of drugs are very rarely used as monotherapy: DPP4i - 4.06%; SGLT2i - 1.35%; among all double combinations, a combination of conventional GLT agents (Met + SU) has the highest share (71.4%), while other two-drug combinations have significantly lower percentages: Met+DPP4i (16.75%), Met+SGLT2i (7.03%), SU+DPP4i (2.4%), SU+SGLT2i (1.04%), DPP4i+SGLT2i (0.57%), Met+GLP-1 RA (0.44%); the most commonly used combinations of three or more drugs were as follows: Met+SU+DPP4i (46.3%), Met+SU+SGLT2i (29.5%), Met+DPP4i+SGLT2i (12.37%), Met+SU+DPP4i+SGLT2i (6.01%) (see Fig. 18).

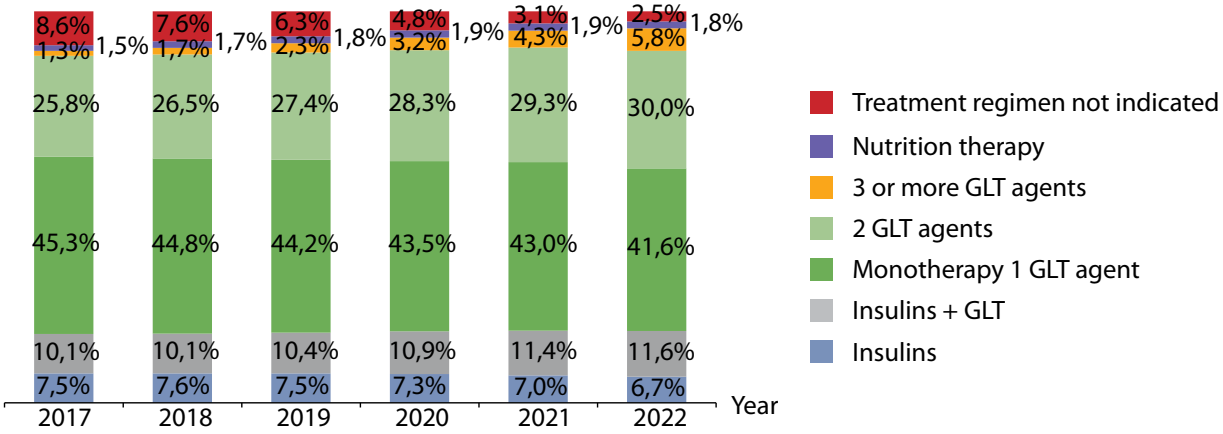

Figure 15. The proportions of using different types of glucose-lowering therapy for T2DM in the RF in 2017–2022. GLT – glucose-lowering therapy.

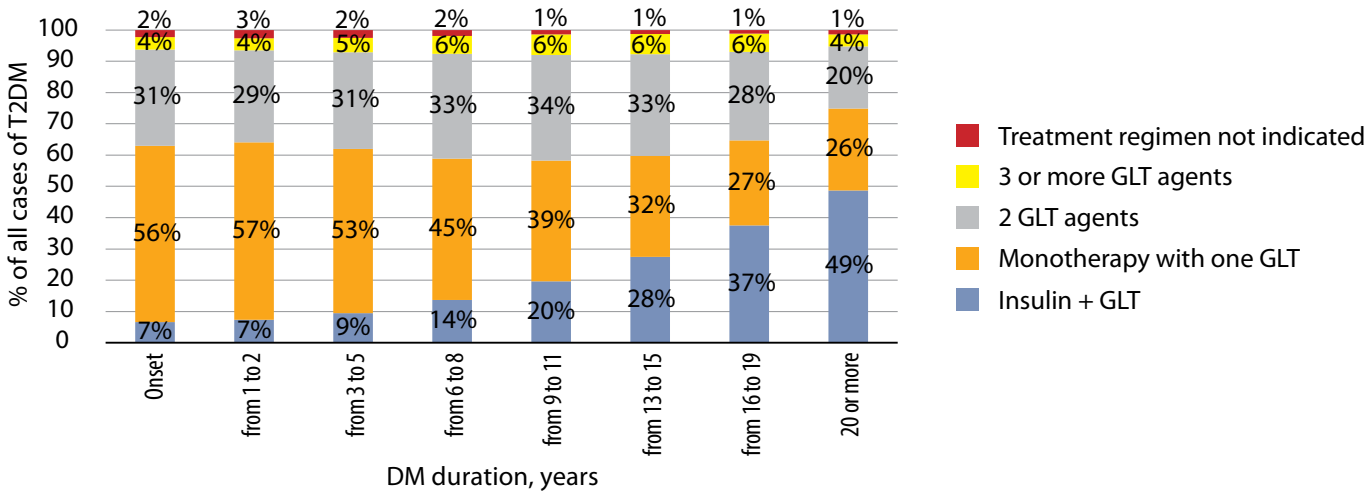

Figure 16. Treatment regimen depending on the duration of T2DM, single-time cut-off data as of January 1, 2023; GLT – glucose-lowering therapy.

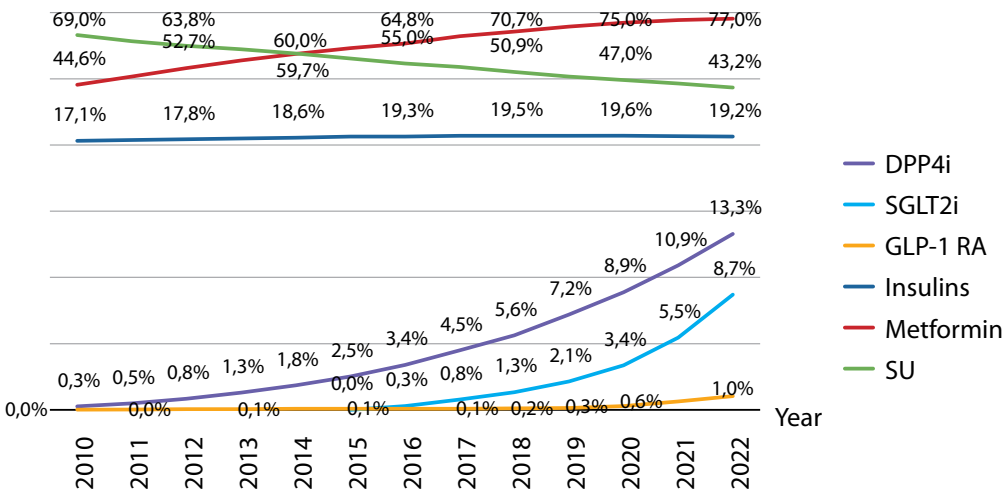

Figure 17. Dynamics of use of different classes of GLT in patients with T2DM in the Russian Federation, 2010–2022. GLT – glucose lowering therapy; SU – sulfonylureas; DPP4i – dipeptidyl peptidase-4 inhibitors; SGLT2i – sodium-glucose cotransporter-2 inhibitors; GLP-1 RA – glucagon-like peptide-1 receptor agonists.

In 2021, a new provision 6.1.3 was included in the «Algorithms of specialized medical care for patients with diabetes mellitus» [15] regarding the use of a «disease-modifying» approach when choosing the GLT regimen: Patients with T2DM and CVD, CHF, chronic kidney disease (CKD) and a high cardiovascular risk should be treated with SGLT2i and/or GLP-1 RA because large-scale international clinical studies have shown that these drugs significantly improve long-term prognosis in patients with these conditions [17–19].

A comparative analysis of the share of SGLT2i and/or GLP-1 RA prescriptions has shown that these drugs are most commonly used in high cardiovascular risk cohorts (patients with CVD, CKD and CHF) compared with the general population of patients with T2DM (see Fig. 19). Single-time data cut-off as of January 1, 2023 showed that the number of patients with T2DM and CKD was 858,738, with CVD - 628,405 and with CHF - 139,915. SGLT2 inhibitors were used in patients with CVD, CKD, CHF in 12.2%, 12.3% and

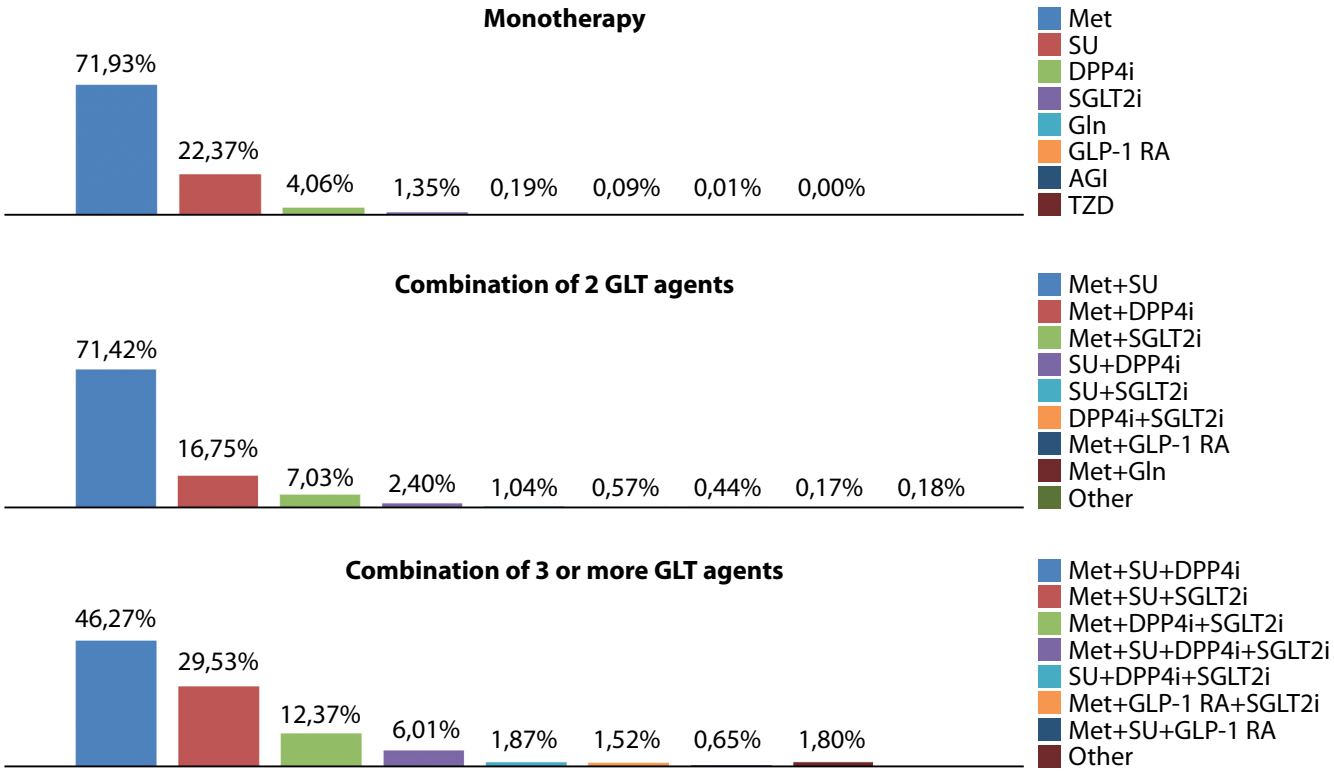

Figure 18. The structure of GLT used (as monotherapy, two-drug or three-drug therapy combinations) in patients with T2DM, single-time cut-off data as of January 1, 2023 in the Russian Federation. Met – metformin; SU – sulfonylureas; DPP4i – dipeptidyl peptidase-4 inhibitors; SGLT2i – sodium-glucose cotransporter-2 inhibitors; GLP-1 RA – glucagon-like peptide-1 receptor agonists; GLN – meglitinides; AGI – alpha-glucosidase inhibitors; TZD – thiazolidinediones.

22.3%, respectively, compared to 8.7% in the general population of patients with T2DM. The differences were less pronounced in respect of the class of GLP-1 RA: CVD - 1.1%, CKD - 1.5%, CHF - 1.7% versus 1.0% in the general cohort of patients with T2DM. For DPP-4 inhibitors: CVD - 12.2%, CKD - 16.1%, CHF - 15.1% versus 13.3% in the general cohort of patients with T2DM. Thus, patients with CVD, CKD and CHF have become more likely to be prescribed with the drugs that are known to reduce cardiovascular and renal risks indicating the implementation of clinical guidelines into real-world clinical practice.

The analysis of changes over time in the use of different types of insulins showed that the percentage of the use of human insulin analogs in Russia in 2010-2022 has increased by 41.1% in patients with T1DM (from 42.5 to 83.6% and by 28% in patients with T2DM (from 29.7% to 57.7%),

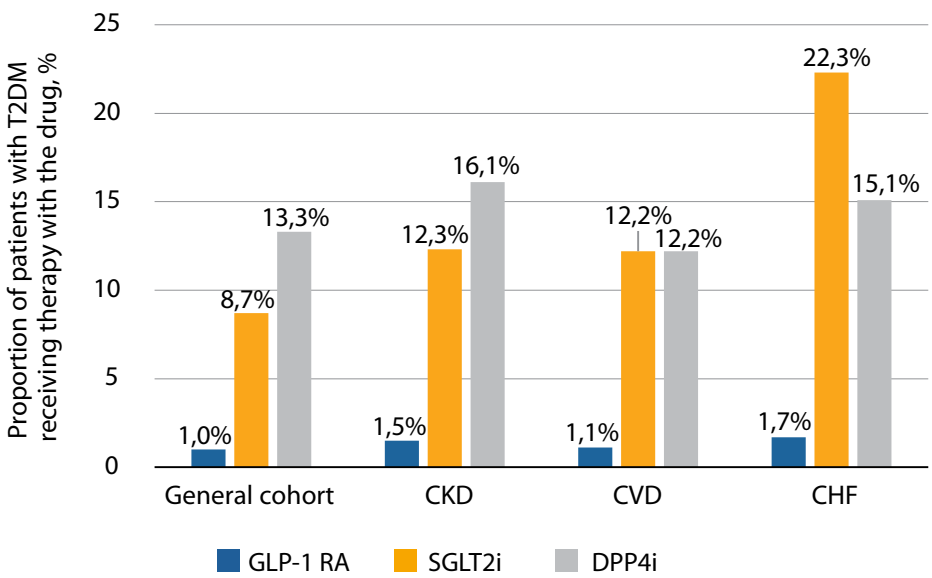

Figure 19. Percentages of the use of dipeptidyl peptidase-4 inhibitors, sodium-glucose cotransporter-2 inhibitors and glucagon-like peptide-1 receptor agonists in T2DM patients in the general cohort and in groups with high cardiovascular risks; single-time data cut-off as of January 1, 2023. CVD – cardiovascular disorders; CKD – chronic kidney disease; CHF – chronic heart failure; DPP4i – dipeptidyl peptidase-4 inhibitors; SGLT2i – sodium-glucose cotransporter-2 inhibitors; GLP-1 RA – glucagon-like peptide-1 receptor agonists.

