

## Viktor Vasilievich Trusov — organizer of endocrinology service of Izhevsk

E.V. Khalimov, A.Yu. Mikhailov\*, S.N. Styazhkina, M.A. Zavalina, S.I. Likhovskikh

Izhevsk State Medical Academy, Izhevsk, Russia

### Abstract

The article is devoted to the 85th anniversary of Professor Viktor Vasilyevich Trusov (1936–2012), one of the prominent representatives of the therapeutic, scientific school of the Izhevsk State Medical Academy. In the range of diverse scientific interests and developments of Viktor Vasilyevich, a significant part was the issues of practical support to patients with endocrinological pathology, including patients with diabetes mellitus. Professor V.V. Trusov was a member of the Board of Russian Association of Endocrinologists, a member of the European Association for the Study of Diabetes, a member of the American Diabetes Association, worked on the problems of optimizing care for patients with diabetes. The article highlights the diabetology segment of the endocrinology service in Izhevsk on the materials of the endocrinological department of the State Clinical Hospital No. 6. The role of Professor Viktor Vasilyevich Trusov in the organization of the endocrinological center of Izhevsk, the viability of the methodological guidelines and recommendations laid down by him in the organization of care for patients with diabetes mellitus was noted. The organization of the work of the endocrinology center are considered. The analysis of the main indicators of the prevalence of diabetes mellitus was carried out according to the data of the endocrinology department (2017–2020). The special place of the diabetic foot clinic in the work of the center is highlighted. Modern and original methods of management of such complications of diabetes mellitus as diabetic foot syndrome are presented.

**Keywords:** Viktor V. Trusov, Endocrinology Center, diabetes mellitus, diabetic foot syndrome.

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Viktor Vasilievich Trusov was born on April 20, 1936, in Kazan, in a family of employees. After graduating from the Izhevsk State Medical Institute (IzhGMI) in 1959, defense candidate and doctoral dissertations, Professor V.V. Trusov headed the Department of Internal Diseases and applied radiation diagnostic methods and military field therapy at IzhGMI. Under the guidance of V.V. Trusov, the department was distinguished by an inextricable union of a creative approach to solving complex scientific problems and successful diagnosis and treatment of patients. During his leadership in the department, he has trained a whole generation of talented and caring doctors and scientists, more than 100 clinical residents, and 200 interns.

V.V. Trusov devoted substantial time to scientific and social work. He was the dean of IzhGMI in 1966–1969 and vice-rector for academic work in 1971–1975 and scientific work in 1975–1987. He combined in the best way the abilities of a medical practitioner, scientist-researcher, teacher of higher education, and public health organizer.

With his active organizational and clinical abilities in the Udmurt Republic (UR), a radiological service was organized, and endocrinological care for the population was improved [1]. For more than 30 years, Professor V.V. Trusov was the chairman of the Association of Endocrinologists of Udmurtia and was elected as a member of the Board of the Association of Endocrinologists of Russia, of the European Association of Diabetologists, and of the American Association of Diabetologists. Since 1998, he has been the chief endocrinologist of the Ministry of Health of the UR. Under his leadership, the Republican program “Diabetes mellitus” was developed in 1997 [2].

The Professor made a significant contribution to the development of science. His interests were multifaceted. He authored 900 scientific publications, including those published abroad, 12 monographs, and 5 textbooks. The scientific contribution of V.V. Trusov is secured by 15 copyright certificates and patents, several rationalization proposals, and 65 methodological recommendations for practical healthcare [3].

**Table 1.** Number of patients with diabetes mellitus (DM) registered at the endocrinology center in Izhevsk in 2018–2020

| Years | DM type 1        |                 | DM type 2        |                 | Total | Proportion among served population, % |
|-------|------------------|-----------------|------------------|-----------------|-------|---------------------------------------|
|       | Total registered | Newly diagnosed | Total registered | Newly diagnosed |       |                                       |
| 2018  | 264              | 13              | 5431             | 346             | 5695  | 4.8                                   |
| 2019  | 267              | 13              | 5464             | 139             | 5731  | 4.9                                   |
| 2020  | 274              | 7               | 5162             | 198             | 5436  | 4.6                                   |

Professor V.V. Trusov was actively involved in the training of scientific personnel. Under his scientific guidance and advisory assistance, 10 doctoral and 42 master's theses were completed and defended. For 15 years, V.V. Trusov was the chairman of the dissertation council of the Izhevsk State Medical Academy (IzhGMA).

