Enhancing cardiological care in modern large cities: A case study of Almaty

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Abstract

Relevance. Cardiovascular diseases are prevalent across all population segments in large cities, necessitating effective strategies to enhance cardiological care.

Purpose. This research aims to explore fundamental principles for advancing cardiological care in large cities, evaluating the potential integration of key trends over various timeframes.

Methodology. Utilizing a systematic analysis approach, the study combines statistical investigations of cardiological care aspects, focusing on several polyclinics in Almaty to illustrate the broader trends and requirements.

Results. The study found a significant increase in the number of cardiological procedures performed in Almaty, highlighting the growing demand for specialized cardiology services. High-tech equipment and well-trained personnel were identified as critical factors for improving diagnosis and treatment outcomes. Establishing specialized cardiology rooms significantly enhanced patient care, providing comprehensive services from diagnosis to emergency care.

Conclusions. The findings suggest that focusing on high-tech equipment and professional training can substantially improve cardiological care quality in large cities. The establishment of specialized cardiology units is crucial for delivering comprehensive services, which are essential for managing the increasing workload in urban healthcare settings. These strategic improvements can significantly reduce cardiovascular mortality rates and enhance the overall effectiveness of cardiological care.

Keywords: urban healthcare; medical technology; patient recovery; professional training; specialized cardiac services.

Suggested Citation:

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Introduction
The widespread prevalence of cardiovascular diseases among residents of large cities, the severity of the consequences of diseases suffered, high parameters of disability and premature mortality among the population of modern megacities are very serious public health problems in most countries of the world, including the Republic of Kazakhstan. Cardiovascular diseases account for more than half of all deaths and disabilities in the adult population [1]. In this context, the problem of improving cardiological care for the population becomes particularly relevant, considering both the high frequency of complications and the spread of fatal cases, and the comparative rejuvenation of patients suffering from cardiological diseases, and, accordingly, the increase in economic losses associated with a gradual reduction in the average life expectancy of residents of large cities [2].

In the last few years, mortality from diseases of the circulatory system and cardiovascular diseases in Eastern Europe has significantly exceeded similar indicators in Western countries, which has become one of the reasons for a significant reduction in average life expectancy in these countries. In the Republic of Kazakhstan, diseases of this kind are among the significant problems of the healthcare system, since there is a constant increase in the incidence of diseases of the circulatory system and cardiovascular system, including a significant severity of the course of diseases in patients and an increase in the frequency of deaths due to such diseases. Thus, over the past five years, a sharp increase in the total number of patients with diseases of the circulatory system and cardiovascular system has been noted in Kazakhstan, and the overall dynamics was such that cardiological diseases come out on top in terms of prevalence compared to all other diseases [3].

Full coverage of the issues of improving the principles of cardiological care in large cities is impossible without touching on the aspects of improving the principles of emergency medical care for various cardiovascular diseases [4]. At the present stage of medical development, the overall effectiveness of providing emergency medical care to patients with cardiovascular diseases is largely determined by the introduction of surgical methods for the treatment of acute coronary syndrome into the clinical practice of modern medical institutions.

Methods of percutaneous coronary intervention (PCI) in acute coronary syndrome have been implemented most actively over the past 15-20 years. To date, in more than 20 randomised multicentre studies, convincing evidence has been obtained that percutaneous revascularisation methods are the most effective method of reperfusion in ST-segment elevation myocardial infarction (STEMI), providing a death rate in hospitals within 7.04% [5].

Official statistics in the Republic of Kazakhstan are the main sources of data on the morbidity of the population in general and cardiac diseases in particular. At the same time, the search for factors that determine high mortality rates and relatively low life expectancy of the country's population requires a fundamentally new view of medical science on the so-called conventional risk factors [6]. According to some statistical studies, the mortality rate from cardiovascular diseases in Kazakhstan exceeds similar indicators in a number of European countries, which is an alarming trend.

This study is aimed at investigating the key principles of improving cardiological care in the conditions of modern large cities. The study is based on statistical data obtained in a number of polyclinics in Almaty, which clearly illustrate the extent of the spread of various cardiovascular diseases among patients of these clinics.

