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Ways to improve early detection of malignant neoplasms in people over 65

Relevance. *Rising the efficiency of early detection, in particular among people over 65, is a perspective form of anti-cancer control given the high incidence of malignant diseases in elderly population.*

Purpose of the study *is to improve early detection of malignant neoplasms at the PHC level among people over 65.*

Tasks of the study: *1) Develop an algorithm of active diagnostics of cancer pathology at the PHC level in people over 65. 2) Assess the efficiency of this algorithm in the regions with high cancer morbidity and advancement.*

Material for the study was the data taken from the official statistical reports "Indicators of Cancer Service in the Republic of Kazakhstan" for 2012 and 2014 and the annual statistical reports of the southern districts of Almaty Region by the Almaty Regional Oncological Dispensary (AROD) for 2013-2014.

Methods of research: *1). Training of nurses and district doctors. 2). Active identification of a risk group during household visits by paramedics (district nurse and paramedic, low-grade medical workers of examination rooms and occupational health rooms). 3). Further examination of the risk group at the district outpatient clinics (district doctors and district oncologists, staff of the Department of Oncology of KazNMU.*

Conclusions: *1) The developed "Algorithm of malignant neoplasms detection in people over 65" by paramedical personnel allowed increasing early detection among people over 65 in the southern part of Almaty region, the Republic of Kazakhstan from 51.3% in 2013 to 56.7% in 2014 (p<0.05). 2) The algorithm was most effective in breast cancer detection – the detectability has increased by 3.0 times (29 and 87 cases, respectively).*

Keywords: *cancer, detection, patients above 65 years, local outpatient service.*

Introduction. According to the Address of the Head of the Republic of Kazakhstan dated 12.11.14 "Kazakhstan's way - 2050...", the priority direction in the development of health care is the prevention of diseases on the basis of regular preventive examinations. In the Republic of Kazakhstan, malignant neoplasms (MN) are detected in three main ways: through screening, during preventive examinations and on appeal [1-3]. Active detection of diseases at early stages is the most efficient way. Screening is an active detection of MN financed by the state [1-3]. At the same time, not for all malignancies which are the main causes of death in the Republic of Kazakhstan there are state screening programs of early detection [1]. Thus, lung cancer, stomach cancer, esophageal cancer for different reasons are not included in the screening programs of active detection due to the lack of international effective screening programs (lung cancer) or very high costs required for effective active early diagnostics (stomach and esophageal cancer). Preventive examinations of the population over 65 are not elaborated; their share in MN detection is very low (0.025 %), and there is no state financing at PHC level. At the same time, there are no clear regulations (orders, guidelines of MoH RK) on which diseases require periodic health examination, the age gap is not clear (65+ till what age?), as well as the examination algorithm, as well as it is not clear who should do the examination.

Therefore, to improve early diagnostics and reduce mortality from MN it is required to develop a low-cost, affordable and efficient scheme of improvement of early diagnostics with mandatory coverage of diseases which are the main causes of cancer mortality. Considering the increase in the life expectancy of the population in our republic and the developed countries of the world, high incidence of MN in the elderly population, improving early diagnostics efficiency among people over 65 is a promising area of cancer control.

Purpose of the study. Improving early diagnostics efficiency among people over 65 at PHC level.

Tasks of the study.

1. To study the structure of oncological morbidity and mortality from MN among the population of the Republic of Kazakhstan over 65.
2. Develop an algorithm for active diagnosis of oncological pathology at the PHC level in people over 65.
3. To evaluate the effectiveness of this technique in regions with high oncological morbidity and advancement of MNs.

Materials and Methods. The following statistical data was used to analyse the structure of cancer morbidity among the population of the RK: the percentage of people over 65 among the population of Kazakhstan and in the advanced countries of Asia, America and Europe and the level of oncological morbidity in the population of the Republic of Kazakhstan up to and over 65 years. The research was built on the materials of official statistical reports «Indicators of Cancer Service of the Republic of Kazakhstan» for 2012 and 2014 and the annual statistical reports of Almaty Regional Oncological Dispensary (AROD) for the southern part of Almaty region for 2013-2014.

Table 1 – Dynamics of demographic indicators of the Republic of Kazakhstan. Average annual population of the Republic of Kazakhstan up to 2040 [4]

Year	Total, persons	Of them, age group over 63	
		Abs.	%
2010	16 321 581	1 261 392	7.7
2011	16 556 600	1 286 809	7.8
2012	16 791 425	1 318 005	7.8
2013	17 029 120	1 359 115	7.9
2014	17 267 141	1 402 500	8.1
2020	18 596 568	1 692 946	9.1
2030	20 313 981	2 329 749	11.4
2040	22 269 074	2 689 579	12.1

Results. The conducted analysis has shown that the proportion of population over 65 in Kazakhstan as of 2012 was 7.8% (Table 1). However, this indice was much higher in industrialized countries of the world with a high life expectancy: in Japan – 37.7%, Singapore – 32.8%, Germany – 30.2% (Table 2).

