The Ministry of Health of Ukraine
I. Horbachevsky Ternopil National Medical University
of the Ministry of Health of Ukraine

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Master's Thesis

# MANAGEMENT AND QUALITY OF LIFE IMPLICATIONS OF DIABETES MELLITUS IN THE ELDERLY

The Master of Science in Nursing

The Scientific Supervisor of the Thesis

I. Horbachevsky Ternopil National
Medical University of the MoH of Ukraine

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# INTRODUCTION

**The relevance of the study.** Over the recent decades, diabetes mellitus [7, 10, 15], along with cardiovascular disease and cancer, has been an increasingly prevalent condition [4, 11, 18]; to date, it has assumed the proportions of a "noninfectious epidemic" [20, 32, 33, 42].

Diabetes mellitus may develop at any age [13, 17, 35]; typical characteristics include early disability and high patient mortality [19, 20] as a result of developing complications [11, 19, 25, 46]. These circumstances place diabetes among health problems of high social significance [31, 33, 40]. Although, as of today, it may be said that the major questions of diabetes have found their answers [3, 17] regarding therapeutic approaches [12] and preventing complications [19, 25], nonetheless, another reason why diabetes remains a serious problem includes a significant negative impact on daily living of patients [3, 23, 28].

According to WHO experts [51], diabetes is a chronic disease that develops when the pancreas fails to produce sufficient amounts of insulin or when the body is incapable of effective utilization of its insulin. Insulin is a hormone regulating blood sugar levels. The overall outcome of uncontrolled diabetes is hyperglycemia or increased blood sugar level, which ultimately leads to serious damage to many systems within the body, especially the nerves and blood vessels [11, 19, 25, 46].

In 2014, the incidence of diabetes in adults 18 years of age and older was 8.5% [18, 32, 51]. In 2016, there were 1.6 million diabetes-related deaths and in 2012 there were 2.2 million deaths attributable to high blood sugar levels [33, 42]. Diabetes-related premature mortality has grown 5% between 2000 and 2016 [19, 20]. Between 2000 and 2010, there was a decline in diabetes-related premature mortality in high income economies, but in 2010–2016 this figure rose again [20]. In countries with incomes below average, the increase in

diabetes-related premature mortality has been observed during either of the aforementioned periods.

At the same time, noncontagious disease of the four principal categories (cardiovascular disease, cancer, chronic respiratory disease and diabetes) was 18% less likely to cause death in people 30 to 70 years of age in 2016 compared to 2000 [51].

In spite of such favorable results of reduced mortality, an important concern for many elderly diabetics [17, 40, 47] is diabetes management in the home [22, 24, 26], as well as improving their quality of life while taking into account all the complexities of diabetes management in the elderly [35].

To say the least of it, organization of home-based nursing care for patients with diabetes and management of this disease [24], timely prevention of complications [27, 29, 44] and working with the patient's significant others constitute challenging tasks for the nursing staff [1, 3]; on the other hand, these tasks are very important and requires high levels of knowledge and skills from the nurse [1, 3, 14, 45].

**The aim of the study:** to perform an analysis and an assessment of age-specific aspects of diabetes management in the elderly and its effect on their quality of life.

**Study objectives.**

1. To study the special considerations of clinical course and management of diabetes in the elderly and to study the principal methods of screening for complications.
2. To define and investigate the characteristic naturally occurring changes of carbohydrate metabolism in aging individuals.
3. To investigate the specific aspects pertaining to diagnosis of and screening for type 2 diabetes in the elderly.
4. To study the special characteristics of diabetes in the elderly.
5. To study and define the nursing roles in improving the quality of life in patients with diabetes mellitus.

**The subjects of the study**. Elderly patients with diabetes provided with home-based medical observation, treatment and care; the data obtained in these patients were used for analysis and investigation of characteristic features of diabetes management with respect to quality of life effects of diabetes.

**The object of research.** The influence of diabetes management on the quality of life of elderly patients with diabetes provided with home-based medical observation, treatment and care.

**The methods of study:** general clinical and special endocrinological assessments, medical history, assessment of risks and complications of diabetes, observation, physical examination, general health assessment, collection of information on chief complaints, laboratory and imaging tests; data analysis and the statistical method.

**The scientific and practical value of the study.** In order to analyze and assess age-specific aspects of diabetes management in the elderly and its effect on their quality of life, we have studied the special considerations of clinical course and management of diabetes in the elderly and assessed the principal methods of screening for complications of diabetes. We determined and studied the characteristic naturally occurring changes of carbohydrate metabolism in aging individuals in the following areas: a study of distinctive mechanisms of age-related changes in glucose tolerance, sensitivity of tissues to insulin, insulin secretion and production of glucose by the liver. We studied the special clinical, laboratory and psychosocial characteristics of type 2 diabetes in the elderly, which inform therapeutic approaches to this patient population and the distinctive nature of nursing observation, care and screening for type 2 diabetes in the elderly; the special characteristics of diabetes in the elderly have also been assessed. In the elderly, the negative impact of diabetes was the greatest on such aspects of quality of life as freedom of nutrition, employment, physical capacity and anxiety about the future. This study has also assessed and defined the nursing roles in improving the quality of life in patients with diabetes mellitus. The first and foremost requirements include the knowledge of specific aspects of

diabetes in the elderly and understanding the process of interaction with the patients. Treatment outcomes in patients with diabetes and their quality of life greatly depend on the attitude of nurses to their patients.

# CHAPTER 1
# SPECIAL CONSIDERATIONS OF CLINICAL COURSE AND MANAGEMENT OF DIABETES IN THE ELDERLY. SCREENING FOR COMPLICATIONS (REVIEW OF LITERATURE)

In the 21st century, the issue of diabetes mellitus (DM) assumed the proportions of a global epidemic affecting people in all countries, of all national backgrounds and all age groups [4, 17, 32]. The fastest growth of DM population is seen in the senior age group (65 years and older) [13, 40, 47]. According to the third review of National Health and Nutrition Examination Survey (NHANES III), the prevalence of type 2 DM (DM2T) is approximately 8% in 60 year-old individuals, reaching a maximum (22–24%) in octogenarians [4, 10, 18]. In spite of substantial efforts by healthcare providers [1, 12, 37, 41, 48], the global prevalence of diabetes is steadily on the rise [11, 20, 42]. Unfortunately, lack of effective policies aimed at creating a healthy lifestyle-promoting environment in many countries [14, 16] and unavailability of quality medical care means that prevention [27, 29, 44] and treatment of diabetes [12], especially in people with disabilities is not viewed as an overarching priority. Such an approach must change, since uncontrolled diabetes has very grave implications for the patient's health and wellbeing [11, 19, 25, 46]. In addition to that, diabetes and its complications bear heavily on finances of the patient and their family as well as on the country's economy on the whole [17, 25, 51].

American Diabetes Association (ADA) publish yearly Standards of Medical Care in Diabetes [3], contemporary best practices, which provide an extensive view of the range of issues in diabetes. These Standards contain a dedicated section covering the special characteristics of diabetes in the elderly. The results of this work were published in January 2018 in *Diabetes Care*, an ADA journal, which is consistently printing academic papers on the most important issues of Diabetology [3].

An important challenge is to assess medical, psychological, functional and social geriatric aspects in elderly patients in order to provide a foundation for goals and therapeutic approaches to diabetes management [3, 24, 26].

The screening for geriatric syndromes may be acceptable among the elderly patients experiencing limitations in their basic or instrumental activities of daily living, since these limitations may adversely affect self-control of diabetes and be associated with health-related quality of life [3, 5, 15, 16].

Diabetes is a special abnormal condition in the ageing population [2, 17, 43, 47]. Approximately one quarter of people over 65 years of age have diabetes [6, 8, 23] and half of them have prediabetes [20, 32, 39, 42], with a distinctive trend towards aggravation of this situation in the coming decades. Elderly people with diabetes have higher rates of premature mortality [19, 20] and functional incapacitation/disability; they are also characterized by a faster loss of muscle tissue, as well as by concomitant conditions and diseases, such as coronary heart disease, stroke and/or hypertension [8, 17]. This population cohort is also at higher risk for the conditions and syndromes, which are prevalent in the geriatric population [9, 15, 16, 40], such as polymedication, cognitive impairment, urinary incontinence, falls and chronic pain.

The screening for complications of diabetes [29, 30, 34] in the elderly should be customized and reviewed from time to time, since the results of screening tests may inform therapeutic approaches and targets. Elderly people are at higher risk for depression, which requires appropriate diagnosis [23, 28] and management [22, 26]. Treatment of patients with diabetes [12] may require evaluation of medical, psychological, functional and social realms, since this data may also inform targets and therapeutic approaches. Special attention should be given to complications [11, 25], which may develop rapidly and/or substantially deteriorate the patient's functional status, e.g. concerning the eyes or lower extremities.

Neurocognitive function.

A screening is recommended for early detection of mild cognitive impairment or dementia and depression in people ≥65 years of age during a primary consultation and then yearly as required [36, 37, 39, 49, 50].

