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CLINICAL NURSING MONITORING OF PATIENTS WITH COMPLICATIONS OF TYPE 2 DIABETES

ABSTRACT

of the Dissertation

for acquiring the educational and scientific degree "Doctor"

Scientific supervisor

Prof. Silvia Borisova Dimitrova, Doctor of Public Health Sciences

Varna, 2025

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The dissertation contains 270 pages, including 28 tables, 69 figures, 5 schemes, 6 appendices. 249 literary sources are cited.
The dissertation was discussed and proposed for defense by the departmental council of the Department of Health Care at the Shumen Branch of the Medical University "Prof. Dr. Paraskev Stoyanov" - Varna on 04.12.2025.

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The materials for the defense are available in the Doctoral School Department of MU-Varna and are published on the MU-Varna website.

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INTRODUCTION

Diabetes mellitus (DM) is one of the most common metabolic diseases in modern society, characterized by chronic hyperglycemia, resulting from impaired insulin secretion, impaired insulin action, or a combination of both mechanisms. Chronic complications of diabetes affect a significant proportion of affected individuals and are among the leading causes of morbidity, disability, and mortality globally, which is why increasing attention is being paid to the role of the nurse in managing care and supporting the patient to achieve effective self-management of the disease.

The main components of effective control and management of diabetes mellitus include adherence to established principles of healthy nutrition, regular and adequate physical activity, systematic monitoring of blood sugar levels, adherence to prescribed drug therapy, as well as building sustainable skills and habits for the prevention and control of chronic complications. Of particular importance is the formation of healthy behavioral patterns and skills for coping with daily challenges related to self-management of the disease, which is directly related to the objectives of this study.

Modern medical and health care for patients with diabetes mellitus is carried out within a multidisciplinary team and is aimed at preventing acute complications and delaying the development of chronic vascular and neurological damage. The role of the nurse in this team is key in terms of implementing an individualized approach to the patient, providing comprehensive, continuous and high-quality care, as well as maintaining effective communication between the patient and other members of the team, which is an essential prerequisite for improving the quality of health care provided.

Nursing care for patients with diabetes mellitus includes assessment and monitoring of the clinical condition, recognition and observation of specific complications of the disease, as well as support in the process of treatment, recovery, self-control and self-management. The basis of the prevention of chronic complications of type 2 diabetes mellitus is early diagnosis and systematic preventive activities, which to a significant extent depend on the professional qualifications, competence and skills of the nurse. Her role includes motivating patients to active participation in the treatment process, provision of reliable information, consultation and training for strict adherence to medical recommendations, as well as support in the formation of healthy habits and behavior. At the same time, the nurse contributes to preserving and improving the quality of life of patients and provides significant

psychosocial support.

Optimization of nursing care in the conditions of outpatient control and clinical monitoring of patients with complications of type 2 diabetes mellitus is an important prerequisite for increasing patient satisfaction with the health care received, improving treatment outcomes and reducing the economic and social burden of the disease on the health system.

The relevance of this dissertation work is determined by the growing need for the nurse, as part of the multidisciplinary team, to expand her role towards independent clinical monitoring, follow-up and training of patients with complications of type 2 diabetes mellitus, in accordance with modern trends in the development of nursing practice and patient-centered care.

1. PURPOSE, TASKS, MATERIALS AND METHODS OF THE STUDY

1.1. Purpose, Tasks and Working Hypotheses

Purpose: To analyze and evaluate the role of the nurse in the clinical monitoring and care of patients with complications of type 2 diabetes mellitus in an outpatient setting (practice), with a view to improving nursing practice and enhancing patients' self-management and quality of life.

To achieve this purpose, the following tasks **were set**:

1. To perform a theoretical analysis of scientific sources and regulatory documents governing the activities, responsibilities and competencies of nurses in outpatient endocrinology practice.
2. To examine contemporary models and best practices of clinical nursing monitoring in patients with type 2 diabetes mellitus and its complications.
3. To investigate the role and functions of the nurse in the clinical monitoring and care of patients with complications of type 2 diabetes mellitus in an outpatient setting.
4. To study the interaction between nurses, physicians and the multidisciplinary team involved in the follow-up and care of patients with type 2 diabetes mellitus.
5. To assess the level of self-management, satisfaction with care and quality of life of patients with complications of type 2 diabetes mellitus.
6. To develop and implement a nurse-led outpatient control and monitoring program for patients with type 2 diabetes mellitus.
7. To evaluate the effect of the program on diabetes control indicators and on the subjective well-being of patients.
8. To formulate practical guidelines for improving nursing care for patients with complications of type 2 diabetes mellitus.

Working Hypotheses

Based on the reviewed literature and the stated aim of the dissertation, the following working hypotheses were formulated:

- There is a statistically significant positive relationship between the quality and intensity of clinical nursing monitoring and the level of disease self-management in patients with type 2 diabetes mellitus.
- The implementation of a nurse-led outpatient control and monitoring program leads to improvement in metabolic control, subjective well-being

and long-term prognosis of patients with complications of type 2 diabetes mellitus.

- Effective interaction between nurses, physicians and the multidisciplinary team improves the quality of care provided and reduces the risk of complications in patients with type 2 diabetes mellitus.
- Active participation of the nurse in patient education and support improves self-management, satisfaction with care and quality of life in patients with complications of type 2 diabetes mellitus.

1.2. Materials and Methods

1.2.1. Subject of the Study

The subject of the study is clinical nursing monitoring in patients with complications of type 2 diabetes mellitus, considered as a system of activities for planning, organization, coordination and evaluation of nursing care aimed at increasing the effectiveness of follow-up, the quality of healthcare and the improvement of patients' long-term prognosis.

In accordance with the subject of the research activity, the dissertation includes two main components:

- Theoretical study;
- Empirical study.

1.2.2. Objects of the Study

- Regulatory documents governing the activities, responsibilities and professional competencies of nurses in outpatient endocrinology practice;
- Literary and electronic sources presenting best practices, models and organization of nursing activities in patients with type 2 diabetes mellitus and its complications;
- Management processes of outpatient diabetes care related to planning, coordination, optimization and quality assessment of nursing activities;
- Patients with type 2 diabetes mellitus and related complications followed up in an outpatient setting;
- Nurses involved in outpatient monitoring, education and care of patients with type 2 diabetes mellitus;
- Endocrinologists involved in the organization, monitoring and control of patients with type 2 diabetes mellitus.

1.2.3. Study Design

The study design includes theoretical and empirical research.

I. Theoretical Study

The theoretical framework of the study was developed through a critical analysis of regulatory documents related to regulations, standards and professional competencies of nurses in outpatient endocrinology practice, as well as through analysis and synthesis of scientific literature in order to systematize concepts, theoretical models and best practices in clinical nursing monitoring. A comparative analysis was conducted to identify differences and common trends between Bulgarian and international models of nursing care, on the basis of which the main theoretical statements were summarized and the conceptual framework of the study was derived.

II. Empirical Study

1. **Qualitative study among medical professionals (physicians) regarding the role of the nurse in clinical monitoring and interaction within the multidisciplinary team**

The method used for data collection was the in-depth interview. The opinions of physicians recognized experts in the field of endocrinology were explored regarding the role of the nurse in clinical monitoring, the effectiveness of interaction within the multidisciplinary team and the factors determining the quality of healthcare provided to patients with complications of type 2 diabetes mellitus.

Data were collected through informal conversations in the participants' natural environment their workplace. Conditions were created for maximum freedom and spontaneous sharing of professional experience, opinions and personal impressions.

Qualitative Study among Endocrinologists

The qualitative study using in-depth interviews included 10 endocrinologists (n = 10), selected on a voluntary basis according to predefined inclusion criteria aimed at ensuring representativeness of expert opinions. All respondents were proven specialists with high qualifications and practical experience in the diagnosis, monitoring and follow-up of patients with type 2 diabetes mellitus. The interviews were conducted with experts working in healthcare institutions in the city of Ruse: DCC 1 – Ruse Ltd., DCC 2 – Ruse Ltd., MC 1 – Ruse Ltd., MC Ruse, MC "Medic Consult" Ltd., Kanev University Hospital JSC and Medica University Hospital JSC.

Participants were selected based on their position in the organization of the treatment process and their practical experience in outpatient monitoring and control of patients with type 2 diabetes mellitus. The respondents included both physicians with managerial and coordinating functions and specialists actively involved in daily

clinical and follow-up activities.

For the purposes of the in-depth interviews, a specific research instrument was developed – Questionnaire No. 1 for conducting in-depth interviews. The structure of the questionnaire was built around three main thematic areas and a concluding section, covering the key aspects of the study.

The in-depth interviews with the experts (endocrinologists) were conducted by the researcher between November 2024 and January 2025. Participants were personally invited after prior communication and provision of detailed information about the aims and content of the study. The interviews were conducted face-to-face at a convenient time and place for the respondents – at their workplaces (endocrinology offices, outpatient practices or hospital departments).

At the beginning of each interview, the purpose of the study was presented, full anonymity and voluntary participation were guaranteed, and informed consent was obtained for conducting and audio-recording the conversation. Each interview lasted on average between 50 and 60 minutes and followed a pre-developed thematic framework ensuring comparability and analytical validity of the collected information. After completion, the audio recordings were transcribed verbatim and subjected to content (thematic) analysis, including coding and extraction of main themes and categories reflecting the participants' professional perceptions and experience.

2. Qualitative Study among Nurses on Professional Competencies and Activities in the Care of Patients with Type 2 Diabetes Mellitus

For the purposes of the qualitative study among nurses, a specific research instrument was developed – Questionnaire No. 2 for standardized face-to-face interviews. The instrument was designed to collect reliable and comparable information regarding nurses' professional competencies, activities, attitudes and readiness to participate in the provision of contemporary healthcare for patients with type 2 diabetes mellitus. The questionnaire is structured into three thematic blocks covering all main directions of the study.

The questions are standardized in wording and sequence, and all respondents were interviewed in the same order and with the same questions. The wording is clear, neutral and non-directive, ensuring ethical and objective data collection. Closed-ended questions with the possibility of choosing one or more answers predominate, which ensures comparability and facilitates analysis. Some questions include an "other" field allowing participants to add their own comments or clarifications, thus supplementing the qualitative aspect of the study.

The interviews were conducted personally by the researcher, ensuring

adherence to the standardized procedure and high reliability of the information. Each interview lasted approximately 30–40 minutes and was conducted in a calm environment at the respondents' workplaces. Before the start, the purpose of the study was explained, anonymity and voluntary participation were guaranteed, and after obtaining oral informed consent, the conversation was recorded and a protocol note was prepared.

The interview data were processed through a systematized analysis of expert opinions, summarizing key themes and trends related to clinical nursing monitoring in patients with type 2 diabetes mellitus.

The standardized interview survey included 70 nurses (n = 70), selected on a voluntary basis according to predefined inclusion criteria: professional experience in caring for patients with type 2 diabetes mellitus, active involvement in outpatient monitoring and counseling, and willingness to participate in the study.

Respondents work in various structures of the healthcare system in Ruse region, providing broad representation of nursing practice in outpatient and hospital endocrinology care. The study included nurses working in primary care outpatient practices, endocrinology offices, as well as endocrinology departments and units of regional hospitals.

Specifically, the interviewed nurses were from the following healthcare institutions: "APIMP-IP Tural" Ltd., "APIMP-IP Dr. Bozhidar Nikolov" Ltd., "APIMP-IP Dr. Krasimira Boycheva" Ltd., "APIMP-IP Dr. Velislava Bryazovska" Ltd., APIMP GP "Megamed" Ltd., "APIMP-IP Dr. Gergana Dimitrova Ruse" Ltd., "APIMP-IP Dr. Rositsa Getsova" Ltd., "APIMP-IP Dr. Maria Dzhurova" Ltd., "APIMP-IP Dr. Tatyana Zhekova" Ltd., "APIMP-IP Dr. Kostadinova" Ltd., "DCC 1 – Ruse" Ltd., "DCC 2 – Ruse" Ltd., "MC 1 – Ruse" Ltd., "MC Ruse" Ltd., MC "Medic Consult" Ltd., "Medica" Ruse University Hospital Ltd., "Kanev" University Hospital JSC.

Participants had diverse professional experience ranging from less than 5 to more than 25 years. The average age of respondents was between 41 and 55 years, reflecting a group with established practical experience and long-term professional commitment.

The interviews were conducted between October and December 2024 at the participants' workplaces in a calm environment allowing free expression of opinions. Before each interview, the purpose of the study was explained, anonymity, voluntariness and confidentiality were guaranteed, and oral informed consent was obtained.

3. Quantitative Study among Patients on the Level of Disease Self-Management, Satisfaction with Healthcare and Perceived Quality of Life

As part of the empirical research, a quantitative sociological survey was conducted among patients with type 2 diabetes mellitus, aimed at assessing the level of disease self-management, satisfaction with healthcare and perceived quality of life. The study was carried out among patients under dispensary follow-up in primary care outpatient practices and endocrinology offices in Ruse region. The study included patients with type 2 diabetes mellitus aged over 40 years who voluntarily agreed to participate and independently completed a questionnaire. The total number of respondents was 180 (n=180).

For the experimental part of the study, two research groups were formed:

- Experimental group (EG): patients in whom a nurse-developed Outpatient Blood Glucose Control Program was implemented (n=15). Within the program, patients participated in structured training conducted by a nurse, aimed at effective blood glucose control, prevention of acute and chronic complications, and development of disease self-management skills.
- Control group (CG): patients receiving standard healthcare and dispensary monitoring activities regulated by the National Framework Contract and existing standards for outpatient care (n=15).

Two consecutive patient surveys were conducted to assess disease self-management, health behavior attitudes and satisfaction with care. Two questionnaires were developed to evaluate changes in self-control, self-management and quality of life among participants in the experimental program.

1.2.4. Organization of the Study

The study was conducted after approval by the Ethics Committee for Scientific Research at the Medical University – Varna (Decision No. 142 of 18 April 2024).

To ensure accuracy, the main part of the study was carried out independently by the PhD candidate. Access to patients and implementation of the experiment were facilitated with the cooperation of the managers of the participating healthcare institutions, without compromising the independence of data collection and analysis.

All collaborators were informed in advance about the aims, scope and methodology of the study and were trained to work with the research instruments: personal data protection notice, respondent information sheet, informed consent form

and questionnaires. All collaborators signed a declaration of confidentiality and personal data protection. The empirical studies were conducted in strict compliance with ethical standards and voluntary participation, ensuring full anonymity of the information provided.

1.3. Design of the Experimental Study

The aim of the experiment was to assess the role of the nurse within the healthcare team in improving disease self-management and preventing complications in patients with type 2 diabetes mellitus through implementation of an outpatient blood glucose control program.

