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Влияние эпидемии COVID-19 на заболеваемость и смертность онкологических больных в Рязанской области

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АННОТАЦИЯ

Введение. В 2020 г. человечество столкнулось с пандемией новой инфекции SARS-CoV-2 (англ: *Severe Acute Respiratory Syndrome-related Coronavirus 2*; коронавирус 2, связанный с тяжелым острым респираторным синдромом), существенно затронувшей экономические, социальные и в т. ч. медицинские аспекты нашей жизни. На фоне данных изменений онкологические заболевания, как и многие другие коморбидные патологии, казалось бы, отошли на второй план. Но, как мы понимаем, они не потеряли своей актуальности, а лишь на время «затаились в тени». Анализу и пониманию процессов, происходящих на фоне переориентации медицины на борьбу с пандемией, помогает изучение основных статистических показателей, используемых для оценки распространённости опухолевых патологий и результатов работы онкослужбы.

Цель. Изучить изменения основных статистических показателей онкологической службы Рязанской области во время эпидемии COVID-2019 (англ.: *COronaVIrus Disease 2019*, коронавирусная инфекция 2019 г.).

Материалы и методы. Проведён анализ основных статистических показателей заболеваемости, выявляемости и смертности от злокачественных новообразований (ЗНО) в Рязанской области на основании статистических форм федерального статистического наблюдения № 7 (Форма № 7) «Сведения о ЗНО», отчётов и данных канцер-регистра Рязанской области за период 2012–2022 гг. Проанализированы наиболее актуальные статистические показатели, а также отдельно рассмотрены данные по наиболее распространённым и актуальным опухолевым локализациям.

Результаты. Отмечено, что в период разгара пандемии COVID-19 в 2020–2021 гг., наблюдалось резкое падение общего числа случаев выявления ЗНО — кажущееся снижение «заболеваемости». При этом, наблюдалось увеличение доли пациентов с запущенной IV стадией патологии лёгких, желудка, колоректального рака, что в свою очередь привело в некоторых случаях к увеличению одногодичной летальности и, в целом, к повышению смертности среди онкобольных. Следует отметить, что несмотря на сложную обстановку, связанную с нарушением сроков диспансеризации пациентов, перепрофилированием ряда медицинских организаций и возросшей нагрузкой на первичное медицинское звено, в целом онкослужба Рязанской области показала не столь катастрофическое ухудшение основных статистических показателей, а по ряду из них — доли выявления ранних стадий, результатам лечения опухолей визуальных локализаций — положительную динамику. В 2022 г. официально зарегистрированные показатели заболеваемости ЗНО в нашем регионе вновь вернулась к прежним значениям, сопоставимым с 2019 г.

Заключение. Опыт последних лет должен помочь в разработке мероприятий по предупреждению как самого распространения подобных эпидемиологических заболеваний, так и в отношении мер по недопущению падения качества оказания специализированной медицинской помощи, в том числе в области онкологии.

Ключевые слова: *COVID-19; злокачественные новообразования; статистические показатели; Рязанская область*

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Impact of COVID-19 Epidemic on Morbidity and Mortality of Cancer Patients in the Ryazan Region

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ABSTRACT

INTRODUCTION: In 2020, humanity faced a pandemic of a new infection a Severe Acute Respiratory Syndrome-related Corona Virus 2 (SARS-CoV-2) that had a significant impact on the economic, social, including medical, aspects of our life. Against the background of these changes, oncological diseases, like many other comorbid pathologies, seemed to fade into insignificance. But, as we understand, they have not lost their relevance, but only 'retreated to the shadow' for a while. Study of the basic statistical indicators used for evaluating the prevalence of cancer pathology and the results of the work of oncological service, helps analyze and understand the processes occurring in conditions of reorientation of medical measures for combating the pandemic.

AIM: To study changes in the main indicators of the oncology service of the Ryazan region during the COronaVIrus Disease 2019 (COVID-2019) epidemic.