Elderly people with diabetes are at higher risk for cognitive impairment [49, 50], which may manifest as mild memory impairment and as pronounced dementia. Patients with diabetes have higher rates of all-cause dementia, Alzheimer's disease and vascular dementia than people with normal glucose tolerance [38]. There are multiple currently ongoing studies of cerebral effects of hyperglycemia and hyperinsulinemia [24] and new classes of drug products are being evaluated. For instance, studies of cholinesterase inhibitors and glutamatergic antagonists failed to demonstrate any positive therapeutic benefits in maintaining or improving cognitive function as well as preventing cognitive deterioration.

The presence of cognitive impairment in the patients may impede treatment and care [37, 39] and complicate the achievement of individualized glycemic targets, as well as targets of lipid profiles and blood pressure. Self-control of blood glucose levels, insulin dose adjustments and dietary compliance are becoming more difficult. Therefore, in such cases it is very important to simplify therapeutic and medication schedules as much as possible and to recruit other people (relatives, significant others) to assist with treatment and care of the patients [12]. Moreover, inadequate glycemic control and longer duration of diabetes lead to an additional deterioration of cognitive functions. There are currently ongoing studies evaluating the possibility of preventing or slowing down the progression of diabetes to maintain cognitive function in the patients. However, studies of intensive glycemic control and blood pressure control to achieve specific targets have not demonstrated any cognitive improvements. In this connection, a yearly screening for cognitive impairment or dementia is recommended in diabetic patients ≥65 years of age [30, 41].

Hypoglycemia

Hypoglycemia in elderly patients with diabetes should be avoided as actively as possible [23, 28]. Hypoglycemia should be detected and managed by adjustments of glycemic targets and pharmacological interventions.

It is important to prevent hypoglycemic episodes in order to reduce the risk for cognitive impairment and other serious adverse outcomes [19, 20]. Large global studies have found intense glycemic control [39, 43] to provide no benefits pertaining to brain structure or cognitive capacity during follow-up. At the same time, no long-term deteriorations of cognitive function have been detected in patients with relatively high incidence of recurring severe hypoglycemia. It is important to understand that cognitive impairment is associated with a higher risk for hypoglycemia and, conversely, serious hypoglycemia is associated with higher risk for dementia. Hypoglycemic episodes should be thoroughly controlled and avoided, while glycemic targets and pharmacological interventions may need to be adjusted to meet the changing needs of elderly people [13, 35, 47].

The recommendations on diabetes management [22, 24, 26] to define treatment targets in elderly patients with diabetes [12]:

1. Elderly patients with diabetes and few concomitant chronic conditions, as well as those with intact cognitive function and functional status should have stricter glycemic goals (glycosylated hemoglobin level <7.5% [58 mmol/mol]) [39, 43]; the glycemic targets in patients diagnosed with multiple comorbidities may be relaxed (<8.0–8.5% [64–69 mmol/mol]).

2. In some elderly individuals, there may be some reasonable relaxations of glycemic targets as part of a customized approach. However, it is imperative to avoid hyperglycemia, which leads to symptoms or increases the risk of acute hyperglycemic complications in all patients.

3. The screening for diabetic complications in elderly patients should be personalized [36, 49]. Special attention should be given to such complications that may potentially cause functional impairment.

4. Most elderly people will benefit from hypertension management to attain personalized blood pressure targets.

5. The management of other cardiovascular risk factors in the elderly should be personalized, while taking proper timeframes into account. Patients with life expectancy at least equal to the timeframes of primary prevention [27, 29, 44] or secondary interventions may benefit from antihyperlipidemic treatments and acetylsalicylic acid.

Providing medical care to elderly patients with diabetes is complicated by their clinical, cognitive and functional heterogeneity, which should be taken into account when deciding on targets and priorities of treatment. The levels of glycosylated hemoglobin (HbA1c) are often used as a standard biomarker for glycemic control in all patients with diabetes, provided there are no conditions affecting red blood cells (i.e. hemodialysis, recent blood loss or blood transfusion, erythropoietin treatment, etc.). In cases where the HbA1c test is unusable, routine blood sugar tests are used.

There are several studies that demonstrate the benefits of intensive control of glucose and lipids in the blood, as well as blood pressure control [39, 43]. In order to experience long-term benefits of intense control, patients with long predicted life expectancy, who have no cognitive and physical impediments and who prefer collaborative decision making, may have therapeutic interventions and targets similar to those in younger people with diabetes. It should be emphasized that patient education in self-management of diabetes and a continuous support of diabetes self-control are vital components of comprehensive treatment in elderly patients [10, 12].

Less intense glycemic targets are advisable in patients with existing complications of diabetes [11, 19, 46], life-long comorbidities and substantial cognitive and physical impairments. These patients are less likely to benefit from reduced risk of microvascular complications, while they are more prone to adverse effects of hypoglycemia. However, people with inadequately controlled diabetes may develop acute complications, including dehydration, poor wound

healing and hyperglycemic hyperosmolar coma. At the very least, glycemic targets should address avoidance of such consequences.

In patients on palliative or hospice care, the focus should be on improving symptoms and eliminating complications of glycemic management [22, 24]. Therefore, if the patient develops organ failure, drug therapy should be titrated or discontinued. Moribund patients may be discontinued from most of the pharmacological agents used for type 2 diabetes [19, 20]. However, there is no consensus on management of type 1 diabetes in these patients.

Although glycemic control may be very important for elderly patients with diabetes, a greater reduction in the incidence and mortality will likely result from controlling other cardiovascular risks [29, 45], and not only from a limited glycemic control [6, 17, 38]. Clinical studies have provided convincing evidence for the importance of adequate hypertension management in elderly people [13, 35, 40]. There is less evidence for the expediency of reducing lipid levels in blood and therapy with acetylsalicylic acid. However, the benefits of these treatments as part of primary prevention and secondary interventions are likely to be more noticeable in the elderly patients whose life expectancies are equal to or exceed the duration of the clinical trial.

Recommendations on pharmacological therapy:

1. Elderly people at higher risk for hypoglycemia [14, 29] should be given drugs with low potential to cause hypoglycemia.

2. Excessive treatment of elderly patients should be avoided, especially given that this problem is unfortunately very common.

3. In order to reduce the risk for hypoglycemia, the health care provider should consider deintensifying or simplifying complex therapeutic schedules to the extent such reduction is possible within personalized glycemic targets.

Particular care should be taken when selecting and controlling pharmacotherapy in elderly patients with diabetes [12]. Cost of treatment may be one of the decisive factors, since subjects in this age group usually take many medications. It is important to juxtapose the complexity of the treatment regimen

with self-management capacities in the elderly people [17, 40, 47]. Personalized glycemic targets should be determined and routinely adjusted based on comorbid chronic conditions, cognitive function and functional status. A more stringent glycemic control in elderly people with multiple morbidities is associated with higher risk for hypoglycemia and is viewed as excessive therapy, but, quite unfortunately, it is prevalent in clinical practice. When patients have to follow a complicated insulin regimen, which exceeds their self-management capacities, reducing the intensity (or simplification) of therapy may lower the risk of hypoglycemia and the disease-associated distress without compromising glycemic control.

Metformin is a first-line drug for type 2 diabetes in elderly people. Recent studies showed that metformin could be used safely in patients with estimated glomerular filtration rate $\geq$30 mL/min/1.73 $m^2$ However, this product is contraindicated in patients with progressive renal failure and should be used with caution in subjects with impaired liver function or congestive heart failure due to higher risk for lactic acidosis. The use of metformin may be temporarily withheld prior to surgical procedures, during hospitalization or when an acute disease may deteriorate renal or hepatic function.

Thiazolidinediones, if used at all, should be used with great caution in patients with severe heart failure or with risk for congestive heart failure [31, 40], as well as in patients at high risk for falls or fractures.

Sulfonylureas and other agents that stimulate insulin secretion are associated with hypoglycemia and should be used with caution. If used, short-acting sulfonylureas, such as glipizide, are preferable. Glyburide is a longer-acting drug and as such is contraindicated in elderly patients.

Oral dipeptidyl peptidase-4 inhibitors have few side effects and a minimal risk for hypoglycemia. However, their price tag may be an obstacle for many elderly patients. A systematic review concluded that incretin-based agents do not increase the incidence of serious adverse cardiovascular events [35, 47].

Glucagon-like peptide-1 receptor agonists are injection drugs, which require adequate visual, motor and cognitive capacities for their administration. The use of these drugs may be associated with nausea, vomiting and diarrhea. In addition to that, a decrease in body weight when using drugs of this group may be undesirable in some elderly patients, especially those with cachexia.

Inhibitors of sodium–glucose cotransporter 2 are used orally, which may be preferable for elderly patients with diabetes [35, 40]; however, long-term consequences are limited, in spite of initial data on efficacy and safety of these agents.

The use of insulin assumes patients or their caregivers have good visual and motor skills, as well as sufficient cognitive capacity. Insulin therapy is based on the ability of an elderly patient to inject insulin independently or with a caregiver's assistance. Insulin doses should be titrated in order to meet personalized glycemic targets and to avoid hypoglycemia. The use of basal insulin once a day is associated with minimal adverse effects and may be regarded as an optimal option for many elderly patients. Several daily injections of insulin may be too complicated for people in this age group, who have existing complications of diabetes, lifelong chronic disease or a limited functional status.