Table 2 – Forecast of the proportion of population over 65 years (%) by countries of the world, 2030-2050 [4]

Countr	Year 2030	Year 2050
Japan	30.6	37.7
Singapore	27.4	32.8
Germany	27.3	30.2
Italy	27.0	32.6
Hong-Kong	25.8	32.6
Slovenia	25.7	33.1
Finland	25.0	25.6
Austria	24.6	29.0
Belgium	24.4	27.1
Greece	24.2	31.7
Netherlands	24.1	25.2
Croatia	24.1	28.5
Spain	23.9	33.2
Switzerland	23.9	25.0
South Korea	23.4	35.1

Comparative analysis of general cancer morbidity in the RK up to and oer 65 years shows a higher level of oncological pathology among people over 65 years – nearly 10 times (Figure 1).

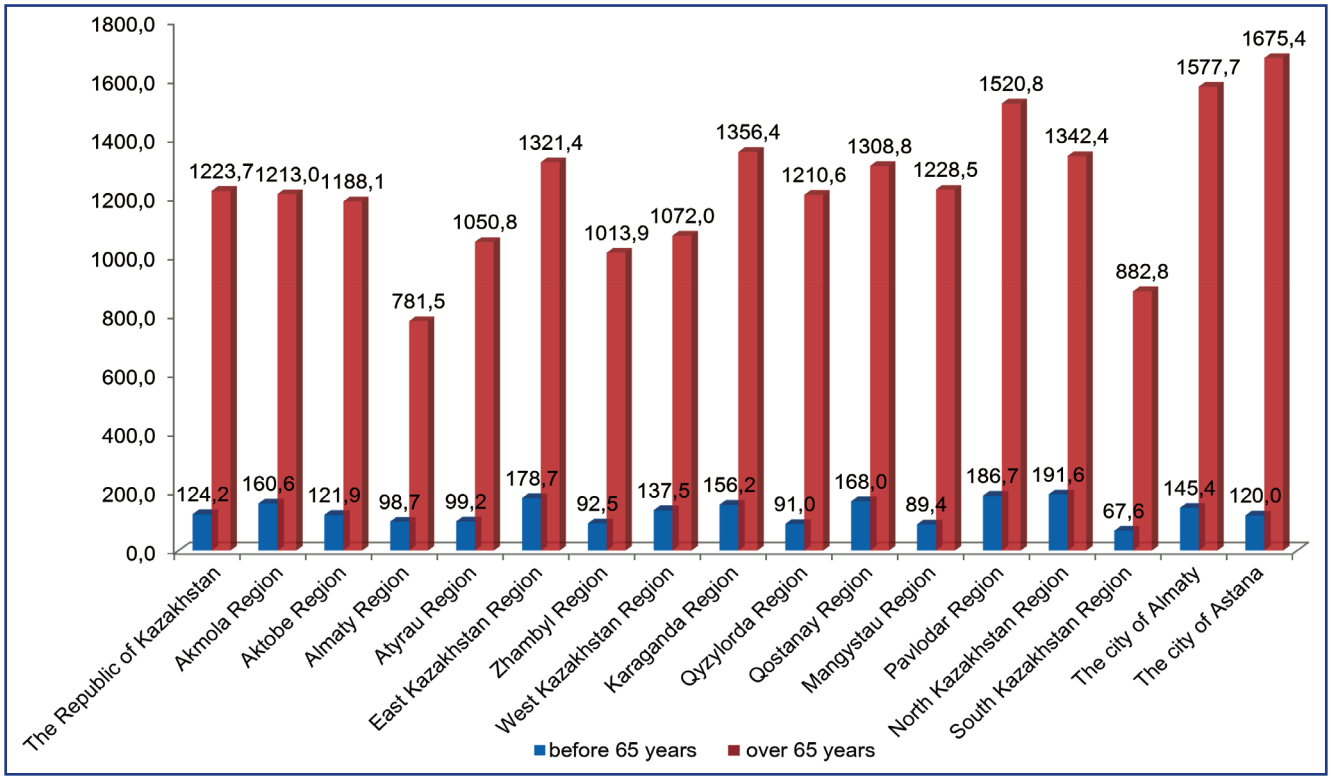

Figure 1 – Comparative data on the incidence of malignant neoplasms among the population of the Republic of Kazakhstan up to and over 65 years [4]

Still, this tendency in the difference of morbidity among people up to and over 65 years is not homogenous for individual pathologies. Thus, the morbidity from cervical and breast cancer is higher among people before 65 years what substantiates the necessity to conduct screening for cervical and breast cancer among people before 65 years (Fig. 2).

