ANNOTATION

of the dissertation of Jumagaziyeva Oryngul Jenisbekovna entitled **"Development and substantiation of organizational and managerial mechanisms of nursing activities within the Disease Management Program"** submitted for the degree of Doctor of Philosophy (PhD) in the educational program 6D110200 – Public Health

Relevance of the Research Topic

Chronic non-communicable diseases (hereinafter referred to as NCDs) remain one of the most pressing challenges of modern healthcare, being the leading causes of premature mortality and disability in developed countries. The majority of people living with non-communicable diseases reside in low- and middle-income countries. Approximately 47% of all deaths worldwide are caused by NCDs, with cardiovascular diseases, stroke, and diabetes being the primary contributors. According to the World Health Organization, the number of people with diabetes increased from 108 million in 1980 to 422 million in 2014, while other researchers associate diabetes with 4.2 million deaths among adults aged 20–79 years. According to the International Diabetes Federation, diabetes accounts for 11.3% of all deaths globally, with the lowest proportion observed in the African region (6.8%) and the highest in the Middle East and North Africa (16.2%). Diabetes-related mortality was most prevalent among individuals aged 60 years and older (46.2%), particularly in the African region (73.1%), and lowest in the European region (31.4%). Another study reported that the global age-standardized prevalence of diabetes was 6.1%, with projections indicating that this figure may exceed 10.0% by 2050. High body mass index is the leading contributor to the global burden of diabetes-related disease, which increased by 24.3% worldwide between 1990 and 2021.

Arterial hypertension is the leading cause of premature mortality from cardiovascular diseases. An increase in the prevalence of arterial hypertension from 1990 to 2019 was observed in both men (from 317 to 652 cases) and women (from 331 to 626 cases). However, the most significant progress in diagnosis and treatment has been achieved in high-income countries of Central Europe, as well as in some upper-middle-income countries and, more recently, in high-income countries including Costa Rica, Taiwan, Kazakhstan, South Africa, Brazil, Chile, Turkey, and Iran. Complications of cardiovascular diseases, such as chronic heart failure, affect more than 64 million people worldwide, while research in this area remains limited.

Numerous epidemiological studies have conclusively demonstrated the role of risk factors such as smoking, arterial hypertension, overweight and obesity, elevated blood glucose and cholesterol levels, alcohol abuse, and low physical activity in the development of cardiovascular and other chronic non-communicable diseases. Accordingly, prevention of risk factors for the development and progression of NCDs is a key priority for healthcare professionals, particularly at the level of primary health care (PHC).

More than a decade ago, in response to emerging challenges in healthcare delivery, the concept of Disease Management was introduced as a structured, systematic approach aimed at maximizing patient self-management capacities, reducing the risk of disease progression, disability, and mortality, and enhancing the productivity and cost-effectiveness of healthcare systems. Disease management represents a comprehensive concept that organizes the structure and delivery of healthcare in accordance with the natural course of a disease in an individual patient. A distinctive feature of this approach is its focus on empowering patients to become more competent in managing their behavior and illness, as well as fostering shared responsibility between patients and healthcare organizations for health outcomes.

Since 2013, the Ministry of Health of the Republic of Kazakhstan has implemented Disease Management Programs for three major conditions: diabetes mellitus, arterial hypertension, and chronic heart failure (Order of the Ministry of Health of the Republic of Kazakhstan No. 211 dated April 5, 2013 "On the implementation of the Chronic Non-Communicable Disease Management Program in pilot regions"). These programs aim to improve patient health outcomes, promote patient self-care and self-management, increase the use of effective medications, and enhance treatment adherence. As a result, reductions in disease exacerbations, complications, and the need for inpatient and emergency care can be expected. Successful implementation of these programs requires active involvement of district nurses, enhancement of their professional status and functional responsibilities, improved collaboration between primary care physicians and specialists, and the development and dissemination of effective educational programs and tools for patients.

Therefore, the relevance of this study lies in examining the role and functions of nurses in the implementation of Disease Management Programs at the primary health care level in the Republic of Kazakhstan.

Purpose of the study

To develop a model of nursing activities in the implementation of the Disease Management Program.

Objectives of the study

1. To analyze international and national experience regarding the role of nurses in organizing care for patients participating in disease management programs, using diabetes mellitus as an example.
2. To study the prevalence and mortality of three diseases included in Disease Management Programs—diabetes mellitus, arterial hypertension, and chronic heart failure—in the city of Almaty.
3. To analyze existing nursing practices within Disease Management Programs.
4. To assess patient experience and satisfaction with medical care within the Disease Management Program, taking gender characteristics into account.
5. To develop practical recommendations for a nursing activity model in the implementation of the Disease Management Program.