Treatment in residential institutions.

Recommendations:

1. The personnel of residential institutions (nursing homes) should be taught how to improve diabetes management [22, 24, 26] in elderly patients with diabetes [17, 35, 40, 47].

2. People with diabetes, who live in residential institutions, are in need of a thorough assessment in order to define their glycemic targets and make a proper selection of antihyperglycemic agents based on their clinical and functional status.

Diabetes management in residential institutions is a task of special significance [24, 26]. Customized healthcare is important for all patients as a

whole, but healthcare providers [1], as well as nursing personnel and lay caregivers need precise practical guidance. Such guidance and training must include identification of diabetes and assessment of institutional quality. On the whole, such institutions should develop their own policies and preventive measures [27, 29, 44], as well as methods of hypoglycemia management.

It is noted that the elderly people living in residential institutions may have irregular and unpredictable meals, malnutrition, anorexia and swallowing difficulties. In addition to that, therapeutic diets may inadvertently lead to a decrease in food consumption and, respectively, to decreased body weight and malnutrition. The diets adjusted to cultural considerations, individual preferences and personal targets of the patient may improve quality of life and satisfaction with nutrition.

Elderly patients with diabetes living in such institutions are especially prone to hypoglycemia. These patients have a disproportionately high incidence of complications and comorbidities, which, in turn, may also increase the risk for hypoglycemia. Such problems include cognitive impairment, kidney disease, disorders of hormonal regulation and counter-regulation, suboptimal hydration, disorders of appetite and food intake, polymedication and impaired intestinal absorption. An important distinction of residential institutions from medical institutions is the lack of daily assessment of patients, which may lead to hypodiagnosis and insufficient control.

Palliative care.

Recommendations:

1. Should elderly patients with diabetes need palliative care, stringent control of blood pressure as well as discontinuation of therapy may become necessary. In a similar fashion, antihyperlipidemic therapy may be deintensified or altogether discontinued [12, 17, 23].

2. Providing general comfort, prevention of problematic symptoms and preserving the quality of life and dignity of the patient are high-priority tasks of diabetes management in a palliative care setting.

The treatment of elderly patients [35, 40, 47] in a setting of palliative medicine or hospice-based care has a number of special aspects. Overall, this approach should contribute to comfort, symptom management and prophylaxis (i.e. control of pain, hypoglycemia, hyperglycemia and dehydration), as well as preserve the dignity and the quality of life of patients with limited life expectancy. The patient is entitled to a right to refuse diagnosis and treatment; at the same time, the treating physicians may consider discontinuation of therapy and limiting diagnostics. Target levels of blood glucose should be aimed at preventing hypoglycemia and hyperglycemia. Decision-making may require involving the patient, their family or lay caregivers; this should result in developing a treatment plan, which would be convenient and effective to achieve the targets. Pharmacological therapy may include oral agents as first-line treatments, followed by a simplified insulin regimen. Basal insulin may be administered as required, accompanied by oral agents and without a fast-acting insulin. The agents potentially causing gastrointestinal symptoms (such as nausea) or excessive decrease in body weight, may not be the best choice in this situation. As symptoms develop, certain pharmacological agents may be tapered until completely discontinued.

It is assumed that if a patient is stable, the treatment regimen should continue with the emphasis on preventing hypoglycemia and using blood glucose levels, but not glycosylated hemoglobin. If the patient has organ failure, preventing hypoglycemia is even more important. Prevention and management of dehydration is another important consideration. The dosing of insulin may be reduced in patients with type 1 diabetes as oral food intake decreases, but insulin may not be discontinued completely. In case of type 2 diabetes, the dosage of hypoglycemia-inducing medicinal products should be selected correctly. The main objective is to avoid hypoglycemia, while maintaining blood sugar levels at the upper end of preferred target range. It may be reasonable to discontinue all medication in moribund patients with type 2 diabetes. In a similar situation with type 1 diabetes, the consensus is lacking. However, using small amounts of basal

insulin may maintain blood glucose levels and prevent acute hyperglycemic complications.

On the whole, it should be emphasized that it is nursing staff that successful management [22, 24, 26] and the quality of diabetes care [2, 8, 17] greatly depend on, with a direct influence on quality of life of patients and their families.

# CHAPTER 2
# THE OBJECT OF RESEARCH AND METHODS OF STUDY

The subjects of our study included elderly patients with diabetes provided with home-based medical observation, treatment and care; the data obtained in these patients were used for analysis and investigation of characteristic features of diabetes management with respect to quality of life effects of diabetes.

The object of our study was the influence of diabetes management on the quality of life of elderly patients with diabetes provided with home-based medical observation, treatment and care.

Taking into account that the aim of our study was to perform analysis and study age-specific aspects of diabetes management in the elderly and its effect on their quality of life, we used the following methods of study: analysis of scientific literature reports concerning problems of diabetes in the elderly, complications of diabetes, assessment of risk for new-onset diabetes and evaluation of new approaches to treatment and management of diabetes mellitus; general clinical and special endocrinological assessments, medical history, assessment of risks and complications of diabetes, patient observation, physical examination of patients with diabetes, general health assessment, collection of information on chief complaints of patients, laboratory and imaging tests; analysis of study data; statistical method, etc.

# CHAPTER 3
# SPECIAL ASPECTS OF NATURALLY OCCURRING CHANGES OF CARBOHYDRATE METABOLISM IN AGING INDIVIDUALS

In their routine work with diabetic patients, healthcare workers often encounter various individual manifestations of the disease and its course in different patients; this is why the first series of our study included assessment of naturally occurring changes of carbohydrate metabolism in ageing individuals.

Our study enrolled 48 patients who were assessed for naturally occurring changes of carbohydrate metabolism in ageing individuals.

This problem was addressed in the following areas, i.e. study of distinctive mechanisms of age-related changes in glucose tolerance, sensitivity of tissues to insulin, insulin secretion and production of glucose by the liver (Figure 3.1.).

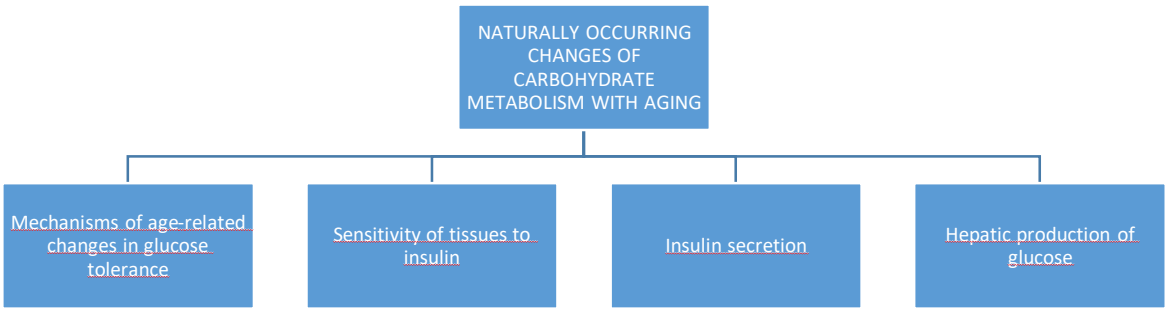


Figure 3.1. The diagram of naturally occurring changes of carbohydrate metabolism in ageing individuals

The mechanisms of age-dependent changes in glucose tolerance.

Age-dependent changes in glucose tolerance have been observed in 25 subjects (52.08%). These changes are characterized by the following trends:

For every additional 10 years of age after the 50th birthday:

- Fasting glycemia is increased by 0.055 mmol/L (1 mg %)

- Glycemia 2 hours after meals is increased by 0,5 mmol/L (10 mg %)

As it follows from the above trends, postprandial glycemia is subject to the greatest change, while fasting glycemia does not appear to change much with age.

The three main mechanisms known to underlie DM2T include the following: reduced tissue sensitivity to insulin (insulin resistance), inadequate insulin secretion in response to food intake and hyperproduction of glucose by the liver.

In order to understand the peculiarities of age-related changes in carbohydrate tolerance, it is important to trace which of the mechanisms underlying DM2T undergoes the greatest changes as the body ages.

The sensitivity of tissues to insulin. Reduced tissue sensitivity to insulin was observed in 32 subjects (66.7%).

Reduced tissue sensitivity to insulin is the principal mechanism leading to disorders of carbohydrate metabolism in overweight individuals. In elderly people, glucose clamp technique detected a reduction in sensitivity of peripheral tissue to insulin and, respectively, reduced glucose uptake by peripheral tissue. This deficiency is mainly observed in elderly subjects with obesity. The elderly age brings along multiple additional factors that aggravate existing insulin resistance. These include low physical activity, reduced muscle bulk (the muscles being the principal peripheral tissue to utilize glucose) and abdominal obesity (this type of obesity intensifies by the age of 70 years and then usually declines). All these factors are closely intertwined.

Secretion of insulin. Reduced insulin secretion was observed in 12 subjects (25%).