At the same time, the morbidity from lung, esophageal and stomach cancer that cause more than 50% of deaths from MN in the RK is higher among people over 65 years. Therefore, these nosologies should be included in the new developed program of early diagnostics among people over 65 years.

To develop the algorithm of active diagnostics of cancer pathology at PHC level among people over 65 at the first stage in 2012 the Scientific Council of Kazakh Institute of Oncology and Radiology (KazIOR) has approved the project of a multicentre clinical controlled study.

In 2012, KazIOR employees have conducted visiting lectures for 1570 PHC employees and trained district doctors of the East Kazakhstan, North Kazakhstan, Pavlodar, Karaganda and Almaty oblasts, still there was no improvement in the efficiency of early detection of cancer diseases.

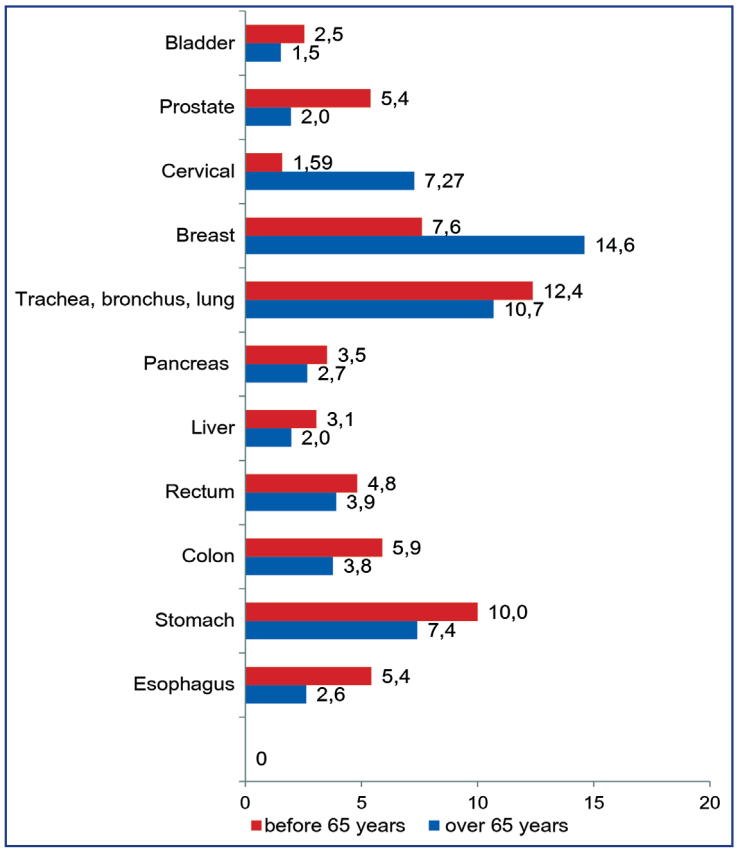

Figure 2 – Structure of cancer pathology in the Republic of Kazakhstan up to and over 65 years [4]

In September 2014, the results of the project were reported in the city of Kazan at the Congress of Oncologists of the CIS. After the debate, it was proposed to include in education in rural areas and in remote regions of not only doctors but also district nurses, paramedics, nurses, staff of inspection and preventive departments.

Taking into account the failures of the first variant of the diagnostics improvement, in 2014 Higher School of Public Health of the Republic of Kazakhstan has approved a new Grant for early diagnosis of cancer in Almalinsky district of the city of Almaty and in the southern districts of Almaty region of the Republic of Kazakhstan. In autumn 2014, a multicentre controlled clinical trial was started to improve the diagnostics of MN; at that, training was conducted taking into account the rating of the structure of mortality by main nosologies: cancer of the lung, mammary gland, oesophagus, stomach, colorectal cancer and melanoma of the skin. Separate Early Diagnostics Algorithms were developed for paramedical personnel (stage 1) and public health physicians (stage 2) using simple efficient low-cost diagnostic methods.

In 2014, training of medical workers, including district doctors and nurses, staff in the outpatient clinics and ambulance stations, ambulance services, admission rooms for emergency surgery, therapy, cardiology and phthisiology was started in the southern districts of Almaty region – Karasay, Ili, Talgar and Uyghur, and in the most «elderly» – with a high proportion of people over 65 – Almaly and Medeu districts of the city of Almaty. In total, 830 medical workers were trained, 70% of them being the paramedical workers, including district nurses and paramedics.

