ABSTRACT

of the dissertation work of Diana Zhenisovna Dosbayeva on the topic: «Improvement of multidisciplinary medical rehabilitation for patients with chronic heart failure» presented for the degree of doctor of philosophy (PhD) in the specialty 6D110200 – «Public Health»

Relevance of the research topic

Heart failure (HF) is a clinical syndrome characterized by symptoms and/or signs caused by structural and/or functional abnormalities of the heart, confirmed by elevated levels of natriuretic peptides and/or objective signs of pulmonary or systemic venous congestion. This universal definition and classification of HF were proposed in 2021.

According to Gianluigi Savarese, heart failure (HF) affects more than 64 million people worldwide (Savarese G., 2023). According to the Heart Failure Association (HFA) of the European Society of Cardiology (ESC) in 2019, the median overall prevalence of HF per 1,000 people was estimated at 17 (ranging from ≤12 in Greece and Spain to >30 in Lithuania and Germany) (Seferovic P.M., 2021). Meanwhile, according to the 2021 statistics from the American Heart Association's National Health and Nutrition Examination Survey (NHANES), the prevalence of HF was about 2.5% (Virani S., 2021). In England, from 2015 to 2019, the rate of newly diagnosed HF increased from 4.1/1,000 to 4.9/1,000 person-years, and the prevalence rose from 2.1% to 2.4% (Bellanca L., 2023). The prevalence of HF in Asian countries was 2–3% in Hong Kong, 5% in Indonesia, 1–2% in the Philippines, 0.6% in South Korea, 6% in Taiwan, and 0.4% in Thailand (Reyes E.B., 2016). The rising prevalence of chronic heart failure (CHF) is associated with the demographic aging of the global population. In the United States, it is projected that the prevalence of CHF will increase by 46% from 2012 to 2030, with a corresponding increase in healthcare costs by approximately 127% (Virani S.S., 2021). Over the past few decades, the prognosis for HF has somewhat improved, but mortality and hospitalization rates remain high, with cardiovascular diseases being the main cause of HF-related morbidity.

The medical strategy of modifying health behavior has an effective impact on the physical and psychological condition of patients with heart failure (HF), promoting recovery and minimizing disease progression in patients. Additionally, cardiac rehabilitation helps prevent recurrent hospitalizations, which ultimately reduces healthcare costs (Shahim B., 2023; Dalal H.M., 2019; Witham M.D., 2012). A systematic review identified significant benefits of exercise-based rehabilitation, including a likely reduction in the overall risk of hospitalizations in the short term, as well as a potential reduction in hospitalizations due to HF (Long L., 2019). However, this systematic review found insufficient evidence regarding the impact of exercise-based rehabilitation on health-related quality of life, while another systematic review and meta-analysis showed that exercise positively influences quality of life outcomes (standardized mean difference 1.16) (Palmer K., 2018).

The fight against chronic heart failure (CHF) and its consequences has led to significant successful outcomes for patients and their families. With the right treatment approaches and prevention of complications, the quality of life for patients with CHF can be improved. To reduce mortality and hospitalizations due to heart

failure, it is recommended that patients be managed by a multidisciplinary team. Programs aimed at combating CHF and global mechanisms for reducing the burden of preventable non-communicable diseases (NCDs) have been developed in various countries, one of which is the United Kingdom, where care is provided under the guidance of nurses, improving treatment outcomes through pharmacological, interventional, and comprehensive care (Brennan E.J., 2018).

Thus, worldwide, the dynamic monitoring of patients with CHF poses a challenge to healthcare systems, and efforts to reduce its social and economic burden have become a major global public health priority (Davidson P.M., 2015).

In the Republic of Kazakhstan, cardiovascular diseases are the leading cause of mortality and morbidity (Junusbekova G., 2023; Mukasheva G., 2022). To provide comprehensive care, the strategy includes the implementation of disease management programs for patients with chronic heart failure (CHF) (Chan B.T., 2020), as well as the development of regulatory documents to ensure medical rehabilitation for patients with CHF. However, the readiness of doctors and nurses to provide patient-oriented care and the level of understanding by patients of their own role in managing their condition have not been determined. Therefore, the relevance of this work lies in studying the approaches to providing multidisciplinary medical rehabilitation for patients with CHF in the city of Almaty.

Objective of the study: To improve rehabilitation care for patients with chronic heart failure through the implementation of a multidisciplinary team approach at the primary health care level.

Research tasks:

1. To study international and domestic experience in providing rehabilitation care to patients with chronic heart failure.
2. To study the dynamics of morbidity and mortality of chronic heart failure in Almaty.
3. To evaluate the organization of medical and preventive care for patients with CHF at the primary healthcare level in Almaty.
4. To study the multidisciplinary approach to the rehabilitation of patients with chronic heart failure.
5. To test the rehabilitation program for patients with chronic heart failure at the «Talmed» medical center and assess its impact on the quality of life of patients with CHF.

Research Methods

The study involves the analysis of morbidity and mortality rates from chronic heart failure (CHF), assessment of the effectiveness and monitoring of treatment at the primary healthcare level, evaluation of rehabilitation programs, and analysis of the quality of life of patients with CHF, which are divided into 5 tasks.

Task 1: To analyze international and domestic experience in providing rehabilitation care to patients with chronic heart failure.
Materials: Data sources included databases such as PubMed, Cochrane, and Google Scholar. A total of 208 literature sources were selected and included in the literature review and discussion of the results. The Mendeley program was used to generate the bibliographic list, (https://www.mendeley.com/).

Methods: a bibliographic search was conducted by keywords and their combinations, such as «chronic heart failure», «patient-oriented care», «needs and

requirements of patients with chronic heart failure», «inpatient care», «primary care», «quality of life», «satisfaction and accessibility of care», «self-management», «clinical guidelines».

Task 2: To study the dynamics of morbidity and mortality rates from chronic heart failure in Almaty to forecast potential improvements over a 10-year period (2013-2023).
Materials: Data on morbidity and mortality from chronic heart failure in Almaty were obtained from the National Scientific Center for Healthcare Development (NSCHD), Almaty branch. The analysis included diseases according to the ICD-10 code: Heart failure, which includes the following subgroups: I50.0 – congestive heart failure; I50.1 – left ventricular failure; I50.9 – unspecified heart failure. The study period covered 2013-2022.