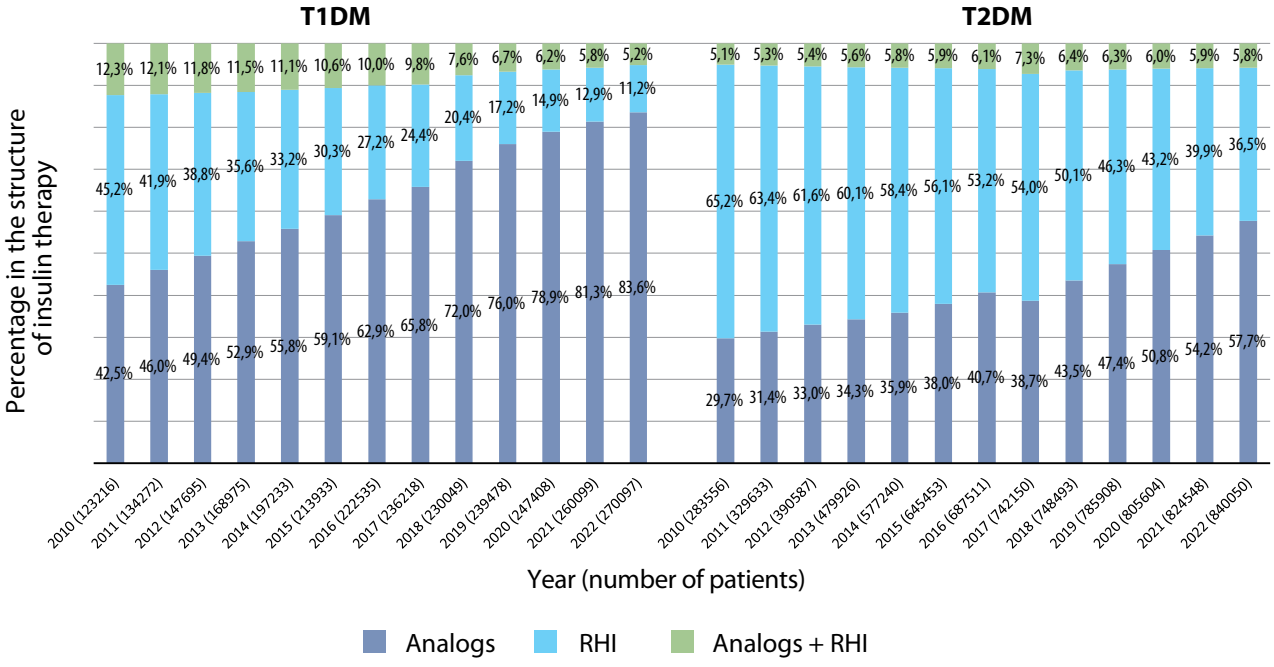

Figure 20. Changes in the types of insulin therapy used (analogs, recombinant human insulins (RHI), their combination) in patients with T1DM and T2DM, 2010–2022.

while the percentage of the use of RHI decreased from 45.2 to 11.2% in patients with T1DM and from 65.2 to 36.5% in patients with T2DM (see Fig. 20).

We have also analyzed the frequency of using insulin analogs and insulin pumps in children and adolescents (<18 years of age) with T1DM. The percentage of the use of insulin analogs in this group increased from 74.7 to 98.4% over the past 13 years (see Fig. 21); there has been a positive trend in the use of insulin pump therapy: since 2016, the increase has become 10% (from 14 to 24%), which in absolute terms means an increase from 4,549 to 11,305 people, thus, there has been improvement in the coverage of children and adolescents with the most modern types of insulin therapy [20].

The analysis of prevalence of DM complications in the Russian Federation

The analysis of single-time cut-off data as of January 1, 2023 showed similar patterns of distribution with the predominance of microvascular complications: diabetic neuropathy — 41.3 and 23.7%, diabetic nephropathy, CKD — 22.8 and 19.1%, diabetic retinopathy (DR) — 28.9 and 12.3%

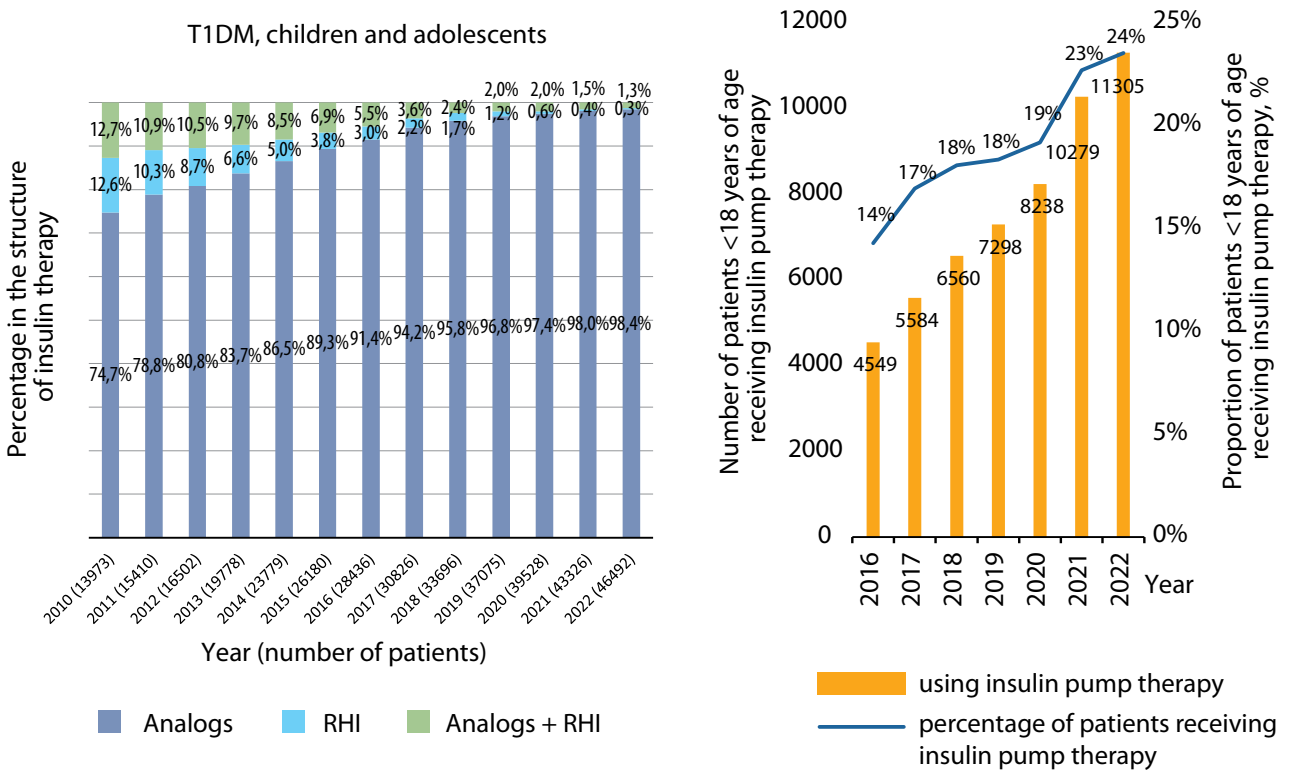

Figure 21. Trends in the structure of used insulin therapy (analogs, recombinant human insulins (RHI), their combination, 2010–2022) and data on the use of insulin pump therapy (2016–2022) in children and adolescents (<18 years of age) with T1DM according to the Federal Diabetes Registry.

in patients with T1DM and T2DM, respectively (see Fig. 22). However, macrovascular complications were significantly less common: in patients with T1DM/T2DM, the frequency of coronary artery disease was 2.2%/9.4%, and the frequency of MI was 0.9%/3.4%. Given the overall number of patients with T2DM (>4.5 million); the number of patients with CVD and other equivalents of high cardiovascular risk - CF, CKD and amputations - comprises 1.91 million people.

The first results in terms of decreased frequency of diabetic complications were obtained during the implementation of the Federal Program «Diabetes Mellitus» (2007–2012) due to large-scale government measures aimed at the development of diabetes care services in the Russian Federation, the creation of specialized offices for the treatment of DR and diabetic foot, «Educational programs [«schools»] for diabetic patients» and the implementation of structured training programs, as well as the development of a healthcare providers training system [9]. Following the analysis of prevalence of complications over the past years, we see that these positive trends are still observed.

During the analyzed period (2010-2022), the frequency of the majority of diabetic complications has become steady and/or has decreased, except for two disorders - CKD and CHF, the prevalence of which have significantly increased primarily as a result of the diagnostic concept paradigm shift and the improvement in early diagnosis.

Dynamics in the frequency of the most common diabetic complications in the RF in 2010–2022 were as follows (see Fig. 23):

- DR: in patients with T1DM, it decreased by 4.47% (0.89-fold decrease) from 38.98% to 34.5%; in patients with T2DM, it decreased by 4.95% (0.71-fold decrease) from 17.28% to 12.33%;
- diabetic neuropathy: relatively steady parameters in patients with T1DM (44.08–47.40%) and T2DM (22.31–23.75%);
- diabetic foot syndrome: in patients with T1DM, it decreased by 1.79% (0.66-fold) from 5.28% to 3.48%; in patients with T2DM, it decreased by 1.02% from 2.31% to 1.29% (0.56-fold);

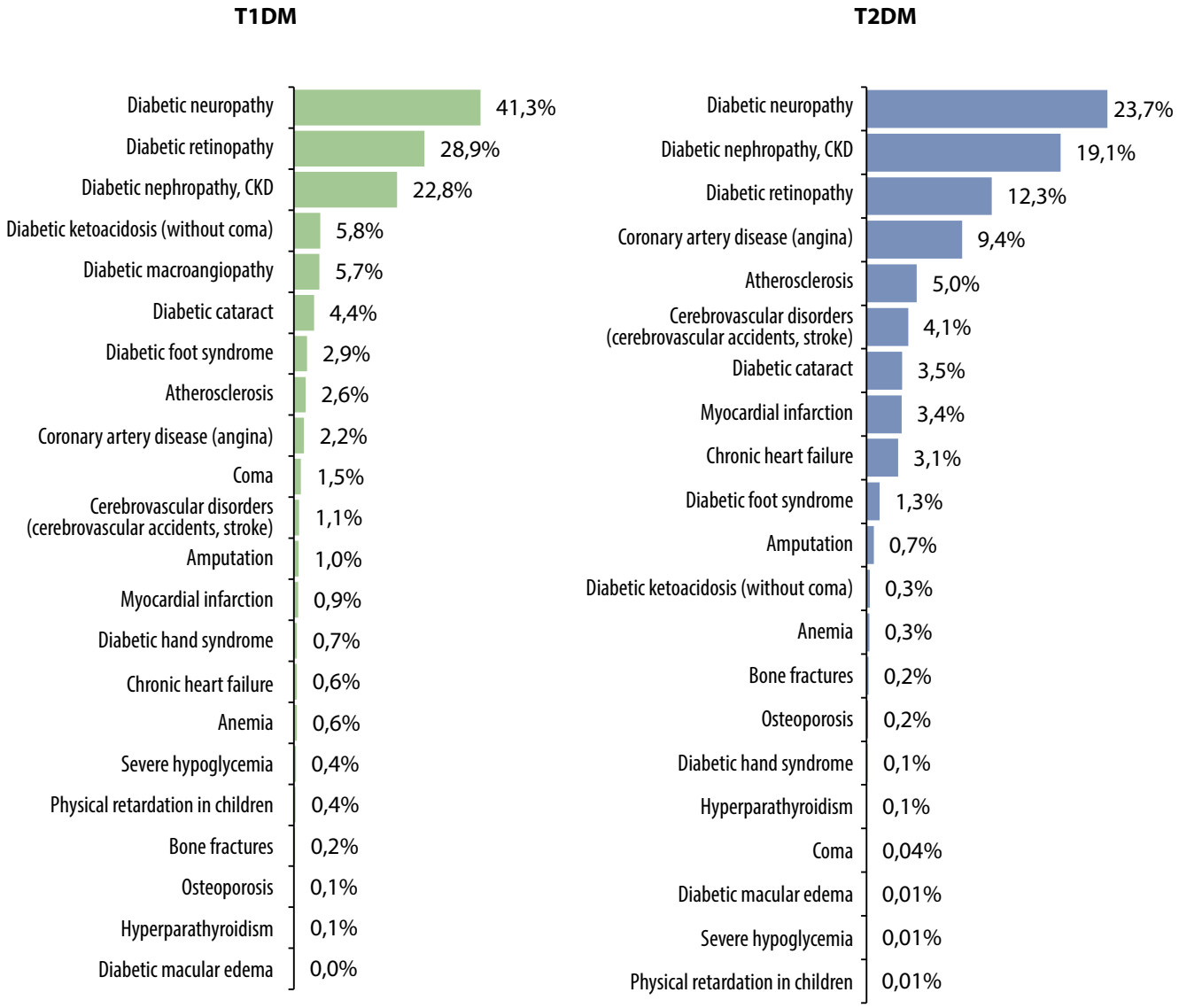

Figure 22. Distribution of the frequency of complications of T1DM and T2DM in the Russian Federation as of January 1, 2023 (general age group).