The experimental study included 30 patients (n = 30) selected from those who had completed Questionnaire No. 1 and expressed willingness to participate. Based on voluntariness and equality principles, two groups were formed: an experimental group (n=15) and a control group (n=15). Participants were selected according to predefined inclusion and exclusion criteria. The study was conducted as a quasi-experimental field study with pre-test and post-test measurements and a control group.

The main independent variable was the implementation of the nurse-led training program for outpatient control, and the dependent variables were:

- level of disease self-management;
- indicators of metabolic control (blood glucose, HbA1c, lipid profile, blood pressure);
- subjective assessment of quality of life and satisfaction with care.

A comprehensive set of instruments was developed and applied, including questionnaires, a self-monitoring diary, a health status observation chart and informational materials, all specifically adapted to the study population.

1.4. Methods of the Study

1.4.1. Sociological Methods

- Questionnaire survey to collect quantitative data from patients with type 2 diabetes mellitus regarding disease self-management, health status, physical activity, dietary habits, satisfaction with care and quality of life.
- In-depth interviews to explore the role of the nurse in clinical monitoring, the effectiveness of multidisciplinary team interaction and factors determining quality of care.
- Standardized interviews to study professional competencies, activities and attitudes regarding nurses' participation in patient education and follow-up.

- Experimental method to evaluate the effectiveness and applicability of the developed nursing intervention in outpatient practice.

1.4.2. Statistical Methods

The following statistical approaches were used for processing and analyzing the data:

- Descriptive statistics (frequencies, percentages, means).
- Correlation analysis to identify the presence and strength of statistical relationships, considering only dependencies with high statistical reliability ($P \geq 0.95$).
- Variance analysis for one-dimensional empirical distributions.
- Comparative analysis before and after program implementation and between experimental and control groups.
- Graphical analysis to visualize trends and differences.

Normality of distribution was tested using the Kolmogorov–Smirnov test and homogeneity of variances with Levene's test ($\alpha = 0.05$). Student's t-test and Pearson's chi-square test were applied, with all results interpreted at $P \geq 0.95$ ($\alpha \leq 0.05$).

1.5. Design of the Program "I Control My Diabetes"

To improve disease self-management in type 2 diabetes mellitus and enhance the effectiveness of nursing care in outpatient settings, the intervention program "I Control My Diabetes" was developed. The program has a clearly structured content and combines educational and practical approaches for acquiring knowledge, skills and habits for self-control of the disease. It is based on international best practices and recommendations of the World Health Organization (WHO) and the International Diabetes Federation (IDF), adapted to the national context and the professional role of the nurse.

The program was applied to patients with complications of type 2 diabetes mellitus in the experimental group and aims to achieve sustainable improvement in self-control, behavioral change and enhanced quality of life through active patient participation and targeted nurse support.

The program consists of five thematic modules, each containing specific educational topics and practical guidelines to enhance knowledge and self-management. It is implemented through group training and discussion sessions led by the researcher (nurse). Each session lasts 45–60 minutes and includes interactive dialogue, discussion of real clinical cases and demonstrations of correct self-monitoring techniques.

2. RESULTS AND DISCUSSION

2.1. Characteristics of the subjects

Study among patients with type 2 diabetes mellitus

The scientific study examined the opinions of 180 patients with type 2 diabetes mellitus (n=180). Basic demographic characteristics were analyzed, including gender, age, marital status, place of residence, employment, and income adequacy. The gender distribution was relatively balanced – 46.11% (n=83) men and 53.89% (n=97) women, which is consistent with national epidemiological data and reflects a slightly higher proportion of women in older age. The study included patients from different age groups, which ensures representativeness of the sample (Fig. 1).

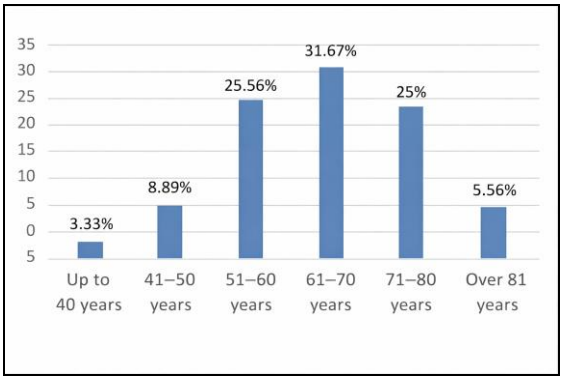


Figure 1. Distribution of patients by age

The smallest group is that of patients up to 40 years of age – 3.33% (n=6), while the largest share is represented by individuals aged 61–70 years – 31.67% (n=57). Patients aged 51–60 years account for 25.56% (n=46), and those aged 71–80 years – 25.00% (n=45). Only 5.56% (n=10) are over 81 years of age. The data indicate that the main part of the sample is concentrated in the age range of 51–80 years, which is characteristic of a longer course of type 2 diabetes mellitus and an increased risk of complications. This justifies the need for targeted training in self-control and lifestyle modification.

With regard to marital status, 62.78% (n=113) of the respondents are married, 18.33% (n=33) are widowed, 13.89% (n=25) are divorced, and 4.99% (n=9) are single. Analysis of employment status shows that 50.56% (n=91) of the patients are not working, 46.67% (n=84) are employed, and 2.78% (n=5) are retired.

Patients' financial resources emerge as a significant factor for adherence to

recommendations for blood glucose control, particularly with respect to diet and access to medications and self-monitoring supplies. A moderate statistically significant association was found between income adequacy and adherence to dietary regimen ($\chi^2 = 21.36$; df = 2; $p < 0.05$), confirming the importance of socio-economic factors in planning individualized nursing care (Table 1).

Table 1. Relationship between income level and adherence to the dietary regimen among patients with type 2 diabetes mellitus

Income category	**Adhere to the regimen (N)**	**Do not adhere to the regimen (N)**	**Total (N)**
Income is sufficient	45	20	65
Income is insufficient	30	74	104
Income is extremely insufficient	2	9	11
Total (N/%)	**77 (42.8%)**	**103 (57.2%)**	**180 (100%)**

Among patients with sufficient income, 69.23% (n = 45) adhere to the recommended dietary regimen, whereas non-adherence predominates among individuals with insufficient and extremely insufficient financial resources—71.15% (n = 74) and 81.82% (n = 9), respectively. The data confirm a statistically significant association between income adequacy and adherence to the dietary regimen, highlighting the importance of socio-economic factors in planning individualized nursing interventions.

Assessment of Patients' Physical Activity and Nutrition

Physical activity and nutrition are key components of self-management in type 2 diabetes mellitus and are essential for maintaining optimal glycaemic control and preventing chronic complications. The analysis of the results focuses on evaluating the actual status of these lifestyle aspects among the studied patients.

The results show that physical activity among patients with type 2 diabetes mellitus is limited and, in a substantial proportion of cases, insufficient to achieve effective metabolic control. Most often, patients report walking as their main form of physical activity—23.89% (n = 43) for up to 30 minutes daily and 36.67% (n = 66) for up to 60 minutes. Longer activity of up to 120 minutes per day is reported by 26.67% (n = 48), and more than 120 minutes by 12.78% (n = 23) of the respondents. Walking and light exercises predominate, while structured sports activities are rarely reported (Fig. 2).

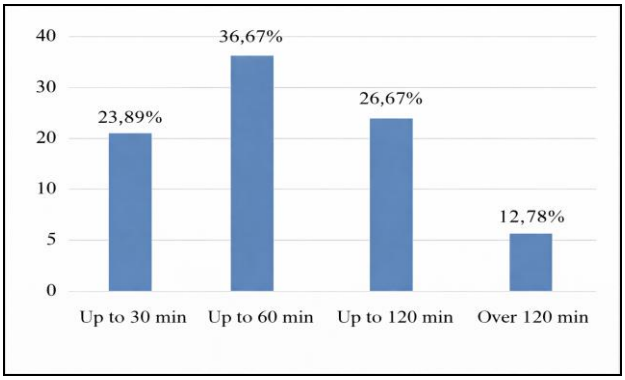


Figure 2. Physical Activity

The largest proportion of patients perform activities of moderate intensity at home and at the workplace – 48.33% (n=87), followed by individuals with low levels of physical activity – 36.67% (n=66). High-intensity activity is reported by only 6.11% (n=11), while 8.89% (n=16) of respondents are unable to assess its level. A statistically significant relationship between age and level of physical activity was found ($p < 0.05$), with a clear tendency toward decreasing intensity of daily and leisure-time physical activity with advancing age.

Analysis of dietary behavior shows that 58.89% (n=106) of patients do not adhere to dietary recommendations related to the control of type 2 diabetes mellitus. This result indicates a substantial deficit in adherence to dietary guidelines, which is a key factor for glycaemic control and prevention of complications. Further analysis shows that the largest proportion of patients eat three times a day – 63.33% (n=114), while 28.33% (n=51) eat twice daily and 7.22% (n=13) more than three times per day (Fig. 3).

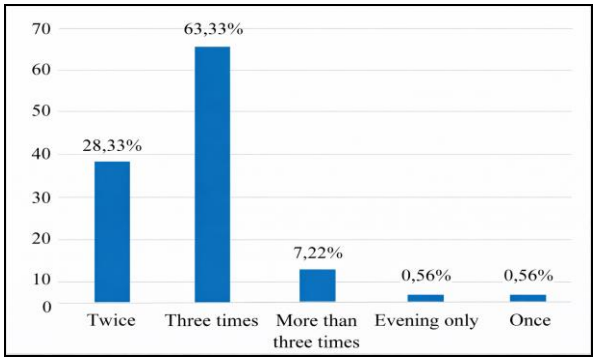


Figure 3. Number of meals per day

Although most patients demonstrate relatively regular meal patterns, in some cases the frequency is insufficient and may adversely affect glycaemic control.
Regarding the consumption of sweet foods, 40.00% (n=72) report eating them very rarely, and 17.22% (n=31) do not consume them at all, while daily intake is reported by a minimal proportion – 2.78% (n=5). These data indicate a relatively good level of awareness of the effect of simple carbohydrates on glycaemic control, but also highlight the need for additional education and support for some patients in order to optimize dietary habits.

Statistical analysis reveals a significant association between adherence to dietary recommendations and the frequency of consumption of sweet foods (χ^2 = 18.82; df = 4; $p < 0.001$). Patients who do not follow the dietary regimen consume sweet foods more frequently, whereas among those who adhere to recommendations, the categories “never” and “very rarely” predominate.

The largest proportion of patients consume salty foods very rarely – 34.44% (n = 62), or have completely excluded them from their diet – 17.78% (n = 32). Salty foods are consumed once a week by 29.44% (n = 53), while daily consumption is reported by only 5.56% (n = 10), indicating relatively good compliance with recommendations to limit salt intake (Fig. 4).

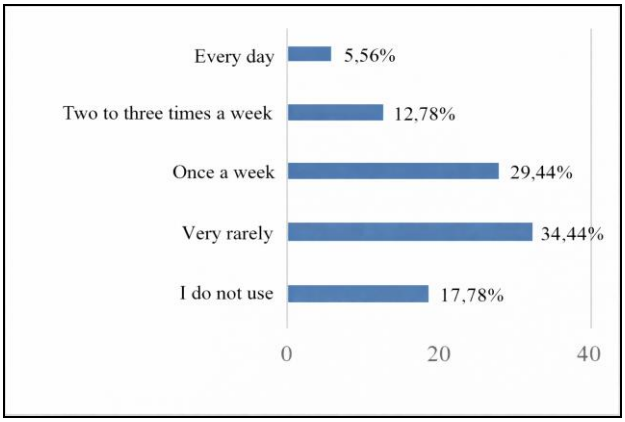


Figure 4. Consumption of salty foods

Foods containing animal fats are consumed very rarely by 37.22% (n=67) of patients or are completely excluded from the diet by 20.00% (n = 36). Such products are consumed once a week by 23.33% (n=42), two to three times per week by 14.44%

(n=26), while daily consumption is reported by only 5.00% (n=9), indicating relatively good compliance with recommendations to limit saturated fat intake.

Fresh fruit and vegetable intake is reported as daily by 47.22% (n=85) of patients, and 30.56% (n=55) include them in their diet two to three times per week. Nevertheless, 10.56% of respondents consume them very rarely or do not include them in their diet at all, highlighting the need for additional education on balanced nutrition for some patients with type 2 diabetes mellitus.

Statistical analysis did not reveal a significant association between the frequency of consumption of fresh fruits and vegetables and the intake of foods containing animal fats ($\chi^2 = 10.58$; df = 16; p = 0.834). This indicates that the two dietary habits occur independently and that patients do not compensate for higher intake of animal fats by increasing consumption of plant-based foods.

A substantial proportion of patients limit their intake of white flour products – 29.44% (n=53), which is a favorable practice for glycaemic control. However, 6.67% (n=12) of the respondents continue to consume them ежедневно (daily). Statistical analysis shows a significant association between adherence to dietary and physical activity regimens and income adequacy (one-sided $p < 0.05$), indicating the substantial influence of financial resources on patient behavior in controlling type 2 diabetes mellitus.

The main reasons reported by respondents for not following the recommended dietary regimen and eating patterns are predominantly financial and organizational difficulties (Fig. 5).

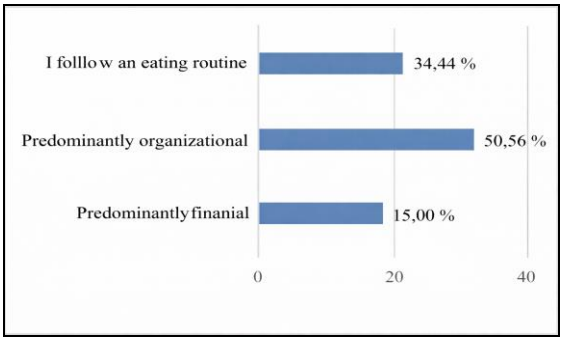


Figure 5. Reasons for non-adherence to the dietary regimen

The main difficulties in adhering to the dietary regimen are predominantly organizational in nature, reported by 50.56% (n = 91) of patients, while financial constraints rank second at 15.00% (n = 27). At the same time, 34.44% (n = 62) of the respondents state that they strictly follow dietary recommendations. Statistical

analysis reveals a significant association between adherence to dietary and physical activity regimens and income adequacy (one-sided $p < 0.05$), underscoring the role of socio-economic factors in the control of type 2 diabetes mellitus.

The level of education is important with regard to awareness and adherence to recommendations for blood glucose control (Fig. 6).