Reduced insulin secretion is the principal deficiency underlying DM2T development in non-obese subjects. As is known, secretion of insulin in response to intravenous administration of glucose occurs in two phases. The first phase is a rapid and intense secretion of insulin during the initial 10 minutes; the second

phase is longer (up to 60–120 minutes) and less intensive. The first phase of insulin secretion is required for effective control of postprandial glycemia.

An absolute majority of researchers have established a substantial reduction during the first phase of insulin secretion in non-obese elderly people.

Perhaps this is the reason for the significant increase in postprandial glycemia (by 0.5 mmol/L) every decade after reaching the age of 50 years.

Production of glucose by the liver. Reduced production of glucose by the liver was observed in 8 subjects (16.7%).

Multiple historical studies conducted between 1980 and 1990 have shown that production of glucose by the liver did not substantially change with age. Also, the blocking influence of insulin on production of glucose by the liver is not reduced. Subsequently, changes in glucose metabolism in the liver may not be the cause of significant age-dependent changes in glucose tolerance. An indirect evidence suggesting normal production of glucose by the liver in the elderly is the fact that fasting glycemia (which is greatly dependent on hepatic release of glucose during the night hours) barely changes with age.

All subjects in this series of the study (48 patients without clinical manifestations of diabetes, i.e. 27 males and 21 females) had confirmed changes in carbohydrate metabolism, which were increasing with age as shown in the figure below (Figure 3.2.).

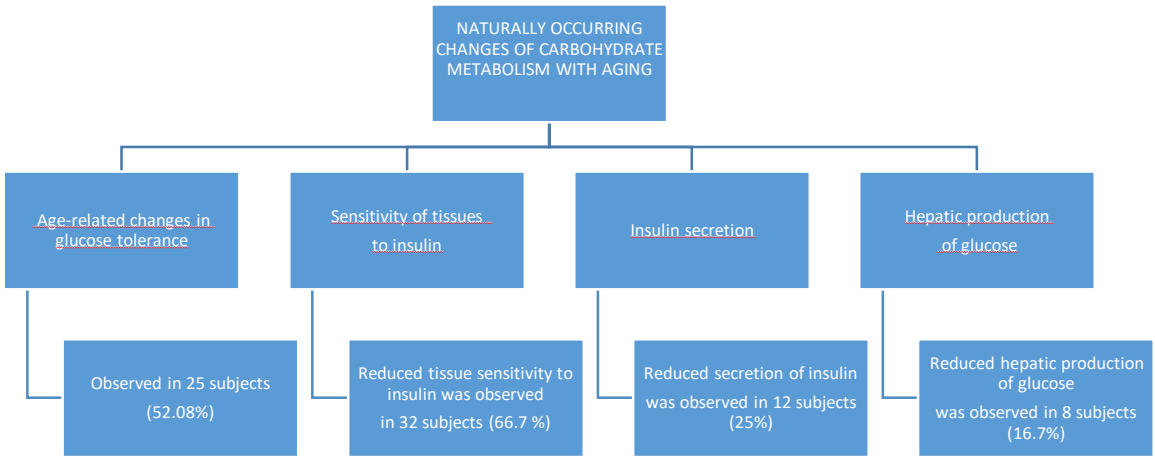

Figure 3.2. Changes of carbohydrate metabolism in ageing individuals in a series of 48 subjects without diagnosed diabetes.

Therefore, glucose metabolism in the elderly is determined by the following two main factors: sensitivity of tissues to insulin and insulin secretion. The first factor (insulin resistance) is more expressed in elderly subjects with obesity. The second factor (reduced insulin secretion) dominates in non-obese elderly subjects.

# CHAPTER 4
# DIAGNOSIS OF AND SCREENING FOR TYPE 2 DIABETES IN THE ELDERLY

Early diagnosis and screening for DM2T late in life has a special place in diabetes management.

Diagnostic criteria of DM in the elderly do not differ from those approved by the WHO (1999) for the general population.

Diagnostic criteria of DM:

- fasting plasma glucose >7.0 mmol/L (126 mg%)
- fasting capillary blood glucose >6.1 mmol/L (110 mg%)
- Plasma glucose (capillary blood glucose) 2 hours after meals (or after a load with 75 g of glucose) >11.1 mmol/L (200 mg%)

The diagnosis of DM is established when the above values have been confirmed twice.

If fasting plasma glucose is found to be between 6.1 and 6.9 mmol/L, the diagnosis of fasting hyperglycemia is made. If glycemia 2 hours after glucose load is found to be between 7.8 and 11.1 mmol/L, the diagnosis of impaired glucose tolerance is made.

In the elderly, DM does not always have an explicit clinical presentation (polyuria, polydipsia, etc.). This disease often has an occult and latent course and does not manifest until late DM complications come to the fore in the clinical presentation. Such complications include impaired vision (retinopathy), kidney problems (nephropathy), ischemic ulcers or gangrene of lower extremities (diabetic foot syndrome), heart attack or stroke. Therefore, there should be an active surveillance for DM2T in the elderly, i.e. routine DM screening in higher-risk populations.

Identification of high risk for DM2T requires mandatory screening tests to diagnose potential DM. There is still no consensus on which test is the most suitable for DM2T screening: fasting glycemia, postprandial glycemia, glucose

tolerance test, glucosuria or HbA1c. The screening of patients at high risk for DM based solely on fasting glycemia may not always be capable of identifying patients with postprandial hyperglycemia (which, as found over the last years, comes laden with an extremely high risk of cardiovascular mortality). This is why we believe using fasting glycemia as a single screening test for early detection of DM2T is a clearly deficient approach. Fasting glycemia should by all means be complemented by testing the levels of glycemia 2 hours after meals.

Therefore, an annual test for fasting glycemia and glycemia 2 hours after meals is required for active detection of DM2T in populations with moderate and high risk for diabetes.

To detect the risk for DM2T in this series of the study, we used a questionnaire developed by the American Diabetes Association.

Positive responses were scored in points.

The test of the American Diabetes Association to assess the risk of developing DM2T:

| |
|---|
| I am a woman who gave birth to a child weighing > 4.5 kg at birth — 1 point |
| I have a sibling with DM2T — 1 point |
| One of my parents has(had) DM2T — 1 point |
| I have excessive body weight — 5 points |
| I am a person with a sedentary lifestyle — 5 points |
| My age is between 45 and 65 years — 5 points |
| My age is > 65 years — 9 points |

If the respondent scored less than 3 points, their risk for DM is evaluated as low at the moment. If the respondent scored between 3 and 9 points, their risk for DM is evaluated as moderate. Finally, if they score 10 points or more, such a patient is at high risk for DM. From this questionnaire, it follows that the age >65 years is a single factor associated with the highest risk for DM2T.

This series of our study enrolled 48 patients without diagnosed diabetes, who had assessments of naturally occurring changes of carbohydrate metabolism in ageing individuals (previous series) and 53 patients with type 2 diabetes.

The results of the survey conducted in 48 patients without diagnosed diabetes are summarized in Table 4.1 and the results obtained in 53 patients with type 2 diabetes are summarized in Table 4.2.

| The item of the questionnaire | The number of people who gave an affirmative response | % of respondents in the given group |
|---|---|---|
| I am a woman who gave birth to a child weighing > 4.5 kg at birth — 1 point | 4 subjects | 8.33% |
| I have a sibling with DM2T — 1 point | 8 subjects | 16.67% |
| One of my parents has(had) DM2T — 1 point | 15 subjects | 31.25% |
| I have excessive body weight — 5 points | 18 subjects | 37.5% |
| I am a person with a sedentary lifestyle — 5 points | 27 subjects | 5.6% |
| My age is between 45 and 65 years — 5 points | 12 subjects | 25% |
| My age is > 65 years — 9 points | 36 subjects | 75% |

Table 4.1. The results of the test of the American Diabetes Association to assess the risk of developing DM2T in 48 subjects without diagnosed diabetes

Overall in this group, less than 3 points was the result in 7 subjects (14.5%) reflecting their currently low risk of developing DM; 29 subjects (60.4%) have scored 3 to 9 points and their risk of developing DM was assessed as moderate; 12 subjects (25%) scored at least 10 points, which suggested high risk of developing DM2T.

| The item of the questionnaire | The number of people who gave an affirmative response | % of respondents in the given group |
|---|---|---|
| I am a woman who gave birth to a child weighing > 4.5 kg at birth — 1 point | 9 subjects | 16,98% |
| I have a sibling with DM2T — 1 point | 34 subjects | 6.41% |
| One of my parents has(had) DM2T — 1 point | 42 subjects | 79.24% |
| I have excessive body weight — 5 points | 47 subjects | 88.68% |
| I am a person with a sedentary lifestyle — 5 points | 45 subjects | 84.9% |
| My age is between 45 and 65 years — 5 points | 8 subjects | 15.09% |
| My age is > 65 years — 9 points | 45 subjects | 84.9% |

Table 4.2. The results of the test of the American Diabetes Association to assess the risk of developing DM2T in 53 patients with type 2 diabetes

Overall in this group of study patients, less than 3 points was the result in 2 subjects (3.77%) reflecting their currently low risk of developing DM; 29 subjects (54.7%) have scored 3 to 9 points and their risk of developing DM

was assessed as moderate; 22 subjects (41.5%) scored at least 10 points, which suggested high risk of developing DM2T. Therefore, 97.2% of the patients with diabetes had confirmed moderate and high risks for developing DM, suggesting suitability of this test to detect risks in the patients currently free from clinical manifestations of diabetes but at serious risk to develop clinical disease.