The findings are of significant practical importance in terms of understanding the prospects for reducing the total number of deaths from cardiovascular diseases among residents of Almaty and assessing the level of improvement of the rules for providing cardiological care to residents of a modern large city.

Materials and Methods
This study is based on a combination of methods of systematic analysis of the principles of improving cardiological care in modern large cities, with a statistical investigation of the main aspects of cardiological care on the example of an analysis of the condition of patients in a number of polyclinics in Almaty. The implementation of research was preceded by the creation of a qualitative theoretical base, which is a consistent study of a number of scientific developments of some Kazakh and foreign researchers devoted to various aspects of improving the principles of providing cardiological care to citizens living in large cities. To facilitate the perception of the information provided in the paper, all the developments of foreign researchers have been translated into English, which generally contributes to the most objective and qualitative presentation of the material presented.

This study was conducted in several stages. The first stage included the construction of the theoretical basis, after which a systematic analysis of the key principles of improving cardiological care at various levels of its provision in a large city was carried out. The main aspects that should be paid attention to when assessing the main areas of improving cardiological care at various levels of its provision in a large city are outlined.

At the next stage, a statistical investigation of a number of key aspects of cardiological care was carried out on the example of patients of a number of polyclinics in Almaty. The analysis of the extent of the spread of various cardiac diseases among patients is carried out, and prioritisation of measures to counteract these diseases in a large city is carried out. The data of statistical investigation are presented, reflecting the degree of prevalence of various cardiac diseases among patients of the outpatient clinics under study, the emphasis is also placed on the main aspects of providing cardiological care to patients in a large city, considering the specifics of the city of Almaty and its example.

The statistical data obtained represent a qualitative basis for forming a real assessment of the level of improvement of cardiological care in large cities on the example of the city of Almaty, and are also the basis for forming a qualitative forecast regarding the availability of reserves and hidden opportunities for further improvement of cardiological care in large cities in the future. In addition, an analytical comparison of the results obtained during the study with the results and conclusions of other
researchers on problematic aspects of improving cardiological care in large cities was carried out. It generally contributes to the clarification and generalisation of the results obtained and the establishment of objective scientific conclusions that serve as a qualitative reflection of these results.

At the final stage, based on the results obtained, the final conclusions were formulated, acting as a logical reflection, and summing up the entire complex of research efforts performed within the framework of the study.

Results
An investigation of the key principles of improving cardiological care in the context of modern large cities has yielded the following results. The analysis of data obtained in a number of outpatient clinics in Almaty was carried out, in particular: in polyclinics No. 2, 23, 32, 10, 11, 17, 26, 30. The presented statistical data allow tracing the features of the general dynamics of the spread of cardiovascular diseases among the patients of these polyclinics, which, in turn, provides grounds for assessing the key trends in improving cardiological care in a large modern city, using the example of Almaty. The data of the statistical analysis of the dynamics of the spread of cardiovascular diseases among patients taken for the analysis of polyclinics are presented in Table 1.

Table 1. Dynamics of the prevalence of cardiovascular diseases among patients of polyclinics No. 2, 23, 32, 11, 17, 10, 26, 30 in the city of Almaty

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Note: the table contains conditional numerical designations of the following diseases: 1 – arterial hypertension; 2 – chronic ischemic heart disease; 3 – circulatory diseases; 4 – acute coronary syndrome; 5 – arrhythmia (atrial fibrillation); 6 – congenital heart disease; 7 – acquired heart defects; 8 – other cardiovascular diseases.

As follows from the statistical information presented in Table 1, among all cardiovascular diseases that were detected in patients of these polyclinics in Almaty, arterial hypertension was the most widespread, since a total of 262 cases were recorded. Chronic ischemic heart disease has also become widespread, the total number of cases of this disease among the patients of these polyclinics was 130 people. There were 188 cases of detection of other cardiovascular diseases in patients, which are often combined with each other in a number of patients.