After training, the schedule of household visits was prepared and a motivational component introduced: for each stage 1 cancer case detected during the project, an additional amount of money in the amount of 10 to 30 thousand Tenge was paid as the stimulating component of a comprehensive per capita standard depending on the rating of the detected oncological disease in the structure of the mortality of the district.

Together with the employees of the Oncology Department of Kazakh State National Medical University (KazNMU), in January-May 2014 the visiting stage of post-examination of at-risk groups was carried out on the bases of the central district hospitals in the Karasay, Ili, Talgar and Uyghur districts of Almaty region. In Zhambyl district, the training and post-examination were carried out by Almaty Regional Oncological Dispensary (AROD). The Kapshagay district did not participate in the training and was taken as a control region.

The study design included:

1. Training of nurses and district doctors
2. Active detection of the at-risk group during household visits by paramedicals (district nurse and paramedic, average medical worker of examination and professional departments)
3. Post-examination of the at-risk group in out-patient clinics (district doctors and regional oncologists, staff of the Department of Oncology of KazNMU)
4. Payment of material compensation in case of morphological confirmation of diagnosis and timely start of treatment.

Results. Analysis of the obtained data for all localizations in the southern districts of Almaty region where training was conducted showed a significant increase in the detection of patients with early stages. Thus, the number of detected early stages of lung cancer has increased by 2.07 times (14 and 29 cases, respectively), stomach cancer – by 1.2 times (11 and 14 cases, respectively), CRC – by 1.9 times (10 and 19 cases, respectively), breast cancer – by 3.0 times (29 and 87 cases, respectively), skin cancer and melanoma – by 2.28 times (25 and 57 cases, respectively).

According to the statistical department of AROD and KazIOR, in the pilot districts in 2015 the number of detected early stages of breast cancer during the project has grown as follows:

Talgar district – from **19** cases in 2013 to **41** cases in 2014
Uyghur district – from **1** case in 2013 to **12** cases in 2014
Karasay district – from **17** cases in 2013 to **38** cases in 2014
Ili district – from **16** cases in 2013 to **58** cases in 2014

At that, this tendency of significant improvement of efficiency was true not for all nosologies. Thus, in case of lung cancer, colorectal cancer, oesophagus and stomach cancer nearly in all districts the authors faced the unavailability of endoscopic examination or the impossibility to cover all patients from at-risk group detected during household visits. The greatest difficulties were associated with colonoscopy, fibrobronchoscopy, and with the absence or lack of training of radiologists. Contrast study of the oesophagus, stomach and large intestine was nearly not conducted thus reducing the efficiency of the whole program for those nosologies.

Besides, unfortunately, in Karasay district we faced the increased detection of not only early stages (Table 3, Figure 3). During the implementation of the project, the number of advanced cases and the death rate have also increased due to the identification during household visits of patients with stage 4 who were not previously registered (Figure 4). Besides, the number of detected cases of tuberculosis has increased nearly 4.5 times, and the number of cases of diseases of the circulatory system – nearly 2 times.

Table 3 – The number of newly detected cases with stages 1-2 MNs [5]

Districts	Year 2013		Year 2014	
	Abs. number	Share,%	Abs. number	Share,%
Zhambyl	56	33.0	97	53
Ili	158	52.0	208	54
Karasay	139	44.0	189	54.3
Talgar	123	51.0	214	66
Uyghur	34	46.5	54	55.6
The town of Kapshagay	59	69.0	49	54.4