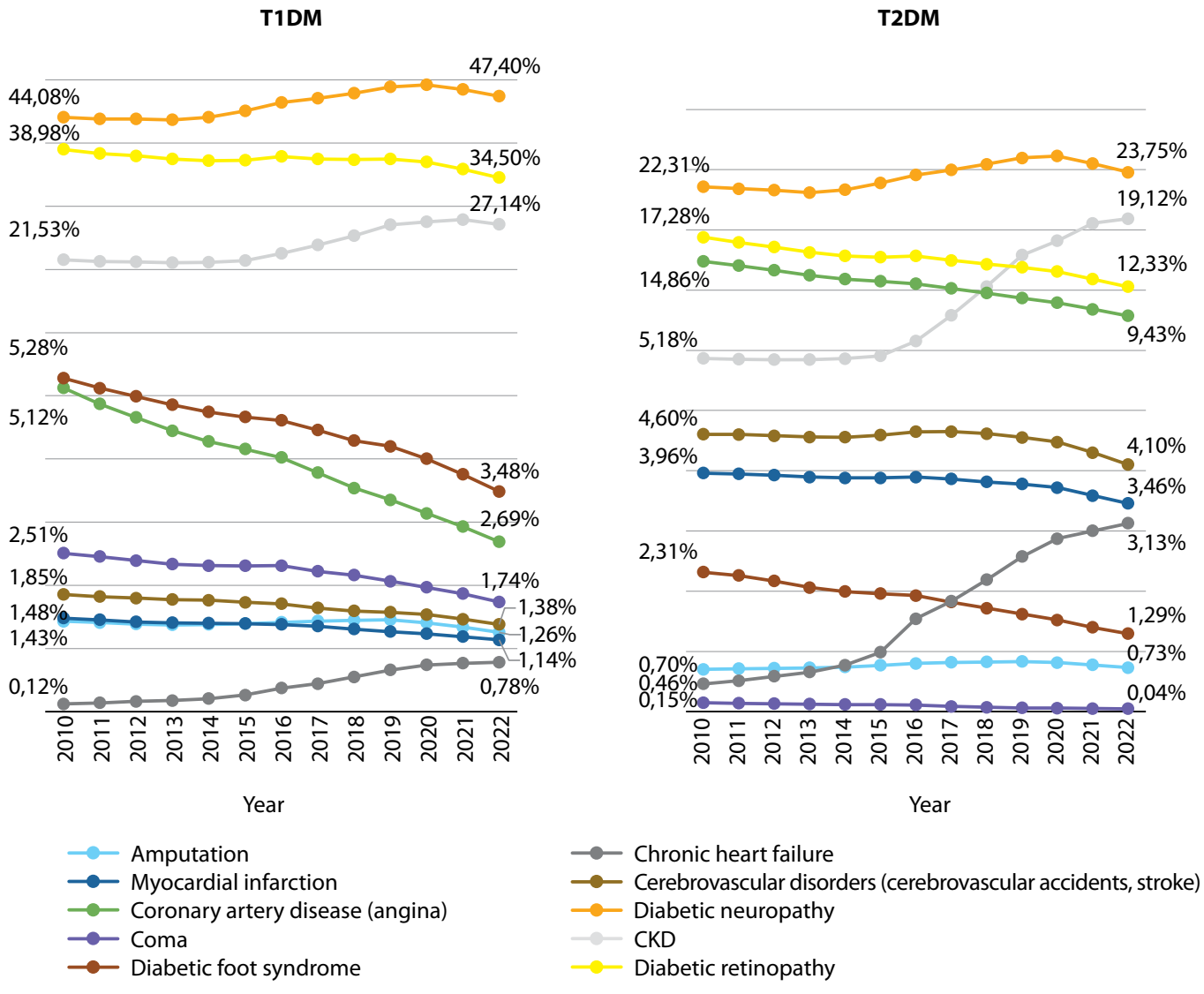

Figure 23. Changes over time in the frequency of complications of T1DM and T2DM in adult patients (>18 years of age) in the Russian Federation in 2010–2022.

- MI: in patients with T1DM, it decreased by 0.34% (0.77-fold) from 1.48% to 1.14%%; in patients with T2DM, it decreased by 0.5% from 3.96% to 3.46% (0.87-fold);
- CAD: in patients with T1DM, it decreased by 2.44% (0.52-fold) from 5.12% to 2.69%; in patients with T2DM, it decreased by 5.43% from 14.86% to 9.43%% (0.63-fold);
- cerebrovascular disorders: in patients with T1DM, it decreased by 0.47% (0.74-fold) from 1.85% to 1.38%; in patients with T2DM, it decreased by 0.5% from 4.60% to 4.10% (0.89-fold);
- amputations: in patients with T1DM, it decreased by 0.17% (0.88-fold) from 1.43% to 1.26%; in patients with T2DM, it remained steady (0.70–0.73%);
- coma: in patients with T1DM, it decreased by 0.77% (0.69-fold) from 2.51% to 1.74%; in patients with T2DM, it decreased by 0.11% (0.3-fold) from 0.15% to 0.04%;
- CKD: in patients with T1DM, it increased by 5.6% (1.26-fold) from 21.53% to 27.14%; in patients with T2DM, it increased by 13.69% (3.69-fold) from 5.18% to 19.12%;
- CHF: in patients with T1DM, it increased by 0.66% (6.36-fold) from 0.12% to 0.78%; in patients with T2DM, it increased by 2.67% (6.8-fold) from 0.46% to 3.13%;

The analysis of end-stage diabetic complications

One of the key parameters of the quality of diabetes care that reflect the effectiveness of prophylactic measures is the proportion of patients with end-stage diabetic complications.

Over the past years, there has been improvement in terms of a decreased frequency of end-stage complications: DR (blindness) and CKD (dialysis), and a lower percentage of high amputations [9].

Blindness

There has been a decrease in the number of new cases of blindness in relation to new cases of DR per year (while there has been no decrease in the total number of blind diabetic patients in 2010–2022): in patients with T1DM - from 3.7 to 2.3%; in patients with T2DM - from 1.3 to 0.9% (Fig. 24). These trends are of priority importance for improving the quality of life of patients with DR and are due to better diagnosis of complications in routine clinical practice. Currently, the initial (non-proliferative) stage of DR is diagnosed in 70.4% of patients with T1DM and in 81% of patients with T2DM [21].

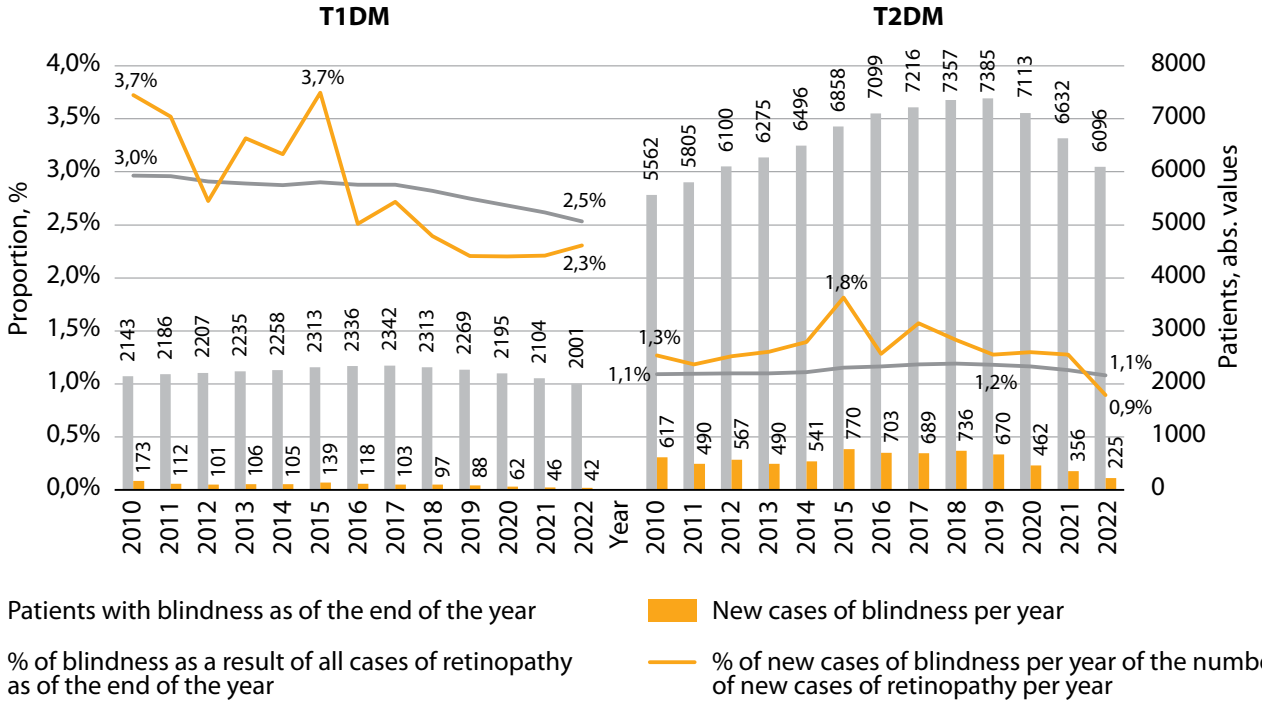

Figure 24. The number of new cases of blindness per year; the number of all cases of blindness at the end of the year and the proportion (%) of blindness related to all cases of diabetic retinopathy and new cases of diabetic retinopathy per year in adult patients with type 1 and 2 diabetes mellitus in 2010-2022.

Chronic kidney disease (CKD)

The results of the dynamic analysis indicate an increased prevalence of CKD from 2015 to 2022 (see Fig. 23), which is related to the implementation of a new diagnostic concept into clinical practice. However, it should be emphasizes that we cannot attribute this fact to an increased frequency of renal impairment in diabetic patients. First of all, this is a consequence of changes in diagnostic criteria that have significantly expanded the categories of patients to be accounted for by the glomerular filtration rate, especially in patients with T2DM. The absence of a true increase in the incidence of CKD is supported by a decrease in the prevalence of end-stage kidney disease (S5) over the same period, for which the diagnostic criteria have not changed. Thus, the results of the analysis of end-stage CKD showed a steady decrease in the proportion of S5 CKD of all cases of CKD: in patients with T1DM - from 33.7 to 7.2%; in patients with T2DM - from 29.7 to 1%; there has been a decrease in the proportion of S5

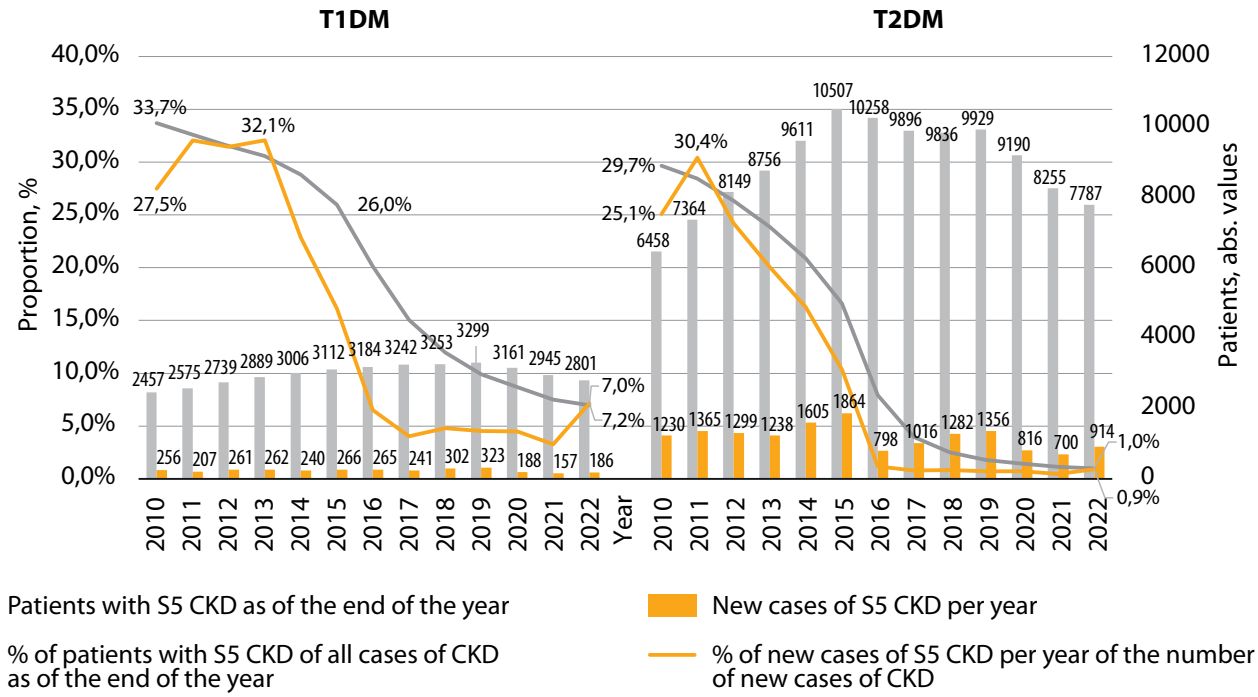

Рисунок 25. Частота и количество случаев терминальной стадии хронической болезни почек (С5) у взрослых пациентов с сахарным диабетом 1 и 2 типа, новых случаев в год, и всех пациентов с С5 в абсолютных значениях, а также в процентном соотношении от новых и всех случаев хронической болезни почек (ХБП) в динамике 2010–2022 гг.

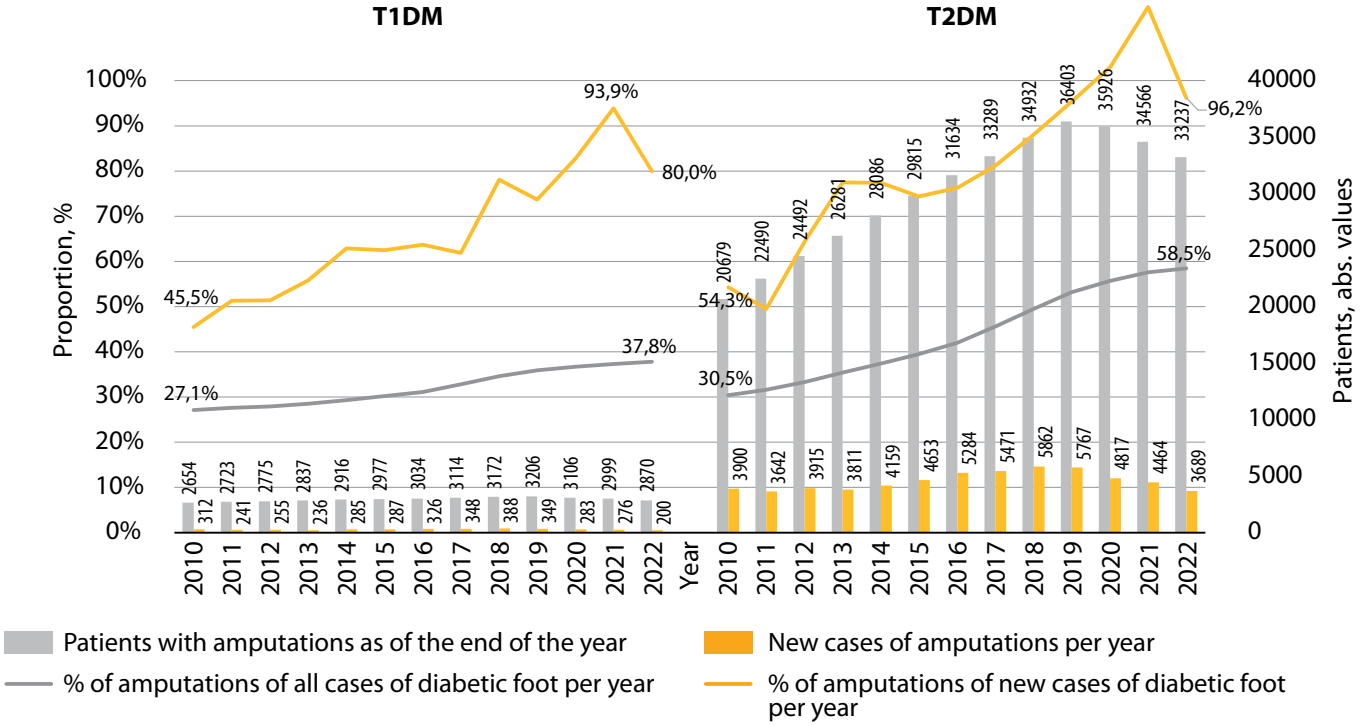

Figure 26. The total number of amputations and new cases of amputations per year (in absolute values) and the percentage of amputations from all cases of diabetic foot syndrome and from new cases of diabetic foot syndrome per year in adult patients with type 1 and 2 diabetes mellitus over time in 2010-2022.

of new cases of CKD: in patients with T1DM - from 27.5% to 7%; in patients with T2DM - from 25.1 to 0.9% (see Fig. 25).