MATERIALS AND METHODS: The main statistical indicators of morbidity, detestability and mortality from malignant neoplasms (MNs) in the Ryazan region were analyzed on the basis of statistical forms of federal statistical observation No. 7 (Form No. 7) 'Record of MNs', reports and data of cancer registry for 2012–2022. The most relevant statistical indicators were analyzed, data on most common and relevant tumor localizations were separately considered.

RESULTS: At the height of COVID-19 pandemics in 2020–2021, a sharp reduction of the total number of identified MN cases was observed a seeming decline of 'mortality'. At the same time, there was an increase in the proportion of patients with advanced IV stage pathology of lungs, stomach, and colorectal cancer, which, in turn, led in some cases to increase in one-year mortality, and to general increase in mortality among cancer patients. To note, despite a complicated situation associated with non-observance of the terms of the periodic medical examinations, reprofiling of a number of medical organizations and increased load on the primary medical care organizations, the oncology service of the Ryazan region showed a not that catastrophic impairment of the main statistical indicators, and of some of them a proportion of detection of early stages, results of treatment of tumors of visual localization even a positive dynamics. In 2022, officially registered cancer incidence rates in our region returned to previous values comparable to 2019.

CONCLUSION: The experience of recent years should help in developing measures to prevent both the spread of similar epidemiological diseases and measures to prevent a decline of the quality of specialized medical care, in particular, in the field of oncology.

Keywords: *COVID-19; malignant neoplasms; statistical indicators; Ryazan region*

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ECO•VECTOR

LIST OF ABBREVIATIONS

BCOVID-19 — COronaVIrus Disease 2019
ICD-10 — International Classification of Diseases and Related Health Problems, 10th Revision
MN — malignantneoplasm
SARS-CoV-2 — Severe Acute Respiratory Syndrome-related Coronavirus 2
WHO — World Health Organization

INTRODUCTION

Throughout its history, mankind has faced epidemics of various infectious diseases, which have dramatically impacted economic, social and other aspects of life on the planet. Severe Acute Respiratory Syndrome-related Coronavirus 2 (SARS-CoV-2) [1] with full confidence can be calledone of most significant pandemics of the 21st century, which in the first monthsposed new challenges to the entire healthcare organizing system, to specialists of all profiles, and required reorientation of many medical specialties [2].

The actual consequences of the effect of the new coronavirus infection on the course and development of various non-communicable diseases have yet to be established. However, already today we can attempt to evaluate global changes that occurred in certain areas of medicine duringthe most acute phase of the pandemic, and try to make conclusions about mistakes to learn from them for the future [3–7].

In this article, we will try to look at the stateof and changes in the oncological care for the population from position of practicing oncology on an example of the Ryazan region.

The **aim** of this study to changes in the main statistical parameters of the oncological service of the Ryazan region during the epidemic of COVID-19 (COronaVIrus Disease 2019).

MATERIALS AND METHODS

The article presents the results of study and analysis of the data of the cancer registry of the Ryazan region, information from the department of statistical analysis and accounting of the state budgetary institution of the Ryazan Region 'Regional Clinical Oncology Dispensary', all-Russian consolidated systematic reports 'State of cancer care for the population of the Russian Federation' and 'Oncological diseases in Russia (morbidity and mortality)'annually published by Herzen Moscow Research Oncological Institute, a branch of the National Medical Radiology Research Center of the Ministry of Health of Russia, for 2012–2022 [8, 9]. Open data from official Internet resources of the Federal State Statistics Service of the Russian Federation and the World Health Organization (WHO) were also used [1, 10].

The main local recording document was Federal Statistical Observation Form No. 7 (Form No. 7) 'Information on malignant neoplasms (MNs)' (Rosstat Order: On approval of the form No. 866 on dated 27 December, 2016 [11]).