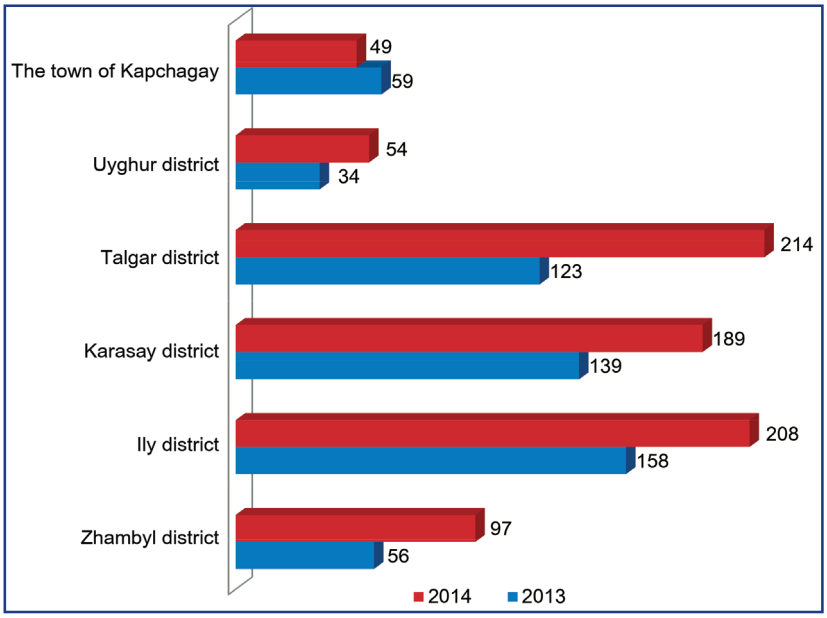

Figure 3 – Diagram of early diagnostics of MNs in the southern districts of Almaty region, 2013-2014 [5]

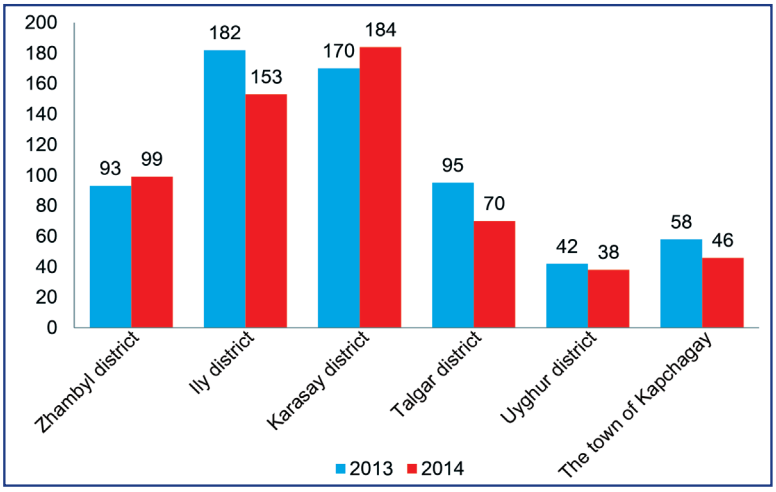

Figure 4 – Deaths from MNs in the southern districts of Almaty region, 2013-2014 [5]

At that, according to the official statistics of the MoH RK, «...early diagnostics of MN in the age group before 65 years in 2014 was 53.7% what is 2.4% higher than in 2013. The highest indices were detected in **the city of Almaty** (59.7) and **the southern districts of Almaty region** (56%)».

Conclusions.

1. The developed Algorithm of diagnostics of malignant neoplasms among people over 65 with the involvement of paramedicals has made it possible to increase the effectiveness of early diagnosis among people over 65 in the southern districts of Almaty Region of the Republic of Kazakhstan from 51.3% in 2013 to 56.7% in 2014 ($p< 0.05$).

2. The considered technique was most efficient for breast cancer – the growth of early detection by 3.0 times (29 and 87 cases, respectively).

3. At the same time, the improvement for internal localizations was less significant: lung cancer – by 2.07 times (14 and 29 cases, respectively), stomach cancer – by 1.2 times (11 and 14 cases, respectively), CRC – by 1.9 times (10 and 19 cases, respectively).

4. The project showed the unpreparedness of PHC to a sharp increase in the volume of diagnostic services during the pilot project. Thus, the increase of at-risk groups during household visits requires an increase in the capacity of the diagnostic units of the Central District Hospitals and outpatient clinics of cities and a significant increase in the burden on these structures. This necessitates an additional financing for reagents and payment of unscheduled services of relevant specialists (mammography, chest X-ray, x-ray of the oesophagus, stomach and large intestine with contrasting, as well as endoscopic examination of internal organs – fiber-optic bronchoscopy, gastrofibroscopy, colonofiberscopy, cytological and histopathological examinations).

5. Except the improvement of early diagnostics of MN there is a growth in advanced stages, as active household visits reveal both early and late advanced cases. This is associated with a growth in mortality, raises criticism of superior authorities and hinders the implementation of this project on the part of the Health Care Directorates of the regions and cities of the Republic of Kazakhstan.

6. **Prospects of the project.** This study supported the improvement of early diagnostics of malignant neoplasms in rural areas. On September 12, 2017 the Scientific Council of KazIOR has developed and approved a Grant for multicentre clinical study in regions with high morbidity and mortality. In October 2017, the Kazakhstan Institute of Professional Development (KIPD) together with Nagasaki Medical University have started a Multicentre Controlled Clinical study to improve early diagnostics and medical rehabilitation from cancer in rural and urban remote regions of Qostanay, West Kazakhstan and Karaganda regions of Kazakhstan.

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