# CHAPTER 5
# SPECIAL CHARACTERISTICS OF DIABETES IN THE ELDERLY

Type 2 diabetes mellitus (DM2T) in the elderly has its distinctive clinical, laboratory and psychosocial characteristics, which inform special therapeutic approaches to this category of patients, as well as special approaches to nursing observation and care.

Special clinical aspects of DM2T in elderly people.

The greatest difficulties in timely diagnosis of DM2T in elderly patients are caused by asymptomatic (silent) course of the disease, when complaints of thirst, polyuria, pruritus and weight loss are absent.

A characteristic feature of DM2T in the elderly includes predominance of non-specific complaints of weakness, fatigue, dizziness, memory impairment and other cognitive dysfunctions, which may mislead the physician and the nursing staff from suspecting DM at once. Not infrequently, DM2T is detected coincidentally, during assessment for other comorbid conditions. An occult, clinically unpronounced course of DM in elderly subjects leads to a situation when DM2T is diagnosed along with late vascular complications of this disease. As reported by epidemiological studies, more than 50% of the patients had micro- or macrovascular complications at the time of their documented diagnosis of DM2T.

This series of our study enrolled 53 patients with type 2 diabetes, where we documented micro- or macrovascular complications, including coronary heart disease, involvement of blood vessels in low extremities, involvement of ocular blood vessels (retinopathy), involvement of nervous system (neuropathy) and involvement of renal vessels (microalbuminuria, proteinuria and chronic kidney disease).

The results of the study in 53 patients with type 2 diabetes are summarized in Table 5.1.

| Complication | The number of persons with the complication | % |
|---|---|---|
| Coronary heart disease | 21 subjects | 39.6% |
| Involvement of blood vessels in low extremities | 12 subjects | 22.6% |
| Involvement of ocular blood vessels (retinopathy) | 8 subjects | 15.1% |
| Involvement of nervous system (neuropathy) | 10 subjects | 18.8% |
| Microalbuminuria | 19 subjects | 35.8% |
| Proteinuria | 5 subjects | 9.4% |
| Chronic kidney disease | 4 subjects | 7.5% |

Table 5.1. The incidence of micro- or macrovascular complications in 53 patients with type 2 diabetes

The course of DM in elderly subjects is often aggravated by a plethora of concomitant multi-organ morbidities. In our study, 77.4% of patients with DM2T (41 subjects) were found to have a combination of hypertension and dyslipidemia, which called for mandatory pharmacological interventions. Pharmacological treatments may disrupt carbohydrate and lipid metabolism on their own, further complicating management of metabolic disorders in patients with DM.

An important diagnostic difficulty in DM2T in the elderly includes impaired recognition of hypoglycemic states, which may potentially lead to severe hypoglycemic coma. More than anything else, patients in this category have abnormally weak autonomous symptoms of hypoglycemia (i.e. palpitations, shivering and food cravings), which is attributable to weaker activation of counter-regulating hormones.

Apart from micro- or macrovascular complications of diabetes, patients may have occasional comatose states, which fall into the category of acutely developing complications. These include the following:

- Ketoacidotic (diabetic) coma;
- Hyperosmolar coma;
- Hyperlactacidemic coma;
- Hypoglycemic coma.

Ketoacidotic (diabetic) coma is a frequent complication of DM. Many authors still refer to it using the terminology “diabetic coma”.

The following factors contribute to the occurrence of hyperglycemic coma:

- late onset of treatment and incorrect treatment;
- gross dietary non-compliance;
- acute infections and injuries;
- surgical procedures;
- emotionally upsetting situations.

Clinical manifestations of this type of coma result from endogenous toxicity (primarily CNS toxicity) of ketone bodies, dehydration and a shift of acid-base balance towards acidosis. In most cases, the toxic manifestations are increasing gradually; the coma is preceded by a number of harbingers (precomatose state). The following symptoms emerge: intense thirst, polyuria, headache, abdominal pain, vomiting, often diarrhea, and lack of appetite. The patient’s breath has a distinct acetone odor (akin to the smell of rotten apples). Patients have escalating anxiety followed by insomnia and seizures. The respiratory pattern becomes increasingly more Kussmaul-like. Subsequently, agitation gives way to inhibition, manifest as somnolence, indifference and ultimately as loss of consciousness.

When in coma, the patient lies motionless, the skin is dry, the tone of muscles and eyeballs is reduced (soft eyeballs) the pupils are constricted. Kussmaul breathing can be heard from a considerable distance. Blood pressure

(BP) is dramatically reduced. High levels of sugar and ketone bodies are detected in urine.

Hyperosmolar coma develops due to a severe and rapid dehydration caused by vomiting and/or diarrhea.

Unlike ketoacidotic coma, the presentation of a hyperosmolar coma lacks Kussmaul breathing and acetone breath, but has neurological symptoms (muscle hypertonicity).

Severe hyperglycemia is a common feature, but hyperosmolar coma is characterized by a distinctively high plasma osmolarity (up to 350 mOsm/L and above) while levels of ketone bodies are normal.

Hyperlactacidemic coma is very rare. It may develop in a patient with diabetes receiving large doses of biguanides or with hypoxia of any cause (heart failure, respiratory distress, anemia).

This type of coma is suggested by high levels of lactic acid in the blood in absence of ketosis, acetone odor in the breath and severe hyperglycemia.

The most important interventions for management of ketoacidotic coma and precoma include large doses of regular rapid-acting insulin and sufficient amounts of intravenous fluid (isotonic solution of sodium chloride and 25% solution of sodium bicarbonate).

Patients with both coma and precoma should be immediately hospitalized to a therapeutic in-patient unit. In order to diagnose this type of precoma or coma, the patient should be given 40-60 units of insulin prior to transportation; this dose must be documented in ambulance records. Other on-site pre-hospital interventions are performed in a comatose patient only in case of an unpreventable delay with transportation to emergency room.

Hypoglycemic coma occurs as a result of an abrupt drop in blood sugar (hypoglycemia); it is mostly seen in diabetic patients receiving insulin.

The most frequent cause of hypoglycemic coma is insulin overdose, triggered by an inadequately large dose of insulin or by insufficient intake of food after the dose of insulin. The risk for a hypoglycemic coma increases with

attempts to “cover” the dose of insulin with simple carbohydrates. A much less frequent cause of hypoglycemia is a tumor of insular apparatus of the pancreas (insulinoma), which produces excessive amounts of insulin.

Patients with diabetes may develop mild hypoglycemic states, manifest as abrupt craving for food, shivering, sudden-onset weakness and sweating. Taking a lump of sugar, a spoon of jam, a hard candy or a piece of bread (approx. 100 g) usually provides a rapid relief. If this condition cannot be improved for one reason or another, further escalation of hypoglycemia presents with generalized anxiety, fear, increasing trembling and weakness. If not provided with help, most patients will rapidly lapse into a coma with loss of consciousness and seizures. The pace at which hypoglycemic coma develops is very fast: it may take only a few minutes from initial symptoms to the loss of consciousness.

Unlike patients in ketoacidotic coma, the skin of patients in hypoglycemic coma is wet with perspiration, muscular tone is increased, and tonic or clonic seizures are a frequent manifestation. The pupils are dilated; the tone of eyeballs is normal. There is no acetone odor in the breath The respiratory pattern is not altered. Blood sugar usually drops below 3.88 mmol/L. Most frequently, urine dipstick tests for glucose and acetone are negative.

It is essential to know all these symptoms for correct planning and implementation of therapeutic interventions. An emergency IV push of 40-80 mL of 40% glucose should be performed immediately; if there is no effect, the dose of IV glucose should be repeated. If the patient does not regain consciousness, intravenous drip of 5% glucose (D5W) is initiated. Hydrocortisone 125-250 mg intravenously or intramuscularly is also used in severe hypoglycemia. Such treatment is usually performed in an inpatient setting and is usually effective; most patients recover from coma.

If the patient rapidly regains consciousness as a response to emergency interventions at a pre-hospital phase, the patient must be hospitalized anyway, since their insulin regimen may need to be adjusted over the next few days after the episode of coma.

It is worth mentioning that as a result of high quality of diabetes management, no patients in our study had comatose states.

Special laboratory aspects of DM2T in elderly people.