The analysis covered the period 2012–2022, of most interest undoubtedly being years 2020 and 2021 the height of the COVID-19 pandemic. Most relevant statistical indicators, in our opinion, were analyzed, such as 'crude'indicators of incidence of MNs and mortality from them, including mortality fromnon-oncological diseases, the percentage of identified cases of I–II stage cancer and cancer *in situ*, percentage of patients with IV stage of tumor process, percentageof actively identified patients, one-year mortality, the number of postmortem diagnoses at autopsy. These indicators were assessed in dynamics. Tumor ofsome most common and actual localizations were discussed separately.

Statistical processing of the results was carried out using the Office 2010 licensed application package (Microsoft, USA). Descriptive statistics methods were used to present the results.

RESULTS

The most vivid statistical indicator is the overall morbidity with MNs. A 'crude' overall morbidity calculated per 100 thousand population in the period 2012–2019 fluctuated around 500 cases in the Ryazan region (Figure 1) [12]. Upon that, in 2020 and 2021 it declined to 426 and 443 cases, respectively, per 100 thousand population, that is, morbidity decreased by more than 15%–18%.

Other most important indicators are early detect ability, including cases of cancer *in situ*, proportion of actively identified patients, of patients with IV stage of tumor process (Table 1).

In the clinical practice, the prognosis for a patient and the results of his treatment largely depend on the *timely*

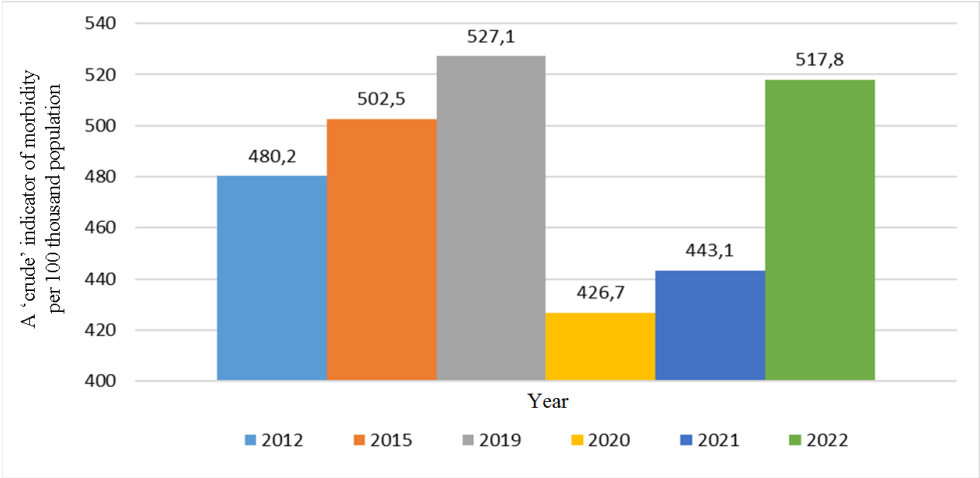

Fig. 1. Dynamics of 'crude' indicator of morbidity with malignant neoplasms in the Ryazan region in 2012–2022.

Table 1. Dynamics of Early Diagnoses of Malignant Diseases in the Ryazan Region in 2015–2022

Parameters	2015	2019	2020	2021	2022
I–II stage, n (%)	2960 (52.1)	3340 (57.2)	2740 (58.2)	2888 (59.2)	3214 (59.0)
IV stage, n (%)	1161 (20.5)	1084 (19.1)	808 (17.8)	891 (18.3)	1064 (19.6)
Actively identified, n (%)	1479 (26.0)	1420 (26.6)	1100 (26.8)	984 (20.2)	1389 (25.5)
Cancer «*in situ*», n (%)	94 (1.6)	191 (3.3)	129 (2.7)	123 (2.5)	82 (1.5)

diagnosing the pathology. Unfortunately, the overall mortality among the population of the Ryazan region during the pandemic rose by more than 19%. Thus, in 2020, 17,825 deaths were recorded, and in 2021 — already 22,022, among them more than 2 thousand from cancer diseases. The summary graph of dynamics of mortality from MNs is given in Figure 2.