A decrease in both the absolute values and percentages of patients with S5 CKD (especially in terms of new cases of S5 CKD per year: from 256 to 186 cases/year in patients with T1DM and from 1230 to 914 cases/year in patients with T2DM; see Fig. 25) can be considered a positive result of the measures for prevention of CKD progression using kidney-protective therapy [22].

Amputations

The results of the analysis of end-stage outcomes of diabetic foot syndrome showed an overall increase in the number of amputations: in patients with T1DM — from 2654 cases in 2010 to 3,206 in 2019 before the COVID-19 pandemic and 2,870 cases in 2022; in patients with T2DM — from 20,679 cases in 2010 to 36,403 in 2019 and 33,237 in 2022; as well as an increase in the proportion of amputations in new cases of diabetic foot syndrome per year: 45.5–80% and 54.3–96.2% in patients with T1DM and T2DM, respectively (see Fig. 26). These trends can be considered as improvement due to an increase in the proportion of minor surgical procedures with the preservation of the supporting function of the foot. The prognosis of life of patients with diabetic foot syndrome is directly dependent on the level of amputation. It should be noted that the results of the analysis of amputations performed in 2010–2022 have demonstrated a steady decrease in the proportion of high amputations and an increase in the percentage of minor surgical procedures in patients with both types of DM: 65% in patients with T1DM and 55% in patients with T2DM (see Fig. 27).

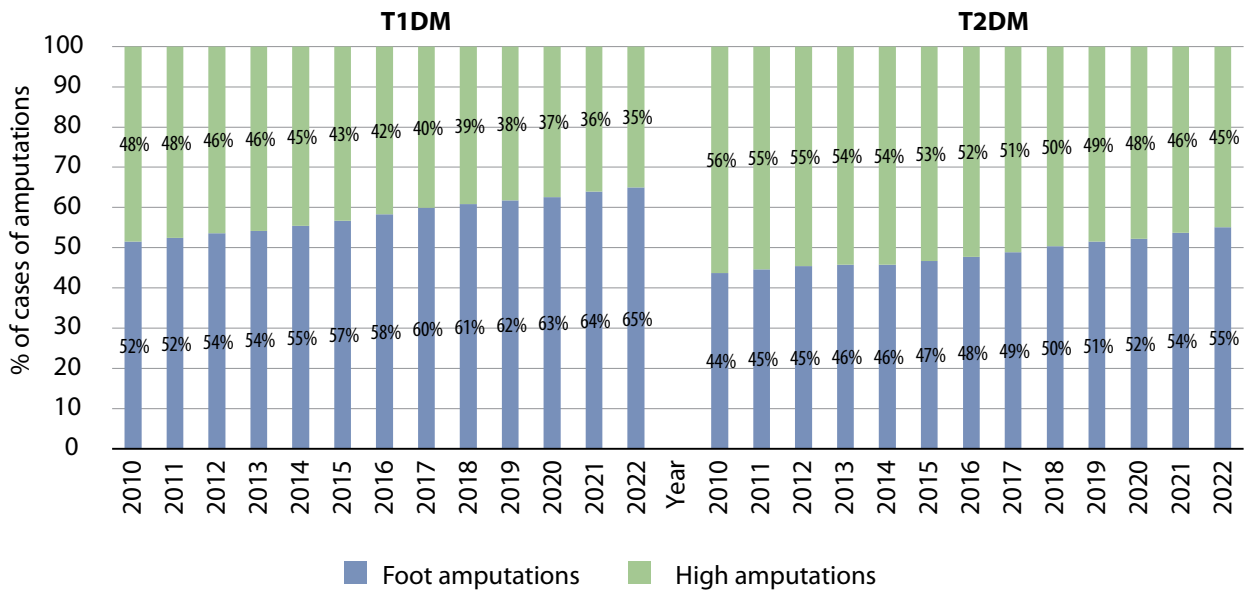

Figure 27. Distribution by the levels of amputations (% of patients) in adult patients with T1DM and T2DM in 2010–2022

Therefore, arrangement of routing of patients with diabetic foot syndrome and providing them with specialized medical care are of utmost importance. The management of patients with diabetic foot in general surgical practice without the participation of endocrinologists and podiatrists is considered a less effective strategy worldwide, since it is often limited to surgical treatment at late disease stages without the possibility of using limb salvage techniques [23]. This requires improvement of measures for the development of specialized medical care in healthcare institutions of the constituent entities of the Russian Federation. These institutions must have specialized diabetic foot offices in their structure and have the required personnel and facilities for performing reconstructive lower limb vascular surgery in specialized units.

CONCLUSION

At the moment, the FDR information and analytical system is a key tool for systematization of the most important epidemiological and clinical characteristics of diabetic patients based on data obtained from real-world clinical practice.

The article presents the results of a dynamic analysis of epidemiological parameters of DM, prevalence of complications, state of carbohydrate metabolism and the types of used GLT. During the analyzed period, the prevalence of DM per 100,000 remained steady in all age groups, which indicates the importance of clinical and epidemiological monitoring for this socially important disease. It is noteworthy that the numbers of new cases of DM tend to decrease, which is largely due to the transition of the management of patients with newly diagnosed DM to the responsibility of primary care facilities. Life expectancy values have remained steady, while the mortality rates have decreased; however, there was an increase in these parameters during the COVID-19 pandemic with the preservation of cardiovascular complications as the leading cause of death. There was a decrease in the frequency of diabetic complications in the analyzed period, except for CKD and CHF, which was a result of the diagnostic concept paradigm shift and the improvement in early diagnosis of these conditions. The analysis of the carbohydrate metabolism control parameters showed improvement in terms of a decreased proportion of patients with uncontrolled diabetes, and an increased proportion of patients with the values of HbA_{1c} within the target range in both types of DM. Despite the fact that there are positive trends in the use of insulin analogs in the structure of insulin therapy, the analysis of the current state indicates insufficient and delayed intensification of GLT with predominant use of conventional GLT agents both as monotherapy and as combination therapy, along with a lower percentage of the use of innovative drugs that have been shown to reduce cardiovascular and renal risks.

Taking into account the priority of targeted glycemic control as the basis for preventing the risks of diabetic complications, it is necessary to optimize current approaches. Currently, the registry system helps not only to analyze the structure and changes over time in the types of drugs used, but also to personify the rational choice of therapy in accordance with current clinical guidelines.

In this regard, the introduction of an FDR-based automated CDSS in 2022 has allowed optimizing the algorithm for managing a diabetic patient by rationalizing the diagnostic search, the follow-up intervals and scheduling visits to the clinic, as well as the choice and intensification of drug therapy.

Thus, the registry is a system of remote monitoring of clinical data of diabetic patients at both federal and regional levels, which provides for continuous monitoring from the moment of the disease onset and throughout its course, which is an important component of controlling strategic risks associated with the development of diabetic complications.

Further development of the FDR and consolidation of the regions into a single database are a reliable basis for the implementation of state policy in the field of improving the quality of diabetes diagnosis, monitoring and treatment to solve the tasks set as part of the Federal Project «Fighting against Diabetes Mellitus».

ADDITIONAL INFORMATION

Funding of the study. The study was conducted as part of the State Assignment of the Ministry of Health of the RF No. 122012100183-1 (Assignment for Research, Development and Technological Activities).

Conflict of interest. The authors declare no obvious and potential conflicts of interest related to the publication of this article.

Contribution of authors. Shestakova M.V., Vikulova O.K., Zheleznyakova A.V., Isakov M.A., Sazonova D.V. — analysis and interpretation of the study results, writing the manuscript; Dedov I.I., Mokrysheva N.G. — final analysis of the results and editing of the text of the manuscript. All of the authors approved the final version of the article before publication, agreed to be responsible for all aspects of the work, implying proper examination and resolution of issues relating to the accuracy or integrity of any part of the work.

Acknowledgements We thank Aston Consulting JSC for technical support for the diabetes registry in an online format.

We thank all healthcare professionals (physicians, nurses, records data specialists) for their active work for completing the DM registry database.

REFERENCES

1. *Глобальный доклад по диабету.* Женева: Всемирная организация здравоохранения; 2018. Лицензия: CC BY-NC-SA 3.0 IGO. [Global report on diabetes. Zheneva: Vsemirnaia organizatsiia zdravookhraneniia; 2018. Litsenziia: CC BY-NC-SA 3.0 IGO. (In Russ.)].
2. International Diabetes Federation. *IDF Diabetes Atlas, 10th edn.* Brussels, Belgium; 2021 [cited 11.04.2023]. Available from: https://www.diabetesatlas.org
3. Дедов И.И., Шестакова М.В., Викулова О.К., и др. Атлас регистра сахарного диабета Российской Федерации. Статус 2018 г. // *Сахарный диабет.* — 2019. — Т. 22. — №2S. — С. 4-61. [Dedov II, Shestakova MV, Vikulova OK, et al. Atlas of the diabetes register of the Russian Federation. Status 2018. *Diabetes Mellitus.* 2019;22(2S):4–61. (In Russ.)]. doi: https://doi.org/10.14341/DM12208