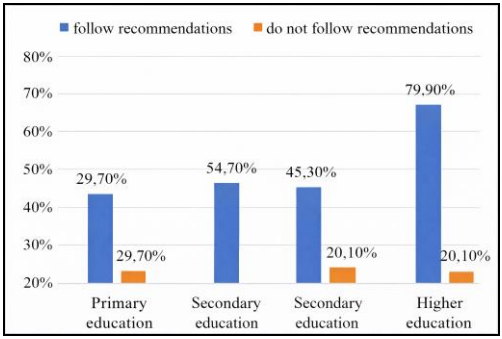


Figure 6. Adherence to dietary and physical activity recommendations by level of education

Respondents with a higher level of education demonstrate better awareness and stricter adherence to recommendations for a healthy lifestyle, highlighting the importance of health education for effective disease self-management. The results show a statistically significant relationship between educational level and adherence to dietary and physical activity recommendations ($p < 0.05$).

Adherence to the recommended dietary regimen is a key element in the management of type 2 diabetes mellitus, and compliance with dietary recommendations, blood glucose self-monitoring and health-related behaviors differ by gender. Men show higher levels of physical activity but also more frequent deviations from the recommended dietary regimen (Fig. 7).

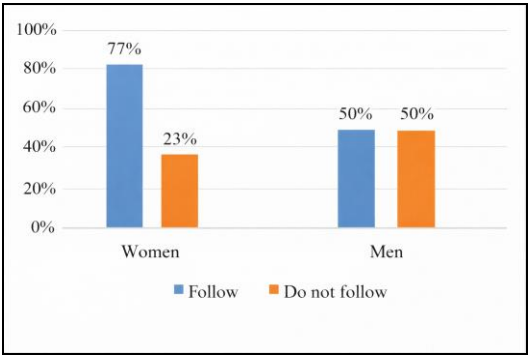


Figure 7. Adherence to the dietary regimen by gender among patients with type 2 diabetes mellitus

Women report systematic adherence to the dietary regimen and greater responsibility for blood glucose control more often than men ($p < 0.05$). Patients who follow dietary recommendations maintain better glycaemic values ($r = 0.46$; $p < 0.05$). A similar relationship is observed between physical activity and glucose control, confirming that the combined approach of diet and exercise is the most effective in managing the disease.

Health Status of the Studied Patients and Awareness of the Disease

Assessment of the health status and level of awareness of patients with type 2 diabetes mellitus is essential for understanding the factors that influence the effectiveness of self-control and adherence to prescribed treatment. The chronic nature of the disease, the need for constant blood glucose monitoring and lifestyle modification require a high degree of patient engagement and knowledge. Among patients with a duration of type 2 diabetes mellitus exceeding 10 years, the frequency of complications reaches approximately 75%, confirming the progressive nature of the disease (Fig. 8).

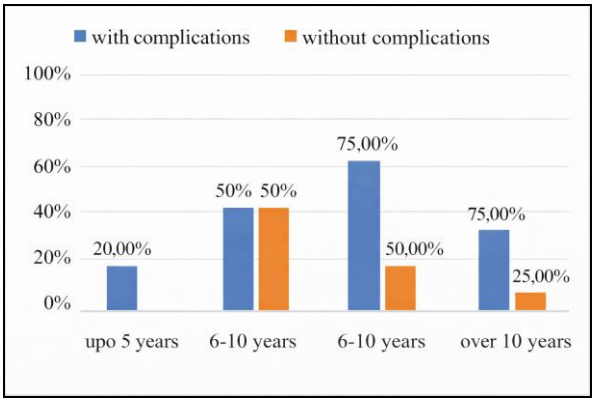


Figure 8. Distribution of complications according to disease duration

A statistically significant relationship was found between disease duration and the risk of developing chronic complications—vascular, neurological and retinal ($p < 0.05$), with the probability of their occurrence increasing proportionally with the number of years the patient lives with the disease.

Chronic complications of type 2 diabetes mellitus were identified in 53.33% (n = 96) of the surveyed patients (Fig. 9).

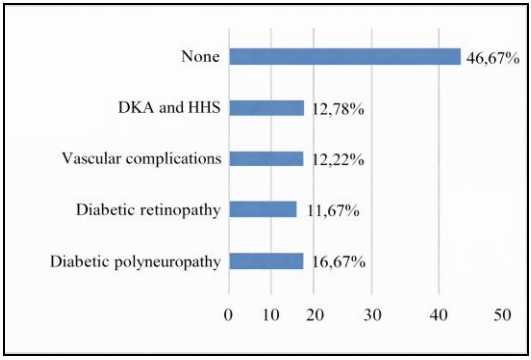


Figure 9. Complications of diabetes mellitus

The most common complication is diabetic peripheral neuropathy – 16.67% (n=30), followed by diabetic retinopathy – 11.67% (n=21), and vascular complications – peripheral and cardiovascular – 12.22% (n=22). Combined complications, including both diabetic peripheral neuropathy and retinopathy, were registered in 12.78% (n=23) of patients. In 46.67% (n=84) no chronic complications were identified.

A statistically significant relationship was found between the duration of

diabetes mellitus and the occurrence of complications ($p < 0.05$), as well as between manifested complications and the effectiveness of home blood glucose self-monitoring ($p < 0.05$). These associations confirm that as the duration of the disease increases, the risk of developing chronic complications rises significantly, especially in patients with insufficient self-control and irregular monitoring of glycaemic values.

Chronic comorbidities have a significant impact on the control and course of type 2 diabetes mellitus. Among the studied patients, the most frequently reported comorbidity is arterial hypertension – 32.78% (n=59), followed by previous myocardial infarction – 14.44% (n=26) and stroke – 8.33% (n=15), highlighting the high cardiovascular risk in the studied population. Less frequently reported were gout – 7.22% (n=13) and other chronic diseases – 5.56% (n=10), while 31.67% (n=57) of patients reported no additional chronic conditions (Fig. 10).

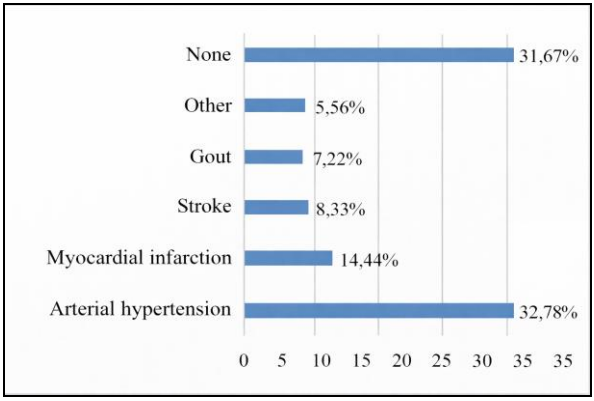


Figure 10. Comorbid chronic diseases among patients

The analysis showed a statistically significant relationship between disease duration and the presence of chronic comorbidities ($\chi^2 = 12.74$; $p = 0.000 < 0.05$). Patients who do not regularly measure their blood glucose levels more often suffer from hypertension, indicating an interrelationship between self-monitoring and the presence of comorbid conditions ($\chi^2 = 9.83$; $p = 0.002 < 0.05$).

Patient awareness is a key factor for effective self-management of type 2 diabetes mellitus, as knowledge about the disease, its risks, blood glucose control, nutrition and physical activity largely determines the success of therapy and prevention of complications. In this regard, the sources from which patients receive information about the disease and the necessary behavioral changes after diagnosis were analyzed (Fig. 11).

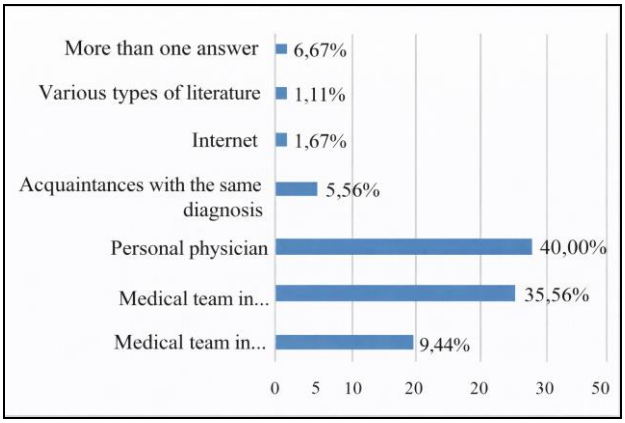


Figure 11. Sources of information on blood glucose control methods

The main source of information after the diagnosis of type 2 diabetes mellitus is the medical team in primary outpatient care – 40.00% (n=72), followed by an endocrinologist in specialized outpatient care – 35.56% (n=64). A smaller proportion of patients receive information in endocrinology departments – 9.44% (n=17), from acquaintances with the same diagnosis – 5.56% (n=10), or combine more than one source – 6.67%. The use of internet sources and specialized literature is limited. Correlation analysis reveals a statistically significant positive relationship between the level of awareness and satisfaction with the care received ($p < 0.05$), indicating that better-informed patients rate the quality of healthcare more highly.

Almost half of the patients have undergone training covering the main aspects of self-management in type 2 diabetes mellitus – dietary regimen, physical activity and behavior in hypo- and hyperglycaemic states (46.11%; n=83). At the same time, an identical proportion of respondents (46.11%; n=83) report that they have not participated in organized training for disease management, highlighting a significant deficit in educational coverage. The data show statistically significant associations between participation in training and gender ($p < 0.05$), age ($p < 0.05$) and educational level ($p < 0.01$). Women in younger age groups and individuals with higher education participate more frequently in diabetes self-management education programs, whereas the lowest engagement is observed among men, patients over 60 years of age and those with primary education (Table 2).

Table 2. Cross-tabulation (χ^2) analysis of the relationship between participation in training and patients' main demographic characteristics

Demographic Factor	Category	Trained (N)	Not trained (N)	Total (N)	χ^2	df	p
Gender	Women	55	50	105	4.21	1	0.040
	Men	28	47	75	-	-	-
Age	25–45 г.	32	23	55	7.84	2	0.020
	46–60 г.	36	42	78	-	-	-
	> 60 г.	15	32	47	-	-	-
Education	Primary	12	28	40	10.91	2	0.004
	Secondary	38	47	85	-	-	-
	Higher	33	22	55	-	-	-

As part of the multidisciplinary team, the nurse participates in patient monitoring, education and counseling. The study assessed patients' perceptions of the quality and effectiveness of healthcare in type 2 diabetes mellitus, as well as their trust in the nurse as a consultant and educator in the field of self-management and prevention of complications. Age and gender were not identified as determining factors for satisfaction with healthcare in the studied group. Patients aged 25–45 years reported higher satisfaction, whereas partial satisfaction was more frequently observed among those over 60 years of age; however, these differences did not reach statistical significance ($p > 0.05$). In contrast, the analysis shows a statistically significant relationship between satisfaction with healthcare and patients' educational level ($p < 0.05$).

The level of awareness regarding the disease and self-management is a critical factor shaping patients' sense of security, competence and empowerment. Patients who have more frequent interactions with the nurse and receive information about the disease rate the quality of care provided more highly.

To determine whether willingness to participate is related to basic socio-demographic characteristics, a comparison of frequency distributions using χ^2 analysis was performed. Women are significantly more willing to participate in programs related to self-control and prevention, which is consistent with data in the literature indicating higher health engagement among women (Fig. 12).

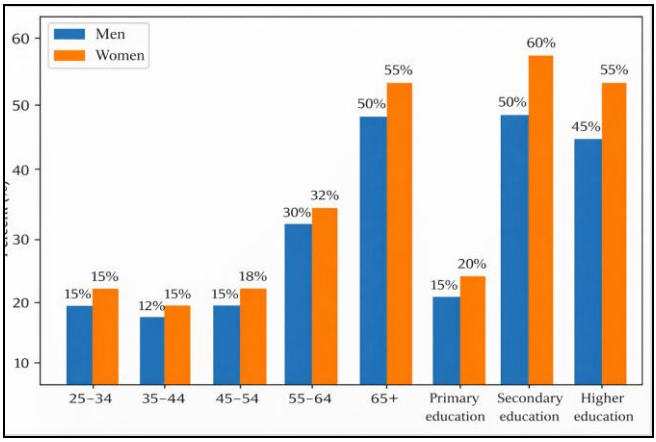


Figure 12. Willingness to participate in training among patients with type 2 diabetes mellitus by age, educational level and gender (%)

Women express a higher willingness to participate (76.36%) compared with men (54.29%). The highest levels of willingness are observed in the 65+ age group (50% of men; 55% of women), outlining age as a factor with an increasing but borderline influence. Age-related differences in motivation and perception of nursing education are identified, with probable contributing factors being low digital literacy, reduced interest in behavioral change and more deeply rooted habits ($p \approx 0.05$).

Willingness to participate increases from 15% among men and 20% among women with primary education to 50% and 60%, respectively, among those with secondary education, and reaches 45% among men and 55% among women with higher education. A statistically significant relationship is established between educational level and willingness to participate in nursing education ($p < 0.05$). The data confirm that gender and educational level are leading determinants of willingness to participate, while age shows a borderline effect, highlighting the importance of health literacy and socio-cultural characteristics in planning nursing interventions.

2.2. Professional Perceptions of the Role of the Nurse in the Care of Patients with Type 2 Diabetes Mellitus (results of the standardized interview)

Professional Profile and Role of Nurses in the Care of Patients with Type 2 Diabetes Mellitus

Type 2 diabetes mellitus is a chronic socially significant disease that requires long-term control, active patient participation and coordinated actions by healthcare professionals. In the context of increasing prevalence and a growing frequency of

chronic complications, the effectiveness of care largely depends on the role of the nurse as a key participant in clinical monitoring, patient education and support.

In their professional activity, nurses maintain continuous contact with patients, support self-control and disease self-management, monitor health status and assist in adapting therapeutic and behavioral recommendations to individual needs. Through interaction with the physician and the patient's family, the nurse performs a coordinating function aimed at ensuring consistent and integrated care.

Nursing practice for patients with type 2 diabetes mellitus requires a complex set of professional competencies, including clinical skills, monitoring of key health indicators, education, counseling and support in the process of disease self-management. In this context, nurses' professional perceptions are an important source of information about the real opportunities, limitations and challenges in practice, as well as about the potential for improving nursing care, especially in outpatient settings.

Despite the importance of the nursing role, daily practice often reveals limited opportunities for the full realization of nurses' professional potential, particularly in outpatient care. This necessitates a systematic and structured approach to patient education, counseling and follow-up for individuals with type 2 diabetes mellitus.

Nurses' professional perceptions of their role in the care of patients with type 2 diabetes mellitus, their attitudes toward patient education and counseling, perceived competencies and limitations, as well as their evaluation of interaction within the multidisciplinary team, were examined through a standardized interview. The study included 70 nurses (n = 70) working in various structures of hospital and outpatient care—primary care outpatient practices, endocrinology offices in specialized outpatient care, therapeutic departments with an endocrinology profile, and the endocrinology department of a university multidisciplinary hospital for active treatment (Fig. 13).