Research methods

- Information and analytical method;
- Quantitative and qualitative methods;
- Statistical method.

Object of the study– Primary health care organizations in the city of Almaty, nurses involved in the implementation of the Disease Management Program, and patients registered in the program.

Subject of the study– Organizational, managerial, and professional activities of nurses in the implementation of the Disease Management Program, as well as mechanisms of interaction between nurses and patients.

Key provisions submitted for defense

1. From 2016 to 2023, Almaty experienced a steady increase in the incidence of type 2 diabetes mellitus, arterial hypertension, and chronic heart failure, accompanied by growth in preventable and treatable mortality, particularly among men and older adults.

2. In performing key tasks related to patient monitoring and education within the Disease Management Program, nurses face knowledge gaps and limitations in educational activities, which negatively affect the effectiveness of patient self-management. Difficulties in patient adherence to recommendations necessitate active engagement and the introduction of modern tools such as automated monitoring systems.

3. Men and women participating in Disease Management Programs for the three conditions demonstrate different needs and behaviors in managing chronic diseases, requiring gender-sensitive approaches to education, support, and communication to improve treatment effectiveness and quality of life.

4. The nursing activity model within the Disease Management Program is an effective tool for comprehensive support of patients with chronic diseases and is well adapted to primary health care settings. Its implementation requires systemic support, staff training, consideration of regional and gender characteristics, and infrastructure development to ensure sustainable and effective performance.

Description of the main research results

From 2016 to 2023, the incidence of three major chronic conditions in Almaty—type 2 diabetes mellitus, arterial hypertension, and chronic heart failure—showed a steady increase. The number of diabetes cases rose from 28,920 to 54,850, with the most pronounced growth observed in the 18–44 age group (from 1,183 to 3,239 cases). The prevalence of arterial hypertension increased from 85,534 to 178,899 cases, with the greatest growth among individuals aged 75 years and older. Chronic heart failure demonstrated the most dramatic increase, from 4,173 cases in 2016 to 21,704 cases in 2023, particularly among individuals aged 60–74 and 75 years and older.

Analysis of diabetes-related mortality from 2014 to 2023 revealed a peak in 2021 (30.6 per 100,000 population), associated with the COVID-19 pandemic and reduced access to healthcare. The average annual percent change (AAPC) was 1.9%, with a wide confidence interval (−3.4% to 7.4%),

indicating no statistically significant long-term trend. The absolute increase in preventable and treatable diabetes mortality was 8.64 per 100,000 population, of which 5.37 cases were preventable and 4.32 treatable. Mortality increased more markedly among men (10.73 per 100,000) than among women (7.35 per 100,000), highlighting gender differences.

Despite the rise in absolute mortality, relative annual changes remained modest (0.40–0.43%). Male mortality rates remained consistently higher, reaching 36.06 per 100,000 in 2021, compared to 27.33 per 100,000 among women. These findings underscore the need to strengthen preventive and therapeutic measures, particularly considering gender and age characteristics, and highlight the importance of reinforcing primary health care systems to reduce the burden of NCDs.

A survey of 13 nurses in Almaty revealed that their primary responsibilities include timely examinations, first aid provision, prevention of complications, and patient education regarding medication use, diet, and procedures. Most nurses reported insufficient knowledge and the need for additional training, while educational activities were often limited to verbal consultations.

Nurses reported difficulties in working with patients who fail to adhere to treatment regimens, dietary recommendations, and self-monitoring practices. To address these challenges, nurses conduct counseling sessions, invite patients for follow-up consultations, and emphasize the potential of automated monitoring systems based on electronic health records. International experience demonstrates that structured patient education and support programs significantly improve treatment outcomes and reduce hospitalization rates.

Among 278 patients with arterial hypertension, no statistically significant gender differences were found in socio-demographic characteristics, timing of diagnosis, volume of oral information, or dietary adherence. However, women more frequently received written information, while men were more likely to smoke and consume alcohol. Gender differences were also observed in awareness of risk factors and levels of emotional support and involvement in treatment decision-making.

Among 278 patients with diabetes mellitus, significant gender differences were identified in social status and behavioral risk factors, with higher rates of smoking and alcohol consumption among men. Women more frequently expressed the need for guidance on physical activity. Satisfaction with nursing care and participation in self-monitoring did not differ by gender.