4. Федеральная служба государственной статистики. Здравоохранение в России 2021 г. Публикация от 03.02.2022. [Federal'naja sluzhba gosudarstvennoj statistiki. Zdravoohranenie v Rossii 2021 g. Publikacija ot 03.02.2022. (In Russ.)]. Доступно по: https://rosstat.gov.ru/folder/210/document/13218. Ссылка активна на 11.04.2023.
5. Дедов И.И. Сахарный диабет в Российской Федерации: проблемы и пути решения // *Сахарный диабет*. — 1998. — Т. 1. — №1. — С. 7-18. [Dedov II. Sakharnyy diabet v Rossiyskoy Federatsii: problemy i puti resheniya. *Diabetes mellitus*. 1998;1(1):7-18. (In Russ.)]. doi: https://doi.org/10.14341/2072-0351-6209
6. Дедов И.И., Шестакова М.В., Викулова О.К. Государственный регистр сахарного диабета в Российской Федерации: статус 2014 г. и перспективы развития // *Сахарный диабет*. — 2015. — Т. 18. — №3. — С. 5-22. [Dedov II, Shestakova MV, Vikulova OK. National register of diabetes mellitus in Russian Federation: status on 2014. *Diabetes mellitus.* 2015;18(3):5-23. (In Russ.)]. doi: https://doi.org/10.14341/DM201535-22
7. Дедов И.И., Шестакова М.В., Викулова О.К. Эпидемиология сахарного диабета в Российской Федерации: клинико-статистический анализ по данным Федерального регистра сахарного диабета // *Сахарный диабет*. — 2017. — Т. 20. — №1. — С. 13-41. [Dedov II, Shestakova MV, Vikulova OK. Epidemiology of diabetes mellitus in Russian Federation: clinical and statistical report according to the federal diabetes registry. *Diabetes mellitus*. 2017;20(1):13-41. (In Russ.)]. doi: https://doi.org/10.14341/DM8664
8. Дедов И.И., Шестакова М.В., Викулова О.К., и др. Сахарный диабет в Российской Федерации: распространенность, заболеваемость, смертность, параметры углеводного обмена и структура сахароснижающей терапии по данным Федерального регистра сахарного диабета, статус 2017 г. // *Сахарный диабет*. — 2018. — Т. 21. — №3. — С. 144-159. [Dedov II, Shestakova MV, Vikulova OK, et.al. Diabetes mellitus in Russian Federation: prevalence, morbidity, mortality, parameters of glycaemic control and structure of hypoglycaemic therapy according to the Federal Diabetes Register, status 2017. *Diabetes Mellitus.* 2018;21(3):144-159. (In Russ.)]. doi: https://doi.org/10.14341/DM9686
9. Шестакова М.В., Викулова О.К., Железнякова А.В., и др. Эпидемиология сахарного диабета в Российской Федерации: что изменилось за последнее десятилетие? // *Терапевтический архив*. — 2019. — Т. 91. — №10. — С. 4–13. [Shestakova MV, Vikulova OK, Zheleznyakova AV, et al. Diabetes epidemiologyin Russia: what has changed over the decade? *Therapeutic Archive.* 2019;91(10):4–13. (In Russ.)]. doi: https://doi.org/10.26442/00403660.2019.10.000364
10. Дедов И.И., Шестакова М.В., Петеркова В.А., и др. Сахарный диабет у детей и подростков по данным Федерального регистра Российской Федерации: динамика основных эпидемиологических характеристик за 2013–2016 гг. // *Сахарный диабет*. — 2017. — Т. 20. — №6. — С. 392-402. [Dedov II, Shestakova MV, Peterkova VA, et al. Diabetes mellitus in children and adolescents according to the Federal diabetes registry in the Russian Federation: dynamics of major epidemiological characteristics for 2013–2016. *Diabetes mellitus.* 2017;20(6):392-402. (In Russ.)]. doi: https://doi.org/10.14341/DM9460
11. Дедов И.И., Шестакова М.В., Викулова О.К., и др. Эпидемиологические характеристики сахарного диабета в Российской Федерации: клинико-статистический анализ по данным регистра сахарного диабета на 01.01.2021 // *Сахарный диабет*. — 2021. — Т. 24. — №3. — С. 204-221. [Dedov II, Shestakova MV, Vikulova OK, et al. Epidemiological characteristics of diabetes mellitus in the Russian Federation: clinical and statistical analysis according to the Federal diabetes register data of 01.01.2021. *Diabetes mellitus.* 2021;24(3):204-221. (In Russ.)]. doi: https://doi.org/10.14341/DM12759
12. Шестакова М.В., Викулова О.К., Исаков М.А., Дедов И.И. Сахарный диабет и COVID-19: анализ клинических исходов по данным регистра сахарного диабета Российской Федерации // *Проблемы эндокринологии*. — 2020. — Т. 66. — № 1. — С. 35-46. [Shestakova MV, Vikulova OK, Isakov MA, Dedov II. Diabetes and COVID-19: analysis of the clinical outcomes according to the data of the Russian Diabetes Registry. *Problems of Endocrinology*. 2020;66(1):35-46. (In Russ.)]. doi: https://doi.org/10.14341/probl12458
13. Федеральная служба государственной статистики. [Russian Federal State Statistics Service. (In Russ.)]. Доступно по: www.gks.ru. Ссылка активна на 11.04.2023.
14. Дедов И.И., Франк Г.А., Мокрышева Н.Г., и др. Согласованная позиция эндокринологов и патологоанатомов о кодировании причин смерти у пациентов с сахарным диабетом (мнение экспертов) // *Сахарный диабет.* — 2021. — Т. 24. — №3. — С. 300-309. [Dedov II, Frank GA, Mokrisheva NG, et al. Consensus position of endocrinologists and pathologists on coding causes of death in patients with diabetes mellitus (expert opinion). *Diabetes Mellitus.* 2021;24(3):300-309. (In Russ.)]. doi: https://doi.org/10.14341/DM12783
15. Дедов И.И., Шестакова М.В., Майоров А.Ю., и др. Алгоритмы специализированной медицинской помощи больным сахарным диабетом (10-й выпуск) // *Сахарный диабет*. — 2021. — Т. 24 — №S1 — С. 1-235. [Dedov II, Shestakova MV, Mayorov AYu, et al. Standards of specialized diabetes care. *Diabetes Mellitus.* 2021;24(S1):1-235 (In Russ.)]. doi: https://doi.org/10.14341/DM12802
16. Викулова О.К., Железнякова А.В., Исаков М.А., и др. Динамический анализ состояния углеводного обмена в субъектах Российской Федерации по данным мобильного медицинского центра (Диамодуль) и регистра сахарного диабета Российской Федерации // *Сахарный диабет.* — 2020. — Т. 23. — №2. — С. 104-112. [Vikulova OK, Zheleznyakova AV, Isakov MA, et al. Dynamic analysis of glycaemic control parameters in the regions of Russia according to the data of the mobile medical centre (Diamodul) and Federal Diabetes Register. *Diabetes Mellitus.* 2020;23(2):104-112. (In Russ.)]. doi: https://doi.org/10.14341/DM12327
17. Дедов И.И., Шестакова М.В., Майоров А.Ю., и др. Сахарный диабет 1 типа у взрослых. Клинические рекомендации // *Сахарный диабет*. — 2020. — Т. 23. — №1S. — С. 42-114. [Dedov II, Shestakova MV, Mayorov AY, et al. Diabetes mellitus type 1 in adults. *Diabetes mellitus*. 2020;23(1S):42-114. (In Russ.)]. doi: https://doi.org/10.14341/DM12505
18. Дедов И.И., Шестакова М.В., Майоров А.Ю., и др. Сахарный диабет 2 типа у взрослых. Клинические рекомендации // *Сахарный диабет*. — 2020. — Т. 23. — №2S. — С. 4-102. [Dedov II, Shestakova MV, Mayorov AY, et al. Diabetes mellitus type 2 in adults. *Diabetes mellitus.* 2020;23(2S):4-102. (In Russ.)]. doi: https://doi.org/10.14341/DM12507
19. Kaul S. Mitigating cardiovascular risk in type 2 diabetes with antidiabetes drugs: A review of principal cardiovascular outcome results of EMPA-REG OUTCOME, LEADER, and SUSTAIN-6 trials. *Diabetes Care.* 2017;40(7):821-831. doi: https://doi.org/10.2337/dc17-0291
20. Дедов И.И., Шестакова М.В., Петеркова В.А., и др. Сахарный диабет у детей и подростков по данным Федерального регистра Российской Федерации: динамика основных эпидемиологических характеристик за 2013–2016 гг. // *Сахарный диабет.* — 2017. — Т. 20. — №6. — С. 392-402. [Dedov II, Shestakova MV, Peterkova VA, et al. Diabetes mellitus in children and adolescents according to the Federal diabetes registry in the Russian Federation: dynamics of major epidemiological characteristics for 2013–2016. *Diabetes mellitus.* 2017;20(6):392-402. (In Russ.)]. doi: https://doi.org/10.14341/DM9460
21. Липатов Д.В., Викулова О.К., Железнякова А.В. и др. Эпидемиология диабетической ретинопатии в Российской Федерации по данным Федерального регистра пациентов с сахарным диабетом (2013–2016 гг.) // *Сахарный диабет.* — 2018. — Т. 21. — №4. — С. 230-240. [Lipatov DV, Vikulova OK, Zheleznyakova AV, et al. Trends in the epidemiology of diabetic retinopathy in Russian Federation according to the Federal Diabetes Register (2013–2016). *Diabetes Mellitus.* 2018;21(4):230-240. (In Russ.)]. doi: https://doi.org/10.14341/DM9797
22. Шамхалова М.Ш., Викулова О.К., Железнякова А.В., и др. Эпидемиология хронической болезни почек в Российской Федерации по данным Федерального регистра взрослых пациентов с сахарным диабетом (2013–2016 гг.) // *Сахарный диабет*. — 2018. — Т. 21. — №3. — С. 160-169. [Shamkhalova MS, Vikulova OK, Zheleznyakova AV, et al. Trends in the epidemiology of chronic kidney disease in Russian Federation according to the Federal Diabetes Register (2013–2016). *Diabetes Mellitus.* 2018;21(3):160-169 (In Russ.)]. doi: https://doi.org/10.14341/DM9687

23. Галстян Г.Р., Викулова О.К., Исаков М.А. и др. Эпидемиология синдрома диабетической стопы и ампутаций нижних конечностей в Российской Федерации по данным Федерального регистра больных сахарным диабетом (2013–2016 гг.) // *Сахарный диабет.* — 2018. — Т. 21. — №3. — С. 170-177. [Galstyan GR, Vikulova OK, Isakov MA, et al. Trends in the epidemiology of diabetic foot and lower limb amputations in Russian Federation according to the Federal Diabetes Register (2013–2016). *Diabetes Mellitus.* 2018;21(3):170-177 (In Russ.)]. doi: https://doi.org/10.14341/DM9688

24. Железнякова А.В., Викулова О.К., Серков А.А., и др. Динамический мониторинг сердечно-сосудистых заболеваний у пациентов с сахарным диабетом по данным обследования в мобильном медицинском центре (Диамодуль) в регионах России // *Consilium Medicum.* — 2020. — Т. 22. — №10. — С. 39–44. [Zheleznyakova AV, Vikulova OK, Serkov AA, et al. Dynamic monitoring of cardiovascular diseases in patients with diabetes mellitus according to mobile medical center (Diamodule) in the regions of Russia. *Consilium Medicum.* 2020;22 (10):39-44. (In Russ.)]. doi: https://doi.org/10.26442/20751753.2020.10.200323

AUTHORS INFO

***Olga K. Vikulova**, MD, PhD, Associate Professor; address: 11 Dm.Ulyanova street, 117036 Moscow, Russia; eLibrary SPIN: 9790-2665; ORCID: http://orcid.org/0000-0003-0571-8882; e-mail: gos.registr@endocrincentr.ru

Ivan I. Dedov, MD, PhD, Professor; ORCID: http://orcid.org/0000-0002-8175-7886; eLibrary SPIN: 5873-2280; e-mail: dedov@endocrincentr.ru
Marina V. Shestakova, MD, PhD, Professor; ORCID: http://orcid.org/0000-0003-3893-9972; eLibrary SPIN: 7584-7015; e-mail: nephro@endocrincentr.ru
Anna V. Zheleznyakova, MD, PhD, ORCID: http://orcid.org/0000-0002-9524-0124; eLibrary SPIN: 8102-1779; e-mail: azhelez@gmail.com
Mikhail A. Isakov, PhD in Biology; ORCID: orcid.org/0000-0001-9760-1117; eLibrary SPIN: 5870-8933; e-mail: m.isakov@aston-health.com
Daria V. Sazonova, MD; ORCID: https://orcid.org/0000-0001-6838-9487; SPIN-код: 8534-2190; e-mail: sazonova_dv@mail.ru
Natalya G. Mokrysheva, MD, PhD, Professor; ORCID: https://orcid.org/0000-0002-9717-9742; eLibrary SPIN: 5624-3875; e-mail: nm70@mail.ru

TO CITE THIS ARTICLE:

Dedov II, Shestakova MV, Vikulova OK, Zheleznyakova AV, Isakov MA, Sazonova DV, Mokrysheva NG. Diabetes mellitus in the Russian Federation: dynamics of epidemiological indicators according to the Federal Register of Diabetes Mellitus for the period 2010–2022. *Diabetes Mellitus*. 2023;26(2):104-123. doi: https://doi.org/10.14341/DM13035

APPENDIX 1.

Table 1. The prevalence of DM in all age groups in 85 federal constituent entities of the RF as of January 1, 2023

Region	Number of people				Per 100,000 population			
	T1DM	T2DM	Other types of diabetes	Total	T1DM	T2DM	Other types of diabetes	Total
85 regions of the RF	**277 092**	**4 581 990**	**103 680**	**4 962 762**	**191,0**	**3 158,8**	**71,5**	**3 421,3**
Republic of Adygea	812	13 678	514	15 004	174,0	2 930,6	110,1	3 214,7
Altai Republic	326	4 712	82	5 120	147,6	2 134,1	37,1	2 318,9
Altai Krai	4 523	91 353	873	96 749	200,1	4 041,5	38,6	4 280,2
Amur region	1 193	28 755	564	30 512	155,0	3 735,1	73,3	3 963,3
Arkhangelsk region	2 704	43 788	6 975	53 467	253,6	4 107,3	654,3	5 015,2
Astrakhan region	1 652	33 062	1 161	35 875	167,5	3 353,1	117,7	3 638,4
Republic of Bashkortostan	7 304	116 900	281	124 485	183,2	2 931,4	7,0	3 121,6
Belgorod region	3 101	50 748	447	54 296	203,1	3 324,2	29,3	3 556,6
Bryansk region	2 479	45 694	364	48 537	212,8	3 923,1	31,3	4 167,2
Republic of Buryatia	1 080	35 271	305	36 656	110,3	3 601,9	31,1	3 743,3
Vladimir region	2 606	54 446	477	57 529	197,6	4 127,5	36,2	4 361,2
Volgograd region	4 428	86 352	745	91 525	181,4	3 537,1	30,5	3 749,0
Vologda region	3 137	41 021	1 519	45 677	276,2	3 612,4	133,8	4 022,4
Voronezh region	5 193	86 544	24 831	116 568	227,8	3 796,1	1 089,2	5 113,1
Republic of Dagestan	2 186	36 367	177	38 730	69,6	1 157,1	5,6	1 232,3
Jewish Autonomous Region	171	3 078	1	3 250	111,5	2 007,8	0,7	2 120,0
Trans-Baikal Krai	1 961	24 265	166	26 392	188,6	2 333,5	16,0	2 538,0
Ivanovo Region	2 135	47 879	1 870	51 884	219,3	4 918,0	192,1	5 329,4
Republic of Ingushetia	438	7 669	19	8 126	83,9	1 468,4	3,6	1 556,0
Irkutsk region	4 246	83 534	1 938	89 718	180,8	3 556,1	82,5	3 819,4
Kabardino-Balkarian Republic	1 241	11 159	39	12 439	143,1	1 286,4	4,5	1 433,9
Kaliningrad region	2 120	30 028	479	32 627	207,0	2 932,0	46,8	3 185,8
Republic of Kalmykia	415	9 529	259	10 203	155,5	3 571,1	97,1	3 823,7
Kaluga region	2 035	33 072	170	35 277	201,6	3 276,6	16,8	3 495,0
Kamchatka Krai	405	9 146	171	9 722	130,0	2 934,9	54,9	3 119,8
Karachayevo-Circassian Republic	856	13 313	242	14 411	185,0	2 877,7	52,3	3 115,1
Republic of Karelia	1 864	27 035	1 297	30 196	310,2	4 498,4	215,8	5 024,4
Kemerovo region	4 351	74 629	1 667	80 647	167,6	2 875,5	64,2	3 107,4
Kirov region	2 404	58 208	5 989	66 601	195,4	4 730,3	486,7	5 412,4
Komi Republic	1 603	29 174	3 261	34 038	200,2	3 643,5	407,3	4 251,0
Kostroma region	1 335	19 133	31	20 499	215,8	3 092,8	5,0	3 313,6
Krasnodar Krai	10 689	178 286	3 371	192 346	188,6	3 145,6	59,5	3 393,7
Krasnoyarsk Krai	5 835	88 806	2 946	97 587	205,5	3 127,7	103,8	3 436,9
Republic of Crimea	3 519	50 177	295	53 991	186,2	2 655,1	15,6	2 856,9
Kurgan region	1 886	36 597	351	38 834	234,9	4 559,0	43,7	4 837,7
Kursk region	2 246	35 493	535	38 274	208,0	3 286,8	49,5	3 544,4
Leningrad region	4 569	53 243	292	58 104	239,8	2 794,9	15,3	3 050,1
Lipetsk region	2 104	28 479	159	30 742	189,6	2 566,0	14,3	2 769,9
Magadan region	225	3 596	34	3 855	163,9	2 619,2	24,8	2 807,9
Republic of Mari El	1 057	24 342	77	25 476	158,0	3 637,8	11,5	3 807,3
Republic of Mordovia	1 587	27 312	16	28 915	206,6	3 556,2	2,1	3 764,9