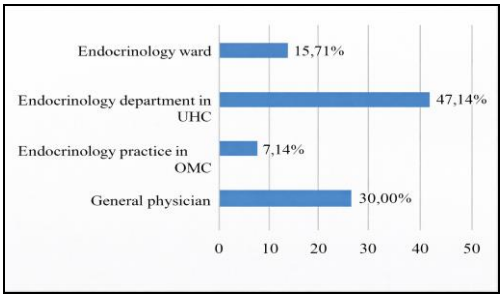


Figure 13. Distribution of nurses by workplace

The hospital setting plays a leading role in the provision of nursing care related to acute and complicated diabetic conditions (47.14%). At the same time, the data point to the need to strengthen the role of nurses in outpatient structures, where long-term follow-up, education and patient support are provided—elements that are critical for successful disease self-management.

The largest proportion of nurses in the sample are those with more than 26 years of professional experience, highlighting the predominance of long-practicing specialists – 37.14% (n=26). Relatively similar proportions are observed among nurses with 5–10 years of experience – 20.00% (n=14) and those with 11–15 years – 18.57% (n=13). The group with 16–25 years of experience is represented by 11.42% (n=8) of respondents. The lowest proportion is found among nurses with less than 5 years of work experience – 12.86% (n=9). Of particular interest is the extent to which accumulated professional experience contributes to the subjective sense of professional competence, autonomy and readiness for independent clinical decision-making when working with patients with chronic diseases (Fig. 14).

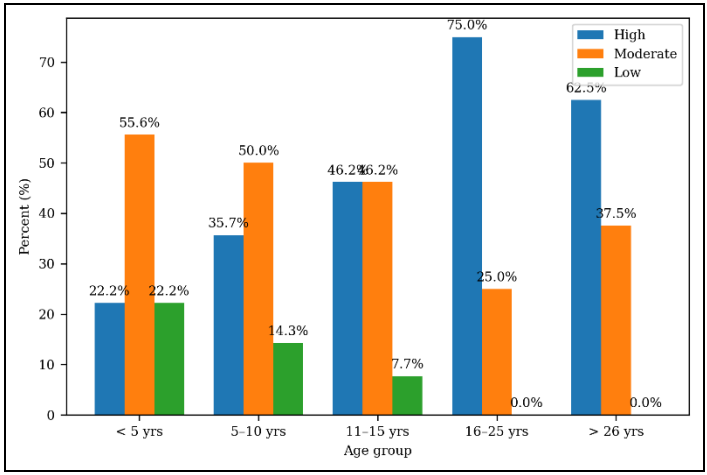


Figure 14. Relationship between professional experience and confidence in the professional role of the nurse

Among nurses with less than 5 years of professional experience, moderate professional confidence predominates (55.6%), with a substantial proportion reporting low confidence (22.2%), reflecting the initial stage of professional development. With increasing years of experience, a clear trend toward higher self-assessed professional competence is observed: in the groups with 11–15 and 16–25 years of experience,

high confidence predominates (46.2% and 75.0%, respectively), while low confidence is no longer present. A similar trend is observed among nurses with more than 26 years of experience. Professional experience is established as a leading factor in the formation of professional confidence in the care of patients with type 2 diabetes mellitus, with the relationship being statistically significant ($\chi^2 = 16.44$; $p < 0.05$).

Job Satisfaction, Professional Development and Training Needs among Nurses Caring for Patients with Diabetes Mellitus

Job satisfaction, opportunities for professional development and needs for additional training are key determinants of the effectiveness and sustainability of nursing practice in caring for patients with type 2 diabetes mellitus. Care for this patient group requires complex competencies, including clinical monitoring, education and support for self-management. Nurses' evaluations on these indicators are directly related to their motivation, professional commitment and readiness to apply contemporary approaches in diabetes care, as well as to staff retention in clinical practice.

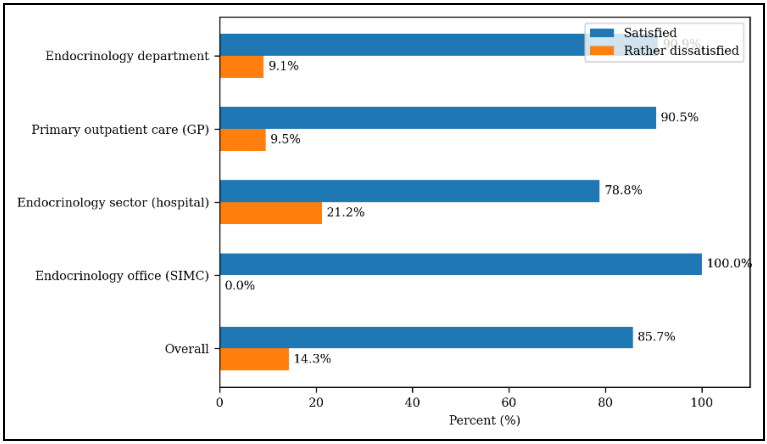


Figure 15. Job satisfaction

All nurses working in specialized outpatient endocrinology offices report satisfaction with their job responsibilities – 100% (n = 5), which can be interpreted as a reflection of a well-structured work organization and clearly defined professional roles. In endocrinology departments, a very high level of satisfaction is also observed – 90.9% (n=10), with dissatisfaction represented by a single case – 9.1% (n=1). A similar profile is found among nurses working in primary outpatient care practices,

where 90.5% (n=19) are satisfied and 9.5% (n=2) are rather dissatisfied. Among nurses from endocrinology units within therapeutic departments, a relatively lower but still high level of satisfaction is reported – 78.8% (n=26), with 21.2% (n=7) being rather dissatisfied, which is likely related to the higher work intensity and broader scope of professional duties.

A statistically significant relationship is found between workplace and job satisfaction ($p = 0.048$). The organizational structure in which the nurse works influences their level of satisfaction. The high values in outpatient and specialized units and the lower values in therapeutic departments support this conclusion.

Assessment of opportunities for professional development is a key indicator of the organizational environment and the capacity of the healthcare institution to provide conditions for improving nursing practice. It is directly related to motivation, staff retention and the quality of care provided, especially in areas with high requirements for clinical competence such as diabetes care (Fig. 16).

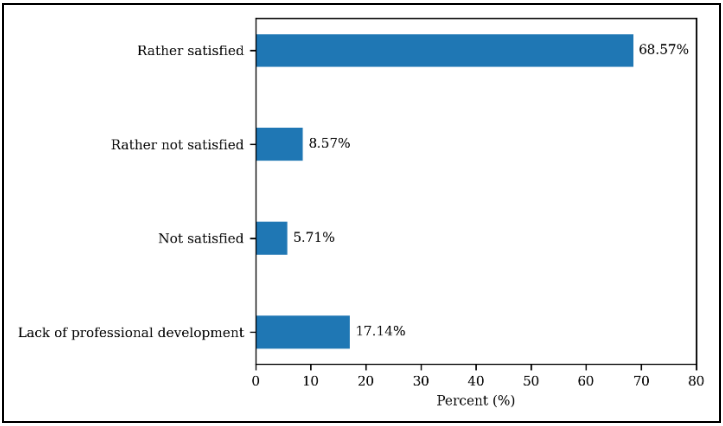


Figure 16. Satisfaction with professional development at the workplace

The data indicate a predominantly positive assessment of opportunities for professional development, with 68.57% (n=48) of nurses expressing satisfaction, suggesting the presence of supportive organizational conditions in most healthcare structures. At the same time, 8.57% (n=6) report rather dissatisfaction, and 5.71% (n=4) complete dissatisfaction. In addition, 17.14% (n=12) indicate a lack of real opportunities for development, pointing to existing institutional limitations and differences between healthcare facilities in terms of support for professional growth. A comparative χ^2 analysis assessing the relationship between nurses' workplace and their evaluation of professional development opportunities did not reveal a statistically

significant association ($\chi^2 = 9.84$, df = 9, p = 0.36).

Participation in courses for continuing professional education was examined as an indicator of nurses' engagement in lifelong learning and maintenance of competencies required for the care of patients with type 2 diabetes mellitus (Fig. 17).

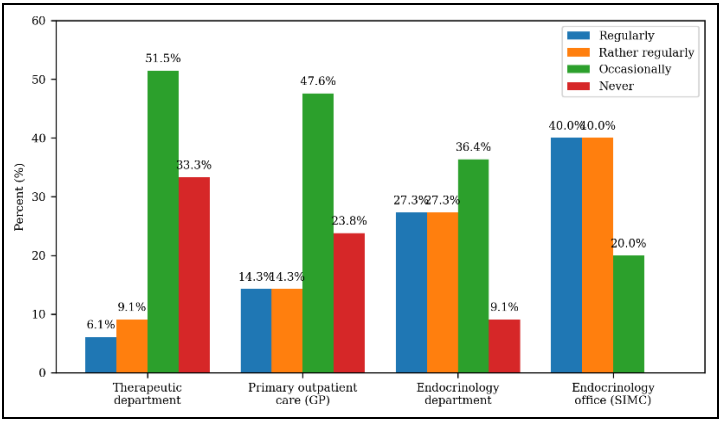


Figure 18. Need for additional professional training of nurses

The analysis shows a clearly expressed consensus among nurses regarding the need for additional training to effectively perform counseling and preventive activities for patients with type 2 diabetes mellitus. More than half of the respondents categorically state that additional training is mandatory – 52.86% (n=37), reflecting an acknowledged need to upgrade knowledge and skills in the context of the increasing complexity of diabetes care. A significant proportion of those interviewed – 40.00% (n=28) – consider the need for training to be conditional and dependent on individual preparation and professional confidence, highlighting the importance of a personalized approach to professional development. Only 7.14% (n=5) believe that not every nurse should perform these activities, indicating weak support for limiting the nursing role in this area. The distribution of responses reveals an attitude recognizing the necessity of systematic training, which is critical for high-quality counseling, maintenance of autonomous nursing functions and increased effectiveness of patient self-control in type 2 diabetes mellitus.

Statistical analysis did not identify a significant relationship between nurses' educational level, workplace and their perception of the need for additional training, suggesting that attitudes toward professional education are relatively similar across educational groups and work settings ($\chi^2 \approx 1.42$; $p > 0.20$).

Nursing Activities in the Provision of Contemporary Healthcare for Patients with Type 2 Diabetes Mellitus

Informing patients about the disease, treatment principles and methods of blood glucose control is a key component of nursing care in type 2 diabetes mellitus. Effective communication between the nurse and the patient is a prerequisite for the formation of knowledge, motivation and skills for disease self-management. In this regard, the study assessed the extent to which nurses provide information about the disease and methods of blood glucose control as part of their daily professional practice (Fig. 19).

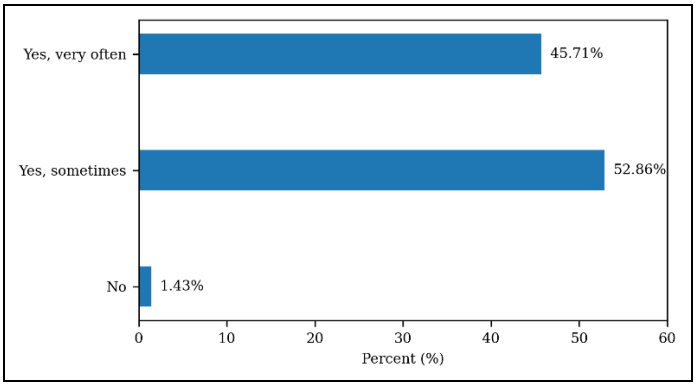


Figure 19. Participation in the information process

Informing patients about the disease and blood glucose control is a widely practiced activity among nurses. The largest proportion of respondents report that they provide this information "very often" – 45.71% (n=32), indicating a high level of engagement in supporting patients with type 2 diabetes mellitus. At the same time, a substantial proportion of nurses inform patients "sometimes" – 52.86% (n=37), which demonstrates the presence of an established practice but also suggests the influence of factors such as workload, organizational characteristics of the work process or differences in professional roles across healthcare settings.

The main activities performed by nurses when working with patients with type 2 diabetes mellitus reflect the real content of nursing practice and make it possible to assess the extent to which contemporary standards of diabetes care are applied in practice (Fig. 20).

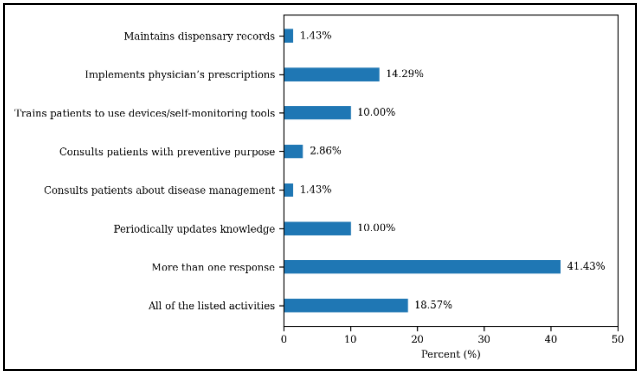


Figure 20. Nursing activities in patients with diabetes mellitus

Nurses perceive quality care for patients with type 2 diabetes mellitus as a multi-faceted process requiring the performance of more than one activity. The highest proportion of responses is "more than one activity" (41.43%), indicating an acknowledged need to combine educational and counseling interventions in daily practice. In addition, 18.57% of respondents state that all listed activities are necessary, reflecting a comprehensive understanding of the expanded scope of the nursing role.

Among the specific activities, the most frequently highlighted is the execution of physicians' orders (14.29%), reflecting the traditionally established clinical function of the nurse. A relatively equal proportion of respondents indicate periodic updating of patients' knowledge and training in the use of a glucometer and insulin administration (10.00% each), showing recognition of the educational function but not its leading role in practice. The proportions are significantly lower for activities related to counseling on diet and physical activity (1.43%), prevention of hypo- and hyperglycaemia (2.86%), and maintenance of dispensary documentation (1.43%). This distribution suggests that preventive and behavioral interventions are perceived as less emphasized or secondary, despite their key importance for long-term disease control.

No statistically significant relationship was found between professional experience and perceptions of necessary activities in diabetes care ($p > 0.05$). Despite an existing attitude toward an integrated approach, educational, counseling and preventive activities are still not uniformly established as core components of nursing practice, which justifies the need for clearer definition and institutionalization of the expanded nursing role in the care of patients with type 2 diabetes mellitus.

Of interest was nurses' opinion regarding their attitudes and readiness to

engage in educational activities (Fig. 21).