A responsible and sympathetic person, a brilliant scientist, and a true colleague, V.V. Trusov remains a guide in the activities of IzhGMA employees, providing an example in scientific and teaching activities. The need for a scientific search for new methods of diagnosing and treating patients is a distinctive feature of the clinician; thus, it is necessary to meet the scientific and practical requirements of the time – this principle of V.V. Trusov laid the foundation for the work of the established scientific school.

One of the merits of V.V. Trusova was the opening of the endocrinological service of the UR and the creation of a city endocrinological center on the basis of the Izhmash medical unit, currently the City Clinical Hospital No. 6 (City Clinical Hospital No. 6). In 1992, under the guidance of the chief diabetologist of the Ministry of Health of the Russian Federation, Doctor of Medical Sciences, Professor A.S. Ametov, V.V. Trusov was the organizer of the Izhevsk Diabetes Center, which became an integral part of the network of the International Diabetes Program, which united 20 cities of Russia.

Prior to the creation of the city endocrinological center, the treatment of patients with diabetes mellitus (DM) was conducted by both endocrinologists, who are not present in all medical institutions of the city, and therapists following a general therapeutic appointment. When the center was created, the foundation was laid for the Regional Register of Patients with DM in UR. UR physicians had the opportunity to get acquainted with the world achievements in the prevention, diagnosis, and treatment of DM and its complications. There was an opportunity to conduct training seminars with the invitation of leading endocrinologists of the Russian Federation. The foundations and principles of the endocrinology service laid down by V.V. Trusov were as follows: preventive measures, early detection of DM, dispensary ob-

servation, assessment of the rehabilitation potential of patients with DM, and use of modern methods of treatment of patients with DM.

Only 54% (Dedov V.I., 2019) of cases of type 2 DM are diagnosed. Moreover,  $4.6\% \pm 0.1\%$  of the served population is registered with DM in the endocrinological center, which is higher than the average figures for the UR (3.4%) by 1.2% and the Russian Federation (3.06%) by 1.54% [4]. The indicators present a good diagnostic system of the endocrinological service. Data on the registration of patients with DM are reflected in Table 1.

The endocrinological center founded by V.V. Trusov School of Diabetes continues to operate. In school, patients with DM, mainly type 2, are told about the cause of DM, main changes in the body, dietary habits, and daily routine through microlectures and educational games. Practical classes were focused on the use of a glucometer, technique of insulin therapy, and complications of DM, including the development of diabetic foot syndrome (DFS). Of the patients newly diagnosed with type 2 DM between 2015 and 2020,  $85\% \pm 4\%$  attended the training course.

V.V. Trusov successfully dealt with the issues of diagnosing, treating, and preventing DFS, a formidable complication of diabetes. He developed a diagnostic and therapeutic algorithm for treating patients with DFS. Despite the success of treatment, the survival prognosis of patients with DFS is significantly worse than that of patients with cancer [2, 5, 6]. In the Russian Federation, DFS was recorded in 0.15%–10.3% of patients with DM, depending on the region. Of these, the neuropathic form with a trophic ulcer was noted in 41.6%, Charcot foot in 7.4%, neuroischemic form in 32.4%, and ischemic form in 18.5% [5]. In 2020, in the UR, 291 patients with DFS, or 0.6% of the patients with DM, were registered; specifically, neuropathic form (trophic ulcer) was noted in 59 (20.3%), Charcot foot in 10 (3.4%), ischemic form in 51 (17.5%), and neuroischemic in 171 (58.6%) patients.

On the initiative of V.V. Trusov, since 2009, the diabetic foot office has been functioning as part of the endocrinology center, where residents of Izhevsk and Udmurtia are served. In the same year, 1500–1600 examinations of patients with diabetes were

**Table 2.** Distribution of lower limb amputation procedures for diabetic foot syndrome according to the endocrinological center of Izhevsk in 2018–2020

| Year | Total amputations | Minor | Below-knee amputation | Above-knee amputation | Proportion among patients with DM, % | Proportion among patients with DFS, % |
|------|-------------------|-------|-----------------------|-----------------------|--------------------------------------|---------------------------------------|
| 2018 | 4                 | 2     | 1                     | 1                     | 0.1                                  | 14.0                                  |
| 2019 | 4                 | 4     | 1                     | –                     | 0.07                                 | 12.5                                  |
| 2020 | 7                 | 3     | 2                     | 2                     | 0.15                                 | 18.9                                  |

Note: DM, diabetes mellitus; DFS, diabetic foot syndrome.