Methods: A retrospective analysis of morbidity and mortality from CHF was conducted, along with the construction of forecast estimates using regression analysis with the least squares method based on 10 years of data. To control the quality of the regression model, F-statistics (analysis of variance) were applied, which showed the statistical significance of the models for CHF morbidity (ICD I50.0-I50.9), patients on dispensary records with congestive heart failure (I50.0), and patients on dispensary records with left ventricular failure (I50.0). Analysis and forecasting models were built using MS Excel with the TREND function.

Task 3: To evaluate the organization of medical and preventive care for patients with CHF at the primary healthcare level in Almaty.
Materials: According to the National Scientific Center for Healthcare Development (NSCHD), 958 general practitioners and primary health care therapists were registered, which allowed us to form a sample of 274 respondents. The data of 259 respondents (242 general practitioners and 17 therapists) from Almaty were included in the window analysis in the summary of refusals to participate in the investigation and errors in filling out the questionnaire. 9816 patients with CHF were also registered. When calculating the sample, 370 respondents were needed for a 95% probable interval and a 5% margin of error. A total of 202 patients were involved in the operation, which is less than the estimated number. This was due to the limited availability of patients and the low response rate to the invitation to participate in the operation. However, if the margin of error were increased to 7%, the required sample size would be approximately 192 respondents. Thus, the sample of 202 patients exceeds the minimum required number for a 7% margin of error, which confirms the statistical reliability of the results with a slightly increased margin of error. This makes it clear that reducing the sample size does not significantly affect the accuracy and representativeness of the data.

Methods: To study the opinions of primary care physicians (GPS and therapists) regarding the organization of dynamic monitoring and rehabilitation of patients with CHF, a questionnaire was developed that includes two main blocks: the passport part (age, specialty, work experience) and the main part covering key aspects such as the diagnosis and treatment of CHF, the development and implementation of individual programs for patients with CHF, the effectiveness of these programs, patient education, monitoring of medication intake, causes of hospitalization, and other aspects.

During the development the research tool, the issue of the availability of clinical recommendations and protocols or other types of documents was taken into account.

It took about 15-20 minutes for the participants to fill out the questionnaire. The survey was conducted anonymously in PHC organizations. The questionnaire contained an informed consent text confirming the respondents' voluntary participation in the study. The questionnaire was distributed both in paper and electronic form via the Google Form platform. The survey was conducted between September and December 2018. The data obtained were analyzed taking into account the demographic characteristics of the respondents, including age, which allowed for detailed analysis. When analyzing the data obtained, especially in the sections devoted to patient-oriented approaches in caring for patients with CHF, as well as the role of clinical guidelines and protocols in practical application, intergroup comparisons were conducted between therapists and general practitioners.

In order to study patient-oriented rehabilitation care for patients with CHF, a questionnaire consisting of seven sections was developed:

1) passport part
2) difficulties in obtaining rehabilitation assistance
3) timeliness and completeness of medical examination
4) satisfaction with the help received from the medical organization
5) The role of patient-oriented care
6) awareness of your illness
7) aspects of self-management

The questionnaire was reviewed and approved by the Local Ethics Commission (Protocol №IRB-A250-2024). The questionnaire also included an informed consent text confirming the respondents' voluntary participation in the study. The survey was distributed in paper and electronic form via the Google Form service. The survey was conducted between September and December 2018. In the analysis of the data obtained during the patient survey, intergroup comparisons by gender were conducted. 123 (60.9%) men and 79 (39.1%) women were participated in the study.

Statistical analysis of the survey data included frequency statistics of responses, and inter-group comparisons were conducted using the chi-square test with a likelihood ratio adjustment. Results were considered statistically significant at a level of $p<0.05$. Data were processed using the IBM SPSS Statistics software (version 22).

Task 4: To study a multidisciplinary approach in the rehabilitation of patients with chronic heart failure.

Materials: A model for improving rehabilitation care for patients with CHF was developed based on the results of a literature analysis, as well as data obtained during a survey among stakeholders, including patients with CHF and doctors. The model was based on key aspects of patient-centered care, such as patient information and training, as well as coordination of medical personnel.

A model for improving rehabilitation care for patients with CHF. The model was based on the results of a literature review, as well as surveys among stakeholders, i.e., patients with CHF and doctors. The model included aspects of patient-oriented care for CHF patients, such as their information and education, as well as coordination by medical staff. The model was tested at the «Talmed» medical center, which provides healthcare, including rehabilitation for neurological, cardiological, and traumatological patients. Rehabilitation services are provided for patients who have had a heart attack, stroke, CABG, PCI, and pacemaker implantation.

Methods: An interview was conducted as part of a qualitative study aimed at evaluating the effectiveness of the model. The study involved two psychologists, four general practitioners, six nurses, one cardiologist, and one exercise therapist. To collect the data, three central open-ended questions were used, supplemented by several sub-surveys based on the PCO (Population, Context, Outcome) structure, where "P" denotes the population under study, "C" denotes the context of the study, and "O" denotes the result of interest. The PCO framework helps researchers develop a focused research question. The central research questions included:

- What is the role of each member of the multidisciplinary team in the rehabilitation process?
- Who should be the coordinator of the rehabilitation program for patients with CHF?
- What are the main barriers to the effective implementation of a rehabilitation program for patients with CHF?

The data was analyzed by transcribing interviews. The researcher carefully read the data, and then coded the results. The highlighted codes were grouped according to common concepts, which made it possible to describe the key findings of the study.

Task 5: To test the rehabilitation program for patients with chronic heart failure at the «Talmed» medical center and assess its impact on the quality of life of patients with CHF.

Materials: Results from surveys of 108 patients (70.4% men and 29.6% women), of whom 76.8% had a history of ischemic heart disease (IHD), and 23.2% did not.