The diagnosis of DM2T in elderly subjects may be challenging not only because of a faded clinical presentation, but also due to atypical laboratory findings. These findings include the following:

- absence of fasting hyperglycemia;
- predominance of isolated postprandial hyperglycemia in 50-70% patients;
- increase in renal threshold of glucose with age.

| Special aspects of laboratory assessments | The number of subjects found to have such special aspects | % |
|---|---|---|
| absence of fasting hyperglycemia | 32 subjects | 60.4% |
| predominance of isolated postprandial hyperglycemia | 27 subjects | 50.9% |
| increase in renal threshold of glucose | 29 subjects | 54.7% |

Table 5.2. Special aspects of laboratory assessments in 53 patients with type 2 diabetes

The absence of fasting hyperglycemia and the predominance of postprandial hyperglycemia add to the evidence that active DM2T screening in elderly subjects should not be limited to occasional measurements of plasma glucose (or capillary blood glucose) only in a fasted condition. These

measurements should be supplemented by testing for glycemia 2 hours after meals.

In elderly patients, diagnosis of DM or assessment of its control cannot be informed by glucosuria. In young people, renal threshold of glucose (i.e. the level of glycemia when glucose appears in urine) is approximately 10 mmol/L, while in individuals 65-70 years of age and older this threshold is elevated to 12-13 mmol/L. Subsequently, even poorly controlled DM may not always be associated with emergence of glucosuria.

Psychosocial characteristics of DM2T in elderly people.

Elderly patients often live in solitude, social isolation, helplessness and poverty. These factors often lead to psychoemotional disorders, severe depression and anorexia. The course of the underlying disease in this age is usually complicated by cognitive dysfunctions (impaired memory and limited attention span and learning ability). The risk of Alzheimer's disease in these patients is higher. In elderly and senile patients, appropriate caregiving and generic medical care is often prioritized over optimal control of DM.

Taking the above special aspects into account, diabetes management in the elderly consistently leads to improving the quality of medical care and, as a result, increasing the quality of life of patients with diabetes and their significant others.

# CHAPTER 6
# THE NURSING ROLES IN QUALITY OF LIFE IMPROVEMENT IN PATIENTS WITH DIABETES MELLITUS

Currently, assessments of quality of life in many chronic disease are of increasing importance. Taking into consideration a complicated schedule of control and treatment, as well as multiple somatic manifestations (acute and chronic complications), diabetes has a profound quality of life impact. It is important to take into account that quality of life, in its turn, has a significant impact on prognosis of the disease.

In modern healthcare, the biopsychosocial model of health and disease is gaining progressively more influence. This model is centered on the patient as a personality with his/her unique feelings and fears, aspirations and hopes. At the same time, the traditional natural science-shaped medical thinking has led to a situation when healthcare providers mainly focus on clinical and metabolic parameters, leaving psychosocial aspects of the disease out of the scope of their attention. Such an approach is referred to as a biomedical approach. For a person with a chronic disease like diabetes, the first and utmost priority is how much the disease is affecting their physical, emotional and social wellbeing, i.e. their quality of life.

Nevertheless, in spite of a persisting disagreement between the biomedical and biopsychosocial approaches, quality of life parameters are becoming mandatory assessments in many (primarily chronic) conditions. Overall quality of life and satisfaction with treatment are important parameters of efficacy and safety for any new drug or method of treatment.

The scientific approach to quality of life is believed to originate in 1947, when D.A. Karnofsky, a professor at Columbia University (USA) published a paper on clinical evaluation of anti-cancer chemotherapy, where a comprehensive assessment of personality of a patient with a severe somatic disease has been presented. In 1980, G.L. Engel proposed a biopsychosocial

model of Medicine; the essence of this model is taking into account the psychosocial aspects of disease. In further exploration of the problem, greatly significant research included works by A. McSweeny (the author suggested evaluating quality of life based on four aspects: emotional state, social functioning, activities of daily living and spending leisure time) and works by N. Wenger, who identified three main parameters (functional capacity, perception and symptoms) and nine sub-parameters (daily routine, social and intellectual activities, general health perception, the symptoms of the underlying disease and the comorbidities, economical status, welfare and satisfaction with life).

Since 1995, a French international non-profit organization studies quality of life (QoL), implementing a concept that the goal of any treatment is to approximate the QoL of patients to that of virtually healthy people.

However, it is important to emphasize that there is still no such thing as a generally accepted notion of quality of life. The issue of characterization and description of quality of life has been a subject of much debate over the last years. Such notions as “quality of life”, “wellbeing”, “health status” and “satisfaction with treatment” are often used interchangeably. This further complicates defining each of them individually.

Among multiple factors to define quality of life in DM, the following can be identified as the most significant:

- Food limitations: probably the most vulnerable component of quality of life;
- Requirements concerning self-control and treatment, which often place a significant burden on the patient (this refers to time commitments and high degree of psychological strain associated with the need to control DM continuously, absence of “leaves” from disease management, etc.);

- A constant threat of complications that triggers anxiety and depression; when these complications appear, the patient's capacity to engage in activities of daily living is substantially reduced;
- Fear of hypoglycemia, which, in addition to reduced emotional wellbeing, leads to limitations of physical activity;
- Communication difficulties associated with fear of rejection by significant others, fear of losing one's job, problems within the family, etc.;
- The financial burden of treatment, affecting not only the healthcare system, but also the patient and their family.

DM is often associated with symptoms of depression, which have a significant negative impact on quality of life. There is evidence that depression is a stronger prerequisite of such medical outcomes in DM patients as hospitalization and mortality than physical and metabolic factors, complications, body mass index and glycosylated hemoglobin levels.

Therefore, the level of quality of life may become a key factor in patient’s ability to manage their disease and ensuring their future health and wellbeing.

Evaluation of quality of life includes a thorough assessment of damage in the three main spheres of human functioning: physical, psychological and social. This evaluation actually involves discussing personal aspects of life with diabetes to find out how the disease affects the daily life of the patient.

Instruments for quality of life assessment in diabetes.

Questionnaires are currently the main method to evaluate quality of life or its individual components. These instruments are created according to clearly defined criteria. Prior to clinical use, the instruments are checked for their psychometric properties.

These properties include the following:

Validity: the capacity to assess the characteristic stated in the its name (for instance, the quality of life per se, and not some aspects of physical functioning

or emotional wellbeing), i.e. validity shows to what extent the instrument is measuring exactly what it is designed to measure;

Reliability: the capacity of the questionnaire to yield consistent and precise measurements under otherwise identical conditions;

Responsiveness: the capacity of the questionnaire to register valid changes caused by alterations in respondent's status, i.e., in course of treatment.

Instruments (questionnaires) currently used to assess QoL and related concepts can be conventionally classified under following two categories.

I. For whom the technique is intended:

- for overall population, including healthy individuals and patients;
- for patients with any disease;
- for patients with specific disease(s), e.g. DM, asthma, etc.

Therefore, all questionnaires can be divided into general instruments (applicable to the entire population) and nosology-specific instruments (i.e. designed to assess the quality of life in a certain disease.

II. What is directly assessed:

- QoL;
- subjective health status;
- emotional wellbeing, satisfaction with treatment, etc.;

Over the past two decades, multiple questionnaires have been created to assess various aspects of quality of life in diabetes.

The Diabetes Quality of Life Measure (DQOL) was one of the first of such instruments. It was originally designed for use in DCCT (Diabetes Control and Complications Trial) in the 1980s. The questionnaire is intended for patients with type 1 DM and assesses discomfort associated with an intense treatment regimen. This questionnaire is still widely used to assess quality of life in patients with diabetes.

The Audit of Diabetes-Dependent Quality of Life (ADDQoL) is a questionnaire with a fundamentally different approach to quality of life assessment. The instrument is a list of questions applicable to those spheres of

life, which can be potentially affected by diabetes: work/career, social life, family relationships, friendship, sexual life, leisure time, freedom of travel, concerns for one's future, motivation to achieve goals, physical activity, potential loss of autonomy and the pleasure of consuming food. There are two versions of this questionnaire: the first version contains 18 questions and the second Version contains 19 questions.

The questionnaires to assess the QoL in DM may also include The Diabetes-Specific Quality of Life Scale (DSQOLS) and Diabetes-39 (D-39).

By analogy with ADDQoL, questionnaires to assess QoL in complications of diabetes. The nephropathy QoL questionnaire is designed to assess QoL in patients with kidney disease (terminal stage) treated with hemodialysis, peritoneal dialysis or patients who underwent kidney transplantation. The instruments currently used to assess QoL in involvement of lower extremities include the Diabetic Foot Ulcer Scale (DFS) questionnaire and the Neuropathy- and Foot Ulcer-Specific Quality of Life instrument (NeuroQoL).

The below questionnaires do not directly assess the quality of life, but rather individual aspects of emotional and psychological wellbeing affected by diabetes, the concerns associated with diabetes-specific symptoms and satisfaction with treatment.

Diabetes assessment scale: this questionnaire is intended to determine the way the patient feels about diabetes and his/her attitude to diabetes. The ATT-39 questionnaire was one of the first instruments designed to assess psychological adjustment to diabetes.

The following instruments are also used as part of routine practice: The Questionnaire on Stress in Patients with Diabetes (QSD), List of symptoms in type 2 DM and Problem Areas in Diabetes (PAID) scale (this scale describes the emotional distress typical for DM).