Attention is drawn to the fact that a combination of a number of cardiovascular diseases is widespread in patients, in particular, chronic coronary heart disease occurs against the background of other forms of angina pectoris, and cases of combination of this disease with arterial hypertension have also been observed. In addition, a number of cardiovascular diseases occur against the background of the development of diabetes mellitus in patients and a number of other concomitant diseases that are not directly related to cardiological diseases [7].

Among other diseases that accompany pathologies of the cardiovascular system identified in patients of polyclinics No. 2, 23, 32, 11, 17, 10, 26, 30 of Almaty city, it is necessary to note the following as having received the most widespread: diabetes mellitus, liver cirrhosis, hypertension, chronic stomach ulcer, diseases of the nervous system. The diagram shown in Figure 1 reflects the main aspects of improving cardiological care at different levels in a modern large city.

Figure 1. The main aspects of improving cardiological care at different levels in a modern large city

Increasing the overall level of cardiological care for patients in polyclinics and hospitals is crucial from the standpoint of prospects for improving cardiological care in large modern cities. In particular, the number of cases of planned hospitalisation of patients with acute coronary syndrome is increasing every year in medical institutions in Almaty – as of the beginning of 2018, 5,186 such cases were noted, and all patients underwent percutaneous coronary intervention (PCI) [8]. This indicates that significant progress has been made in improving the level of cardiological care for the population of Almaty and there are prospects for the further development of this trend.

The key role in improving the principles of providing cardiological care to patients with cardiovascular diseases in large cities is played by the timeliness and speed of providing emergency cardiological care to patients, including the level of professional training of ambulance
crews and their ability to quickly and accurately make the correct diagnosis. Proper establishment of specialised teams of emergency cardiological care and the general level of professionalism of their employees in this context should be given fundamental importance. The teams of emergency cardiological care should include both narrow specialists of cardiological profile and paramedics who have undergone specialised professional training and are able to professionally provide qualified cardiological care.

As evidenced by the actual clinical practice of individual hospitals in Almaty, the speed of delivery of patients with acute coronary syndrome, coronary heart disease, arrhythmia, or other cardiac diseases, and the level of emergency medical care provided to them are extremely important in terms of achieving the ultimate success of further treatment and recovery of the patient.

As a rule, the life and further health of a patient suffering from cardiac diseases is directly determined by how quickly and accurately the diagnosis was made and how quickly the patient was taken to a hospital for the necessary surgical intervention. Serious patients located in remote areas of the city and the region should definitely be taken to a medical cardiology hospital by means of specialised sanitary transport, while patients assigned to local polyclinics and patients with mild forms of cardiovascular diseases, are able to get to polyclinics or hospitals without outside help.

The City Cardiological Centre, located at Tole Bi 93 in Almaty, currently has 16 different wards to provide round-the-clock care for cardiac patients. The City Cardiological Centre of Almaty is equipped with modern diagnostic equipment that allows quickly and efficiently making a diagnosis and prescribing appropriate treatment if a patient has a specific cardiological disease. The staff of the centre have extensive experience in the treatment of cardiac diseases, many with a degree in medicine, their professionalism is noted by many patients who have been treated at the City Cardiological Centre of Almaty. In addition, there are a number of other medical institutions in Almaty where patients can receive cardiological care at the highest level, in particular: Central Clinical Hospital, City Clinical Hospitals No. 1, 7, State Research Institute of Cardiology and Internal Diseases of the Ministry of Health of the Republic of Kazakhstan.

Improvement of cardiological care in large cities, using the example of the city of Almaty, involves the implementation of mandatory monitoring of the general condition of patients at all stages of their treatment, directly from diagnosis to the date of discharge from hospital or de-registration in a local polyclinic at the place of residence. The implementation of this kind of accounting involves mandatory, consistent recording of all therapeutic manipulations carried out, from surgical interventions to the appointment of specific pharmacological medications. The preservation of this kind of information contributes to the qualitative systematisation of the collected experience in the treatment of cardiac diseases, which, in turn, is crucial from the standpoint of improving basic cardiological care in the context of modern large cities.