Methods: The study was conducted as a longitudinal study lasting 9 months. The recruitment of patients was carried out from June to November 2021 after the formation of a multidisciplinary team in accordance with the order of the director of the «Talmed» Medical Center №149 dated 05/30/2021. To assess the quality of life of patients with CHF, the EQ - 5D questionnaire was used, which was conducted before and after rehabilitation. The EQ–5D questionnaire includes five questions reflecting the subjective state of the patient's physical and mental health:1- mobility; 2- self-care; 3- activity in daily life; 4- pain/discomfort; 5- anxiety/depression. One of the key advantages of using EQ-5D is the possibility of obtaining a universal assessment of the patient's health status, which allows this tool to be used both in research among a wide population and among specific groups of patients. The EQ-5D-3L questionnaire allows you to collect information about the patient's quality of life in the form of a health profile characterized by three levels of severity of problems in five components, as well as a health score using a visual analog scale (EQ-VAS). The assessment scale for each component includes three levels: 1 — no violations, 2 — moderate violations, 3 — severe violations. The Individual Health Index (EQ-5D index) is calculated based on an assessment of the severity of disorders on all five scales. The visual analog scale (EQ-VAS) allows you to assess the patient's current quality of life, where 0 points correspond to the worst state of health, and 100 points correspond to the best. The patient makes a mark on the part of the scale that corresponds to his well-being at the time of filling out the questionnaire.

Statistical processing was performed using the Microsoft Office Excel 2007 program (Microsoft Corp., USA), SPSS17. The distribution of the trait was determined by calculating the Shapiro–Wilk criterion. To describe the trait, we used its mean value and mean square deviation (with a normal distribution), median and

quartiles (with a distribution other than normal). The Spearman correlation coefficient was used to assess the relationship between the signs. The Wilcoxon criterion was used to assess the difference between two dependent samples with a distribution other than normal.

Functional diagnostic methods: as part of the study, an ultrasound examination (ultrasound) of the heart was performed to measure the ejection fraction, which made it possible to assess the functional state of the heart and the dynamics of changes during rehabilitation.

Thus, a comprehensive methodology was used in the study, including various analysis methods, which allowed us to obtain comprehensive information about the impact of rehabilitation on the quality of life of patients with CHF and to develop practical recommendations for improving rehabilitation care for these patients.

Research objects:

- Healthcare workers;
- Patients with chronic heart failure;
- Patient-oriented approach;
- Integrated care;
- Rehabilitation program.

Subject of the study: PHC organizations in Almaty.

Key points to be defended:

1. In Almaty, from 2013 to 2022, there has been a steady increase in the incidence and mortality of CHF, with a projected further increase in cases in the coming years. At the same time, there is a more pronounced increase in treated cases with congestive HF compared to left ventricular HF, which requires a review of strategies for the diagnosis, prevention and treatment of CHF at the primary health care level.

2. GPS have insufficient awareness of the health status of patients with CHF, which is manifested in a low level of analysis of hospitalized cases and insufficient knowledge of the signs of the disease, which requires advanced training.

3. Patient-oriented GP care is not being carried out sufficiently, in particular, to inform patients about treatment options, lifestyle changes and the impact of health conditions on daily life, which underlines the need to improve approaches to communication with patients.

4. The presented model of rehabilitation of patients with CHF, with the participation of a multidisciplinary team, demonstrated an improvement in the quality of life of patients, as well as high patient satisfaction with the work of medical specialists.

Research Results

The incidence of CHF according to I50.0-I50.9 from 2013 to 2022 increased from 9,885 to 15,332, with a peak decrease in CHF observed in 2015, down to 7,748. Based on the ten-year incidence data, our forecast predicts an increase in CHF over the next five years to 17,267.

The mortality rate from congestive heart failure (CHF) decreased from 6.5 to 3.0 per 100,000 population between 2013 and 2022, however, the forecast indicates a possible increase by 2027 to 12.0 per 100,000 population.

The number of patients registered for dispensary observation with congestive heart failure (I50.0) increased from 232 to 7,160 from 2013 to 2022. A slight decrease is observed in 2023 to 7,590, followed by an increase to 10,969 by 2027.

The mortality rate associated with left ventricular failure (I50.1) per 100,000 population was high in 2022, at 0.54 per 100,000 population. Overall, during the study period from 2013 to 2022, this rate averaged 0.16. The forecast for the next five years shows a likely decrease in this rate to 0.48 compared to 2002, with the peak decrease observed in 2023 at 0.35 per 100,000 population.

Also, for this nosology, the number of patients under dispensary observation increased from 9 to 683 between 2013 and 2022. It is worth noting the significant rise during the COVID-19 period, from 284 in 2019 to 683 in 2022. Over the next five years, further growth is forecasted in the group of patients with CHF and left ventricular failure, reaching 946 by 2027. Additionally, there has been an increase in treated cases since 2017, from 2 to 13 cases in 2022, with the highest number recorded in 2020, at 23 cases. During the study period, three cases of mortality were observed.

Currently, the Ministry of Health of the Republic of Kazakhstan is working on improving indicators at the first preventive stage for patients with pre-existing conditions. For this purpose, Kazakhstan has implemented the Chronic Non-communicable Disease Management Program, aimed at reducing the number of complications of the primary diseases, particularly CHF, diabetes mellitus, and hypertension. The program was initially tested in pilot regions and has been rolled out in all other regions since 2017. In many clinics, patients in the program are managed by a multidisciplinary team: in addition to a cardiologist, the treatment involves a general practitioner, nurse, healthy lifestyle specialist, psychologist, and social worker. The implementation of this program may have contributed to the reduction of CHF mortality, particularly from 2013 to 2019, but it is important to note the rise in mortality during the COVID-19 pandemic.

To study the existing practice of rehabilitation for patients with CHF, one of the clinics in Almaty with a population of 60,000 was selected as an example. Based on the survey conducted with general practitioners (GPs) and therapists, it was found that doctors aged 31-50 years associate the etiology of CHF in their patients with ischemic heart disease (IHD) in 100% of cases, while for those aged 20-30 years, it is 33.7%, and for those over 50 years old, 65.1% associate it with a mixed form (systolic and diastolic dysfunction). At the same time, 16.3% of young respondents aged 20-30 years stated that they did not know the etiology of CHF in their patients. All therapists (100%) are confident that their patients have ischemic etiology, while 28.9% of GPs associate it with mixed etiology, and 5.8% of respondents expressed uncertainty.