Diabetes Care Profile (DCP) has been developed as a self-administered questionnaire to assess the social and psychological factors related to diabetes and its treatment. The Diabetes Health Profile (DHP) is an instrument intended

for insulin-requiring patients, consisting of the following 3 scales: Psychological Distress, Barriers to Activity and Disinhibited Eating. Th Well-Being Questionnaire for patients with DM is a 50-item instrument with 4 scales to assess individual aspects of quality of life, symptoms, discomfort, life impact and emotional wellbeing.

There are also instruments to assess narrow problematic diabetes-related areas, such as fear of injections in adult insulin-requiring patients, fear of hypoglycemic episodes, etc.

Therefore, the above data suggest current lack of a unanimously accepted golden standard in QoL assessment of diabetes. In other words, there is no single instrument used for a comprehensive assessment of all aspects of diabetes. Every questionnaire is intended to evaluate a number of vulnerable aspects of quality of life and specific damage in one or several dimensions: physical, psychological and social role functioning. Whether to select one or several instruments for quality of life assessment depends on specific tasks in a given study.

More frequently, diabetes develops gradually (especially in the elderly) and its onset rarely has a sudden nature. Nevertheless, the nurse should keep in mind that patients with diabetes may require hospitalization and in-patient care. Hospitalization in diabetes may be required regardless of patient's age and gender. Two types of hospitalization are possible:

Scheduled (elective) hospitalization is required when the patient needs to have special treatments and a thorough/comprehensive assessment. Such hospitalization may be an option in patients requiring a surgical or a prosthetic procedure.

Emergency hospitalization is performed as decided by emergency medical services personnel and with patient's consent.

Hospitalization of elderly patients is important in the following cases:

- Diabetes-related coma or a precomatose state.
- The need to adjust insulin therapy.
- Decompensation of diabetes.

- Pronounced ketoacidotic events.
- Exacerbation of certain comorbidities (cholecystitis, pneumonia, urolithiasis, acute pancreatitis, etc.).
- Manifest diabetic angiopathy, retinopathy and nephropathy.

In-patient treatment of diabetes is an optimal solution when only a physician may help select and titrate the dose of correct medications and improve the general condition of the patient.

Potential problems in the patient:

1. Thirst
2. Increased appetite
3. Weakness
4. Decreased ability to work
5. Weight loss
6. Pruritus
7. Heartaches
8. Pain in lower extremities
9. Dryness of skin
10. Furunculosis
11. Comatose state

Nursing actions related to patient care

1. Explaining the importance of dietary compliance to the patient
2. Patient education in dietary choices and preparation of food.
3. Controlling the food brought from outside (if permitted by institutional policies)
4. Educating the patients in aseptic and antiseptic precautions with parenteral administration of insulin in the home.
5. Explaining daily urine collection for glucosuria to the patients
6. Skin care in severely ill patients to prevent skin problems and pressure ulcers
7. Monitoring of body weight.

8. Monitoring of urine output.

9. Monitoring of BP and HR.

10. Providing premedical aid when a comatose state develops.

11. Monitoring glucose levels in the blood in and urine.

Nursing interventions include the following: taking body temperature, assessment of fluid balance, monitoring of oral medication compliance and providing assistance when needed; care for severely ill patients, preparation of patients for various assessments, scheduling of diagnostic/imaging tests and taking patients to the tests when necessary, performing injections (e.g. subcutaneous injections of insulin), etc.

In this study, we conducted an analysis of diabetic patients' impression of quality of life.

In order to assess quality of life perceptions in diabetic patients, we have conducted a survey using a questionnaire referred to as "Diabetic Patients' Impression of Quality of Life Questionnaire". The survey included 53 patients (26 males and 27 females).

100.0% of respondents were 60 years of age and older.

Family structure of respondents was as follows:

Living with a spouse: 45.0%.

Living with a spouse and child(children): 12.0%.

Living with parents: 0%.

Living with children: 15.0%

Living alone: 30.0%

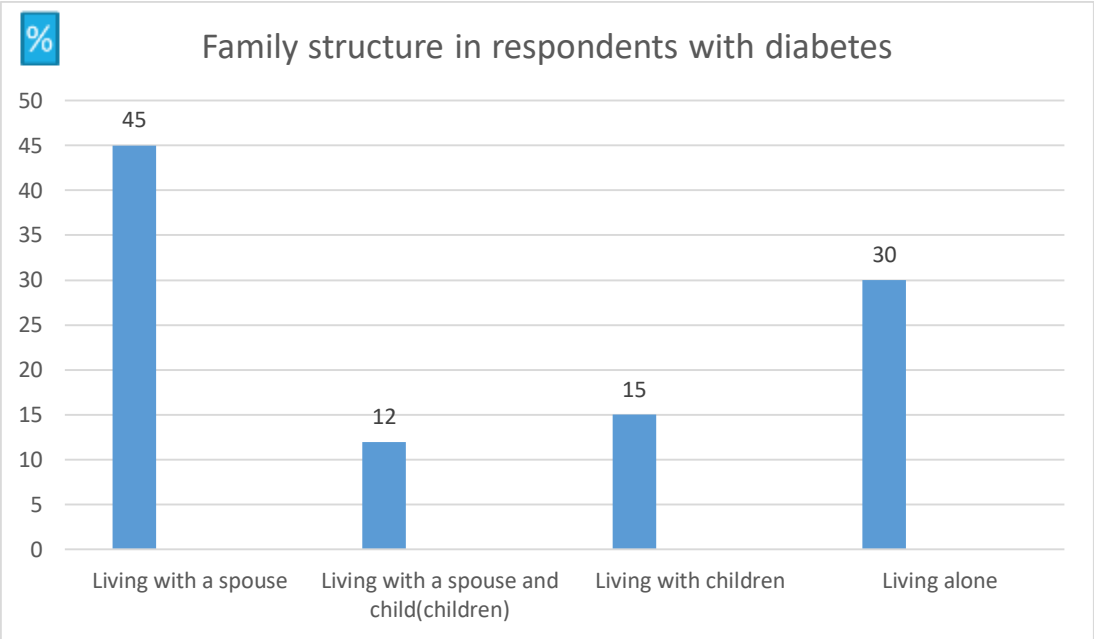


Figure 6.1. Family structure in respondents with diabetes

Self-assessment of health status by the respondents has shown satisfactory health in 55.0% and unsatisfactory health in 35.0% of respondents; 10.0% of respondents could not provide a definite answer.

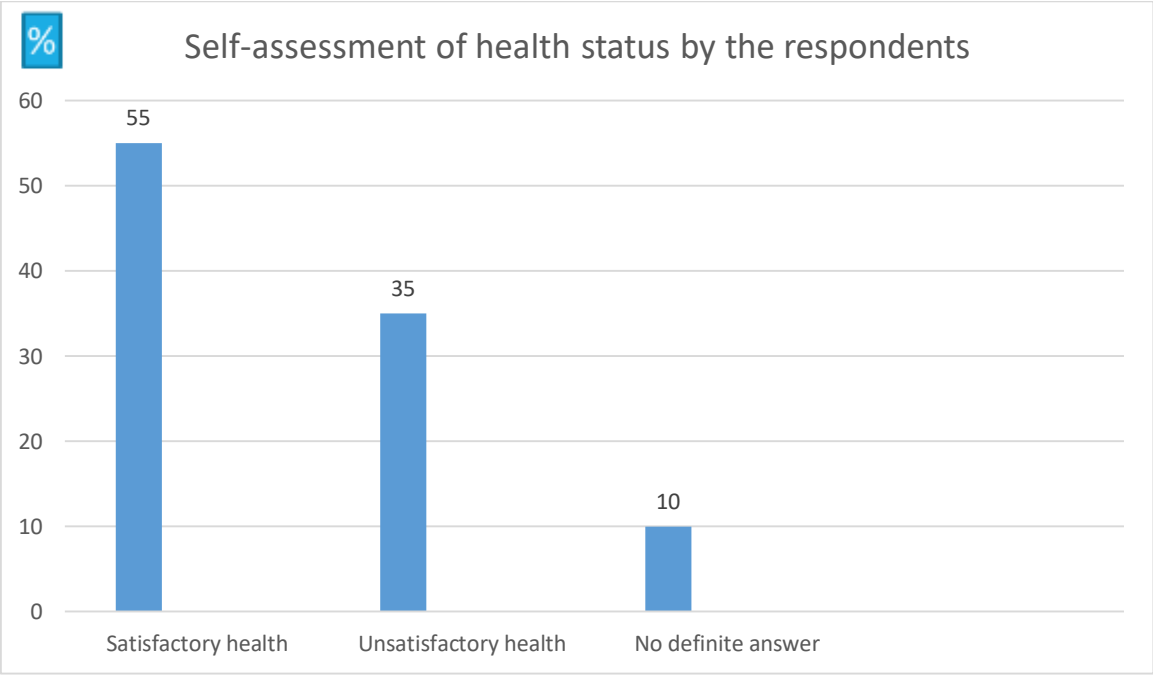


Figure 6.2. Self-assessment of health status by the respondents in 53 patients with diabetes

Distribution of patients by impaired activity of main organs and systems was as follows: skin impairment in 35.0% respondents, gastrointestinal tract impairment in 70.0%, cardiovascular system in 50.0%, circulation in lower extremities in 60.0%, impairment of sensory organs and manifestations of polyneuropathy in 40.0%.