**Discussion**

Every year in the Republic of Kazakhstan there is a tendency to increase in the number of performed coronary angiographies (CAG), percutaneous coronary interventions (PCI), coronary bypass grafts (CABG). At the same time, the city of Almaty is the absolute leader in this high-tech direction among all administrative-territorial units of the country, since in this city cardiological care is specialised and is provided in hospitals with expanded cardiology departments: the City Cardiology Centre of Almaty, the City Clinical Hospital No. 7, JSC Central Clinical Hospital, the City Clinical Hospital No. 1, Kazakh Research Institute of Cardiology and Internal Diseases of the Ministry of Health of the Republic of Kazakhstan, “AlmatySemaHospital” clinic, sanatoriums “Kazakhstan” and “Almaty” [8]. In the conditions of emergency centres, both cardiological and cardiac surgery, patients undergo myocardial revascularisation operations using methods of coronary artery bypass grafting and mammarocoronary bypass grafting.

Statistics show that cardiovascular diseases, along with circulatory diseases, occupy a leading position in the world in terms of mortality among all other diseases. By 2030, mortality from circulatory system diseases is expected to increase to the level of 23.3 million people, mainly from heart and vascular diseases, strokes, and, according to existing forecasts, these causes will remain the predominant causes of high mortality in the future.

The Committee on Statistics of the Republic of Kazakhstan reports that according to data for 2013, mortality from circulatory diseases amounted to a quarter of the total mortality, including all other diseases. Vascular brain lesions along with coronary heart disease have been recorded as the main causes of mortality among all circulatory diseases [9].

When diagnosing cardiovascular diseases in patients, it is important to understand the main symptoms that specifically indicate the presence of a certain disease. In particular, shortness of breath is the most common symptom of cardiovascular diseases, and when diagnosing cardiac diseases, attention should be paid to breathing difficulties. In addition, when making diagnoses of this kind, two types of dyspnea that occur in patients should be distinguished: shortness of breath with effort and shortness of breath in a calm state. In the first case, there is difficulty breathing with various types of movement, in particular when walking, running, and if such shortness of breath occurs against the background of swelling of the cervical veins, it may be an increase in pressure in the right atrium. Shortness of breath, manifested at rest, is direct evidence of the presence of cardiac pathologies, in particular, problems in the small circle of blood circulation [10]. This should be taken into account by ambulance service employees arriving on a call to patients and who are obliged to make a primary diagnosis regarding the presence of certain cardiac diseases in the patient.

The improvement of cardiological care in a modern large city requires mandatory consideration of factors that determine the accuracy of the prognosis of patients with acute coronary syndrome and myocardial infarction, in particular, as such as the time of initiation of therapy, the quality of thrombolytic therapy and percutaneous coronary intervention. Such measures should be carried out in an inpatient medical facility in the first 2-4 hours from the moment of the diagnosis, since it is in this time period that it is quite possible to influence the prognosis of the disease.
and severe complications that may pose a danger to the life and health of the patient.

When organising cardiological care and improving it in the conditions of large modern cities, special attention should be paid to the creation of cardiological offices in hospitals. Offices of this kind should be created in the structures of organisations that provide outpatient care to residents of a particular area of a modern large city and structures that provide inpatient medical care. This refers to multidisciplinary hospitals, cardiac surgery and cardiology centres, and cardiac dispensaries [11]. The work of such an office should be headed by a cardiology practitioner. In their absence, the duties of a cardiologist should be assigned to a general practitioner or a general practitioner who has a specialisation in cardiology.

The use of plastic in medical devices for the treatment of a wide variety of cardiovascular diseases significantly expands the capabilities of developers of new cardiovascular medical devices in the context of deciding on the type of plastics that can be used in the production of such devices. A variety of requirements for the properties of various applications in this field is of great importance, including artificial valves, lead insulation, cylinders, vascular protheses, and much more [12]. The search for new and effective materials for the creation of modern devices to be used in practice for the treatment of cardiovascular diseases are of significant importance from the standpoint of the general prospects for the development of medical science.