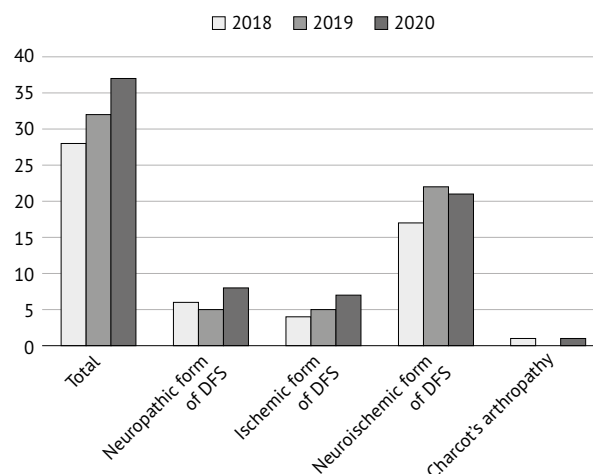
conducted in the office. Examination of patients with newly diagnosed type 2 DM reaches 90%–92%. The structure of patients with DFS who are registered in the diabetic foot office is shown in Fig. 1.

From the distribution of patients with DFS, the number of patients with the neuropathic form of DFS was smaller in UR (21.6%) than in the Russian Federation (41.6%) and that of the neuroischemic form was larger in UR DFS (56.8%) than in the Russian Federation (32.4%). An unfavorable DFS course with the development of extensive necrotic complications, osteomyelitis of the bones of the foot and lower leg, and inability to perform revascularization procedures result in limb amputation at different levels. Data on the performance of amputations in patients with DFS in GCH No. 6 are given in Table 2.

In the Russian Federation, the rate of amputations in type 2 DM accounts for 0.1% of the number of patients with DM, of which 45.5% were high amputations, similar indicators in SD.

Diagnostics of diabetic distal polyneuropathy was conducted in the “Diabetic foot” office of the endocrinological center. Vibration (using a biothesiometer), temperature, tactile, and proprioceptive sensitivity are assessed. In the diagnosis, the neuropathy symptom scale, visual analog scale, and D4 questionnaire are used. Thereafter, podiatric treatment is provided, and pharmacological preventive treatment is prescribed. In patients who are registered with the dispensary, examinations are prescribed at least two times a year. In patients with active Charcot arthropathy, the limb is unloaded using an individually selected orthosis, and in the inactive stage, the use of manufacturing complex orthopedic shoes is decided. Patients in need of operative revascularization are referred to the Department of Angio-Rentgen Surgery.

In keeping the pledged V.V. Trusov, the scientific potential for improving patient care, the office uses original treatment methods, for which there are patents of the Russian Federation, for example, the use of kinesio taping in the treatment of distal diabetic sensorimotor neuropathy (rationalization proposal of the Federal State Budgetary Educational Institution of Higher Education of the State

**Fig. 1.** Distribution of patients with diabetic foot syndrome (DFS) of the Izhevsk City Clinical Hospital No. 6 in 2018–2020

Medical Academy of the Ministry of Health of the Russian Federation No. 05.19, 2019) [7]. The method is used in a mixed muscular–lymphatic technique with fixation duration of up to 5–7 days. It helps reduce the sensory manifestations of neuropathy and increase the distance of pain-free walking.

With kinesio taping, vibrational and tactile sensitivity improved by  $10.1\% \pm 1.5\%$ . According to the Michigan screening test, physical data in patients with DFS are optimized by  $37.5\% \pm 9.5\%$ . The positive effect of taping lasts up to 2–3 months.

In the complex treatment of patients with DFS with ulcerative defects, autofactors stimulating regeneration (platelet-rich autoplasm and autofibrinogen) are used. Autologous blood of up to 15.0–20.0 mL is taken from patients and centrifuged with the autoplasm platelet concentrate according to the original method with the addition of Biosullina R (RF Patent No. 2695706) to the preparation [8]. The material is applied to the ulcer surface for 2–3 days, and course of treatment includes 5–7 procedures. Complete epithelialization of the ulcerative defect was noted in  $47.5\% \pm 9.9\%$  of the cases and a decrease in the size of ulcers by  $>50\%$  of the original area, representing  $21.4\% \pm 3.5\%$  of the cases. The method has no contraindications and reduces the treatment time by 22.5%–30.0%.