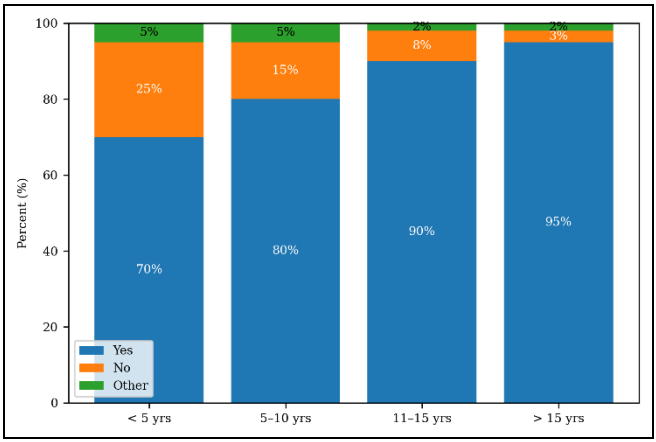


Figure 21. Nurses' readiness to participate in the education of patients with type 2 diabetes mellitus by professional experience (%)

Nurses' readiness to participate in the education of patients with type 2 diabetes mellitus shows a clear dependence on professional experience. With increasing accumulated clinical experience, the proportion of nurses expressing readiness to undertake educational functions increases—from 70.0% among those with less than 5 years of experience to 95.0% among those with more than 15 years. A statistically significant relationship was established between professional experience and nurses' readiness to participate in patient education ($p < 0.05$).

2.3. Expert Opinions on the Role of the Nurse in Clinical Monitoring and the Multidisciplinary Team in the Care of Patients with Type 2 Diabetes Mellitus

Analysis of the role of the nurse in caring for patients with type 2 diabetes mellitus requires not only assessment of practical activities and professional perceptions of practicing nurses, but also consideration of the opinions of physicians with long-standing experience in diabetes care. These opinions contribute to a deeper understanding of the nurse's place in clinical monitoring and the functioning of the multidisciplinary team, as well as to the assessment of opportunities for expanding and optimizing the nursing role in contemporary practice.

The results of in-depth interviews with endocrinologists who have direct professional experience working with patients with type 2 diabetes mellitus and in collaboration with nurses are presented. The analysis of their views outlines key aspects of nursing activity, identifies strengths and limitations of current practice, and

formulates directions for improving clinical monitoring and team-based care.

To analyze the role of the nurse in the clinical monitoring of patients with complications of type 2 diabetes mellitus, the effectiveness of multidisciplinary team interaction, and the factors determining the quality of care provided, in-depth interviews were conducted with 10 physician experts (n=10). To ensure anonymity, participants were coded from P1 to P10. The interview was structured into two main thematic areas and a concluding section, covering the key aspects of the study-quality of healthcare, nursing care in outpatient disease control, and recommendations and perspectives.

The professional profile of the interviewed physician experts demonstrates high relevance to the studied problem. Most respondents practice in endocrinology outpatient clinics, implying daily and direct engagement with patients with diabetes and its complications in outpatient settings—80.00% (n=8). The remaining participants combine work in endocrinology outpatient clinics with duties in endocrinology departments of university multidisciplinary hospitals, providing additional clinical perspective on severe and complicated cases—20.00% (n=2).

Analysis of the in-depth interviews reveals a clearly expressed critical stance toward the current model of standard healthcare for patients with type 2 diabetes mellitus. Although experts define it as necessary and functionally effective, there is consensus that it is insufficient for achieving real and systematic prevention of complications. Most respondents emphasize that the activities regulated by the National Framework Contract and related to dispensary follow-up are mainly diagnostic and controlling rather than preventive (n=7): *"Standard healthcare is determined by the activities specified in contracts with the health insurance fund. They are effective, but only for monitoring already established complications and are not aimed at prevention..."* (P1, P3, P4, P5, P8, P9, P10).

This finding is complemented by the identification of significant organizational and behavioral barriers that limit the effectiveness of outpatient care. Experts highlight lack of time during a single outpatient visit and insufficient patient engagement as major problems:*"Within a single visit it is not possible to assess the patient's condition and provide sufficient information for disease control..."* (P6, P9).

The role of the nurse emerges as a key resource for compensating the systemic deficit in patient monitoring, counseling and education. All interviewed physicians stress that the nurse has the potential to assume a much more active role in clinical monitoring of patients with type 2 diabetes mellitus, describing her as a competent, accessible and sustainable participant in long-term care: *"My experience shows that the nurse participates competently in dispensary follow-up and succeeds in motivating patients*

to control their blood glucose..." (n=10).

Several main areas of nursing competence are identified as essential:

- interpretation of tests and indicators of glycaemic control;
- work with glucometers and insulin pens;
- education for self-monitoring;
- counseling on diet and physical activity;
- prevention of complications, including foot care;
- motivation and support for lifestyle change.

The importance of nurses' communication skills as a tool for behavioral change and patient engagement is strongly emphasized (n=8): *"The nurse must have communication skills. Patients need motivation to follow the rules when they are at home..."* (P1, P2, P5, P6, P7, P8, P9, P10).

Despite recognition that current nursing competencies are sufficient for participation in clinical monitoring, most experts (n=9) point to the need for additional specialized training to enable expansion of the nursing role within the multidisciplinary team. All respondents express high trust in nurses regarding independent implementation of diabetes monitoring and control programs, especially in outpatient and endocrinology settings where they have accumulated experience and additional qualifications.

The data show that the existing model of standard care for patients with type 2 diabetes mellitus is structurally oriented toward follow-up rather than prevention. This necessitates enhancement of the system through formalization of an expanded nursing role focused on clinical monitoring, patient education and motivation.

Expert opinion unequivocally supports the development of a structured nursing program based on clinical monitoring, behavioral intervention and active participation in the multidisciplinary team as a key element for improving control and prevention of complications in type 2 diabetes mellitus.

All interviewed experts - 100.00% (n=10) - state that *"standard healthcare is not sufficient on its own if it is not supplemented with active nursing activities aimed at education, monitoring and prevention of complications."* According to them, the nurse performs a set of key activities with a direct role in improving disease control and should be able to maintain patient records, provide counseling on nutrition and physical activity, train patients in the use of glucometers and insulin pens, and participate in increasing health literacy and self-control.

Most experts further emphasize the nurse's role in the prevention of diabetic foot (P1, P2, P3, P5, P7, P8, P9, P10), stating that she should educate patients on self-inspection of the feet, choosing appropriate footwear and preventing wounds and

infections—highlighting the preventive nature of nursing interventions.

Experts also believe that the nurse's competencies should include clinical activities such as measuring and monitoring blood pressure, providing instructions for laboratory tests, interpreting and recording results, and participating in systematic monitoring of key biomedical indicators, as well as measuring anthropometric parameters (height, weight, waist circumference) as part of metabolic risk monitoring. Although technical aspects of care are considered, some experts stress the communicative and motivational function of the nurse, emphasizing that effective disease control is unthinkable without the nurse's ability to motivate patients to change health behavior and adhere to therapy.

All experts agree that nurses' professional competencies are in principle sufficient for effective participation in patient education (100%, n=10), but the majority (90%, n=9) stress that additional specialized training is mandatory for full, confident and autonomous performance of this role.

All respondents express high trust in nurses, especially those working in outpatient and endocrinology departments, describing them as specialists with accumulated practical experience and additional qualifications who participate fully in the care of patients with type 2 diabetes mellitus.

Experts unanimously state that nurses actively participate in counseling patients on nutrition and physical activity (100%, n=10) and express readiness to entrust nurses with independent implementation of diabetes self-management training programs, provided that they have undergone appropriate specialized training and possess the necessary expertise.

Overall, expert opinion outlines the need to rethink and upgrade standard healthcare by institutionalizing an expanded, structured and autonomous nursing role. The data demonstrate that the nurse is perceived not merely as an executor of physicians' orders but as a central component of the multidisciplinary team with a key role in effective clinical monitoring, education and prevention of complications in patients with type 2 diabetes mellitus.

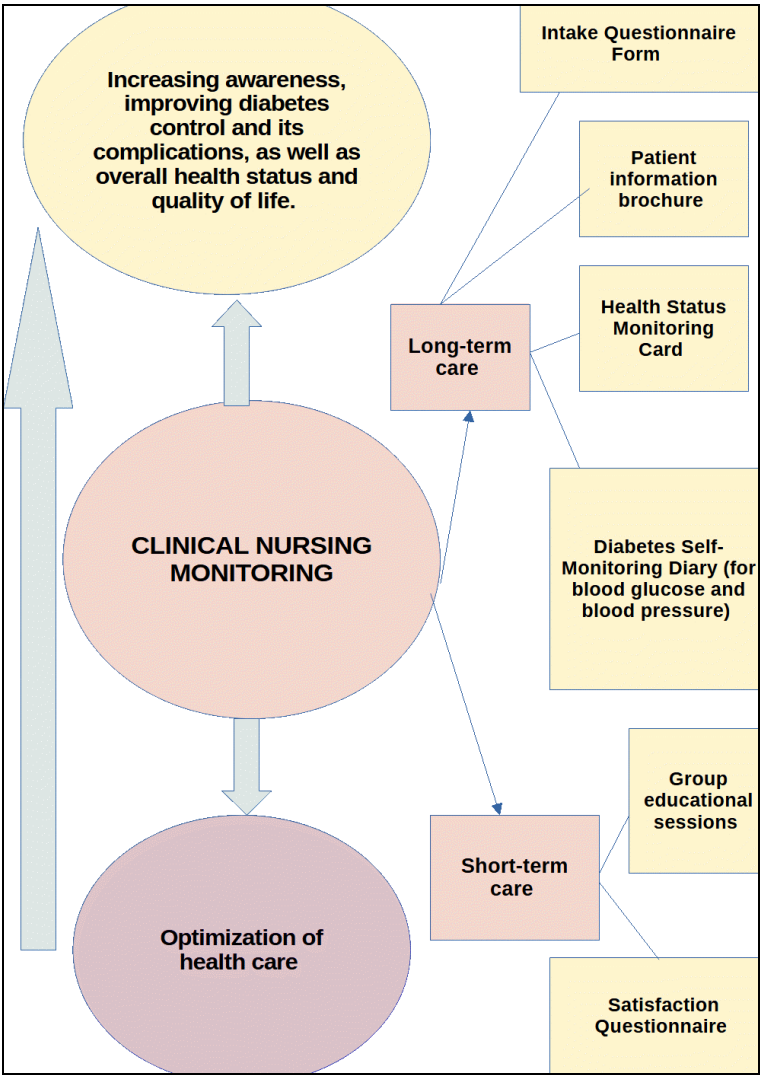
These results provide a strong empirical and expert foundation for the development and implementation of a specialized nursing program for outpatient clinical monitoring that complements, expands and optimizes the existing model of diabetes care.

3. THE NURSE IN THE COMPREHENSIVE MONITORING OF PATIENTS WITH COMPLICATIONS OF TYPE 2 DIABETES MELLITUS – AN INTEGRATED MODEL AND PRACTICAL ALGORITHM

The results of the literature analysis show that effective management of type 2 diabetes mellitus requires an integrated, multidisciplinary and personalized approach based on early diagnosis, systematic monitoring and active patient participation in treatment and self-control. In contemporary practice, there is a growing trend toward optimizing care through the application of structured models that combine clinical monitoring, educational interventions and behavioral support in order to limit chronic complications and improve quality of life.

Modern approaches to the care of patients with type 2 diabetes mellitus are aimed at precise assessment of the individual risk profile and referral to interventions tailored to the patient's health status, comorbidities and psychosocial characteristics. Models are increasingly being applied in which part of the preparatory and follow-up activities are carried out in outpatient or home settings, under clearly defined criteria and with ensured professional support. Within the framework of multidisciplinary partnership, healthcare professionals systematically monitor clinical and behavioral indicators, use standardized assessment tools and implement interventions focused on early identification of risks, enhancement of health literacy and development of disease self-management skills. The nurse ensures continuity and consistency of care, facilitates access to specialized health services and supports the adaptation of therapeutic strategies according to the patient's individual response. This coordinated, systematic and patient-centered function substantiates the need to develop and implement an integrated model of contemporary nursing care for patients with type 2 diabetes mellitus.

We developed a concept for the expanded nursing role in patients with type 2 diabetes mellitus and its complications (Scheme 1). It is based on the understanding that effective management of chronic disease requires systematic assessment, continuity of care and active patient participation in the treatment and self-management process. At the center of the concept is clinical nursing monitoring, through which regular assessment of health status, risk factors and behavioral characteristics of the patient is carried out. The collected information serves to plan and adapt nursing interventions aimed at education, support for self-care and early recognition of complications.



Scheme 1. Concept of the expanded nursing role in patients with complications of type 2 diabetes mellitus

The concept structures nursing activities into short-term and long-term care, allowing both initial education and follow-up over time.

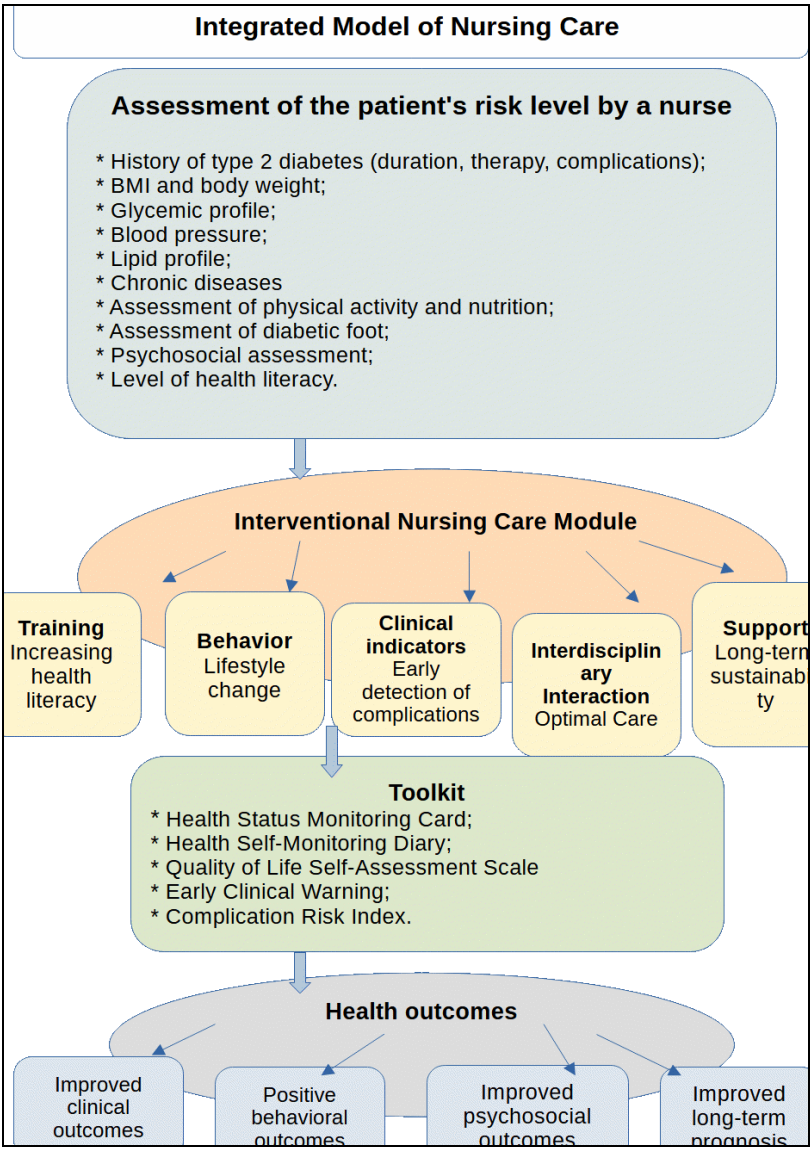
3.1. Integrated Model of Nursing Care for Patients with Diabetes Mellitus

Contemporary trends in the development of nursing define the nurse's role not only as an executor of prescribed medical activities, but as an active participant in the processes of assessment, education, behavioral change, clinical monitoring and long-term patient support. In this context, the construction of a structured, evidence-based and standardized model of nursing care for patients with complications of type 2 diabetes mellitus is driven by the need to increase the effectiveness, quality and sustainability of healthcare.

