

Barriers and strategies in cancers services development in the Republic of Kazakhstan

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Abstract

Introduction: To fight cancer, in 2018, Kazakhstan adopted a comprehensive plan for the development of cancer care for the country's population.

Aim: to present the state of collection of statistics, and perspectives for the oncology service development of the Republic of Kazakhstan through the implementation of the project to create the National Research Oncology Center in Nur-Sultan.

Methods: Official statistical data of international and domestic healthcare organizations, as well as the capabilities of the National Research Oncology Center for further development of the oncology service and training of highly professional personnel.

Results: The official statistics on cancer morbidity and mortality of the Health Ministry of the Republic of Kazakhstan and KazIOR differs from the WHO (International Agency for Research on Cancer) data.

The analysis showed that the current issues of the oncological service of Kazakhstan are low detection rates, insufficient screening coverage of the population, limited access of the population to high-tech methods of diagnosis and treatment, and a shortage of oncologists.

To provide the population by oncological service in accordance with international standards, it is planning to: equip the National Research Oncology Center with high-technological medical and diagnostic equipment; functioning of a research center with six scientific laboratories; training of clinical and non-clinical specialists in the world's leading medical and scientific centers.

Conclusion: Our study found that in Kazakhstan statistical data on cancer morbidity and mortality are not the same by different officials, and has lower rates of early diagnosis. To become the National Research Oncology Center, as center for cancer control in Kazakhstan and in the countries of Central Asia, the National Research Oncology Center needs to improve the cancer statistics, innovate a high-quality of cancer care, and provide an accessibility of the population of the Republic of Kazakhstan to high-tech cancer care.

Key words: cancer care, statistics, high-tech methods, staff training, scientific laboratories

Introduction

The age-standardized incidence rate (World) (per 10,000 people) in Kazakhstan (166.9) is lower in compare than in the USA (362.2), Germany (313.2), and Russia (234.3), whereas the age-standardized mortality rate (World) (per 100,000 people) in Kazakhstan (98.5) is higher or approximately equal in compare with the

USA (86.3), Germany (102.3), and Russia (113.7) [1]. This may indicate to some problem in cancer service of Kazakhstan, for instance to cancer screening and cancer prevention. Cancer care is the most high-cost effectiveness in Kazakhstan's healthcare budget [2].

To fight cancer, in 2018, Kazakhstan adopted a comprehensive plan until 2022 for the development

of cancer care [3, 4]. As part of the comprehensive plan, a construction of a new building of the National Research Oncology Center (hereinafter - NROC) is underway. Tasks of NROC are: ensuring accessibility of the Kazakhstan population as well as the countries of Central Asia to high-tech cancer care; reducing cancer mortality by increasing the accessibility in high-tech methods of prevention, early diagnosis and treatment of cancer in accordance with international standards. The vision of the NROC is to become a leading scientific center in oncology field in the Central Asian region countries with a contemporary infrastructure and trinity integration of clinic, science and education.

The aim of this publication was to present the state of collection of official statistical data, and to detect perspectives for the oncology service development of the Republic of Kazakhstan through the implementation of the project to create NROC in Nur-Sultan.

Material and methods

Analysis of the current situation and development prospects for the fight against oncological diseases according to the data of official international and domestic health organizations, as well as studying the possibility of the NROC in the further development of the country's oncological service and training highly professional personnel.

Results

Cancer is one of the leading causes of death worldwide. According to the World Health Organization (hereinafter - WHO), in 2018, 18.1 million new cases and 9.6 million deaths from cancer were registered worldwide. Kazakhstan is one of the countries with the largest number of cancer [5]. Below, Table 1 presents the comparative data on morbidity and mortality from cancer in the Republic of Kazakhstan with the economic-leading countries of the world in 2018 [2, 6, 7].

Table 1

Comparative data on morbidity and mortality from cancer in the Republic of Kazakhstan with economic developed countries of the world in 2018 (per 100,000 people)

No.	Data	The RK data according to	USA	Germany	Russia		
		WHO	MH RK	KazNIOiR			
1	Morbidity	170.1[6]	195.7[4]	175.2[3]	352.2	313.1	222.1
2	Mortality	109.5[6]	80.81[4]	78.1[3]	91	104.2	119.2

Abbreviations: MH RK, the Ministry of Health of the Republic of Kazakhstan; KazIOR, Kazakh Institute of oncology and Radiology.

Table 1 shows significantly difference on morbidity and mortality from cancer in Kazakhstan between the official statistics of the Ministry of Health of the Republic of Kazakhstan, Kazakh Institute of oncology and Radiology, and WHO with the International Agency for Research on Cancer. According to internal statistics (MH RK and KazIOR) in comparison with external statistics (WHO data), morbidity has an increased data, and mortality a reduced data. Data of morbidity and mortality according to the Ministry of Health of the Republic of Kazakhstan and KazIOR are somewhat different from each other. Such a significant difference in these statistical data of morbidity and mortality may be signs of different collecting methods and material analyzing, which should be standardized.

The table results in the USA and Germany morbidity data are more three times than mortality data, and in Russia are more two times, while in Kazakhstan are only 1.7 times. The mortality data in the USA and Germany are lower than in Kazakhstan. These data may testify that Kazakh has low rates of detection of cancer.