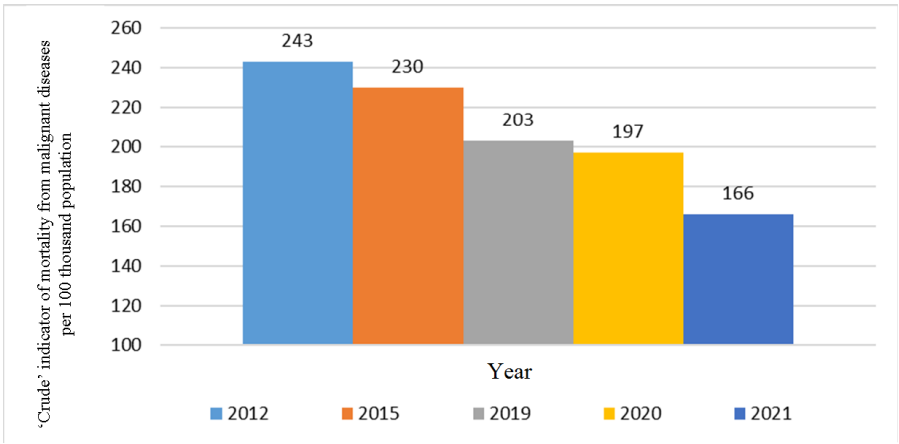

Fig. 2. Dynamics of 'crude' indicator of mortality form malignant neoplasms in the Ryazan region in 2012–2021.

To note, the given statistics includes only patients, in whom the cause of death was direct progression and complications of the tumor process. Over the past decades, overall mortality rates from cancer in the Ryazan region have been showing a steady positive downward trend, including the period of the COVID-19 pandemic. However, taking into account additional information about deceased cancer patients, including those who died from *non-cancer* diseases, we can see the following graph (Figure 3).

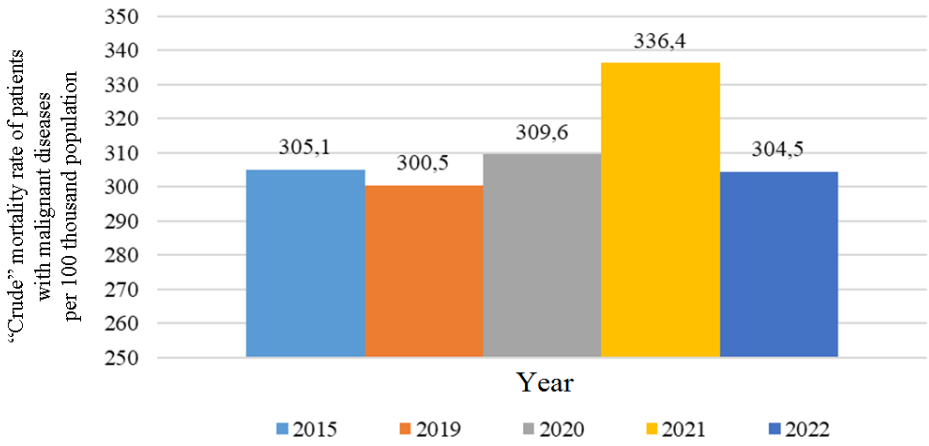

Fig. 3. Mortality among patients registered with malignant neoplasms in the Ryazan region in 2015–2022, including deaths from non-cancer diseases.