Almost a third of respondents across all age groups, except for those aged 41-50 years, noted that they were unaware whether their patients were taking medications that were not prescribed by their doctors. Doctors also noted that in more than 20.5% of cases, patients may take medications that were not prescribed by doctors ($p<0.001$), especially this fact is noted by 100% of respondents in the 41-50 age group. However, all therapists believe that their patients do not take medications without a doctor's prescription. Regarding GPs, only 25.6% agree with therapists, while 43.4% are confident that their patients take medications without a prescription, and a third (31.0%) of GPs expressed uncertainty ($p<0.001$).

Determining the left ventricular ejection fraction is a priority test for diagnosing CHF. However, when conducting the survey, 16.9% of respondents aged 31-40 years stated that they had not determined it ($p<0.001$). Doctors under 30 years old reported being unaware of their patients' serum creatinine levels, with 17.4% in the 20-30 age group and 1.2% in the 31-40 age group ($p<0.001$). The β-type natriuretic peptide was determined in all patients.

Among GPs, it was found that the left ventricular ejection fraction (mainly in about 70% of patients) is less than 30% in 52.5% of cases, while 5.8% reported being unsure. Among therapists, they are confident that ≥ 30% in all patients. Regarding creatinine levels ≥ 1.2 mg/dL, all therapists reported it, while 58.3% of GPs identified it. In contrast, 35.1% consider it to be < 1.2 mg/dL, and 6.6% were unsure. Regarding the B-type natriuretic peptide level, therapists noted < 100 pg/mL in all patients, while 12.0% of GPs reported it, 28.1% identified ≥ 100 pg/mL in one-third of their patients, 18.6% could not detect it, and almost half of the respondents (41.3%) were unsure.

The majority of doctors under 30 years old (83.7%) and those aged 41-50 years (63.0%) conduct analysis of hospitalizations of patients with CHF, while in other groups, this varies between 42-50%. The highest percentage of doctors not conducting such analysis is observed in the 31-40 age group ($p<0.001$). Among therapist respondents, 100% conduct an analysis of hospitalization cases, while among GPs, only 63.6% do so.

The majority of respondents older than 31 associate hospitalization causes in CHF patients with comorbidities. In contrast, doctors younger than 30 years associate hospitalization with CHF and other diseases, with 32.6% and 33.7% respectively ($p<0.001$). GPs associate hospitalization with comorbidities (43.4%), while 37.2% link it to CHF, and 5.8% attribute it to emergency hospitalization due to CHF. Uncertainty regarding the connection with comorbidities is noted by 6.6%, and regarding emergency hospitalization, 7.0%, whereas all therapists link it to comorbidities (100%).

As of the last three years, at least 85.5% of doctors and specialists have participated in continuing education ($p<0.001$). 82.6% or more of specialists believe that training has contributed to improving management of CHF patients. The smallest percentage of specialists, aged 31-50 years (37%), reported developing individual programs for CHF patients. Meanwhile, 100% of doctors aged 41 and older assess the prevalence of CHF in their region, while 57.0% of those under 30 years old and 67.5% of those aged 31-40 years conduct such assessments.

The most common sign or symptom characteristic of CHF, according to the majority of respondents, is edema, except for 37.0% of doctors in the 41-50 age group and 12.7% of doctors over 50 years old ($p<0.001$). All respondents agreed that shortness of breath was present. The absence of fatigue was noted by 16.9% of respondents in the 31-40 age group and 63.0% of those in the 41-50 age group ($p<0.001$). However, shortness of breath with exertion was noted by all except for younger doctors under 30 years old (32.6%) and those aged 31-40 years (16.9%) ($p<0.001$).

Crackles were noted by 16.9% of doctors in the 31-40 age group and 12.7% of the older generation. Additionally, there was a lack of awareness of this symptom among a third of respondents in the 31-40 age group (31.3%) and 41-50 age group

(37.0%), as well as 15.9% of older doctors, which may indicate that doctors do not always assess the functional capacity of the lungs.

Quarterly ECGs are conducted among CHF patients by the largest number of respondents in the under-30 and over-50 age groups, whereas only 65.1% of doctors in the 31-40 age group and 37.0% in the 41-50 age group conduct them regularly.

Echocardiography is performed annually on nearly all patients, with only doctors in the 41-50 age group indicating a lack of awareness regarding echocardiographic coverage of CHF patients, with around 37% of patients in this group being excluded. This may be related to insufficient availability of this service for all patient categories and inadequate analysis of treated cases within the attached population on dispensary observation.

Compared to general practitioners (GPs), therapists always monitor the condition of CHF patients after prescribing all types of medications. Among GPs, the highest number of respondents monitor the condition of CHF patients taking cardiac glycosides (70.7%), beta-blockers (86.8%), and ACE inhibitors (88.8%). However, fewer respondents monitor the use of loop diuretics (42.6%) and thiazide diuretics (51.7%).

Patient-centered care emphasizes partnership in care between patients and healthcare providers and is promoted by the WHO as a key component of quality healthcare. A positive finding in our study is that around 14.5% of respondents aged 31-40 years do not inform patients about the cause of CHF or the underlying disease that needs treatment ($p<0.001$). Additionally, this age group showed the lowest level of patient education on the severity of the disease, with only 68.7% informing patients about the progression of the disease. Furthermore, 16.9% of respondents in the 31-40 age group could not remember if they informed all patients about the severity of the disease ($p<0.001$). Despite this, both GPs (95.0%) and therapists (100.0%) reported that they inform patients about the likelihood of the underlying disease needing treatment, though the data were statistically insignificant. Similarly, when asked if they inform patients about the severity of CHF, 10.7% of GPs responded "no."

Therapists, compared to GPs, always provide information about treatment options, participation in chronic disease management programs, and first aid instructions or actions to take in case of sudden deterioration. Among GPs, over a third (39.3%) do not inform patients about treatment options ($p<0.001$), and there is insufficient coverage of information regarding chronic disease management (12.0%) and necessary actions in case of health deterioration (16.9%).

The majority of doctors in the age group 31-40 years (89.2%) and those older than 50 years (87.3%) inform patients about lifestyle changes that can improve their well-being. However, 32.6% of doctors under 30 years and 10.8% of doctors aged 31-40 years, as well as 37.0% of doctors aged 41-50 years, either do not know or do not inform patients about these changes ($p<0.001$), with 22.7% of GPs failing to provide this information.