The study involved 183 patients with chronic heart failure, including 79 men (43.2%) and 104 women (56.8%). The division by age and level of education did not differ depending on gender ($p=0.77$ and $p=0.724$, respectively), but significant differences in social status were revealed ($p=0.015$): men often work (63.3% vs. 53.8%), and women are much more likely to do household chores (18.3% vs. 2.5%). Women often noted that the

diagnosis was made more than three years ago (42.3% vs. 32.9%, p=0.049), while men often noted that they had received sufficient oral information at the time of diagnosis (72.2% vs. 60.6%, p=0.028). About half of the patients follow a diet (45.9%), a third smoke (35.5%) and drink alcohol (26.2%), there were no significant differences depending on gender. In general, patients are well aware of the main risk factors, of which nutrition is considered the most important factor, especially among men (81.0% vs. 65.4%, p=0.009). The majority of patients positively assessed the results of participation in the program, noting that about 75-85% are confident in the treatment of their disease, and also noted an improvement in their condition and a reduction in risk factors (about 80%). Men are more involved in self-monitoring logging (83.5% vs. 66.3%, p=0.009), developing an action plan (82.3% vs. 67.3%, p=0.023), and are more likely to recommend the program to friends (86.1% vs. 71.2%, p=0.016). The majority of patients are under constant supervision of specialists (cardiologist — 84.2%, ophthalmologist — 58.5%, endocrinologist — 63.9%), and women are more likely to undergo "other types of tests" quarterly (70.2% vs. 53.2%, p=0.04). Men were more likely to receive sugar control training (87.3% vs. 73.1%, p=0.02) and more likely to express satisfaction with the training time (83.5% vs. 68.3%, p=0.032). The relationship with the medical staff is evaluated positively -more than 80% of patients noted it as "very good", and more than 70% are satisfied with the attention to the personal situation and involvement in decision-making. However, only about 25% have the opportunity to communicate with a doctor or nurse around the clock, and 11.5% are unaware of this possibility, which indicates the need to improve relationships outside of business hours. In general, despite the level of support and satisfaction with the organization of medical care, there are areas that need to be improved in the field of patient awareness and increased engagement.

The model of the nurse's activity in the implementation of the chronic disease management program consists of a system of comprehensive step-by-step patient support. This model includes a preparatory stage (screening, patient inclusion, planning), gender and age-sensitive training and informatization, health monitoring, multidisciplinary team coordination and performance evaluation, as well as the preparation of reports. In this model, the nurse plays an important role as the main link between patients, doctors, and social workers, organizing processes, providing motivational advice, and working with patient families. The model is planned to be tested in two primary health organizations in Almaty with the participation of doctors, nurses and patients. Preliminary reviews confirm its implementation and the importance of careful staff training, management support, and the use of modern electronic systems. The potential for scaling was noted, adapting the program to local conditions and PHC structure.

The main risks of implementation are related to the lack of qualified and motivated nurses, technical problems with information technology, organizational diversity, resistance to change, and limited finances. To reduce

them, it is proposed to improve the quality of medical care by collecting feedback, adapting the model to regional specifics, providing comprehensive support at all levels of the healthcare system, continuous professional development and standardization of monitoring and accounting. Chronic non-communicable diseases continue to pose a serious threat to public health, so effective management programs and the active participation of a nurse are needed. It has been proven that the model of nurses' activities can be implemented within the framework of a disease management program and has the potential to scale by strengthening adaptation to local conditions and staff training. For successful implementation, it is important to take into account the identified risks and provide comprehensive support, which will improve the quality and accessibility of medical care for patients with chronic diseases.

Justification of scientific novelty

- For the first time, the organizational and managerial activities of a nurse in the implementation of a disease management program in primary health care in the Republic of Kazakhstan have been comprehensively studied.

- The experience of receiving medical care, the level of awareness and the level of self-management of patients with diabetes mellitus, hypertension and chronic heart failure has been scientifically analyzed.

- For the first time, a model of activity in the disease management program has been developed, adapted to the conditions of Kazakhstan, based on the expanded clinical and managerial role of a nurse.

Practical significance of the results obtained:

- The results of the dissertation research are of practical importance for improving the disease management program in primary health care organizations. The model of nursing developed in the course of the study makes it possible to improve the quality, continuity and effectiveness of medical care for patients with chronic diseases. - The developed model contributes to improving the quality, accessibility and effectiveness of medical care for patients with chronic diseases, as well as strengthening the preventive focus of healthcare.