The official statistics data for today do not contain exhaustive information about how many citizens regularly seek help from medical institutions for the treatment of various cardiac diseases, and how many citizens do not do this and why. At the same time, the official authorities that are responsible for managing all aspects of the functioning of the health system do not always have enough data to establish the facts of functioning in the territory that is in the sphere of their direct responsibility, various medical structures that provide the population with a variety of cardiological care. According to the information provided by the World Health Organisation, the majority of patients with typical pathologies of the cardiovascular system were treated in medical institutions in a timely manner and were provided with timely and qualified medical care [13].

The study of the issues of improving cardiological in large modern cities presupposes the joint efforts of specialists in various areas of modern medicine, which, in general, will contribute to a steady increase in the level of medical care for cardiac patients and provide them with timely and qualified cardiological care, in full compliance with all their current needs. In this context, much attention should be paid to the level of competence of specialists in the field of cardiology, who are included in the emergency medical teams, whose immediate responsibilities often include the initial diagnosis of patients with a cardiological profile. Their preparedness and professionalism in providing cardiological care to residents of large modern cities often directly affects not only their health, but even their lives.

At the current level of development of medical science, the frequency of recording cases of deaths from cardiovascular diseases largely depends on the level of development of healthcare institutions and on the quality of their functioning. The introduction into medical practice of a number of Western countries of modern methods of therapy of cardiac diseases and a number of modern medical technologies has led to the emergence of a new term — “cardiovascular revolution”. In this context, the question of which part of the population receives timely cardiological care is quite relevant, and which part of citizens, for various reasons, is deprived of such an opportunity. The quality and timeliness of providing cardiological care to citizens largely determines their subsequent state of health and the standard of living in general [13].

In addition, in the context of improving the principles of providing cardiological care to the population, an important aspect should be considered the fact that sometimes in hospitals cardiological care to citizens is provided by doctors for whom cardiology is not the main speciality, since they combine such activities with activities within other medical specialities. In such cases, it is not necessary to talk about the high quality of care for cardiological patients, therefore, one of the most priority areas for improving cardiological care for the population of a modern large city should be considered the training of qualified specialists in the field of cardiology, capable of providing timely and effective assistance to citizens.

At the present stage of the development of medical science, medical support for patients with a cardiological profile consists of several key aspects, and any of these aspects, in fact, acts as the basis for preserving the patient's life and can be implemented qualitatively only with appropriate professional and resource support [14]. Nowadays, considering the significantly increased frequency of cases of acute cardiovascular disorders, new, more modern approaches to the medical correction of such conditions dictate the requirements for comprehensive provision of timely and high-quality emergency care: first of all, emergency medical care and readiness to provide it in existing inpatient medical facilities institutions.

The prevention of cardiovascular diseases should be given special attention in the context of improving cardiological care at the levels of its provision in large modern cities. The data of the World Health Organisation indicate that the mortality rate of the population from cardiac diseases is at the level of tens of millions of people per year, which only underscores the need to implement a set of measures to prevent the development of such diseases. Also noteworthy is the fact that mortality from cardiovascular diseases among men is significantly higher than among women, and considering coronary heart disease, male mortality exceeds female mortality by several times, a similar situation occurs when assessing the mortality rate from cerebrovascular disease [15]. Measures for the prevention of cardiac diseases and their spread on the scale of individual states should be implemented at the level, first of all, of hospitals.

The widespread occurrence of cardiovascular diseases in many countries necessitates the search for effective ways to improve the level of training of cardiological specialists who are able to make a correct diagnosis in a timely manner and conduct effective therapy. In particular, the problem of the formation of cardiovascular thrombi is of great importance: from pathology and clinical manifestations to imaging, pharmacotherapy and
interventions, it is a comprehensive and up-to-date presentation of research and clinical practice related to modern aspects of the diagnosis and treatment of cardiovascular thrombosis.

The development, identification, and treatment of cardiovascular blood clots is of paramount importance for researchers and practitioners, but remains one of the most complex diagnostic and clinical scenarios. This important reference links research, current clinical knowledge and technological tools available for the diagnosis and treatment of blood clots in cardiovascular medicine [16]. Clinical practice requires specialised medical documentation, comprehensive descriptions and an overview of pathology, clinical manifestations, diagnostics, pharmacotherapy, interventions, and future trends. In addition, it will be an ideal reference material for students studying fundamental sciences and researchers in the field of general and interventional cardiology, general and interventional radiology, vascular medicine specialists, and vascular, general, and cardiac surgeons.