It was found that more than a third of patients with CHF are not informed by GPs about how their condition may affect daily activities, such as playing golf or taking care of grandchildren (46.1%, $p<0.001$). Additionally, 35.9% of GPs do not inform patients about what to do if they feel stressed or anxious ($p<0.001$).

Our study revealed insufficient awareness about the clinical protocol for CHF among doctors in the age group 41-50 years (37.0%) and those over 50 years old

(28.6%). Dissatisfaction or uncertainty regarding the clinical protocol was reported by young doctors (32.6%), those aged 41-50 years (37.0%), and doctors over 50 years old (50.8%). The highest percentage of young doctors under 30 years (83.7%) reported the need for an update to the clinical protocol, with about half of doctors over 50 years old (54.0%) agreeing.

All therapists reported full satisfaction with the clinical protocol, while 11.6% of GPs had the opposite opinion, and 17.4% were unaware of the protocol ($p<0.004$). Furthermore, 63.2% of GPs noted the need for an update, while 19.4% were unaware, likely due to the group of doctors who rarely use the clinical protocol in their practical activities ($p<0.001$).

The question "Does the clinical protocol include the treatment of comorbidities?" was positively answered by the fewest respondents over 50 years old (49.2%), while the other age groups ranged from 63.0% to 68.7%. Only 17.4% of respondents under 30 years, 20.5% of those up to 40 years, and 22.2% of those over 50 years answered "No." Uncertainty ranged from 10.8% to 28.6%, indicating that not all respondents apply clinical protocols in their practical work or understand the content of this document. A total of 66.5% of GPs reported that the clinical protocol includes issues related to comorbidities, while 100.0% of therapists excluded this, and 21.5% of GPs were unaware of it.

Regarding the existence of clinical guidelines for CHF patients, 17.5% of respondents over 50 years old answered "Yes," while the range in other groups was between 33.7% and 48.8%. Uncertainty was most commonly observed among young doctors under 30 years (34.9%), 30-40 years (31.3%), and those over 50 years (28.6%). Almost all respondents noted the need for developing clinical guidelines, with the range varying from 79.5% to 100.0%. Lack of awareness about clinical guidelines for patients was reported by all therapists (100.0%) and 23.6% of GPs. Among GPs, 37.6% acknowledged the existence of guidelines, while 38.8% did not. Regarding the need for developing clinical guidelines, 89.7% of GPs agreed, while all therapists and 5.8% of GPs disagreed, and 4.5% of GPs were unsure.

In our study, 202 patients with heart failure participated, of which 123 were male and 79 were female. Among the men, the majority had secondary vocational education (43.1%), while among the women, the majority had secondary vocational education (40.5%) and higher education (39.2%). When examining social status, the largest group of participants were pensioners (57.3% of men and 42.7% of women), followed by those who were employed (25.2% of men and 27.8% of women) and the unemployed (17.5% of men and 29.5% of women).

Regarding monthly income, the largest group of respondents reported earning up to 150,000 tenge, with 64.4% of men and 58.5% of women, while 35.6% of men and 41.5% of women earned more than 150,000 tenge.

When asked, "How much do you spend monthly on medical consultations, medications, diagnostics, and laboratory tests?" it was found that male respondents spent more than 20,000 tenge per month compared to women.

Difficulties in receiving medical care at the clinic were noted, such as remote location, with 46.3% of men and 21.5% of women indicating this ($p<0.001$). Inconvenient clinic hours were reported by 17.1% of men and one-third of women (36.7%) ($p=0.002$). Additionally, over half of the female respondents (57.0%) and

38.2% of male respondents noted difficulty in making appointments with specialists ($p=0.01$).

The results regarding the duration of waiting in line for an appointment with the local doctor (more than 1 day), which is considered a barrier to accessing medical care, are statistically insignificant. 16.3% of male respondents and 27.8% of female respondents reported this. Similarly, the prolonged waiting for hospitalization (more than 1 week) was noted by 22.8% of males and 26.6% of females, while the long wait for emergency medical services was mentioned by 34.1% of males and 45.6% of females.

The shortage of staff at the clinic level, such as general practitioners and family doctors, was noted by 21.1% of males and 36.7% of females, while the shortage of cardiologists was reported by 22.0% of men and 36.7% of women.

More than half of the female respondents (69.6%) reported low-quality medical care, which is twice as high as the figure for males (29.3%) ($p<0.001$). This may be related to the respondents' perception of poor attitude from medical staff toward patients, with 32.5% of men and 36.7% of women sharing this view, as well as inadequate diagnostic testing, with 54.5% of men and 75.9% of women indicating this. Although the results are statistically insignificant, the opinion about the low qualification of medical staff was statistically significant among 11.4% of male respondents.

More than half of the respondents consider the cost of medicines in pharmacies and the cost of paid services to be high – 78.5% of women and 39.0% of men ($p<0.001$). The lack of services for disease prevention and health promotion was noted by 44.7% of men and 39.2% of women, with 5.7% of men expressing uncertainty. Timely dispensary examination is more common among women, with 78.5% undergoing it compared to 48.8% of men ($p<0.001$).

Regarding visits to private clinics, the majority of male respondents (57.7%) visited 1-3 times, while 54.4% of women stated they had not visited private clinics. The fewest female respondents (21.5%) visited private clinics 4-8 times, and 24.1% visited 1-3 times. Among men, 22.8% visited 4-8 times, and 19.5% did not visit at all ($p<0.001$). The primary reason for seeking care at private medical centers is dissatisfaction with the quality of free medical services – 56.9% of men and 34.2% of women. Other reasons include dissatisfaction with waiting times and paperwork in public clinics, with 21.1% of men and 29.1% of women reporting this. A small number of respondents cited a lack of positive treatment outcomes – 0.6% of men and 12.7% of women—and 5.7% of men and 8.9% of women noted that the services in public clinics are not entirely free and require additional financial costs ($p<0.001$).

The majority of respondents indicated that prescription medicines are provided for free or on preferential terms with interruptions – 44.7% of men and 54.4% of women ($p<0.001$).

The majority of respondents reported that home care provided by the local doctor in the last 12 months was delivered on time – 61.8% of men and 78.5% of women ($p<0.001$).

The majority of respondents indicated that healthcare workers sometimes inform them about the upcoming medical intervention (administration of medications, procedures, surgery), its risks, test results, diagnosis and prognosis, and treatment

methods – 49.6% of men and 84.8% of women. They also noted that they are informed only if they ask, as reported by 12.2% of men ($p<0.001$).