Personal contribution of the doctoral candidate

The dissertation is an original work authored by Dzhumagazieva Oryngul Jenisbekovna. The author substantiated the research topic, defined the objectives, conducted a literature review, developed the study design, carried out empirical research among nurses and patients participating in the Disease Management Program, performed data collection and analysis, formulated conclusions and practical recommendations, developed the nursing activity model, and prepared the dissertation in its entirety.

Conclusions:

1. In the period from 2016 to 2023, a significant increase in the incidence of diabetes mellitus (from 28,920 to 54,850 cases), hypertension (from 85,534 to 178,899 cases) and chronic heart failure (from 4,173 to 21,704 cases) was noted in Almaty, especially among the elderly and men. Deaths from diabetes

increased from 2.85 to 22.34 per 100,000 population, while the level of preventable deaths ranged from 6.11 to 15.30, with the highest rate recorded in 2021, which is likely related to the COVID-19 pandemic.

2. In-depth interviews with 13 nurses with an average work experience of 9.6 years and 6 years of PHC experience were conducted in all districts of Almaty. The results of the study showed that the activities of nurses are mainly limited to examining, monitoring and teaching patients basic nursing skills, while important elements of the Disease Management Program, such as self-management support, are implemented by only 3 nurses (23.07%). Seven participants (53.8%) noted their lack of knowledge and the need for additional training. The main difficulties were identified as patients' non-compliance with recommendations, lack of time and lack of feedback. In general, the need for additional training, resource provision and systematization of the management of chronic diseases has been identified in order to fully unleash the potential of nursing staff.

3. The results of a study conducted among 739 patients showed that most of them actively participate in the Disease Management Program: the level of regular visits to specialists remains high — 84.2% of patients visit a cardiologist, 63.9% an endocrinologist, and 58.5% an ophthalmologist. Patients with arterial hypertension demonstrate a high level of satisfaction with the program (≈80%), and the proportion of those who consider themselves capable of managing their disease was 82.7%. Women were more likely to receive written information (56.7% vs. 43.0%; $p=0.003$) and were better informed about risk factors (obesity — 95.5% vs. 89.3%; $p=0.044$), while men were more likely to smoke (49.6% vs. 20.4%; $p<0.001$) and alcohol consumption (28.9% vs. 18.5%; $p=0.04$).

Among patients with diabetes, 83.1% believe that they have sufficient knowledge to manage their condition, but 75% noted the need to obtain additional information about the disease. Men were more likely to have behavioral risk factors: smoking — 59.8% versus 21.8%, alcohol consumption — 44.1% versus 20.2%. Women, in turn, more often indicated the need for training in the correct choice of physical activity (77.2% versus 73.5%). Of the 183 patients with chronic heart failure, 79.8% were satisfied with the results of the program, and 74.3% noted that they were able to effectively manage their disease. Despite the fact that 83.1% of patients stated that they had sufficient knowledge, about 70% indicated the need for additional training. Men were more likely than women to keep a self-monitoring diary (83.5% vs. 66.3%; $p=0.009$) and develop an action plan (82.3% vs. 67.3%; $p=0.023$), which indicates a higher involvement of men in the process of self-management of the disease.

4. Systematic improvement is still required to improve the effectiveness of the Disease Management Program. The model of nursing activities in the implementation of the POI is promising, since it was developed based on an analysis of current practice, taking into account the opinions of nurses and patients, which made it possible to assess its feasibility and identify key

sustainability factors. Taking into account gender characteristics and the need for accessible communication outside of working hours, the model is highly patient-oriented and has the potential for long-term effectiveness.

Approbation of the dissertation results

The main results of the dissertation research have been tested at international scientific and practical events. The results of the study were presented and published at the VI Annual International Scientific and Practical Conference "Topical Issues of Communication Skills, medical Psychology and Social Work: from theory to practice", as well as at the II International Forum "Asfen.Forum, New Generation – 2024", held in 2024.

Publications

Based on the results of the study, 12 scientific papers have been published, including:

- 1 article published in a journal from the international Scopus database (Q1).
- 9 articles in journals recommended by the Committee for Quality Assurance in Science and Higher Education of the Ministry of Science and Higher Education of the Republic of Kazakhstan;
- 2 theses in the materials of international scientific and practical conferences;
- 2 copyright certificates;
- 1 methodological recommendation.

Scope and structure of the dissertation

The dissertation work consists of an introduction, 6 chapters, conclusions, conclusions, practical recommendations, and a list of references, including 150 literary sources. The dissertation is presented on 158 pages, illustrated with 34 tables, 3 figures, and contains 4 appendices.