The proposed model is based on the principles of:

- the biopsychosocial model of health;
- a holistic approach to nursing care;
- the chronic care model;
- evidence-based practice;
- patient-centered care and active patient participation in managing their own health.

The developed integrated model of nursing care for patients with complications of type 2 diabetes mellitus represents a conceptual and practical framework that combines systematic nursing assessment, targeted interventions, continuous monitoring and outcome evaluation aimed at optimizing glycaemic control, reducing risk factors and improving quality of life (Scheme 2).



Scheme 2. Integrated model of nursing care for patients with type 2 diabetes

mellitus

The first stage of the model focuses on conducting a comprehensive, evidence-based nursing assessment of the patient with complications of type 2 diabetes mellitus. Its purpose is to objectify the current health status, identify individual risk factors, and determine the degree of risk for the development of acute and chronic complications.

The nursing assessment includes the collection and analysis of structured anamnestic data, such as duration of the disease, nature and effectiveness of pharmacological and non-pharmacological treatment, and the presence of already established micro- and macrovascular complications. At the same time, a systematic assessment of anthropometric indicators is performed, including measurement of body weight and height with subsequent calculation of body mass index, enabling precise evaluation of nutritional status and the risk of insulin resistance. Glycaemic control is assessed by measuring blood glucose levels and glycated haemoglobin (HbA1c), which serves as an objective marker of average glycaemic control over the previous 8–12 weeks. Blood pressure is measured systematically due to its proven role as an independent risk factor for cardiovascular complications.

An essential component of the assessment is lifestyle analysis, including level of physical activity and dietary habits, as well as identification of risk behaviours such as smoking, sedentary lifestyle and low therapeutic adherence. Of particular importance is the examination of the lower limbs to identify early signs of diabetic foot, neuropathy and peripheral vascular disease. The assessment is complemented by psychosocial analysis, including screening for psychological distress, depressive symptoms, availability of social support and subjective readiness for change. In addition, the level of health literacy and the patient's capacity for independent disease management are determined.

Based on the comprehensive analysis of clinical, behavioural and psychosocial parameters, patients are stratified into low, moderate or high risk regarding the probability of decompensation and development of complications. This assessment is a fundamental element of the model and forms the basis for developing an individualized nursing care plan tailored to each patient's specific needs, resources and risk profile.

The intervention module is a core element of the integrated nursing care model and is aimed at implementing targeted, evidence-based and individualized nursing interventions oriented toward optimizing metabolic control, reducing risk factors and preventing the development and progression of diabetic complications. This stage is directly determined by the results of the initial assessment and patient risk

stratification.

The intervention process is implemented through five complementary and structured processes - educational, behavioural, clinical, interdisciplinary and supportive—which function synchronously and form a comprehensive, coordinated and cyclical care process.

Education is aimed at increasing health literacy and building knowledge and skills for disease self-management. By applying principles of adult learning and an individualized, patient-centred approach, the nurse provides structured and adapted education covering basic and specialized aspects of type 2 diabetes mellitus. The content includes the fundamentals of pathophysiology and clinical course, mechanisms of acute and chronic complications, principles of dietary management and carbohydrate control, the importance of regular monitoring of blood glucose and HbA1c, early recognition and response to hypo- and hyperglycaemia, the role of physical activity, and proper skin and foot care for prevention of diabetic foot. Educational activities are delivered in individual and group sessions, with content, duration and frequency adapted to the patient's age, cognitive status, cultural characteristics and level of health literacy.

Behavioural change focuses on forming sustainable, long-term lifestyle modifications that are essential for effective control of type 2 diabetes mellitus. An individualized plan for health behaviour change is developed based on the initial assessment and identified risk factors. Nursing interventions include creating a personalized diet plan aligned with energy needs, comorbidities and socio-cultural context, as well as a structured physical activity plan including aerobic and resistance exercises with gradually increasing intensity. Motivational interviewing is applied to enhance motivation and engagement, supporting awareness of the need for change, overcoming internal resistance and building a sense of control over one's health. For patients with harmful habits, systematic support is provided for smoking cessation and reduction of alcohol consumption.

Monitoring of clinical indicators aims at early identification of signs of metabolic decompensation and complications through systematic and standardized tracking of key health parameters. This includes regular assessment of blood glucose levels through self-monitoring and professional measurements, blood pressure monitoring, periodic testing of HbA1c, follow-up of body weight and BMI, and observation of skin and lower limb status. Standardized tools such as self-monitoring diaries and early warning systems support timely and appropriate decisions regarding intervention adjustments or referral to a physician.

Interdisciplinary interaction ensures coordination among specialists involved

in the care of patients with type 2 diabetes mellitus, guaranteeing comprehensiveness and continuity of interventions. The nurse maintains active communication with the treating physician, dietitian, psychologist, physiotherapist and other professionals, participates in discussions of clinical status and patient progress, and provides reasoned recommendations for adjustments in therapeutic and rehabilitation plans. Timely referrals are made when indicated.

Support is oriented toward maintaining and stabilizing achieved results in the long term and includes periodic telephone and online consultations, organization or participation in peer-support groups, and active involvement of family members in the care and follow-up process. Continuous monitoring of motivation and behavioural patterns aims to prevent regression and sustain healthy lifestyle changes.

Interaction among these five elements ensures a comprehensive, coordinated and adaptive nursing care process focused not only on disease control but also on improving overall quality of life and optimizing long-term prognosis.

Implementation of the model requires standardized, objective and scientifically validated tools to ensure systematic data collection, traceability of interventions and the possibility for quantitative and qualitative outcome analysis. The tools selected are based on their practicality, proven validity and reliability in clinical practice, and relevance to patients with type 2 diabetes mellitus.

The Health Status Monitoring Card is a structured nursing tool for systematic documentation of clinical and functional indicators, including anthropometric, haemodynamic and biochemical parameters, physical examination findings, comorbidities, complications and individual risk factors. It enables standardized data recording, tracking of dynamics over time and objective assessment of changes in patient health status.

The Self-Monitoring Diary is a key tool for actively involving the patient in disease management. It documents daily blood pressure and fasting and postprandial blood glucose, medications or insulin doses, food intake, physical activity and symptoms of hypo- or hyperglycaemia. Its use fosters self-observation, reflection and responsibility, enhancing engagement and improving self-control.

Integrated risk indices are used to objectify patient risk profiles, combining parameters such as HbA1c, blood pressure, lipid profile, obesity, disease duration and comorbidities. These indices enable standardized comparison, precise risk stratification, prioritization of interventions and monitoring of nursing intervention effects over time.

Quality of life assessment tools measure the patient’s subjective perception of physical health, psychological state, autonomy, social contacts and overall life satisfaction,

complementing objective clinical evaluation. Educational materials-including brochures, guides, presentations and self-control algorithms-are adapted to the health literacy level of the target group and provide structured, evidence-based and practical information.

The combined use of these methods ensures traceability, measurability, reproducibility and scientific validity of the integrated nursing care model.

The developed model defines the nurse's role in disease management. By combining evidence-based knowledge, clinical expertise and structured intervention activities, it creates a sustainable mechanism for improving health outcomes and quality of life.

Educational brochure "I Control Diabetes"

The brochure is designed as a practical educational material to support patients in daily disease management, covering:

- mechanisms of the disease and the importance of glycaemic control;
- principles of healthy nutrition and carbohydrate balance;
- physical activity tailored to age and complications;
- management of hypo- and hyperglycaemia;
- foot care and prevention of diabetic foot;
- role of medication and insulin therapy;
- risks associated with smoking, alcohol and improper diet.

It was piloted in the experimental group with 100% satisfaction, high applicability and real improvement in knowledge and behaviour.

Health Status Monitoring Card

This structured document enables the nurse to monitor health status dynamics over six months, including:

- somatic indicators (weight, BP, BMI, waist circumference);
- glycaemic control (blood glucose, variability, HbA1c);
- laboratory data—lipid profile, renal parameters;
- presence and progression of chronic complications;
- assessment of patient knowledge and skills;
- data on diet, physical activity and behavioural risks;
- quality of life and functional activity assessment.

The card provides a comprehensive view of the patient's health status, supports early detection of complications and facilitates communication between the nurse, endocrinologist and general practitioner, enhancing the systematization and

effectiveness of monitoring.

Health Status Monitoring Card (No. ……)

CRITERIA	*SUB CRITERION*	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*	*11*	*12*
		DATE OF THE VISIT											
Body weight (once a month)													
BMI (every 6 months)													
BP (at each visit)													
Subjective complaints during the visit													
Presence of hypoglycemic episodes between visits													
Presence of hyperglycemic episodes between visits													
Results of glycated hemoglobin HbA1c test (every three months)													
Results of Vit. B12 test													
Results of CBC (monthly)	***Blood sugar***												
	07.00												
	12.00												
	14.00												
Lipid profile results (every 6 months)	***Total cholesterol***												
Creatinine test (every 6 months)	***HDL***												
Urine test (microalbuminuria) – every 6 months	***LDL***												
	Triglycerides												
Presence of pulse in the arteries of the lower extremities (once a month)													
Examination of the feet (once a month)	***Arteria Iliaca***												
Lipid profile results (every 6 months)	***Arteria Poplitea***												
	Arteria Dorsalis pedis												
Creatinine test (every 6 months)	***Presence of mycosis***												
	Presence of ulcerations												
	Presence of ragweed, hyper-keratoses, erythema												

3.2. Intervention Program "I Control My Diabetes" – Structure, Content and Role within the Integrated Nursing Care Model

The intervention program was developed as a comprehensive system aimed at sustainable improvement in self-monitoring, behavioral change and quality of life in patients with type 2 diabetes mellitus.

The training is structured into five thematic modules covering the main aspects of disease self-management. It was delivered by a nurse through individual and group sessions and was piloted within a six-month follow-up period.

The thematic modules were implemented as group discussions lasting 45 to 60 minutes, depending on the content and the planned practical activities. The topics were selected purposefully, in line with the deficits in knowledge and self-management skills identified during the preliminary survey, and based on current recommendations for educating patients with type 2 diabetes mellitus.

Module 1. Understanding the disease and the role of self-monitoring - pathophysiology of type 2 diabetes mellitus; importance of glycaemic control; risks of acute and chronic complications.

Module 2. Dietary regimen and healthy nutrition – key principles of diet therapy; food choices; carbohydrate counting; dietary errors and correction.

Module 3. Physical activity – types of physical load; minimum activity recommendations; safety and contraindications.

Module 4. Self-monitoring and techniques for glycaemia management – use of a glucometer; interpretation of values; actions in hypo-/hyperglycaemia; management of variability.

Module 5. Foot care and prevention of complications – early signs of diabetic foot; daily care; preventive behavior and self-observation.

The program was implemented at the Diabetes Center of „DCC 1 – Ruse" Ltd. over a six-month period and included 15 patients (n=15) from the experimental group.

Before the pilot implementation, participants completed a structured questionnaire assessing their baseline level of knowledge regarding diet, physical activity, mechanisms of occurrence and consequences of acute and chronic diabetes complications. The obtained data were used as a starting point for structuring the program content and emphasis, and for subsequent comparative analysis.

The training was delivered during the first five weeks through five consecutive thematic group sessions, each representing a separate module with clearly defined educational objectives, content and expected outcomes.

Training methods included theoretical instruction, practical demonstrations,

independent work with tools, regular meetings and follow-up, individual analysis of errors, and motivational interviewing to stimulate change.

Before the first session, an individual schedule was prepared and agreed with each participant, taking into account their professional commitments and availability. To ensure regular participation and optimal attendance, the experimental group was divided into two subgroups, with identical thematic sessions delivered in different time slots on the same day.

Each visit to the Center began with an objective assessment of participants' health status performed by the principal investigator and documented in the Health Status Monitoring Card. Weight and height were recorded and body mass index (BMI) calculated; blood pressure was measured; subjective complaints were documented; the presence and frequency of hypo- and/or hyperglycaemic episodes were recorded; the feet were examined for early signs of diabetic foot; and palpation of lower-limb arteries (A. iliaca, A. poplitea, A. dorsalis pedis) was performed to assess pulsations.

In parallel, clinical and laboratory indicators prescribed by the physician responsible for dispensary follow-up were reviewed, including: fasting blood glucose measured three times (monthly), glycated haemoglobin (HbA1c – every three months), lipid profile, creatinine and vitamin B12 at the beginning and end of the intervention, as well as urine microalbuminuria. Some tests (lipid profile and vitamin B12) are not mandatory within dispensary follow-up for type 2 diabetes mellitus under Annex No. 8 and Annex No. 13 to the National Framework Contract 2023–2025, but were ordered to provide a more detailed assessment of metabolic and neurological risk profile.

After completion of the group training modules, participants in the experimental group moved to independent application of acquired knowledge and skills, following guidance for diet, physical activity and foot care. Each participant monitored and recorded blood pressure daily in a Blood Pressure Monitoring Diary and blood glucose levels in a Diabetes Diary, provided during the training.