Table 2. Statistics of Most Aggressive Tumor Sites in the Ryazan Region in 2015–2022

Parameters	2015	2017	2019	2020	2021	2022
Stomach (ICD-10: C16)						
Total cases identified, n	387	348	331	266	292	325
Proportion of I–II stages among identified cases, n (%)	126 (32.5)	125 (36.0)	84 (25.3)	100 (37.5)	136 (46.5)	148 (45.5)
Proportion of stage IV among identified cases, n (%)	158 (41.9)	135 (38.8)	117 (35.3)	***106 (39.8)***	100 (34.2)	102 (31.4)
One-year mortality, n (%)	181 (46.7)	155 (44.5)	161 (48.6)	***138 (51.9)***	122 (41.8)	103 (31.7)
Trachea, bronchi, lung (ICD-10: C33, C34)						
Total cases identified, n	585	488	488	355	450	481
Proportion of I–II stages among identified cases, n (%)	178 (30.4)	142 (29.0)	144 (29.5)	112 (31.5)	175 (38.8)	161 (33.5)
Proportion of stage IV among identified cases, n (%)	231 (39.5)	222 (45.5)	205 (42.1)	***164 (46.2)***	173 (38.4)	194 (40.3)
One-year mortality, n (%)	239 (40.8)	248 (50.8)	223 (45.7)	***207 (58.3)***	146 (32.4)	156 (32.4)
Colorectal cancer (ICD-10: C18-C21)						
Total cases identified, n	613	635	709	***609***	***610***	642
Proportion of I–II stages among identified cases, n (%)	249 (40.6)	273 (43.0)	316 (44.6)	297 (48.8)	307 (50.3)	302 (47.0)
Proportion of stage IV among identified cases, n (%)	147 (24.0)	134 (21.1)	142 (20.0)	102 (16.7)	97 (15.9)	134 (20.9)
One-year mortality, n (%)	146 (23.8)	130 (20.4)	131 (18.5)	***141 (23.2)***	122 (20.0)	106 (16.5)

Note: ICD-10 — International Classification of Diseases and Related Health Problems, 10th Revision

Another indicator that reflects the quality of cancer treatment is the one-year mortality of cancer patients. In recent years, it has fluctuated in the Russian Federation depending on the region on average within 20%–24%, incl. in the Ryazan region 23.0% in 2015, 22.5% in 2017, 19.0% in 2019. At the same time, during the COVID-19 pandemic, in 2020 and 2021 this indicator remained similar 18.3%–19.8% [8, 9, 12]. Probably, in the coming years we can expect an increase in this indicator due to a *projected increase in the proportion of advanced cases*, which will disrupt the 'roadmaps' of the quality of oncological care for the population. However, it should be noted that despite the difficulties with drug supply, quarantine restrictions in the work of surgical departments, and the illness of the medical personnel themselves, in the Ryazan region in whole it was possible to provide effective treatment of identified cancer patients, as indirectly evidenced by the persisting level of one-year mortality in 2022 — 18.5%. However, the summary data for all tumor sites are generalized and cannot fully reflect the true status, which is especially important for the most common and aggressive diseases of the stomach, lungs and large intestine. Table 2 provides information about the above-mentioned locations of internal organs, and Table 3 reflects information about malignant tumors of visual locations.

Table 3. Statistics of Visual Tumor Sites in the Ryazan Region in 2015–2022

Parameters	2015	2017	2019	2020	2021	2022
Mammary gland (ICD-10: C50)						
Total cases identified, n	650	590	616	509	608	672
Proportion of I–II stages among identified cases, n (%)	412 (63.3)	406 (68.8)	437 (70.9)	392 (77.1)	444 (73.0)	496 (73.8)
One-year mortality, n (%)	39 (6.0)	25 (4.2)	21 (3.4)	23 (4.5)	17 (2.8)	21 (3.1)
Uterine cervix (ICD-10: C53)						
Total cases identified, n	120	126	127	114	124	124
Proportion of I–II stages among identified cases, n (%)	75 (62.5)	81 (64.3)	87 (68.5)	75 (65.8)	83 (67.0)	77 (62.1)
One-year mortality, n (%)	15 (12.5)	17 (13.5)	12 (9.5)	13 (11.4)	9 (7.3)	13 (10.5)
Skin (ICD-10: C44)						
Total cases identified, n	733	725	891	565	607	765
Proportion of I–II stages among identified cases, n (%)	718 (97.3)	714 (98.5)	877 (98.4)	559 (98.9)	597 (98.4)	747 (97.6)
One-year mortality, n (%)	2 (0.27)	5 (0.69)	7 (0.78)	2 (0.35)	1 (0.16)	2 (0.26)
Melanoma (ICD-10: C43)						
Total cases identified, n	110	109	137	79	99	112
Proportion of I–II stages among identified cases, n (%)	82 (74.5)	83 (76.0)	111 (81.0)	71 (89.9)	84 (85.0)	104 (92.8)
One-year mortality, n (%)	38 (34.5)	11 (10,0)	13 (9.5)	12 (15.2)	6 (6.0)	6 (5.4)