When studying the needs of respondents for specialist services, it was found that 47.1% of men and 30.4% of women needed and received help from a surgeon. However, among men, 19.5% needed help but did not receive it, which is a barrier to accessing medical services. Regarding neurologist services, 9.7% of men and 16.4% of women considered the assistance of this specialist to be inaccessible ($p<0.001$). For cardiologist services, 48.0% of men needed help but did not receive it, which is four times higher compared to women (7.6%).

The assistance of a gastroenterologist was inaccessible to 8.9% of women ($p<0.001$), an endocrinologist to 9.8% of men ($p<0.001$), and a psychologist was inaccessible to 37.4% of men and 27.8% of women. Additionally, 39.0% of men and 27.8% of women indicated that help from a social worker was unavailable ($p<0.001$).

All patients had access to electrocardiography, with the majority undergoing it quarterly (44.3% of men and 44.3% of women) or every six months (64.2% of men and 40.5% of women). Chest X-rays were done on average once a year by 73.2% of men and 59.5% of women, or every six months by 26.8% of men and 40.5% of women. Echocardiography was the least frequent test, with 63.4% of men and 88.6% of women undergoing it once a year. Services to assess lung functionality were not received by 35.8% of men and 84.8% of women. Most respondents undergo blood tests on average once a quarter or every six months.

A third of the respondents were not satisfied with the work of the local doctor – 30.0% of men and 27.8% of women. At the same time, 13.8% of men were unsure whether they had made complaints. The quality of nursing services was unsatisfactory for 17.5% of men, with 42.5% of men and 49.4% of women unsure of their opinion ($p<0.001$), possibly due to inattentiveness and rudeness, reported by 83.3% of men and 100.0% of women. 45.0% of men and 74.7% of women ($p<0.001$) mentioned low qualifications, while 56.7% of men and 30.4% of women ($p<0.001$) cited untimely appointments by the doctor. Additionally, 84.2% of men and 100.0% of women indicated reluctance to answer questions.

When evaluating the possibility of obtaining information about the services of the institution, including through the internet, and leaving feedback or suggestions, 23.3% of men and 24.1% of women rated it as excellent, 29.2% of men rated it as satisfactory, and 17.5% of men and 29.1% of women rated it poorly. 14.2% of men and 46.8% of women were unaware of this opportunity, indicating low patient awareness in this regard ($p<0.001$). Unfortunately, only 59.2% of men and 75.9% of women expressed trust in their doctor, with 23.3% of men unsure about this question ($p<0.001$).

Based on the survey conducted among patients with chronic heart failure (CHF) and doctors, a lack of adherence to a patient-centered approach was identified. In response, we developed a model. In our model, the local healthcare service – doctor and nurse – was identified as the main coordinator. Based on international data, we presented the rehabilitation model for CHF patients to the staff of the "Talmed" Medical Center. A multidisciplinary team was created, consisting of two psychologists, four family doctors, six nurses, one cardiologist, and one physical therapy doctor. The model was presented for discussion. Following the discussion,

duties were assigned to the Center’s staff, and work on providing rehabilitation assistance to CHF patients was initiated.

To study the quality of life of patients with chronic heart failure (CHF) before and after receiving rehabilitation, we conducted a survey using the EQ-5D questionnaire. The study involved 108 patients (70.4% men and 29.6% women), of whom 76.8% had Postinfarction cardiosclerosis (PICS) and 23.2% did not. Data collection was conducted 9 months after the first rehabilitation program among the same group of participants.

When evaluating overall mobility, it was found that after rehabilitation, the number of respondents reporting no difficulties walking increased by 19.3%. Similar changes were observed among men (an increase of 25.2%) and women (an increase of 8.9%). These improvements were attributed to the transition of respondents from more severe categories to less severe ones. Before rehabilitation, 2.5% of respondents were unable to walk, while after rehabilitation, no respondents reported this, indicating a significant improvement in their condition. Rehabilitation had a significant positive impact on respondents' mobility. The main improvements were due to the transition of respondents from more severe states to less severe states.

In the "Self-care" block, it was found that overall the patients' condition was good, with no respondents reporting the worst condition, such as "I have great difficulty washing or dressing" or "I am unable to wash or dress myself." However, positive dynamics were observed after rehabilitation in the category "I have moderate difficulty washing or dressing," with only 3% of respondents reporting this after rehabilitation compared to 10.9% before. Among men, this decreased to 8.1%, and among women, to 8.9%. Additionally, improvement in the first category of condition showed an increase from 46.0% to 57.4%, with 13.8% of men and 7.6% of women indicating this improvement.

In the "Usual Daily Activities" block, it was found that two patients were unable to engage in usual daily activities before rehabilitation; however, after rehabilitation, this figure decreased to 0.0%. Regarding the statement "Usual daily activities are very difficult for me," there was a reduction of 14.3% due to a transition to better health states. Among men, this indicator decreased from 22.0% to 4.9%, and among women, it decreased from 16.5% to 5.1%.

Additionally, for the item "Usual daily activities are moderately difficult for me," a reduction was observed after rehabilitation, from 30.7% to 21.8%, with men showing a decrease from 25.2% to 23.6% and women from 38.0% to 19.0%.

In the comparative analysis, the best result among women was in the item "Usual daily activities are slightly difficult for me," where the indicator increased after rehabilitation to 21.6%, compared to 8.3% for men. There was also a significant reduction in the indicator for the item "Usual daily activities are moderately difficult for me," with a decrease of 19.0% in women and 1.8% in men. This low result in men is related to the transition from the state "Usual daily activities are very difficult for me" for a larger number of respondents, with positive dynamics observed in a decrease to 17.1% for men and 11.4% for women.

Rehabilitation activities had a significant positive effect on the reduction of pain and discomfort in the respondents. Overall, the proportion of subjects with no pain or discomfort increased by 20.8%, with a 13% increase in men and a 32.9% increase in women. The proportion of subjects with moderate pain or discomfort decreased

significantly, especially among men, where the decrease was 38.2%, and among women by 32.9%. The number of respondents with severe pain or discomfort decreased to zero.