In the office, stimulating the regeneration of an ulcer defect is achieved successfully by applying

autofibronectin with autokeratinocytes to the ulcer surface in neuropathic and neuroischemic variants of DFS [9]. The technique does not require additional equipment, and it successfully treats ulcerative defects of various sizes. Autofibronectin was obtained from autologous blood according to the original method, autokeratinocytes were collected by skin excoriation, and the resulting stimulating autofactors were applied to the pretreated ulcer surface. Dressings were performed in 1–2 days, with 5–6 dressings for a course of treatment. This technique allows active regeneration according to cystogram data by  $9.0 \pm 1.5$  days. The technique allows in  $81.1\% \pm 9.7\%$  of cases to achieve epithelialization or reduce up to 30% of the initial area of the ulcer in DFS.

### CONCLUSION

The basic principles of practical and scientific diabetology introduced by Professor V.V. Trusov included the principles of domestic preventive medicine, active preventive orientation, rehabilitation work with the patients, constant scientific search for methods of treating patients with DM and its complications, such as DM. They make it possible to provide qualified assistance to patients with DM in Izhevsk. The diabetic foot office of the endocrinological center allows for the prevention and treatment of ulcerative necrotic processes. The plans of the “diabetic foot” office include the development and implementation of new methods of treating patients with SDS, use of indirect revascularization methods in neuroischemic forms, use of an immobilizing unloading bandage using the total contact cast technology for Charcot arthropathy, and improvement of clinical examination of patients with DFS.

**Author contributions.** E.W.H. put forward the concept of work and administered the project. A.Yu.M. contributed to text writing, literature review, and treatment and diagnostic studies of patients in the diabetic foot office. S.N.S. was involved in the analysis of the obtained data and development of the design of the study.

M.A.Z. and S.I.L. participated in conducting the research and obtaining and analyzing the results.

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### REFERENCES

1. In memoriam: Viktor V. Trusov. *Sakharnyy diabet.* 2012; (4): 136–137. (In Russ.) DOI: 10.14341/2072-0351-5554.
2. Styazhkina S.N., Klimentov M.N., Ledneva A.V., Meytis V.V., Varganov M.V., Akimov A.A. *Sovremennye aspekty khirurgicheskoy endokrinologii.* (Modern aspects of surgical endocrinology.) 2016; 221–224. (In Russ.)
3. Kir'yanov N.A. Trusov Viktor Vasilievich. *Uspekhi sovremennogo estestvoznaniya.* 2011; (6): 107–108. (In Russ.)
4. Dedov I.I., Shestakova M.V., Vikulova O.K., Zheleznyakova A.V., Isakov M.A. Diabetes mellitus in Russian Federation: prevalence, morbidity, mortality, parameters of glycaemic control and structure of glucose lowering therapy according to the Federal Diabetes Register, status 2017. *Sakharnyy diabet.* 2018; 21 (3): 144–159. (In Russ.) DOI: 10.14341/DM9686.
5. Galstyan G.R., Vikulova O.K., Isakov M.A., Zheleznyakova A.V., Serkov A.A., Egorova D.N., Artemova E.V., Shestakova M.V., Dedov I.I. Trends in the epidemiology of diabetic foot and lower limb amputations in Russian Federation according to the Federal Diabetes Register (2013–2016). *Sakharnyy diabet.* 2018; 21 (3): 170–177. (In Russ.) DOI: 10.14341/DM9688.
6. Standards of specialized diabetes care. Edited by Dedov I.I., Shestakova M.V., Mayorov A.Yu. 9th edition. *Sakharnyy diabet.* 2019; 22 (S1): 1–144. (In Russ.) DOI: 10.14341/DM221S1.
7. Styazhkina S.N., Mikhaylov A.Yu., Zavalina M.A., Likhovskikh S.I. Kinesiotaping in a complex treatment of patients with diabetic polyneuropathy of lower limbs, prevention of diabetic foot syndrome. *Modern problems of science and education.* 2019; (6): 164. (In Russ.)
8. Ivanova L.M., Khalimov E.V., Styazhkina S.N., Mikhailov A.Yu., Solovyov A.A. Platelet concentrate as a component of the treatment of trophic ulcers of the lower extremities. *Vestnik sovremennoy klinicheskoy meditsiny.* 2017; 10 (3): 7–10. (In Russ.) DOI: 10.20969/VSKM.2017.10(3).7-10.
9. Mikhailov A.Yu., Pronichev V.V., Soloviev A.A., Styazhkina S.N., Chernenkova M.L., Ledneva A.V. Efficiency of using stimulating autofactors for regeneration of local inflammatory and ulcerous processes. *Permskiy meditsinskiy zhurnal.* 2014; 33 (5): 58–64. (In Russ.) DOI: 10.17816/pmj31558-64.