Note: ICD-10 — International Classification of Diseases and Related Health Problems, 10th Revision

DISCUSSION

Returning to the obtained results showing the overall decline of the incidence of MNs, we must ask a question: does this mean that the situation with cancer diseases in the region is improved? Certainly not, and it is more correct that the graph in Figure 1 be interpreted not as *decrease in morbidity*, but as *a drop in actual detect ability*.

The term '*under reporting*' of cancer cases increasingly appears in the press and printed scientific works. According to oncologists' forecasts, in 2020, about 660 thousand new cases of cancer were to be

identified in Russia, but in fact less than 510 thousand were registered [13]. The 'deficit' of identified cases of cancer in the Ryazan region was about 700–800 people. Upon than, in 2022, incidence rates returned to their average values (Figure 1).

This 'underreporting' and decrease in the detection of cancer can be especially acute in districts of the Ryazan region, among the rural population, which often does not have full access to highly qualified medical care, and also due to the additional complexity of patient routing. Even among the largest districts of the Ryazan region having multidisciplinary medical centers, we can see significantly different incidence rates of MNs (according to Form No. 7 [11] in the Ryazan region for 2020): Kasimovsky district — 470.3 cases per 100 thousand population; Sasovsky — 474.5; Rybnovsky — 466.0; Sarajevsky — 449.1; Ryazhsky — 424.8; Ryazansky — 429.1; Sapozhkovsky — 436.4; Spassky — 432.1; Shatsky — 432.2; Shilovsky — 427.9 cases per 100 thousand population. In total, the share of the rural population of the Ryazan region in the structure of morbidity with all cancers decreased from 1,333 cases in 2019 to 1,074 in 2020.

In 2021 and 2022, at leading oncology congresses and in authoritative scientific publications, it was repeated that the COVID-19 pandemic would change to an *epidemic of 'advanced' oncological diseases*. Indeed, some indicators of early detection of cancer pathology showed small, but nevertheless, negative dynamics. Thus, since 2020, there has been an increase in detection of stage IV cancers as percent of the total number of cancers, with a decrease in the share of cancers actively detected and diagnosed *in situ* (Table 1).

However, as we can see from the presented results, if to rely only on the percent of early stages from all identified cases in the reporting year, the picture seems unchanged and in a certain sense positive. But, taking into account under reporting of cancer patients and reduction of the absolute number of detected cases of early cancer, a conclusion can be made about a *cumulative effect* and *imminent catastrophic rise of advanced cases* in 2023–2024.

Among the causes of the general decrease in MN detection rate, one can single out special quarantine working regimes of outpatient clinics, non-observance of regular medical examination schedule, late presentation and fear of patients themselves to contract the disease in hospitals, failure of screening programs. The situation with realization of the latter has become catastrophic worldwide: in the USA screening for breast cancer decreased by 89.2%, for colon cancer by 84.5%, and some European countries (the Netherlands, Spain, Italy) had to stop treatment of already verified cancer patients, not to mention identifying new ones [14, 15].