Rehabilitation activities also had a significant positive effect on reducing the level of anxiety and depression in the respondents. The proportion of subjects not experiencing anxiety or depression increased by 23.3%, with an increase of 26% among males and 19% among females. All differences were statistically significant.

Examination of the quality of life index on the visual analog scale also showed a positive trend after rehabilitation measures. The final median index showed an improvement from 70.5 to 83, hence an increase of 12.5.

Based on the survey conducted among the patients of the center, the following data on the level of satisfaction with the work of the multidisciplinary team of doctors were obtained: 71.3% are satisfied, 20.4% are not satisfied, and 8.3% found it difficult to answer. Patients noted several key aspects that contribute to their positive perception of the team's work, including.

1. Patients appreciate that the healthcare team works together, which eliminates the need to see each specialist separately.

2. The work of the multidisciplinary team allows patients to receive comprehensive treatment and rehabilitation in one place, which significantly saves time and effort.

These data highlight the efficiency and convenience of the team organization, which contributes to positive patient perception and improvement of their overall condition and quality of life.

Consequently, our study points to the growth of CHF in the global population, which is associated with an increase in life expectancy, as well as the existing new approaches to treatment and preventive care, contributing to a reduction in hospitalization and an increase in quality of life among patients with CHF. The special role of new approaches is to teach the patient self-management and increase the importance of the role of the nurse. Kazakhstan has started the path of providing comprehensive care to patients with CHF. However, in order to improve the way of providing comprehensive care there is a need to take measures through strengthening the patient-centered approach and introduction of clinical guidelines for patients and physicians to work with this group of patients.

The scientific novelty of the study is determined by the following characteristics**:**

• the increase in the incidence and mortality from CHF in Almaty from 2013 to 2022 is justified and a further increase in cases is predicted, as well as a more pronounced increase in treated cases with congestive HF compared with left ventricular;

• insufficient effectiveness of the implementation of a patient-oriented approach on the part of GPS has been demonstrated, especially in terms of informing patients about treatment options, lifestyle changes, and limited compliance with clinical protocols of GPS, especially in the 41-50 age group of specialists.;

• Gender differences in the availability of medical care have been identified: men are more likely to face problems related to the remoteness of primary health care and limited access to specialized specialists (which leads to additional costs for private

clinics), while women note inconvenient doctor appointments, poor quality of care and insufficient diagnostic examination;

• For the first time, a model of rehabilitation of patients with CHF at the private primary health care level has been tested, which has demonstrated a significant improvement in the quality of life and high patient satisfaction with the work of a multidisciplinary team, emphasizing the importance of training nurses to coordinate the rehabilitation process.

Practical and theoretical significance

The theoretical significance of the study lies in an in-depth analysis of the lack of awareness of GPS about the state of health of patients with CHF, which emphasizes the need to improve educational programs. The study also revealed a lack of use of clinical protocols and insufficient patient-oriented care, which opens up new directions for improving the practical aspects of medical practice in the treatment of CHF. The application of a multidisciplinary approach in the rehabilitation of patients with CHF, with an emphasis on training nurses to coordinate the process, contributes to the theory of rehabilitation medicine.

The practical significance lies in the development and testing of a model of rehabilitation of patients with CHF at the PHC level, which has shown a significant improvement in the quality of life of patients. The results obtained can be used to optimize the processes of rehabilitation and care for patients with CHF, increase the awareness of doctors and improve the organization of medical care, as well as to adapt educational programs and clinical protocols in accordance with the identified needs.

The personal contribution of the doctoral candidate.

The author's personal contribution lies in the development of the theoretical and methodological framework of the study, formulation of the study's objectives and tasks, organization and conduction of the research, and active participation in all stages of the research work: statistical data processing, writing the dissertation chapters, interpreting and discussing the results, formulating the conclusions to be defended, as well as the findings and practical recommendations. The author actively participated in the implementation of the research results into practical healthcare and presented reports at conferences.

Conclusions:

1.Worldwide there is a trend of growth of patients with CHF, which is associated with an increase in life expectancy and a significant increase in the number of new cases with CHF is predicted. Analysis for Almaty city showed an increase in the incidence of CHF from 2013 to 2022 from 9885 to 15332 and is projected to increase in the next five years to 17267. A slight decrease in the mortality rate of CHF per 100000 population was from 2013 to 2019, but by 2020 there is an increase. The number of people on D registration with CHF is increasing every year - with congestive heart failure by 771 people and left ventricular failure by 74 people. The number of treated cases with congestive heart failure is significantly higher in comparison with left ventricular failure, this indicator increased from 3 in 2013 to 455 in 2022.

2.GPs were less knowledgeable about the health status of patients with CHF, and only 63.6% of GPs perform analysis of hospitalized cases, and are not sufficiently aware of the signs and symptoms of patients with CHF, indicating the need for training for this category of physicians. Physicians of all age groups monitor the

intake of ACE inhibitors compared to other drug groups. Physicians aged 31-50 are less likely to develop individualized treatment programs for patients with CHF compared to other groups.

3.Patient-oriented care is insufficiently provided by GPs, in particular on information about treatment options (39.3% are not informed), on lifestyle changes, on the impact of health status on daily life, what can be done if the patient feels stress and anxiety, and in persons under 30 years of age. There is a lack of utilization of the GP clinical protocol, particularly in the 41-50 age group.

4.The greatest number of men noted difficulties in obtaining medical care at polyclinics, related to remote location 46.3%, appointment to narrow specialists 38.2% and lack of access to a cardiologist 48.0%, perhaps because of this man spend more than 20000 on medical care, and turn to private clinics from 1 to 3 times 57.7%. While for women the difficulties included inconvenient schedule of doctors' appointments in PHC 36.7%, low quality of medical care 69.6%, which is most likely related to poor attitude of medical workers to the patient 36.7%, as well as insufficient diagnostic examination 75.9%.

The presented model allowed us to receive feedback from patients about the work of the multidisciplinary team, highlighting the importance of training nurses to coordinate rehabilitation for patients with CHF. The model also improved the quality of life for patients with CHF after rehabilitation across all domains: improvement in mobility by 19.3% in the category of those experiencing no difficulty walking; self-care (increase in the category of those experiencing no difficulty by 13.4%); an increase in the category of those experiencing no difficulty with usual daily activities by 10.9%; no pain or discomfort by 20.8%; and no anxiety or depression by 23.3%. The quality of life indicator, measured by the Visual Analog Scale, also showed an increase in the median score by 12.5 points after rehabilitation interventions. Patient satisfaction with the work of the multidisciplinary team at the center was 71.3%.