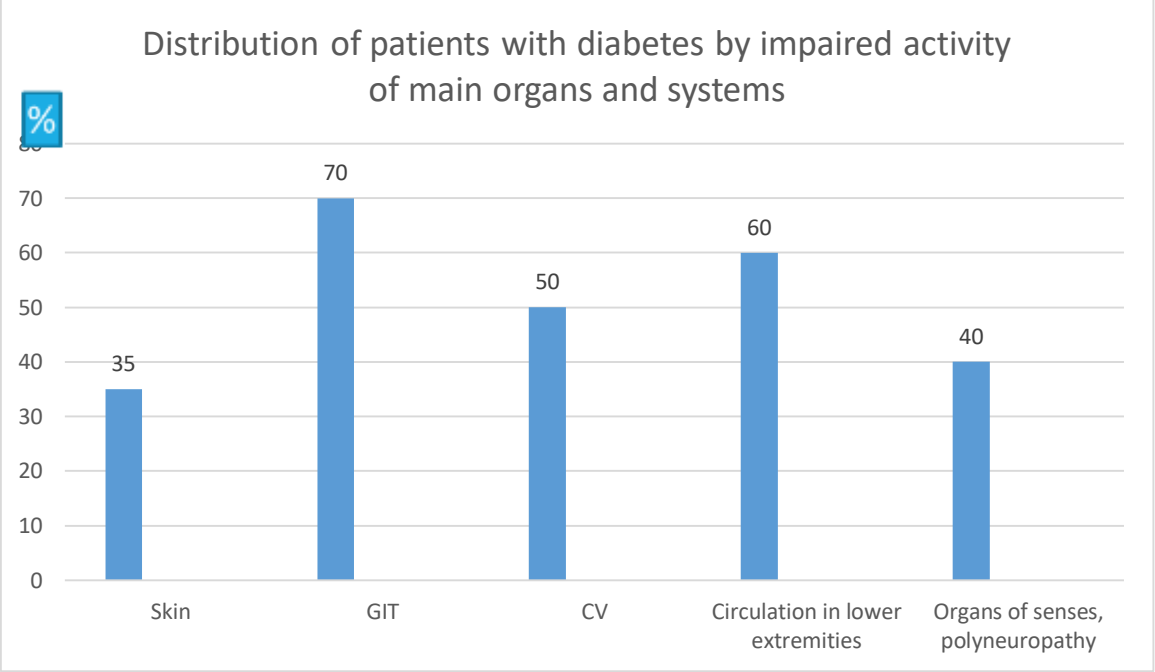


Figure 6.3. Distribution of patients with diabetes by impaired activity of main organs and systems

In view of the foregoing, it may be stated that diabetes causes disorders in virtually all vital organs and systems, with the greatest impairment in the GI tract.

Distribution of patients by sleep disorders found that 65.0% of respondents experienced impaired sleep.

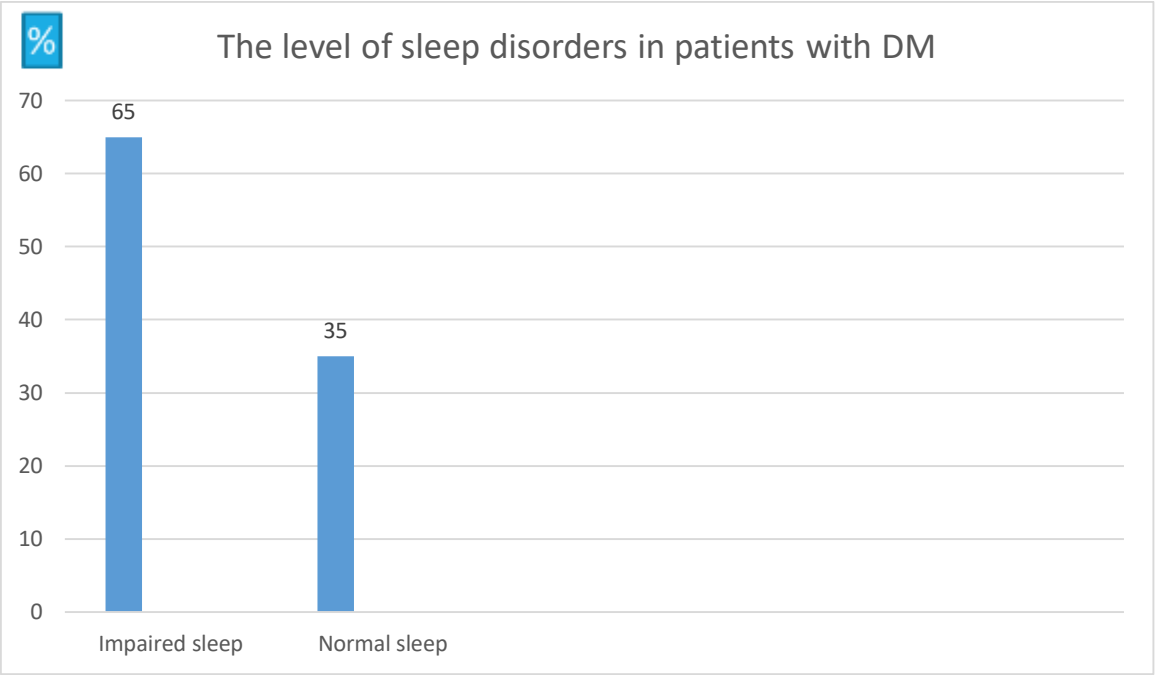


Figure 6.4. The level of sleep disorders in patients with DM

During analysis of mental specific aspects of personality, 80.0% of the patients were found to have feelings of loneliness and futility/lack of purpose. Approximately the same proportion of patients experienced emotional lability/mood swings (tearfulness, irritability etc.).

The reply to the question “Do you feel anxious about your life/have fear of death?” was affirmative in 20.0% of respondents; 30.0% of respondents replied this was only true in times of exacerbation of their disease and 50.0% of respondents gave a negative reply.

An affirmative reply to the question whether they had memory impairment was given by 80.0% of respondents.

Therefore, an inference could be made that a persistent memory loss was occurring in patients with diabetes. A large percentage of patients with diabetes felt offcast and burdensome to their significant others.

In this case, a quality of life assessment is not only clinically important as a criterion of therapeutic efficacy; it also helps visualize the level of social adaptation of a person against a backdrop of their disease.

Guidelines.

For the best quality of life assessment in patients with diabetes, it was suggested to introduce a quality of life questionnaire into practical use.

The goals of using the questionnaire were as follows: monitoring of wellbeing in patients with diabetes, assessment of level of satisfaction with their treatment and how quality of life parameters changed with time.

Only joined efforts of healthcare personnel, the patients and their significant others make it possible to improve care outcomes and quality of life in patients with diabetes. There have been many achievements, but challenges remain.

Diabetes has an overall negative impact in all aspects of quality of life. The negative impact of DM was the greatest in such aspects of quality of life as freedom of nutrition, employment, physical capacity and anxiety about the future.

The greatest concerns of patients include how complications of diabetes affect their employment, physical capacity and financial security.

As opposed to male patients, the greatest impact in female patients involves such aspects of quality of life as family life, social life and freedom of nutrition, as well as general wellbeing.

A pivotal achievement of Diabetology over the past thirty years is increasing the role of nurses and creating a nursing specialization in Diabetology. Such professional nurses provide diabetic patients with high standards of care and organize interactions between hospitals, general practitioners and outpatients; they also prepare patients to various laboratory and imaging tests and engage in patient education.

Diabetes management as part of nursing activity has its own distinctive features. The first and foremost requirements include the knowledge of specific aspects of diabetes in the elderly and understanding the process of interaction with the patients. Treatment outcomes in patients with diabetes and their quality of life greatly depend on the attitude of nurses to their patients.

# CONCLUSIONS

1. This work has provided a study of the special considerations of clinical course and management of diabetes in the elderly and evaluated the principal methods of screening for complications of diabetes.

2. We have defined and studied the characteristic naturally occurring changes of carbohydrate metabolism in aging individuals in the following areas: investigation of distinctive mechanisms of age-related changes in glucose tolerance, sensitivity of tissues to insulin, insulin secretion and production of glucose by the liver.

3. We have studied the following: the special clinical, laboratory and psychosocial characteristics of type 2 diabetes in the elderly, which inform therapeutic approaches to this patient population; and the distinctive nature of nursing observation, care and screening for type 2 diabetes in the elderly.

4. The special characteristics of diabetes in the elderly have been studied. In the elderly, the negative impact of diabetes was the greatest on such aspects of quality of life as freedom of nutrition, employment, physical capacity and anxiety about the future.

5. This work has studied and defined the nursing roles in improving the quality of life in patients with diabetes mellitus. The first and foremost requirements include the knowledge of specific aspects of diabetes in the elderly and understanding the process of interaction with the patients. Treatment outcomes in patients with diabetes and their quality of life greatly depend on the attitude of nurses to their patients.

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