As we understand, the end result of the decrease in the detect ability of early oncopathology will be a direct increase in mortality and in the overall survival of patients. The results of this will be evident over the next several years. Besides, already at the beginning of the epidemics it became clear that mortality rate in patients with COVID-19 correlated with the presence of concomitant pathologies, such as diabetes mellitus, cardiovascular diseases, chronic diseases of lungs and kidneys, MNs [16, 17].

Significant differences in statistical data and in approaches to treatment in different countries, the variability of virus strains and their aggressiveness did not permit to exactly evaluate the extent of influence of COVID-19 on the outcome of cancer (the same as the effect of MN on the severity of course of COVID-19). However, cancer patients infected with COVID-19, certainly have a much higher risk of death from the viral infection (within 10%–20%) compared to patients without cancer history [18, 19].

We see an increase in the total mortality among patients with cancer at the height of the pandemic (Figure 3), which confirms the assumption about *MN being an additional risk factor for unfavorable course of the infectious process*.

As for the most important and common tumor pathologies of the internal organs (Table 2), there was a considerable decrease in the number of detected cases. Upon that, a percent of detection of early stages tends to increase. This is probably due to the fact of turning to medical institutions of the most 'responsible' category of patients, who understand all risks of delay. On the other hand, a share of patients with IV 'advanced' stage also increased, which naturally led to increase in one-year mortality.

Thus, in 2020 we saw a sharp increase in this indicator despite the growing share of early diagnoses, and in 2021 a decrease to almost minimal values over the recent years. As we wrote above, this may be due to the peculiarities of recording cancer patients who died from comorbid pathologies, which were not included in this analysis. To this end, 'optimistic' figures should not be misleading, and perhaps, to truly reflect the state of cancer care, it is necessary that corrected indicators be used, for example, the overall percent of one-year mortality among patients with newly diagnosed tumor pathology. However, it should be admitted that the approaches and possibilities of modern treatment of oncopathology have significantly advanced over recent years.

Concerning tumors of visual localizations (Table 3), there was also noted a decrease in the total number of cases of cancer pathology with preserved tendency to increase in the share of early diagnoses and reduction of one-year mortality rate [20].

Unfortunately, for an objective assessment of the state of oncological care for the population during pandemic, the existing standard forms of medical statistics and records may be insufficient. In 2020 and 2021, there was an 'obliterated' and sometimes paradoxical situation, when there existed excellent official results, such as reduced morbidity, improved early diagnosis, but these parameters did not take into account a sharp increase in mortality from non-oncological pathologies, incl. among the group of risk (patients with MNs, share of posthumously verified diagnoses, patients that do not timely seek medical help).

CONCLUSION

Changes in the main strategic parameters of the oncology service of the Ryazan region during the COVID-19 epidemic were studied and evaluated. The obtained data evidence a significant impact of the pandemic on morbidity; detect ability and mortality among cancer patients. Upon that, the obtained data were oppositely directed. Some parameters (for example, 'crude' morbidity) have a tendency to a 'seemingly' positive change, but they should not be misinforming due to the reasons described above.

In a situation of the changed priorities, the primary care specialists should in no way forget about *oncological alertness*, *observance of regular medical examination schedule* and *screening*. Healthcare organizers should work out in detail and optimize patient routing, including enhancement of information and educational work among the population.

The experience of recent years should help in developing measures to prevent the spread of new infectious diseases and not to allow reduction of the quality of specialized medical care.

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Вклад авторов: *Куликов Е. П., Григорьев А. В.* — концепция и дизайн исследования, редактирование; *Судаков А. И.* — написание текста, статистическая обработка данных; *Мерцалов С. А., Судаков И. Б., Гришина А. А.* — сбор и статистическая обработка данных, редактирование текста. Авторы подтверждают соответствие своего авторства международным критериям ICMJE (все авторы внесли существенный вклад в разработку концепции и подготовку статьи, прочли и одобрили финальную версию перед публикацией).

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