Practical guidelines:

1. The trend in the incidence and mortality rates of CHF suggests a potential increase in the next five years. Therefore, the implementation of cardiorehabilitation programs involving a multidisciplinary team and patient-oriented care principles, aimed at improving the quality of life for patients with CHF, is highly relevant.

2. Medical organization leaders should: support the ongoing professional development of multidisciplinary team members involved in cardiac rehabilitation based on patient-oriented care principles; provide motivational counseling; and actively collaborate with external organizations, particularly in the development of clinical guidelines for patients.

3. The effectiveness of treatment for patients with CHF depends on their engagement. To enhance patient involvement in the treatment process, healthcare providers should conduct training sessions on patient support and information provision, including the amount of information, checking their understanding, and identifying patient needs. This approach will help implement a patient-oriented care strategy.

Approbation of the dissertation results.

The main findings of the dissertation were presented:

1. At a meeting of the Department of Public Health and Social Sciences and at an extended session of the Scientific Committee of the KMU High School of Public Health.

The key points of the dissertation were presented and discussed at:

2. International Conference «Stroke Prevention6 diagnosis and treatment. «6 World Stroke Organization Regional Meeting» September 24-26, 2015 Tbilisi, Georgia. Certificate

3. International Conference «Lipid Metabolism and Cardiovascular Risk», The Open Medical Institute, Continuing Medical Education Credits of the Austrian Chamber of Physicians с докладом на тему: «Aneurysm of valsalva sinus with rupturing into right atrium in a patient with generalized atherosclerosis, Takayasu syndrome is a disease». Salzburg, Austria 27.09 – 01.10.2021.

Published works based on the dissertation research:

Based on the materials of the dissertation, 5 publications were published, including:

1 article in a publication indexed in Scopus information databases:

1. Management of Patients with Heart Failure in Primary Health Care: Печатный, опубликован в журнале "Systematic Review Pharmacy" (2020, 11(4), p.440-444), included in international databases Web of Science и Scopus. Co-authors: Diana Dosbayeva, Zhanat Kozhekenova, Z.Padaiga. This work discusses the management of patients with heart failure at the primary healthcare level. https://www.sysrevpharm.org/articles/management-of-patients-with-heart-failure-in-primary-health-care.pdf

4 articles - in journals recommended by the Committee for Control in the Field of Higher Education and Science of the Republic of Kazakhstan:

1. Программа управления заболеванием: хроническая сердечная недостаточность: Printed, published in «Вестник КазНМУ» (Scientific and Practical Journal, Almaty, 2018, No. 4, pp. 264-270). Co-authors: D.Zh. Dosbayeva, G.Zh. Tokmurzyeva, Zh.A. Kozhekenova. The article presents a disease management program for patients with CHF. https://vestnik.kaznmu.edu.kz/release/2018-4v.pdf

2. Организация медицинской реабилитации больным хронической сердечной недостаточностью на современном этапе: Printed, published in «Астана медициналық журналы» (Astana, 2018, 4(98), pp. 353-357). Co-authors: D.Zh. Dosbayeva, G.Zh. Tokmurzyeva, Zh.A. Kozhekenova. The article discusses modern approaches to organizing rehabilitation for patients with CHF. https://medical-journal.kz/upload/98.pdf

3. Роль клинических руководств в применении врачами первичного звена в практической деятельности при лечении пациентов с хронической сердечной недостаточностью: Printed, published in «Астана медициналық журналы» (Astana, 2019, 1(99), pp. 216-221). Co-authors: D.Zh. Dosbayeva, G.Zh. Tokmurzyeva, Zh.A. Kozhekenova. The article analyzes the application of clinical guidelines by primary care physicians in the treatment of patients with CHF. https://medical-journal.kz/upload/99.pdf

4. Trends in morbidity and mortality from chronic heart failure in Almaty: Printed, published in the Scientific and Practical Journal «Наука и Здравоохранение» (Semey, 2024, Vol. 26(2), pp. 53-59). Co-authors: Diana Dosbayeva, Anuar Akhmetzhan, Nursultan Zhakyp. The article presents the trends in

morbidity and mortality from CHF in Almaty. https://newjournal.ssmu.kz/publication/509/2024-2-53-59/ DOI: 10.34689/SH.2024.26.2.007

Certificates:

1. Stroke Prevention6 diagnosis and treatment. «6 World Stroke Organization Regional Meeting» September 24-26, 2015 Tbilisi, Georgia. Certificate
2. Certificate of advanced training in Cardiology, course: «Cardiovascular Diseases»,108 hours, at the Medical Education Center «Өркен», 2018.
3. Certificate of advanced training in Functional Diagnostics, course: «Echocardiography Diagnosis of Acquired Heart Diseases (2D, 3D)», 108 hours, at the Research Institute of Cardiology and Internal Diseases, 2019.
4. National Medical university School of the health and public health after Khalel Dosmukhamedov. «Managing change in the health care system» dedicated to the 40th anniversary of Alma-Ata Declaration. 2018, Certificate
5. 26.09. – 02.10.2021г Сертификат за участие в семинаре на тему «Lipid Metabolism and Cardiovascular Risk», The Open Medical Institute and its partner, Weill Cornell Medicine, the International Atherosclerosis Society, and the National Lipid Association. Austria, Salzburg.
6. 27.09. – 01.10.2021. Certificate of participation in the seminar on the topic «Lipid Metabolism and Cardiovascular Risk», The Open Medical Institute, Continuing Medical Education Credits of the Austrian Chamber of Physicians. Austria, Salzburg.
7. Certificate of participation in the seminar "Russian National Congress of Cardiologists 2021", Russian Cardiology Society, Saint Petersburg, October 21-23, 2021.

The structure and volume of the dissertation. The work consists of an introduction, literature review, description of the materials and methods of the study, a chapter on the author's research, conclusions, and practical recommendations. The bibliography includes 206 sources. The dissertation is presented on 119 pages, containing 33 tables, 50 figures, and 3 appendices.