Participants visited the Center monthly according to an individual schedule. At each visit, repeat assessment of somatic and laboratory indicators was performed, diaries were reviewed, and individual consultations were conducted when deviations or difficulties were identified. If persistent pathological values of blood pressure or blood glucose were recorded, the physician responsible for dispensary monitoring was informed in a timely manner and, if necessary, appropriate diagnostic and therapeutic actions were undertaken, including referral to specialists (endocrinologist, vascular surgeon, etc.).

At the end of the program, participants in the experimental group completed a

final questionnaire assessing satisfaction with care and subjectively perceived change in quality of life. In parallel, patients in the control group underwent baseline and final measurements of the same key somatic and laboratory indicators without participation in the intervention program, allowing comparative analysis and objective evaluation of the effectiveness of the "I Control My Diabetes" program.

The pilot implementation of the "I Control My Diabetes" program led to statistically and clinically significant improvement in participants' knowledge about the disease and its management. A clear increase in physical activity and a reduction in unfavorable dietary habits were observed as a result of systematic health education and motivational impact.

During the intervention, improved patient responses to risky glycaemic states were recorded, indicating a higher level of preparedness and adequacy in self-monitoring. At the same time, an increase in subjectively perceived quality of life and self-confidence was observed, accompanied by improved self-esteem and enhanced trust in the nurse as a key figure in education, support and follow-up. The effective application of the program demonstrates its structural contribution to contemporary diabetes practice and its potential to be implemented as a standard educational model.

3.2.1. Design and Methodology of the Pilot Implementation

The pilot testing of the author's concept and training program "I Control My Diabetes" was conducted as an interventional study with an experimental and a control group. A detailed description of the design, methodological framework, stages of the study and selection criteria is presented in Chapter Two. This section includes only the key elements needed to understand and interpret the experimental results in the context of the author's concept.

Organization of the Pilot Study

The study included 30 patients with type 2 diabetes mellitus (n=30), divided into two groups:

- Experimental group (EG) – 15 patients who received the author's training program, individual and group nursing consultations, and systematic follow-up according to the developed algorithms.
- Control group (CG) – 15 patients who received standard medical and nursing care without intervention.

Follow-up lasted six months. Both groups received basic educational material (a brochure), but structured training and active nursing intervention were applied only in the experimental group.

In this study, the independent variable was the implementation of the author's program "I Control My Diabetes" combined with structured nursing interventions delivered in outpatient care and dispensary follow-up settings for patients with type 2 diabetes mellitus.

The dependent variables reflect changes in various aspects of health status, behavior and subjective experience, including: level of self-monitoring and self-management; objective indicators of metabolic control-blood glucose values, glycated haemoglobin (HbA1c), lipid profile and blood pressure; behavioral changes related to dietary habits, physical activity and responses to hypo- and hyperglycaemic states; as well as subjective assessment of quality of life and satisfaction with care as key indicators of the program's effectiveness and social impact.

Data Collection Instruments

Three main instruments were applied:

- Questionnaire No. 1 – assessment of knowledge, self-monitoring, behavior and quality of care before the program.
- Questionnaire No. 2 – assessment of achieved changes after program implementation (experimental group only).
- Health Status Monitoring Card – systematic tracking of somatic, clinical and laboratory indicators in both groups.
- Self-monitoring diary for blood glucose and blood pressure – records BP, glucose, diet, activity, therapy and hypoglycaemic events.

In the experimental group, the intervention program includes five thematic modules, individual nursing consultations and monthly monitoring of: blood glucose (morning, evening, hypo-/hyperglycaemic episodes); HbA1c (every three months); blood pressure and weight; lipid profile and creatinine (baseline and final); microalbuminuria and vitamin B12 (at six months); and foot status (monthly).

At each visit, weight, height, BMI, blood pressure, peripheral arterial pulsations, and foot inspection (ulcers, fissures, fungal infections, hyperkeratosis) were recorded, along with subjective complaints and hypo-/hyperglycaemic episodes. Laboratory indicators included fasting glucose, HbA1c, lipid profile, creatinine, vitamin B12 and microalbuminuria. Patients attended five weekly thematic sessions corresponding to the program modules and monthly follow-up visits.

When deviations were identified, the nurse acted according to the algorithms—review of diaries, referral to a physician, vascular consultations and behavioral correction.

In the control group, standard monitoring was performed (weight, BMI, BP,

palpation of peripheral arteries, foot inspection, fasting glucose, HbA1c, lipid profile, creatinine and microalbuminuria). No training or intervention was applied.

Results of the Pilot Implementation

Given the chronic course of type 2 diabetes mellitus and the high social significance of complications leading to early disability, effective blood glucose control is a determining factor for maintaining quality of life and preventing acute and late complications.

From the survey of 180 patients with type 2 diabetes mellitus (n=180), 30 participants (n=30) meeting the predefined inclusion criteria, having signed informed consent and having voluntarily agreed to participate, were included in the experimental part of the study. To ensure objectivity and comparability, patients were divided into two equal groups:

- Experimental group (EG) – 15 patients (n=15) receiving the author's educational program and expanded nursing intervention.
- Control group (CG) – 15 patients (n=15) receiving standard medical and nursing care without intervention.

Allocation was performed in strict compliance with the principles of voluntariness, equality and comparability, ensuring the validity of the pilot results. Both groups had a balanced gender distribution. Women comprised 30.00% (n=9) in both groups, and men 20.00% (n=6) in each group. The gender distribution is balanced and shows no statistically significant difference between groups, ensuring baseline comparability.

Participants in both groups represented different age categories. The largest group was aged 51–60 years, accounting for 40.00% (n=12) of all participants - 16.67% (n=5) in EG and 23.33% (n=7) in CG. The least represented age group was 41–50 years, comprising 10.00% (n=3) - 6.67% (n = 2) in EG and 3.33% (n=1) in CG. In the 61–70 age group, 16.67% (n=5) were in EG and 13.33% (n=4) in CG. Patients aged 71–80 were evenly distributed - 10.00% (n=3) in EG and 10.00% (n=3) in CG.

Educational level is an important factor influencing patient awareness regarding the disease, blood glucose control, diet and physical activity. Higher education is generally associated with better understanding of therapeutic recommendations, greater engagement in self-monitoring and more effective self-management. Therefore, educational level was considered a relevant demographic indicator potentially influencing the effect of the educational intervention (Fig. 22).

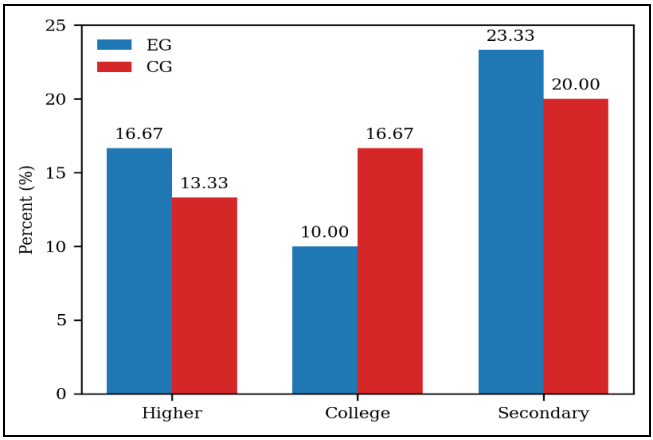


Figure 22. Distribution of patients by educational level

The distribution of participants by educational status shows a relatively similar profile in both groups. In the experimental group, the largest proportion is represented by individuals with secondary education – 23.33%, followed by those with higher education (16.67%) and college/associate degree education (10.00%). The control group demonstrates a comparable structure, with the highest relative share among participants with secondary education (20.00%), followed by college/associate degree (16.67%) and higher education (13.33%). The differences between the two groups are not statistically significant, confirming that the experimental and control groups are comparable in terms of educational status – an important factor for understanding and applying self-management in type 2 diabetes mellitus.

Income adequacy was identified as a significant socio-economic factor influencing the ability to comply with recommendations for diet, physical activity and self-monitoring of blood glucose. In both the experimental and control groups, patients with partially sufficient income predominate – 30.00% (n=9) and 33.33% (n=10), respectively, with a lower proportion of fully sufficient income – 16.67% (n=5) and 13.33% (n=4), and a minimal proportion of extremely insufficient income – 3.33% (n=1) in each group. This ensures comparability between the two groups on this indicator.

Patients in the experimental and control groups were also distributed according to the duration of type 2 diabetes mellitus. In both groups, individuals with disease duration of more than 10 years predominate – 20.00% (n=6) in the

experimental group and 26.67% (n=8) in the control group. Patients with a duration of 6 to 10 years are evenly represented – 13.33% (n=4) in each group, while those with disease duration up to 5 years comprise 16.67% (n=5) in the experimental group and 10.00% (n=3) in the control group.

The chronic course of type 2 diabetes mellitus is associated with increasing costs for treatment, self-monitoring and prevention of complications, which may affect adherence to therapeutic and behavioral recommendations. Among patients with disease duration up to 5 years, financial resources are evenly distributed between "sufficient" and "partially sufficient", whereas among those with duration over 10 years, partially sufficient resources predominate and the presence of patients with insufficient income is observed (Table 3).

Table 3. Distribution of patients according to duration of type 2 diabetes mellitus and financial resources (%)

Statute of limitations / Financial resources	Sufficient	Partially sufficient	Insufficient	Total
До 5 г.	50.0	50.0	0.0	100
6–10 г.	37.5	62.5	0.0	100
>10 г.	14.3	71.4	14.3	100

All patients included in the experimental and control groups had established complications of diabetes mellitus (Fig. 23).

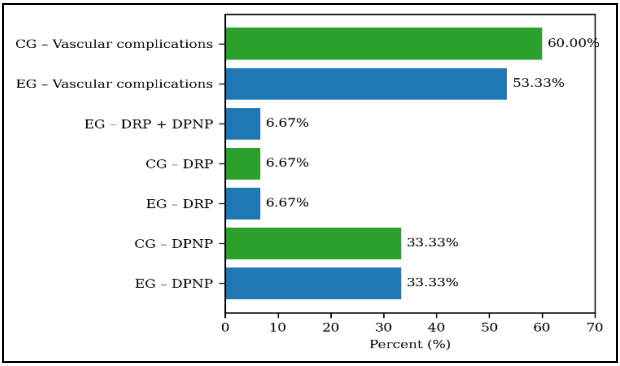


Figure 23. Identified complications of the disease

The distribution of complications among patients in the experimental and control groups shows a predominance of vascular complications, identified in 53.33% (n=8) of patients in the experimental group and 60.00% (n=9) in the control group, which corresponds to literature data for patients with long-standing type 2 diabetes

mellitus. Diabetic peripheral neuropathy was diagnosed in 33.33% (n=5) of participants in both groups, and diabetic retinopathy in 6.67% (n=1) in each group, indicating an even distribution and comparability with regard to the clinical risk profile. Combined complications were identified in 6.67% (n=1) of patients in the experimental group. The similar distribution of complications between the groups ensures comparability of the baseline clinical status and allows an objective assessment of the effect of the applied intervention.

Physical activity before and after the experiment

Physical activity is a key component of self-management in type 2 diabetes mellitus and an essential factor for metabolic control and the prevention of complications. Levels of physical activity were assessed before and after the implementation of the educational intervention in order to monitor the effect of nursing support on the formation of sustainable healthy habits (Figure 24).

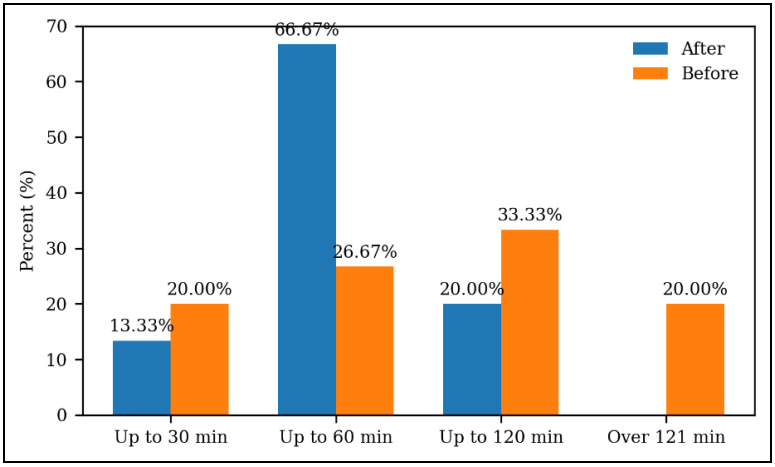


Figure 24. Walking before and after implementation of the program

Monitoring physical activity before and after the intervention makes it possible to assess the impact of nursing care on patient behavior and their potential to reduce the risk of chronic complications and improve quality of life. At baseline, 33.33% (n=5) of patients walked up to 120 minutes per day, 26.67% (n=4) up to 60 minutes, 20.00% (n=3) up to 30 minutes, and 20.00% (n=3) more than 121 minutes daily. After implementation of the educational program, a shift in the distribution was observed: the proportion of patients walking up to 120 minutes per day increased to 66.67% (n=10), those walking more than 121 minutes remained unchanged - 20.00%

(n=3), while patients walking up to 60 minutes decreased to 13.33% (n=2). Despite the observed positive trend, no statistically significant difference was found in physical activity levels before and after the intervention ($p > 0.05$), indicating that changes in physical activity behavior likely require a longer intervention period and more intensive or individualized motivational approaches.

The experimental results show a moderate increase in overall physical activity and a statistically significant improvement in the intensity of leisure-time physical activities after application of the program (Figure 25).

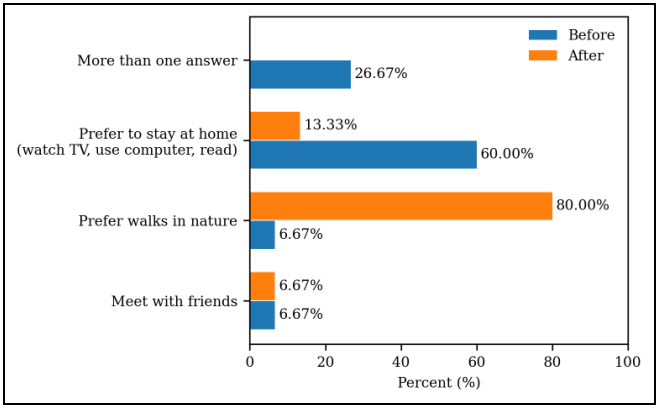


Figure 25. Leisure-time activities

After implementation of the educational program, a clearly expressed positive change in the way leisure time is spent was observed. The proportion of patients who preferred outdoor walking increased from 6.67% to 80.00%, while responses related to a sedentary lifestyle disappeared. The results indicate an increased orientation toward active forms of recreation after the intervention.