End of Table 1

Region	Number of people				Per 100,000 population			
	T1DM	T2DM	Other types of diabetes	Total	T1DM	T2DM	Other types of diabetes	Total
City of Moscow	23 370	329 976	1 183	354 529	185,6	2 620,5	9,4	2 815,5
Moscow region	15 109	241 338	3 850	260 297	195,2	3 117,2	49,7	3 362,1
Murmansk region	1 391	22 901	448	24 740	192,7	3 172,1	62,1	3 426,8
Nenets Autonomous Area	105	1 424	540	2 069	236,6	3 208,2	1 216,6	4 661,4
Nizhny Novgorod region	6 462	130 739	5 234	142 435	206,2	4 172,4	167,0	4 545,7
Novgorod region	1 311	16 926	94	18 331	224,4	2 897,7	16,1	3 138,3
Novosibirsk region	5 043	90 276	3 080	98 399	182,0	3 258,2	111,2	3 551,4
Omsk region	3 703	53 347	528	57 578	197,7	2 848,1	28,2	3 074,0
Orenburg region	4 120	67 892	385	72 397	214,8	3 539,8	20,1	3 774,7
Orel region	1 487	24 462	154	26 103	209,0	3 437,4	21,6	3 668,0
Penza region	2 488	49 942	670	53 100	196,0	3 933,5	52,8	4 182,2
Perm Krai	4 904	89 857	1 767	96 528	192,5	3 526,5	69,3	3 788,3
Primorye Krai	3 440	41 590	3 169	48 199	185,3	2 240,1	170,7	2 596,1
Pskov region	1 164	13 785	93	15 042	190,4	2 255,2	15,2	2 460,9
Rostov region	6 669	125 090	561	132 320	161,1	3 021,9	13,6	3 196,6
Ryazan region	2 239	38 240	1 130	41 609	207,0	3 536,1	104,5	3 847,7
Samara region	7 288	116 610	672	124 570	233,5	3 736,4	21,5	3 991,4
City of St Petersburg	11 820	143 766	3 623	159 209	220,6	2 682,7	67,6	2 970,9
Saratov region	4 374	84 835	156	89 365	185,9	3 605,7	6,6	3 798,2
Republic of Sakha (Yakutia)	984	25 059	89	26 132	99,5	2 534,6	9,0	2 643,1
Sakhalin region	887	18 081	54	19 022	183,8	3 747,3	11,2	3 942,3
Sverdlovsk region	9 788	155 087	779	165 654	230,3	3 649,4	18,3	3 898,1
City of Sevastopol	1 048	10 527	97	11 672	201,4	2 023,4	18,6	2 243,5
Republic of North Ossetia-Alania	1 228	19 681	57	20 966	179,1	2 870,0	8,3	3 057,4
Smolensk region	2 104	27 982	453	30 539	232,0	3 086,1	50,0	3 368,1
Stavropol Krai	4 205	70 905	1 897	77 007	151,8	2 559,2	68,5	2 779,4
Tambov region	2 367	37 077	726	40 170	242,1	3 792,6	74,3	4 109,0
Republic of Tatarstan	8 221	121 643	807	130 671	212,3	3 140,8	20,8	3 373,9
Tver region	2 998	43 835	679	47 512	244,5	3 575,6	55,4	3 875,5
Tomsk region	1 815	36 077	344	38 236	170,5	3 388,7	32,3	3 591,5
Tula region	3 474	65 132	623	69 229	243,3	4 562,2	43,6	4 849,2
Republic of Tyva	239	1 243	8	1 490	72,1	375,0	2,4	449,5
Tyumen region	3 001	58 542	1 294	62 837	194,0	3 784,7	83,7	4 062,4
Republic of Udmurtia	2 293	50 224	224	52 741	155,0	3 395,0	15,1	3 565,2
Ulyanovsk region	2 181	44 757	461	47 399	181,8	3 730,3	38,4	3 950,5
Khabarovsk Krai	1 870	29 890	259	32 019	144,5	2 309,0	20,0	2 473,5
Republic of Khakassia	934	20 199	59	21 192	177,4	3 836,3	11,2	4 024,9
Khanty-Mansi Autonomous Area-Yugra	3 072	59 125	878	63 075	181,1	3 485,4	51,8	3 718,2
Chelyabinsk region	7 170	112 506	756	120 432	210,5	3 302,4	22,2	3 535,0
Chechen republic	913	17 319	83	18 315	60,4	1 146,1	5,5	1 212,0
Chuvash Republic	1 528	34 123	532	36 183	127,9	2 857,2	44,5	3 029,6
Chukotka *(Rosstat 2021)*	93	1 715	2	1 810	186,5	3 439,1	4,0	3 629,6
Yamalo-Nenets Autonomous Area	1 024	15 529	156	16 709	186,1	2 822,4	28,4	3 036,8
Yaroslavl region	3 147	46 863	36	50 046	257,3	3 831,3	2,9	4 091,6

Table 2. The prevalence of DM in children in 85 federal constituent entities of the RF as of January 1, 2023

Region	Number of people				Per 100,000 population			
	T1DM	T2DM	Other types of diabetes	Total	T1DM	T2DM	Other types of diabetes	Total
85 regions of the RF	**35 019**	**1 049**	**651**	**36 719**	**136,1**	**4,1**	**2,5**	**142,7**
Republic of Adygea	85	9	5	99	96,6	10,2	5,7	112,5
Altai Republic	24	3		27	42,1	5,3	0,0	47,4
Altai Krai	619	5	6	630	153,9	1,2	1,5	156,7
Amur region	188	7	8	203	129,0	4,8	5,5	139,3
Arkhangelsk region	348	0	2	350	190,7	0,0	1,1	191,8
Astrakhan region	236	7	3	246	122,5	3,6	1,6	127,7
Republic of Bashkortostan	1 214	37	25	1 276	157,7	4,8	3,2	165,7
Belgorod region	383	10	2	395	158,1	4,1	0,8	163,1
Bryansk region	306	20	2	328	165,4	10,8	1,1	177,3
Republic of Buryatia	190	4	4	198	84,2	1,8	1,8	87,7
Vladimir region	200	21	7	228	97,6	10,3	3,4	111,3
Volgograd region	634	23	11	668	162,7	5,9	2,8	171,4
Vologda region	368	3	9	380	177,5	1,4	4,3	183,3
Voronezh region	679	15	61	755	195,8	4,3	17,6	217,8
Republic of Dagestan	330	36	3	369	44,8	4,9	0,4	50,1
Jewish Autonomous Region	20			20	67,3	0,0	0,0	67,3
Trans-Baikal Krai	285	15	4	304	128,6	6,8	1,8	137,2
Ivanovo Region	238	1		239	158,2	0,7	0,0	158,8
Republic of Ingushetia	107	2		109	80,1	1,5	0,0	81,6
Irkutsk region	651	9	2	662	132,8	1,8	0,4	135,0
Kabardino-Balkarian Republic	136	8	1	145	76,9	4,5	0,6	82,0
Kaliningrad region	240	11		251	139,8	6,4	0,0	146,2
Republic of Kalmykia	31	0		31	58,3	0,0	0,0	58,3
Kaluga region	260	3	3	266	159,1	1,8	1,8	162,8
Kamchatka Krai	82	2	7	91	148,6	3,6	12,7	164,9
Karachayevo-Circassian Republic	136	5	5	146	158,1	5,8	5,8	169,7
Republic of Karelia	181	0	0	181	175,2	0,0	0,0	175,2
Kemerovo region	598	13	17	628	128,0	2,8	3,6	134,4
Kirov region	351	14	13	378	165,9	6,6	6,1	178,6
Komi Republic	228	3	14	245	152,0	2,0	9,3	163,3
Kostroma region	183	5	4	192	170,9	4,7	3,7	179,3
Krasnodar Krai	1 571	41	14	1 626	154,6	4,0	1,4	160,0
Krasnoyarsk Krai	591	36	16	643	109,9	6,7	3,0	119,6
Republic of Crimea	300	29	2	331	91,2	8,8	0,6	100,7
Kurgan region	272	11	2	285	185,4	7,5	1,4	194,3
Kursk region	288	3	3	294	165,9	1,7	1,7	169,3
Leningrad region	267	25	1	293	94,7	8,9	0,4	103,9
Lipetsk region	136	4	0	140	76,2	2,2	0,0	78,4
Magadan region	35	2		37	147,7	8,4	0,0	156,2
Republic of Mari El	159	1	1	161	126,8	0,8	0,8	128,4
Republic of Mordovia	196	12	1	209	182,4	11,2	0,9	194,5
City of Moscow	3 404	100	68	3 572	180,3	5,3	3,6	189,2
Moscow region	1 986	21	29	2 036	146,6	1,6	2,1	150,3

End of Table 2

Region	Number of people				Per 100,000 population			
	T1DM	T2DM	Other types of diabetes	Total	T1DM	T2DM	Other types of diabetes	Total
Murmansk region	156	10	2	168	124,4	8,0	1,6	134,0
Nenets Autonomous Area	23		1	24	228,1	0,0	9,9	238,0
Nizhny Novgorod region	857	4	8	869	167,9	0,8	1,6	170,2
Novgorod region	47	8	0	55	48,5	8,2	0,0	56,7
Novosibirsk region	800	8	22	830	157,4	1,6	4,3	163,3
Omsk region	526	13	4	543	150,5	3,7	1,1	155,3
Orenburg region	555	10	3	568	151,7	2,7	0,8	155,2
Orel region	39	2		41	35,6	1,8	0,0	37,4
Penza region	350	5	9	364	183,9	2,6	4,7	191,2
Perm Krai	635	16	9	660	129,3	3,3	1,8	134,4
Primorye Krai	379		11	390	120,2	0,0	3,5	123,7
Pskov region	50	3		53	52,1	3,1	0,0	55,2
Rostov region	888	38	7	933	133,7	5,7	1,1	140,5
Ryazan region	207	28	1	236	126,1	17,1	0,6	143,7
Samara region	850	49	3	902	163,7	9,4	0,6	173,7
City of St Petersburg	899	44	15	958	106,0	5,2	1,8	112,9
Saratov region	577	7	1	585	156,2	1,9	0,3	158,3
Republic of Sakha (Yakutia)	45	17	0	62	20,1	7,6	0,0	27,7
Sakhalin region	62	4		66	68,7	4,4	0,0	73,1
Sverdlovsk region	1 301	39	144	1 484	162,4	4,9	18,0	185,2
City of Sevastopol	135	2	1	138	154,2	2,3	1,1	157,6
Republic of North Ossetia-Alania	203	1	1	205	147,3	0,7	0,7	148,8
Smolensk region	242	5	3	250	182,0	3,8	2,3	188,0
Stavropol Krai	678	14	5	697	138,3	2,9	1,0	142,1
Tambov region	167	3		170	120,6	2,2	0,0	122,8
Republic of Tatarstan	879	4	0	883	120,0	0,5	0,0	120,5
Tver region	261	23	5	289	134,4	11,8	2,6	148,8
Tomsk region	238	14		252	125,5	7,4	0,0	132,9
Tula region	384	10	3	397	190,0	4,9	1,5	196,4
Republic of Tyva					0,0	0,0	0,0	0,0
Tyumen region	478	9	6	493	147,4	2,8	1,9	152,0
Republic of Udmurtia	366	8	11	385	128,5	2,8	3,9	135,2
Ulyanovsk region	231	0	1	232	120,9	0,0	0,5	121,5
Khabarovsk Krai	268	20	4	292	112,5	8,4	1,7	122,5
Republic of Khakassia	129	1		130	119,1	0,9	0,0	120,0
Khanty-Mansi Autonomous Area-Yugra	517	4	3	524	142,0	1,1	0,8	143,9
Chelyabinsk region	790	31	6	827	125,0	4,9	0,9	130,8
Chechen republic	204	3	0	207	44,0	0,6	0,0	44,6
Chuvash Republic	236	4	3	243	108,6	1,8	1,4	111,8
Chukotka *(Rosstat 2021)*	12	1		13	119,2	9,9	0,0	129,2
Yamalo-Nenets Autonomous Area	191	1	2	194	155,7	0,8	1,6	158,1
Yaroslavl region	428	10	2	440	212,3	5,0	1,0	218,2

Table 3. The prevalence of DM in adolescents in 85 federal constituent entities of the RF as of January 1, 2023

Region	Number of people				Per 100,000 population			
	T1DM	T2DM	Other types of diabetes	Total	T1DM	T2DM	Other types of diabetes	Total
85 regions of the RF	**13 012**	**246**	**214**	**13 472**	**289,6**	**5,5**	**4,8**	**299,8**
Republic of Adygea	38	1		39	239,6	6,3	0,0	245,9
Altai Republic	11			11	114,4	0,0	0,0	114,4
Altai Krai	214	4	2	220	290,5	5,4	2,7	298,7
Amur region	73	2	2	77	260,6	7,1	7,1	274,9
Arkhangelsk region	127	1	1	129	359,0	2,8	2,8	364,7
Astrakhan region	96	1	1	98	295,1	3,1	3,1	301,2
Republic of Bashkortostan	346	6	5	357	263,8	4,6	3,8	272,2
Belgorod region	132	3	0	135	298,5	6,8	0,0	305,3
Bryansk region	118	1		119	330,0	2,8	0,0	332,8
Republic of Buryatia	49	5	3	57	127,5	13,0	7,8	148,3
Vladimir region	85	5	3	93	218,6	12,9	7,7	239,2
Volgograd region	231		2	233	307,3	0,0	2,7	310,0
Vologda region	182	2	3	187	491,3	5,4	8,1	504,8
Voronezh region	191	7	4	202	308,2	11,3	6,5	326,0
Republic of Dagestan	115	3		118	83,3	2,2	0,0	85,5
Jewish Autonomous Region	11			11	195,3	0,0	0,0	195,3
Trans-Baikal Krai	105	4	2	111	261,7	10,0	5,0	276,6
Ivanovo Region	105			105	375,1	0,0	0,0	375,1
Republic of Ingushetia	29	0		29	117,4	0,0	0,0	117,4
Irkutsk region	254	11	0	265	308,7	13,4	0,0	322,1
Kabardino-Balkarian Republic	60			60	197,2	0,0	0,0	197,2
Kaliningrad region	102		1	103	328,9	0,0	3,2	332,1
Republic of Kalmykia	10	1		11	97,1	9,7	0,0	106,8
Kaluga region	94			94	336,2	0,0	0,0	336,2
Kamchatka Krai	33	5	1	39	334,7	50,7	10,1	395,6
Karachayevo-Circassian Republic	38	0		38	215,5	0,0	0,0	215,5
Republic of Karelia	95	3	2	100	485,2	15,3	10,2	510,7
Kemerovo region	265	7	12	284	292,4	7,7	13,2	313,3
Kirov region	119	4	5	128	320,3	10,8	13,5	344,5
Komi Republic	100	3	5	108	357,4	10,7	17,9	386,0
Kostroma region	43	1		44	219,5	5,1	0,0	224,6
Krasnodar Krai	585	11	1	597	327,7	6,2	0,6	334,4
Krasnoyarsk Krai	233	3	11	247	253,5	3,3	12,0	268,8
Republic of Crimea	123	4		127	218,0	7,1	0,0	225,1
Kurgan region	117	5		122	445,4	19,0	0,0	464,5
Kursk region	106	3		109	346,7	9,8	0,0	356,5
Leningrad region	110	3	1	114	210,9	5,8	1,9	218,6
Lipetsk region	69	1		70	202,4	2,9	0,0	205,3
Magadan region	5			5	104,4	0,0	0,0	104,4
Republic of Mari El	44	2		46	205,8	9,4	0,0	215,1
Republic of Mordovia	69		1	70	318,3	0,0	4,6	322,9
City of Moscow	1 242	19	20	1 281	388,6	5,9	6,3	400,8
Moscow region	708	8	9	725	331,6	3,7	4,2	339,5