Thus, the current problem of Kazakhstan's cancer service are:

- unreliable statistics of data on morbidity and mortality on cancer;
- low rates of detection and early diagnosis;
- insufficient coverage of the population with cancer screenings;
- limited access of the population to high-tech methods of diagnosis and treatment;
- shortage of oncologists (125.6 free vacancies) [7].

To implement the comprehensive plan for the development of cancer care in the Republic of Kazakhstan, the NROC is working in three main areas:

1) the delivery of cancer care to population of the Republic of Kazakhstan in accordance with leading international standards;

2) the implementation of personified methods of diagnosis, treatment and prevention in oncology field; the conduct of multicenter scientific research;

3) development and training of high professional staff for cancer service of the Republic of Kazakhstan.

To provide cancer care in accordance with leading international standards there is planned to equip NROC with high-advanced equipment for diagnosis and treatment of cancer diseases, such as:

- proton therapy;
- radionuclide therapy;
- radiation therapy;
- laser therapy;
- chemo-targeted therapy and immunotherapy.

In all developed countries of the world the above-mentioned high-tech methods of treatment are used as to treat cancer. Many of Kazakhstan people are forced to travel abroad to receive these treatment methods. In this regard, realization and functioning of the above diagnostic and treatment methods will allow patients to receive the full range of cancer care from early diagnosis to high-tech treatment and rehabilitation in Kazakhstan, without needs to go abroad.

NROC plans to open a research center with six research laboratories for:

- carrying out molecular genetic research;
- carrying out proteomic and metabolomic studies;
- creation of tumor immunotherapy;
- creation of a bank of cells and tissues;
- carrying out tissue engineering;
- carrying out bioinformatic analysis.

NROC has created the necessary conditions for holding scientific studies in oncology field. In 2019, NROC was accredited as a subject of scientific and scientific-technical activities, and there are functioning the local ethical commission, temporary research teams, a research department, and a scientific electronic

library. Currently, the following research projects are conducted in NROC:

- allogeneic skin transplantation for large oncological interventions;
- the use of the extracellular matrix as a xeno peritoneum in neurosurgical operations;
- multi-omics markers for risk determining of malignant transformation in the lungs;
- retrograde renal graft reperfusion at kidney transplantation;
- evaluation of the complex therapy effectiveness in patients with hemoblastosis and hematopoietic depression with COVID-19;
- desensitizing protocols for patient-recipients with high immunological risk for organ transplantation;
- acellular xenogeneic matrix for breast oncoplasty;
- aging and prolongation of healthy life expectancy with School of Medicine at Nazarbayev University;
- investigation of atmospheric pressure changes in observational study, and its effect on basal/active metabolism.

As the result of scientific research studies in NROC the following high-tech medical services are conducting:

- replacement of joints and/or bones in case of tumor diseases;
- skin allotransplantation for tumor diseases;
- transplantation of autologous, allogeneic hematopoietic stem cells;
- liver and kidney transplantation from cadaver;
- procurement of stem hematopoietic blood cells for autotransplantation.

NROC over the past few years is providing the entire population of the republic with several unique technologies in order to reduce mortality from cancer. The technologies are in great demand by patients, but it are not reimbursed by government (the free guaranteed volume of medical care, or high-tech medical care service, or the compulsory social health insurance). To take the reimbursement the Ministry of Health of the Republic of Kazakhstan requests to collect of the number of diagnosed and treated patients, which is extremely economically and financially costly for the NROC budget.

To increase the accessibility of the country's population to high-tech methods of diagnostics and treatment in accordance with leading international standards, the Ministry of Health of the Republic of Kazakhstan should introduce a system of reimbursement of high-tech unique technologies for diagnosis and treatment through creation of a technology transfer program.

To develop and train of a high-professional staff for oncological care service NROC cooperates with the World Bank,

internships and fellowship trainings in foreign high educational universities within the framework of the Bolashak program, organizes private clinical residency.

Along with the training of clinical specialists, medical physicists, chemists, dosimetric technicians, radiation safety engineers and other specialists for nuclear medicine, proton and radiation therapy are being trained.

NROC has strategic partners for training that are the world's leading medical and research centers, with which it has agreements and memorandums for cooperation:

- West German Cancer Center (Essen, Germany);
- Charite hospital of Oncohematology (Berlin, Germany);
- University of Manchester (Manchester, UK);
- Danish Proton Center (Aarhus, Denmark);
- National Cancer Center (Tokyo, Japan);
- International Atomic Energy Agency (IAEA),
- National Cancer Center (Goyang, South Korea);
- Seoul National University (Seoul, South Korea);
- Medical Institute of S. Berezina (St. Petersburg, Russia);
- Federal center of nuclear medicine projects design and development (Moscow, Russia);
- Minsk Scientific and Practical Center for Surgery, Transplantation and Hematology (Minsk, Belarus).

Conclusion

Our study found that statistical data in Kazakhstan on cancer morbidity and mortality are not the same by different officials. Kazakhstan has comparatively lower rates of early diagnosis. To become NROC as a center for coordination and control over the development of cancer in the Republic of Kazakhstan as well as in Central Asia countries, first of all, NROC has to improve the cancer statistics, and to innovate all worlds' unique technologies for the diagnosis, treatment and prevention of cancer.

New medical technologies, scientific researches and qualified specialists are the main strategy for the development of a contemporary cancer care service to improve the quality of cancer care, as well to ensure an accessibility of the population of the Republic of Kazakhstan to high-quality cancer care.

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