Dietary regimen and self-management of the disease - changes before and after the intervention in the experimental group

At baseline, patients' dietary habits were assessed in order to identify risky practices and the degree of adherence to dietary recommendations. After completion of the educational program, a повторна evaluation was performed to analyze changes in food choices, meal frequency, and overall quality of the diet. The comparative analysis allows assessment of the effect of the intervention and the role of the nurse in modifying dietary behavior and maintaining sustainable disease control (Figure 26).

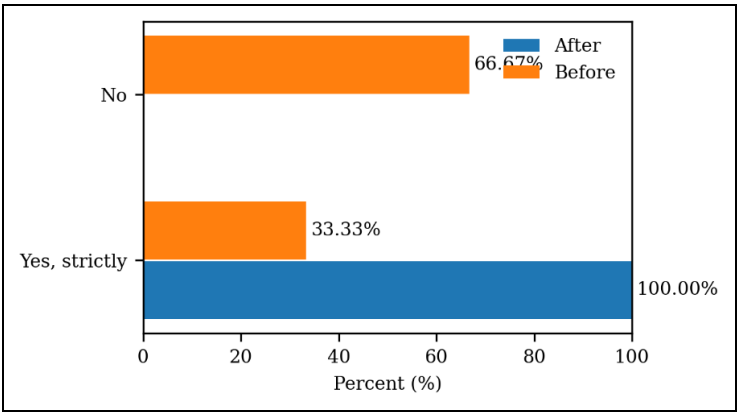


Figure 26. Adherence to dietary recommendations before and after the implementation of the program

Before the educational program, 66.67% (n=10) of patients in the experimental group reported that they did not follow dietary recommendations, while 33.33% (n=5) stated that they adhered to them. This baseline distribution reflects a deficit in conscious adherence to dietary guidelines, typical of patients with limited awareness or low motivation for change. The main reasons for non-adherence were predominantly organizational (73.33%; n=11), while financial difficulties were reported by 13.33% (n=2). After implementation of the educational program, a substantial behavioral change was observed – 100.00% (n=15) of patients declared strict adherence to dietary recommendations. The observed change was statistically significant, confirming the high effectiveness of the nursing educational intervention ($p = 0.005 < 0.01$). The results demonstrate that targeted education and support provided by the nurse lead to a sustainable improvement in dietary behavior – a key factor for long-term glycemic control and prevention of complications in type 2 diabetes mellitus.

Analysis of data on the consumption of individual food groups shows a statistically significant change in dietary behavior after the program, aimed at better adherence to dietary recommendations.

Satisfaction with the quality of healthcare before and after program implementation

At the beginning of the experiment, 53.33% (n=8) of respondents were completely satisfied with the quality of healthcare they received for diabetes; 40.00% (n=6) were not fully satisfied, and 6.67% (n=1) were dissatisfied. At the end of the

experimental study, all patients in the experimental group reported complete satisfaction with the quality of healthcare provided – 100.00% (n=15). No responses were recorded in the categories "not fully satisfied" or "dissatisfied." Similar results were found regarding satisfaction with participation in the educational program and with the individual outcomes achieved, again receiving positive evaluations from all patients – 100.00% (n=15). All participants in the experimental group expressed willingness to rely on a nurse for counseling and education in the future (100.00%; n=15).

The applied Student's t-test shows a statistically significant relationship between patient satisfaction with the quality of healthcare and trust in the nurse (P = 100%, $\alpha = 0.01$; one-sided $P = 0.000 < 0.01$; two-sided $P = 0.000 < 0.01$).

Self-assessment of health status and quality of life

The comparative analysis of the data reveals a noticeable positive change in patients' subjective perception of their overall health status after completion of the program (Figure 27).

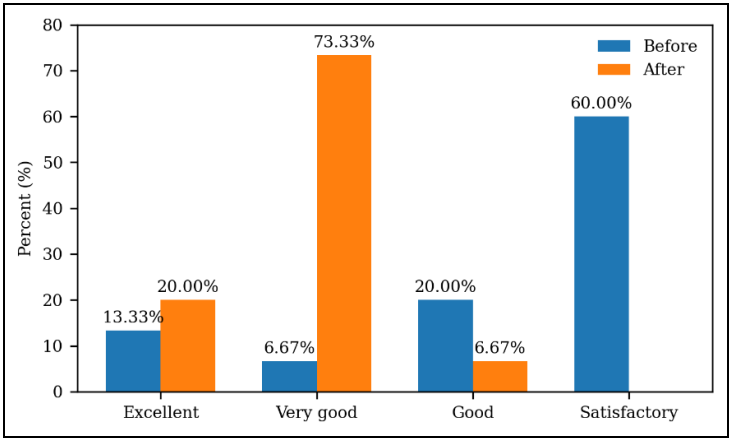


Figure 27. Self-assessment of health status before and after implementation of the program

At the beginning of the experiment, a small proportion of patients in the experimental group rated their health as excellent – 13.33% (n=2), and 6.67% (n=1) as very good. A total of 20.00% (n=3) assessed their health as good, while the majority rated it as satisfactory – 60.00% (n=9).

After implementation of the educational program and the introduction of changes in dietary behavior, physical activity and blood glucose self-monitoring, a

clear shift toward higher levels of subjective health assessment was observed. The proportion of patients who rated their health as excellent increased to 20.00% (n=3), while the largest group – 73.33% (n=11) – rated it as very good. Only 6.67% (n=1) continued to rate their health as good, and after program implementation no responses were recorded in the "satisfactory" category.

This result objectifies the positive impact of the program on the subjective perception of health status and indirectly reflects increased health literacy, self-confidence and patient engagement in their own treatment and disease control. Comparison of responses before and after the educational program reveals a statistically significant difference (P = 100%, $\alpha = 0.01$; one-sided P = 0.000 < 0.01).

A comparative analysis of results related to self-assessment of quality of life allows tracing the changes in participants' subjective evaluation of their overall well-being after implementation of the program (Figure 28).

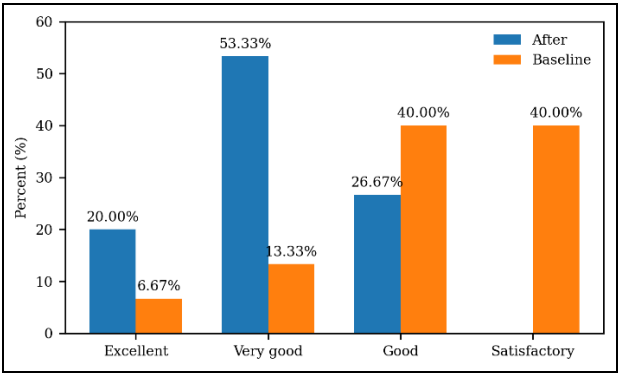


Figure 28. Self-assessment of quality of life before and after implementation of the program

At the beginning of the experiment, patients in the experimental group rated their quality of life mainly as "satisfactory" and "good" – 40.00% (n=6) in each category, with a smaller proportion rating it as "very good" – 13.33% (n=2) and "excellent" – 6.67% (n=1). At the end of the experiment, a redistribution toward higher categories was observed: "very good" increased to 53.33% (n=8), "excellent" to 20.00% (n=3), and "good" accounted for 26.67% (n=4), while no responses were recorded in the "satisfactory" category. A clearly expressed positive trend toward improvement in self-assessed quality of life was identified. Statistical analysis revealed a significant difference between assessments before and after the intervention ($\alpha = 0.01$; one-sided $p = 0.001$), supporting the effectiveness of the educational

program in terms of subjective well-being and patients' self-assessment.

Analysis and interpretation of the Health Status Monitoring Card results

The Health Status Monitoring Card was completed at each patient visit, with the main objective of systematically tracking the dynamics of clinical and biochemical indicators and objectifying the changes observed at the end of the study period. In the experimental group, a correlation analysis (Kendall's coefficient) was performed to assess the relationships between quantitative indicators at baseline and at the end of the intervention. A total of 22 statistically significant correlations were identified (14 at $\alpha = 0.01$; 8 at $\alpha = 0.05$), confirming the presence of clinically meaningful interrelationships between metabolic and hemodynamic parameters. Stable associations were observed between HbA1c and blood pressure, between glycemic values at different time points and HbA1c, as well as between body weight and indicators reflecting cardiovascular risk. During follow-up, no changes were detected on examination of the lower limbs for signs of diabetic foot; preserved peripheral pulses were recorded in all patients.

In the control group, where the educational program was not applied, indicators were recorded at baseline and at the end of the period without statistically significant changes in body weight, BMI, or the main clinical and laboratory parameters. The data did not show a tendency toward improvement in long-term glycemic control, and an unfavorable glycemic profile persisted in the absence of targeted intervention.

The results of the present study demonstrate that the structured nursing program represents an effective interventional strategy for the management of type 2 diabetes mellitus. The developed model leads to measurable improvements in patient behavior, clinical and laboratory parameters, self-monitoring, and quality of life.

The expanded role of the nurse is confirmed as a key factor for sustainable disease control. The implemented algorithms, models, and tools have high potential for practical application and represent a scientifically grounded, effective, and reproducible interventional practice.

The analyzed results prove that nursing care can and should be considered an independent, powerful, evidence-based intervention in the modern management of chronic non-communicable diseases, particularly type 2 diabetes mellitus.

4. CONCLUSIONS, RECOMMENDATIONS AND CONTRIBUTIONS

4.1. Conclusions

Based on the results of the conducted study, the following conclusions can be drawn:

1. The active involvement of the nurse in the clinical monitoring, education and support of patients with type 2 diabetes mellitus has a statistically significant effect on improving self-management behavior and subjective health assessment ($p < 0.05$), confirming her leading role within the multidisciplinary team.
2. The lack of systematic and structured education among a substantial proportion of patients on key topics such as nutrition, physical activity and behavior in hypo- and hyperglycemic states (46.11%) represents a significant risk factor for ineffective self-management and a higher risk of complications.
3. The high level of trust in the nurse as a consultant and educator (80.56%) is statistically significantly associated with higher satisfaction with healthcare and greater willingness to participate in educational programs (Asymp. Sig. = $0.000 < \alpha = 0.05$).
4. After implementation of the nursing intervention program, a statistically significant increase in knowledge and self-management skills is observed in the experimental group compared to the control group ($p < 0.05$), proving the effectiveness of the developed model.
5. Patient engagement in adhering to dietary regimens, physical activity and self-monitoring of blood glucose increases significantly after the intervention (χ^2, $p < 0.05$), confirming positive behavioral change under the influence of nursing care.
6. A positive shift is observed in the subjective assessment of health status after the intervention, with the distribution concentrated mainly in the categories “good” and “very good” ($Sk = –0.84$; $p < 0.05$).
7. There is a statistically significant correlation between the level of patient awareness and the degree of self-management, as well as between the frequency of contact with the nurse and satisfaction with care ($r > 0.3$; $p < 0.05$).
8. Expert opinions from physicians indicate that standard healthcare is a necessary component in the management of type 2 diabetes mellitus but is not sufficient on its own for effective prevention of complications. This outlines the need to expand autonomous nursing functions and apply more

structured educational and preventive approaches.

9. The obtained results support the appropriateness of wider implementation of structured nursing activities for clinical monitoring and education in outpatient practice as an approach with the potential to improve disease control and reduce the risk of complications in patients with type 2 diabetes mellitus.

4.2. Recommendations

To the Ministry of Health

- To consider regulating nursing activities related to clinical monitoring, self-management education, monitoring of risk factors and prevention of complications within Ordinance No. 8 of 3 November 2016 on preventive examinations and dispensary care.

To the National Health Insurance Fund

- To consider including and reimbursing nursing activities related to education, counseling and prevention of complications in patients with type 2 diabetes mellitus as part of the activity package in primary and specialized outpatient care regulated by the National Framework Contract.

To the Bulgarian Medical Association

- To create conditions for discussion and integration of a nursing model for comprehensive care of patients with type 2 diabetes mellitus into future national strategies, programs and action plans for chronic non-communicable diseases.

To Healthcare Institutions

- To pilot and evaluate the application of a structured nursing model for comprehensive care of patients with type 2 diabetes mellitus as a tool to improve the organization and continuity of nursing practice.
- To include indicators related to nursing care for patients with type 2 diabetes mellitus in internal systems for monitoring and quality assessment of care.
- To ensure an internal mechanism for periodic evaluation of applied nursing interventions for patients with type 2 diabetes mellitus, based on clinical and behavioral indicators, in order to optimize practice.

4.3. Contributions

Based on the conclusions, recommendations and results of the author's own research, the following contributions can be highlighted:

Theoretical and cognitive contributions

- A conceptual model of clinical nursing monitoring in patients with complications of type 2 diabetes mellitus has been developed, integrating clinical, behavioral and psychosocial aspects into a unified, structured framework for nursing practice.
- The role of the nurse in continuous monitoring, early detection of deterioration in health status and prevention of complication progression has been theoretically substantiated and systematized.
- The relationship between levels of glycemic control, the clinical course of complications and the need for a differentiated nursing approach based on individual risk has been theoretically grounded and conceptualized.
- The theoretical understanding of clinical nursing monitoring in patients with complications of type 2 diabetes mellitus has been expanded through systematic analysis in the context of complex, long-term and integrated healthcare.

Applied and practical contributions

- A conceptual integrated nursing care model and stages for its implementation in practice have been developed.
- Professional activities and tasks of the nurse related to comprehensive clinical monitoring, prevention of complications and maintenance of compensated status in patients with type 2 diabetes mellitus have been defined and systematized.
- Practical algorithms and tools for systematic and targeted nursing intervention have been developed: a model for outpatient clinical monitoring and control of patients with complications of type 2 diabetes mellitus; a model for conducting structured educational sessions; the informational brochure "I Control My Diabetes"; algorithms for nursing activities in the clinical monitoring of patients with diabetic complications.
- An original interventional program "I Control My Diabetes" has been created and tested, integrated into the process of clinical nursing monitoring with the aim of improving health literacy and self-management in patients with complications of type 2 diabetes mellitus.
- A structured nursing care model has been tested in a real clinical

environment, demonstrating a trend toward improvement in key clinical and behavioral indicators in patients with complications of type 2 diabetes mellitus.

List of publications related to the topic of the dissertation

1. Georgieva, Y. (2024). *Application of hyperbaric oxygenation in the treatment of diabetic foot*. Proceedings of the University of Ruse "Angel Kanchev", Vol. 63, Book 8.3, Health Care, pp. 21–25.

2. Georgieva, Y., Toncheva, S. (2025). *Participation of nurses providing healthcare to patients with type 2 diabetes mellitus in continuing professional development programs and courses*. Health Care, No. 2, pp. 11–16.