End of Table 3

Region	Number of people				Per 100,000 population			
	T1DM	T2DM	Other types of diabetes	Total	T1DM	T2DM	Other types of diabetes	Total
Murmansk region	63	1		64	269,1	4,3	0,0	273,4
Nenets Autonomous Area	6	0		6	347,2	0,0	0,0	347,2
Nizhny Novgorod region	334	1	4	339	373,3	1,1	4,5	378,9
Novgorod region	35	0		35	192,3	0,0	0,0	192,3
Novosibirsk region	279	5	11	295	340,8	6,1	13,4	360,3
Omsk region	190	7		197	325,0	12,0	0,0	336,9
Orenburg region	184	3	1	188	295,4	4,8	1,6	301,8
Orel region	16	1		17	77,1	4,8	0,0	81,9
Penza region	99	2	1	102	277,2	5,6	2,8	285,6
Perm Krai	228	5	3	236	271,3	6,0	3,6	280,8
Primorye Krai	157	1	8	166	281,2	1,8	14,3	297,3
Pskov region	28	1		29	155,0	5,5	0,0	160,6
Rostov region	330	3	1	334	267,3	2,4	0,8	270,5
Ryazan region	94	3	1	98	318,5	10,2	3,4	332,0
Samara region	299	5	1	305	329,0	5,5	1,1	335,6
City of St Petersburg	427	4	14	445	349,4	3,3	11,5	364,1
Saratov region	212	2		214	304,3	2,9	0,0	307,2
Republic of Sakha (Yakutia)	29	2	1	32	72,8	5,0	2,5	80,4
Sakhalin region	24		1	25	149,3	0,0	6,2	155,5
Sverdlovsk region	477	14	39	530	358,0	10,5	29,3	397,8
City of Sevastopol	45	1	2	48	291,3	6,5	12,9	310,8
Republic of North Ossetia-Alania	74	0		74	307,1	0,0	0,0	307,1
Smolensk region	67	1		68	266,3	4,0	0,0	270,3
Stavropol Krai	232	2	4	238	254,7	2,2	4,4	261,3
Tambov region	89	1		90	323,3	3,6	0,0	327,0
Republic of Tatarstan	351	2	2	355	303,0	1,7	1,7	306,5
Tver region	94	3		97	262,2	8,4	0,0	270,6
Tomsk region	103	2		105	300,8	5,8	0,0	306,7
Tula region	142	2	0	144	373,8	5,3	0,0	379,1
Republic of Tyva					0,0	0,0	0,0	0,0
Tyumen region	182	2	2	186	360,1	4,0	4,0	368,0
Republic of Udmurtia	122	5	5	132	246,5	10,1	10,1	266,7
Ulyanovsk region	80	1		81	244,0	3,1	0,0	247,1
Khabarovsk Krai	109	3	1	113	271,8	7,5	2,5	281,8
Republic of Khakassia	59		1	60	319,9	0,0	5,4	325,3
Khanty-Mansi Autonomous Area-Yugra	199	8	2	209	317,8	12,8	3,2	333,8
Chelyabinsk region	294	4	5	303	272,6	3,7	4,6	280,9
Chechen republic	83	1		84	96,9	1,2	0,0	98,1
Chuvash Republic	74	1	5	80	196,9	2,7	13,3	212,9
Chukotka *(Rosstat 2021)*	12	0		12	554,8	0,0	0,0	554,8
Yamalo-Nenets Autonomous Area	66	0	2	68	302,6	0,0	9,2	311,7
Yaroslavl region	142	8		150	385,5	21,7	0,0	407,2

Table 4. The prevalence of DM in adults in 85 federal constituent entities of the RF as of January 1, 2023

Region	Number of people				Per 100,000 population			
	T1DM	T2DM	Other types of diabetes	Total	T1DM	T2DM	Other types of diabetes	Total
85 regions of the RF	**229 061**	**4 580 695**	**102 815**	**4 912 571**	**199,5**	**3 989,0**	**89,5**	**4 278,0**
Republic of Adygea	689	13 668	509	14 866	189,9	3 766,4	140,3	4 096,5
Altai Republic	291	4 709	82	5 082	188,7	3 053,7	53,2	3 295,6
Altai Krai	3 690	91 344	865	95 899	206,8	5 118,6	48,5	5 373,8
Amur region	932	28 746	554	30 232	156,3	4 821,8	92,9	5 071,1
Arkhangelsk region	2 229	43 787	6 972	52 988	262,8	5 162,2	822,0	6 246,9
Astrakhan region	1 320	33 054	1 157	35 531	173,5	4 344,7	152,1	4 670,2
Republic of Bashkortostan	5 744	116 857	251	122 852	186,1	3 785,7	8,1	3 979,9
Belgorod region	2 586	50 735	445	53 766	208,5	4 090,8	35,9	4 335,2
Bryansk region	2 055	45 673	362	48 090	217,7	4 838,2	38,3	5 094,2
Republic of Buryatia	841	35 262	298	36 401	117,6	4 931,4	41,7	5 090,7
Vladimir region	2 321	54 420	467	57 208	215,8	5 060,7	43,4	5 320,0
Volgograd region	3 563	86 329	732	90 624	180,3	4 367,8	37,0	4 585,1
Vologda region	2 587	41 016	1 507	45 110	290,3	4 602,5	169,1	5 061,9
Voronezh region	4 323	86 522	24 766	115 611	231,0	4 624,1	1 323,6	6 178,7
Republic of Dagestan	1 741	36 328	174	38 243	76,7	1 601,4	7,7	1 685,9
Jewish Autonomous Region	140	3 078	1	3 219	118,7	2 609,8	0,8	2 729,4
Trans-Baikal Krai	1 571	24 246	160	25 977	201,9	3 115,9	20,6	3 338,3
Ivanovo Region	1 792	47 878	1 870	51 540	225,4	6 021,6	235,2	6 482,2
Republic of Ingushetia	302	7 667	19	7 988	83,0	2 106,7	5,2	2 194,9
Irkutsk region	3 341	83 514	1 936	88 791	188,1	4 701,1	109,0	4 998,1
Kabardino-Balkarian Republic	1 045	11 151	38	12 234	158,3	1 688,8	5,8	1 852,8
Kaliningrad region	1 778	30 017	478	32 273	216,5	3 654,3	58,2	3 928,9
Republic of Kalmykia	374	9 528	259	10 161	183,9	4 685,2	127,4	4 996,5
Kaluga region	1 681	33 069	167	34 917	205,5	4 042,6	20,4	4 268,6
Kamchatka Krai	290	9 139	163	9 592	117,6	3 706,3	66,1	3 890,0
Karachayevo-Circassian Republic	682	13 308	237	14 227	190,0	3 707,3	66,0	3 963,3
Republic of Karelia	1 588	27 032	1 295	29 915	332,2	5 654,3	270,9	6 257,4
Kemerovo region	3 488	74 609	1 638	79 735	171,2	3 661,8	80,4	3 913,4
Kirov region	1 934	58 190	5 971	66 095	197,0	5 927,2	608,2	6 732,4
Komi Republic	1 275	29 168	3 242	33 685	204,7	4 683,9	520,6	5 409,3
Kostroma region	1 109	19 127	27	20 263	225,4	3 887,8	5,5	4 118,7
Krasnodar Krai	8 533	178 234	3 356	190 123	190,8	3 984,8	75,0	4 250,6
Krasnoyarsk Krai	5 011	88 767	2 919	96 697	226,8	4 016,8	132,1	4 375,7
Republic of Crimea	3 096	50 144	293	53 533	205,8	3 332,7	19,5	3 557,9
Kurgan region	1 497	36 581	349	38 427	237,7	5 808,8	55,4	6 101,9
Kursk region	1 852	35 487	532	37 871	211,5	4 052,6	60,8	4 324,8
Leningrad region	4 192	53 215	290	57 697	266,8	3 387,5	18,5	3 672,8
Lipetsk region	1 899	28 474	159	30 532	211,7	3 173,8	17,7	3 403,2
Magadan region	185	3 594	34	3 813	170,0	3 303,0	31,2	3 504,3
Republic of Mari El	854	24 339	76	25 269	163,5	4 659,8	14,6	4 837,8
Republic of Mordovia	1 322	27 300	14	28 636	206,9	4 273,2	2,2	4 482,3
City of Moscow	18 724	329 857	1 095	349 676	180,3	3 176,6	10,5	3 367,4
Moscow region	12 415	241 309	3 812	257 536	201,1	3 908,4	61,7	4 171,3

End of Table 4

Region	Number of people				Per 100,000 population			
	T1DM	T2DM	Other types of diabetes	Total	T1DM	T2DM	Other types of diabetes	Total
Murmansk region	1 172	22 890	446	24 508	204,5	3 993,6	77,8	4 275,9
Nenets Autonomous Area	76	1 424	539	2 039	233,3	4 371,5	1 654,6	6 259,4
Nizhny Novgorod region	5 271	130 734	5 222	141 227	208,1	5 160,3	206,1	5 574,5
Novgorod region	1 229	16 918	94	18 241	262,1	3 607,9	20,0	3 890,0
Novosibirsk region	3 964	90 263	3 047	97 274	181,8	4 139,5	139,7	4 461,0
Omsk region	2 987	53 327	524	56 838	203,9	3 639,9	35,8	3 879,5
Orenburg region	3 381	67 879	381	71 641	226,9	4 556,3	25,6	4 808,8
Orel region	1 432	24 459	154	26 045	246,3	4 207,6	26,5	4 480,5
Penza region	2 039	49 935	660	52 634	195,4	4 784,9	63,2	5 043,5
Perm Krai	4 041	89 836	1 755	95 632	204,8	4 553,5	89,0	4 847,3
Primorye Krai	2 904	41 589	3 150	47 643	195,5	2 799,5	212,0	3 207,1
Pskov region	1 086	13 781	93	14 960	218,4	2 771,8	18,7	3 008,9
Rostov region	5 451	125 049	553	131 053	162,6	3 730,7	16,5	3 909,8
Ryazan region	1 938	38 209	1 128	41 275	218,3	4 304,3	127,1	4 649,7
Samara region	6 139	116 556	668	123 363	244,5	4 642,5	26,6	4 913,6
City of St Petersburg	10 494	143 718	3 594	157 806	239,1	3 274,8	81,9	3 595,8
Saratov region	3 585	84 826	155	88 566	187,3	4 432,6	8,1	4 628,0
Republic of Sakha (Yakutia)	910	25 040	88	26 038	125,5	3 452,8	12,1	3 590,4
Sakhalin region	801	18 077	53	18 931	213,0	4 806,0	14,1	5 033,0
Sverdlovsk region	8 010	155 034	596	163 640	241,6	4 676,5	18,0	4 936,1
City of Sevastopol	868	10 524	94	11 486	208,0	2 522,1	22,5	2 752,7
Republic of North Ossetia-Alania	951	19 680	56	20 687	181,5	3 756,7	10,7	3 949,0
Smolensk region	1 795	27 976	450	30 221	239,8	3 737,1	60,1	4 037,0
Stavropol Krai	3 295	70 889	1 888	76 072	150,5	3 238,1	86,2	3 474,9
Tambov region	2 111	37 073	726	39 910	260,1	4 567,7	89,4	4 917,3
Republic of Tatarstan	6 991	121 637	805	129 433	231,1	4 021,5	26,6	4 279,2
Tver region	2 643	43 809	674	47 126	265,4	4 398,8	67,7	4 731,8
Tomsk region	1 474	36 061	344	37 879	175,3	4 289,0	40,9	4 505,2
Tula region	2 948	65 120	620	68 688	248,2	5 483,5	52,2	5 784,0
Republic of Tyva	239	1 243	8	1 490	114,7	596,4	3,8	714,9
Tyumen region	2 341	58 531	1 286	62 158	199,7	4 994,1	109,7	5 303,5
Republic of Udmurtia	1 805	50 211	208	52 224	157,6	4 385,0	18,2	4 560,8
Ulyanovsk region	1 870	44 756	460	47 086	191,6	4 585,5	47,1	4 824,2
Khabarovsk Krai	1 493	29 867	254	31 614	146,9	2 939,4	25,0	3 111,4
Republic of Khakassia	746	20 198	58	21 002	186,6	5 052,9	14,5	5 254,1
Khanty-Mansi Autonomous Area-Yugra	2 356	59 113	873	62 342	185,6	4 655,7	68,8	4 910,0
Chelyabinsk region	6 086	112 471	745	119 302	228,2	4 217,6	27,9	4 473,7
Chechen republic	626	17 315	83	18 024	65,1	1 800,4	8,6	1 874,1
Chuvash Republic	1 218	34 118	524	35 860	129,7	3 632,2	55,8	3 817,6
Chukotka *(Rosstat 2021)*	69	1 714	2	1 785	183,3	4 553,5	5,3	4 742,2
Yamalo-Nenets Autonomous Area	767	15 528	152	16 447	189,0	3 827,3	37,5	4 053,8
Yaroslavl region	2 577	46 845	34	49 456	261,7	4 757,3	3,5	5 022,4

APPENDIX 2

Table 1. Incidence of DM in 85 regions of the Russian Federation as of January 1, 2023