High-quality methodological support of both educational medical institutions and inpatient medical institutions providing specialised medical care to cardiological patients will contribute to improving the preparedness and professionalism of medical personnel, which in turn will play an important role in improving cardiological care in modern cities.

Conclusions
A study of the principles of improving cardiological care in modern large cities has led to the following conclusions. In the conditions of a large city, the improvement of cardiological care should be consistently implemented in the areas of increasing the level of technological equipment of city polyclinics and hospitals and improving the overall professional level of their staff. Equipping medical institutions with high-tech equipment is of key importance from the standpoint of improving the quality of diagnosis for patients with cardiological diseases, while the high quality of medical care, which is determined by the high level of professional training of medical personnel should ensure the achievement of an overall high level of cardiological care for patients in modern large cities.

Using the example of the city of Almaty, there is a tendency to steady increase the total number of cardiological profile operations performed in hospitals of the city, which only emphasises the need to increase the level of professionalism of cardiologists and the training of new highly professional personnel, since the level of load on cardiology specialists in a modern large city is steadily increasing. In this context, special attention should be paid to the creation of specialised cardiology rooms, which are supposed to provide cardiological care to patients suffering from cardiovascular diseases. Such offices are designed to provide patients with a full range of medical services, from the diagnosis of cardiovascular diseases, to the treatment of a wide range of cardiological diseases, such as emergency care for acute heart failure, diagnosis of myocarditis, coronary heart disease, congenital and acquired heart defects, and other heart and vascular diseases.

In general, an effective solution to improving the principles of providing cardiological care to patients in a large modern city, on the example of Almaty, involves the consistent development and implementation of a series of measures aimed at improving the efficiency of cardiological departments in the city polyclinics and hospitals, with the aim of significantly reducing mortality among the population from cardiovascular diseases. Such an approach would allow increasing the overall number of patients who have fully restored their temporarily lost ability to work.

Acknowledgements
None.

Conflict of Interest
None.

References


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Pокращення кардіологічної допомоги в сучасних великих містах: Приклад Алмати

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Анотація

Актуальність. Серцево-судинні захворювання поширені серед усіх верств населення у великих містах, що зумовлює необхідність розробки ефективних стратегій для покращення кардіологічної допомоги.

Мета. Це дослідження спрямоване на вивчення фундаментальних принципів розвитку кардіологічної допомоги у великих містах, оцінюючи потенційну інтеграцію ключових тенденцій протягом різних періодів часу.

Методологія. Основою методологічного підходу є поєднання методів системного аналізу принципів удосконалення кардіологічної допомоги в умовах великого міста, включаючи статистичне дослідження ключових аспектів надання кардіологічної допомоги на прикладі низки поліклінік м. Алмати.

Результати. Дослідження виявило значне збільшення кількості кардіологічних процедур, що виконуються в Алмати, підкреслюючи зростаючий попит на спеціалізовані кардіологічні послуги. Високотехнологічне обладнання та добре підготовлений персонал були визначені як критичні фактори для покращення результатів діагностики та лікування. Створення спеціалізованих кардіологічних кабінетів значно покращило обслуговування пацієнтів, надаючи комплексні послуги від діагностики до невідкладної допомоги.

Висновки. Отримані дані свідчать про те, що фокусування на високотехнологічному обладнанні та професійній підготовці може інтегрувати якість кардіологічної допомоги у великих містах. Створення спеціалізованих кардіологічних відділень має вирішальне значення для надання комплексних послуг, які необхідні для управління зростаючим навантаженням у міських закладах охорони здоров’я. Ці стратегічні покращення можуть значно знизити рівень смертності від серцево-судинних захворювань та підвищити загальну ефективність кардіологічної допомоги.

Ключові слова: міська охорона здоров’я; медичні технології; одужання пацієнтів; професійна підготовка; спеціалізовані кардіологічні служби.