Region	Number of people				Per 100,000 population			
	T1DM	T2DM	Other types of diabetes	Total	T1DM	T2DM	Other types of diabetes	Total
85 regions of the RF	**11 848**	**277 573**	**18 573**	**307 994**	**8,2**	**191,4**	**12,8**	**212,3**
Republic of Adygea	40	671	70	781	8,6	143,8	15,0	167,3
Altai Republic	5	227	0	232	2,3	102,8	0,0	105,1
Altai Krai	202	7 084	228	7 514	8,9	313,4	10,1	332,4
Amur region	65	2 147	163	2 375	8,4	278,9	21,2	308,5
Arkhangelsk region	140	3 704	1 362	5 206	13,1	347,4	127,8	488,3
Astrakhan region	94	2 176	152	2 422	9,5	220,7	15,4	245,6
Republic of Bashkortostan	408	10 890	142	11 440	10,2	273,1	3,6	286,9
Belgorod region	119	3 632	7	3 758	7,8	237,9	0,5	246,2
Bryansk region	113	3 714	45	3 872	9,7	318,9	3,9	332,4
Republic of Buryatia	87	3 578	149	3 814	8,9	365,4	15,2	389,5
Vladimir region	50	1 872	41	1 963	3,8	141,9	3,1	148,8
Volgograd region	204	5 386	471	6 061	8,4	220,6	19,3	248,3
Vologda region	105	2 441	381	2 927	9,2	215,0	33,6	257,8
Voronezh region	255	6 494	3 755	10 504	11,2	284,9	164,7	460,7
Republic of Dagestan	123	2 213	9	2 345	3,9	70,4	0,3	74,6
Jewish Autonomous Region	4	45	0	49	2,6	29,4	0,0	32,0
Trans-Baikal Krai	119	1 543	14	1 676	11,4	148,4	1,3	161,2
Ivanovo Region	79	2 499	85	2 663	8,1	256,7	8,7	273,5
Republic of Ingushetia	35	339	1	375	6,7	64,9	0,2	71,8
Irkutsk region	252	6 022	747	7 021	10,7	256,4	31,8	298,9
Kabardino-Balkarian Republic	10	212	0	222	1,2	24,4	0,0	25,6
Kaliningrad region	44	1 050	93	1 187	4,3	102,5	9,1	115,9
Republic of Kalmykia	20	456	4	480	7,5	170,9	1,5	179,9
Kaluga region	97	2 383	41	2 521	9,6	236,1	4,1	249,8
Kamchatka Krai	28	772	49	849	9,0	247,7	15,7	272,4
Karachayevo-Circassian Republic	49	571	51	671	10,6	123,4	11,0	145,0
Republic of Karelia	98	1 801	183	2 082	16,3	299,7	30,4	346,4
Kemerovo region	222	4 505	337	5 064	8,6	173,6	13,0	195,1
Kirov region	104	4 020	569	4 693	8,5	326,7	46,2	381,4
Komi Republic	77	2 297	795	3 169	9,6	286,9	99,3	395,8
Kostroma region	59	1 462	2	1 523	9,5	236,3	0,3	246,2
Krasnodar Krai	519	9 530	678	10 727	9,2	168,1	12,0	189,3
Krasnoyarsk Krai	215	6 356	813	7 384	7,6	223,9	28,6	260,1
Republic of Crimea	94	2 900	83	3 077	5,0	153,5	4,4	162,8
Kurgan region	75	1 427	69	1 571	9,3	177,8	8,6	195,7
Kursk region	107	3 432	84	3 623	9,9	317,8	7,8	335,5
Leningrad region	72	1 805	40	1 917	3,8	94,8	2,1	100,6
Lipetsk region	76	1 473	7	1 556	6,8	132,7	0,6	140,2
Magadan region	9	313	1	323	6,6	228,0	0,7	235,3
Republic of Mari El	65	1 755	42	1 862	9,7	262,3	6,3	278,3
Republic of Mordovia	74	1 535	2	1 611	9,6	199,9	0,3	209,8

End of Table 1

Region	Number of people				Per 100,000 population			
	T1DM	T2DM	Other types of diabetes	Total	T1DM	T2DM	Other types of diabetes	Total
City of Moscow	834	17 195	228	18 257	6,6	136,6	1,8	145,0
Moscow region	532	12 666	461	13 659	6,9	163,6	6,0	176,4
Murmansk region	38	1 447	91	1 576	5,3	200,4	12,6	218,3
Nenets Autonomous Area	9	117	182	308	20,3	263,6	410,0	693,9
Nizhny Novgorod region	300	8 172	459	8 931	9,6	260,8	14,6	285,0
Novgorod region	9	516	1	526	1,5	88,3	0,2	90,1
Novosibirsk region	255	5 701	1 005	6 961	9,2	205,8	36,3	251,2
Omsk region	181	3 192	53	3 426	9,7	170,4	2,8	182,9
Orenburg region	212	5 267	135	5 614	11,1	274,6	7,0	292,7
Orel region	12	749	35	796	1,7	105,3	4,9	111,9
Penza region	124	3 566	185	3 875	9,8	280,9	14,6	305,2
Perm Krai	179	5 448	629	6 256	7,0	213,8	24,7	245,5
Primorye Krai	167	2 291	438	2 896	9,0	123,4	23,6	156,0
Pskov region	5	140	1	146	0,8	22,9	0,2	23,9
Rostov region	303	8 231	351	8 885	7,3	198,8	8,5	214,6
Ryazan region	60	1 759	16	1 835	5,5	162,7	1,5	169,7
Samara region	924	7 835	176	8 935	29,6	251,0	5,6	286,3
City of St Petersburg	12	5	1	18	0,2	0,1	0,0	0,3
Saratov region	172	6 483	67	6 722	7,3	275,5	2,8	285,7
Republic of Sakha (Yakutia)	17	1 056	18	1 091	1,7	106,8	1,8	110,3
Sakhalin region	13	454	7	474	2,7	94,1	1,5	98,2
Sverdlovsk region	491	9 168	227	9 886	11,6	215,7	5,3	232,6
City of Sevastopol	52	555	14	621	10,0	106,7	2,7	119,4
Republic of North Ossetia-Alania	74	1 370	2	1 446	10,8	199,8	0,3	210,9
Smolensk region	86	1 592	56	1 734	9,5	175,6	6,2	191,2
Stavropol Krai	209	5 222	338	5 769	7,5	188,5	12,2	208,2
Tambov region	59	375	4	438	6,0	38,4	0,4	44,8
Republic of Tatarstan	312	7 534	145	7 991	8,1	194,5	3,7	206,3
Tver region	103	2 212	95	2 410	8,4	180,4	7,7	196,6
Tomsk region	71	1 645	30	1 746	6,7	154,5	2,8	164,0
Tula region	155	3 991	23	4 169	10,9	279,6	1,6	292,0
Republic of Tyva	0	0	0	0	0,0	0,0	0,0	0,0
Tyumen region	152	4 703	277	5 132	9,8	304,0	17,9	331,8
Republic of Udmurtia	149	4 216	290	4 655	10,1	285,0	19,6	314,7
Ulyanovsk region	59	3 036	97	3 192	4,9	253,0	8,1	266,0
Khabarovsk Krai	75	1 050	34	1 159	5,8	81,1	2,6	89,5
Republic of Khakassia	41	1 661	7	1 709	7,8	315,5	1,3	324,6
Khanty-Mansi Autonomous Area-Yugra	189	4 441	145	4 775	11,1	261,8	8,5	281,5
Chelyabinsk region	245	6 522	178	6 945	7,2	191,4	5,2	203,9
Chechen republic	69	1 512	12	1 593	4,6	100,1	0,8	105,4
Chuvash Republic	73	3 252	215	3 540	6,1	272,3	18,0	296,4
Chukotka *(Rosstat 2021)*	12	93	0	105	24,1	186,5	0,0	210,6
Yamalo-Nenets Autonomous Area	54	1 158	38	1 250	9,8	210,5	6,9	227,2
Yaroslavl region	147	3 243	42	3 432	12,0	265,1	3,4	280,6

APPENDIX 3.

Table 1. Mortality rates in diabetic patients in 85 regions of the Russian Federation as of January 1, 2023

Region	Number of people				Per 100,000 population			
	T1DM	T2DM	Other types of diabetes	Total	T1DM	T2DM	Other types of diabetes	Total
85 regions of the RF	**3 465**	**124 865**	**128 330**	**256 660**	**2,4**	**86,1**	**88,5**	**176,9**
Republic of Adygea	7	291	298	596	1,5	62,3	63,8	127,7
Altai Republic	5	78	83	166	2,3	35,3	37,6	75,2
Altai Krai	79	3 482	3 561	7 122	3,5	154,0	157,5	315,1
Amur region	24	1 132	1 156	2 312	3,1	147,0	150,2	300,3
Arkhangelsk region	48	1 737	1 785	3 570	4,5	162,9	167,4	334,9
Astrakhan region	26	1 037	1 063	2 126	2,6	105,2	107,8	215,6
Republic of Bashkortostan	134	4 085	4 219	8 438	3,4	102,4	105,8	211,6
Belgorod region	45	1 767	1 812	3 624	2,9	115,7	118,7	237,4
Bryansk region	52	1 696	1 748	3 496	4,5	145,6	150,1	300,2
Republic of Buryatia	18	876	894	1 788	1,8	89,5	91,3	182,6
Vladimir region	24	1 019	1 043	2 086	1,8	77,2	79,1	158,1
Volgograd region	64	2 523	2 587	5 174	2,6	103,3	106,0	211,9
Vologda region	42	907	949	1 898	3,7	79,9	83,6	167,1
Voronezh region	115	3 505	3 620	7 240	5,0	153,7	158,8	317,6
Republic of Dagestan	19	440	459	918	0,6	14,0	14,6	29,2
Jewish Autonomous Region	2	17	19	38	1,3	11,1	12,4	24,8
Trans-Baikal Krai	41	1 345	1 386	2 772	3,9	129,3	133,3	266,6
Ivanovo Region	29	929	958	1 916	3,0	95,4	98,4	196,8
Republic of Ingushetia	1	129	130	260	0,2	24,7	24,9	49,8
Irkutsk region	73	3 040	3 113	6 226	3,1	129,4	132,5	265,0
Kabardino-Balkarian Republic	6	56	62	124	0,7	6,5	7,1	14,3
Kaliningrad region	12	389	401	802	1,2	38,0	39,2	78,3
Republic of Kalmykia	4	149	153	306	1,5	55,8	57,3	114,7
Kaluga region	28	953	981	1 962	2,8	94,4	97,2	194,4
Kamchatka Krai	1	277	278	556	0,3	88,9	89,2	178,4
Karachayevo-Circassian Republic	14	186	200	400	3,0	40,2	43,2	86,5
Republic of Karelia	46	939	985	1 970	7,7	156,2	163,9	327,8
Kemerovo region	63	2 192	2 255	4 510	2,4	84,5	86,9	173,8
Kirov region	31	2 210	2 241	4 482	2,5	179,6	182,1	364,2
Komi Republic	24	1 054	1 078	2 156	3,0	131,6	134,6	269,3
Kostroma region	28	652	680	1 360	4,5	105,4	109,9	219,8
Krasnodar Krai	141	6 258	6 399	12 798	2,5	110,4	112,9	225,8
Krasnoyarsk Krai	97	2 714	2 811	5 622	3,4	95,6	99,0	198,0
Republic of Crimea	20	610	630	1 260	1,1	32,3	33,3	66,7
Kurgan region	12	468	480	960	1,5	58,3	59,8	119,6
Kursk region	42	1 176	1 218	2 436	3,9	108,9	112,8	225,6
Leningrad region	32	711	743	1 486	1,7	37,3	39,0	78,0
Lipetsk region	43	694	737	1 474	3,9	62,5	66,4	132,8
Magadan region	2	25	27	54	1,5	18,2	19,7	39,3
Republic of Mari El	17	787	804	1 608	2,5	117,6	120,2	240,3
Republic of Mordovia	32	674	706	1 412	4,2	87,8	91,9	183,9

End of Table 1

Region	Number of people				Per 100,000 population			
	T1DM	T2DM	Other types of diabetes	Total	T1DM	T2DM	Other types of diabetes	Total
City of Moscow	186	6 296	6 482	12 964	1,5	50,0	51,5	103,0
Moscow region	168	5 669	5 837	11 674	2,2	73,2	75,4	150,8
Murmansk region	10	476	486	972	1,4	65,9	67,3	134,6
Nenets Autonomous Area		43	43	86	0,0	96,9	96,9	193,8
Nizhny Novgorod region	104	4 206	4 310	8 620	3,3	134,2	137,5	275,1
Novgorod region	15	337	352	704	2,6	57,7	60,3	120,5
Novosibirsk region	42	3 279	3 321	6 642	1,5	118,3	119,9	239,7
Omsk region	33	1 206	1 239	2 478	1,8	64,4	66,1	132,3
Orenburg region	71	2 038	2 109	4 218	3,7	106,3	110,0	219,9
Orel region	4	156	160	320	0,6	21,9	22,5	45,0
Penza region	52	1 949	2 001	4 002	4,1	153,5	157,6	315,2
Perm Krai	77	2 699	2 776	5 552	3,0	105,9	108,9	217,9
Primorye Krai	87	2 223	2 310	4 620	4,7	119,7	124,4	248,8
Pskov region	3	36	39	78	0,5	5,9	6,4	12,8
Rostov region	83	3 868	3 951	7 902	2,0	93,4	95,4	190,9
Ryazan region	20	713	733	1 466	1,8	65,9	67,8	135,6
Samara region	89	3 663	3 752	7 504	2,9	117,4	120,2	240,4
City of St Petersburg	8	5	13	26	0,1	0,1	0,2	0,5
Saratov region	84	3 948	4 032	8 064	3,6	167,8	171,4	342,7
Republic of Sakha (Yakutia)	6	218	224	448	0,6	22,0	22,7	45,3
Sakhalin region	1	82	83	166	0,2	17,0	17,2	34,4
Sverdlovsk region	101	3 874	3 975	7 950	2,4	91,2	93,5	187,1
City of Sevastopol	8	166	174	348	1,5	31,9	33,4	66,9
Republic of North Ossetia-Alania	13	793	806	1 612	1,9	115,6	117,5	235,1
Smolensk region	30	715	745	1 490	3,3	78,9	82,2	164,3
Stavropol Krai	35	1 589	1 624	3 248	1,3	57,4	58,6	117,2
Tambov region	9	291	300	600	0,9	29,8	30,7	61,4
Republic of Tatarstan	134	3 662	3 796	7 592	3,5	94,6	98,0	196,0
Tver region	50	1 285	1 335	2 670	4,1	104,8	108,9	217,8
Tomsk region	11	694	705	1 410	1,0	65,2	66,2	132,4
Tula region	60	2 115	2 175	4 350	4,2	148,1	152,4	304,7
Republic of Tyva					0,0	0,0	0,0	0,0
Tyumen region	29	1 488	1 517	3 034	1,9	96,2	98,1	196,1
Republic of Udmurtia	32	1 509	1 541	3 082	2,2	102,0	104,2	208,3
Ulyanovsk region	40	1 652	1 692	3 384	3,3	137,7	141,0	282,0
Khabarovsk Krai	11	441	452	904	0,8	34,1	34,9	69,8
Republic of Khakassia	12	651	663	1 326	2,3	123,6	125,9	251,8
Khanty-Mansi Autonomous Area-Yugra	32	1 326	1 358	2 716	1,9	78,2	80,1	160,1
Chelyabinsk region	69	2 434	2 503	5 006	2,0	71,4	73,5	146,9
Chechen republic	6	500	506	1 012	0,4	33,1	33,5	67,0
Chuvash Republic	23	1 262	1 285	2 570	1,9	105,7	107,6	215,2
Chukotka Autonomous Area					0,0	0,0	0,0	0,0
Yamalo-Nenets Autonomous Area	7	186	193	386	1,3	33,8	35,1	70,2
Yaroslavl region	67	1 913	1 980	3 960	5,5	156,4	161,9	323,8