

# Organization Decisions in Clinical Oncology Based on the Statistics of Malignant Neoplasms

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## ABSTRACT

Cancer service parameters in St.-Petersburg, Russia, were studied in relation to patients with urological malignant neoplasms (uMN) in 2014-2018.

**Material and methods.** We studied a number of medical and statistical indicators obtained from the state reporting forms (ff. 7 and 35).

**Results.** The exponential growth of absolute and "crude" indicators of morbidity and morphological verification of the MN of prostate, kidney and bladder in the early stages of the tumor is presented. An increase in the active detection of MN of the prostate gland (by 3.36) and kidney (by 2.26) were observed, due to the increase in oncological alertness at general practitioners. The number of bladder cancer patients who died within a year increased by 37.5%, indirectly indicates potentially aggressive forms of the tumor and the problem of early diagnostics of cancer. The maximum age of patients with newly diagnosed MN of the prostate/urinary bladder was 64-70 years, according to world statistics, kidney cancer diagnosed in patients of any age. Testicular MN was most often founded in patients 25-39 years old with an exponent in 2014-2016, penile MN – was verified at the age of 55-69 years, with a stable rate of increase in incidence.

However, defects in the collection of primary medical information were identified, which made it difficult to evaluate cancer indicators.

**Conclusion.** Original directions for the development of information collection medical systems and the provision of specialized medical care to the population of St-Petersburg are proposed - improving the system of registration of tumors and the quality of medical training and studies for staff of statistical department, conducting research for prevention of the development of malignancies.

**Keywords:** medical and statistical indicators, prostate cancer, kidney cancer, bladder cancer, testicular cancer, penis cancer, population cancer register.

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## INTRODUCTION

Malignant neoplasms (MN) occupy an important place among socially significant diseases: their development significantly reduces the quality of life and leads to increasing disability of patients living in any region. The analysis of medical and statistical indicators of the incidence and prevalence of MN among Russian residents makes it possible to develop the necessary legislative documents, including orders From the Governments of the Russian Federation and St. Petersburg. The main provisions of that documents help to meet the staffing and logistical needs of medical institutions. According to the decree of the President of the Russian Federation, the government is preparing to create a national cancer program, which will require reliable medical statistics.

The provisions of the Order Ministry of the Russian Federation dated by 2012 "Order of rendering of medical aid to the patient with newly diagnosed EIT" have undergone several changes [1]. For example, if the suspicion or identification of the patient testing specialist consultation-oncologist is carried out not later than 5 working days from the date of referral. Date of histological verification of malignant neoplasms does not exceed 15 workdays. Specialized therapeutic measures in patients with external testing begin no later than 10 calendar days after histological verification of the tumor. Issues of timely detection of neoplasms and provision of specialized medical care to patients with malignant neoplasms are characterized by high relevance; require analysis of medical and statistical indicators and implementation of conclusions in clinical practice.

According to official statistics, the "rough" rate of malignant neoplasms incidence among residents of the Russian Federation in 2017 was 420.3, which is 23.2% higher than in

2007 [2]. The prevalence of malignant neoplasms among the Russian population in 2017 exceeded the level of 2007 by 38.8%, and, additionally by 1.2% in 2018 [3]. This circumstance is due to the increase in the incidence and detection of malignant neoplasms, an increase in the survival rate of patients and, possibly, an unsatisfactory reconciliation of the dead in Russian regions.

The urinary system malignant neoplasms (uMN), or urological malignant neoplasms (category C60-67 due to the International Classification of Diseases-X, or IDC-X) has special urgency, since a number of medical and statistical indicators of those neoplasms are characterized by a constant positive gradient among the residents of the Russian Federation. The incidence of prostate cancer (14.9%) in 2018 ranked second place among the male population of Russia. Kidney and bladder cancer (4.7% each) have got 8th and 9th places, respectively [3]. According to Kaprin A.D. et al. [3], in 2018 the share of uMN incidence in men was 25.1% of the total number of MN. Prostate cancer in 2018 ranked 3rd place (8.2%) among the causes of death in the male population over the age of 60 years, and uMN got the 4th (6.6%), mainly in people 40-49 years of age [3]. Therefore, the task of studying and analyzing the dynamics of indicators of morbidity and mortality from these types of pathology in a specific territory remains of high scientific and practical significance.

The "rough" indicator of the incidence of bladder cancer in 2013 increased by 15.9%, compared with 2003 (from 8.7 to 10.0 per 100 thousand inhabitants.), with an average annual growth rate of 1.5% [6]. Over the same period, the incidence of kidney MN increased by 41.0% (from 10.4 to 14.6 per 100 thousand inhab., with average annual growth rate 3.4%),

prostate is by 145.8% (from 20.8 to 47.5 per 100 thousand inhab., with average annual growth rate of 8.1%) [4].

A similar trend is noticed among residents of St. Petersburg (SPb). There has been a constant increase in the incidence of uMN during 10 years of observation (2008-2018). This publication serves as a natural continuation of the materials on the statistics of MN in SPb, published by a group of authors in 2014-2016 [5, 6, 7]. Having received noteworthy data, the authors continued to study the parameters of the activity of the cancer service of SPb in relation to patients with uMN.

The present study is devoted to the analysis of uMN indicators for the period from 2014 to 2018.

## RESEARCH MATERIALS AND METHODS

Evaluation of the results of cancer care for the residents of SPb was performed for 2014-2018. A number of medical and statistical indicators for uMN, which are obtained from state reporting forms (f. 7 and f. 35), were studied [8].

## RESULTS

When the number of residents of SPb was changed from 5,131,942 people (2014) to 5,351,936 people (2018) [8], the dynamics of the "rough" (per 100 thousand inhabitants) incidence rate of uMN was from 42 to 49.8. The absolute number of uMN patients with a first-time diagnosis in the reporting year is shown in table 1.

Table 1: Information on the number of patients with urologic malignant tumors (uMN) in St.-Petersburg in 2014-2018

Localization of uMN (due to IDC-X)	Absolute number of cases by years of observation				
	2014	2015	2016	2017	2018
penis (C60)	13	21	28	23	29
testis (C62)	65	75	85	82	81
bladder (C67)	539	729	731	758	762
kidney (C64)	839	988	969	971	984
prostate (C61)	1 264	1 580	1 531	1 583	1606
Common cases of uMN in St.-Petersburg	21576	26149	25935	26276	25941

The ratio of the specific weight of groups of patients with uMN for 2014-2018 did not change significantly (Fig. 1)

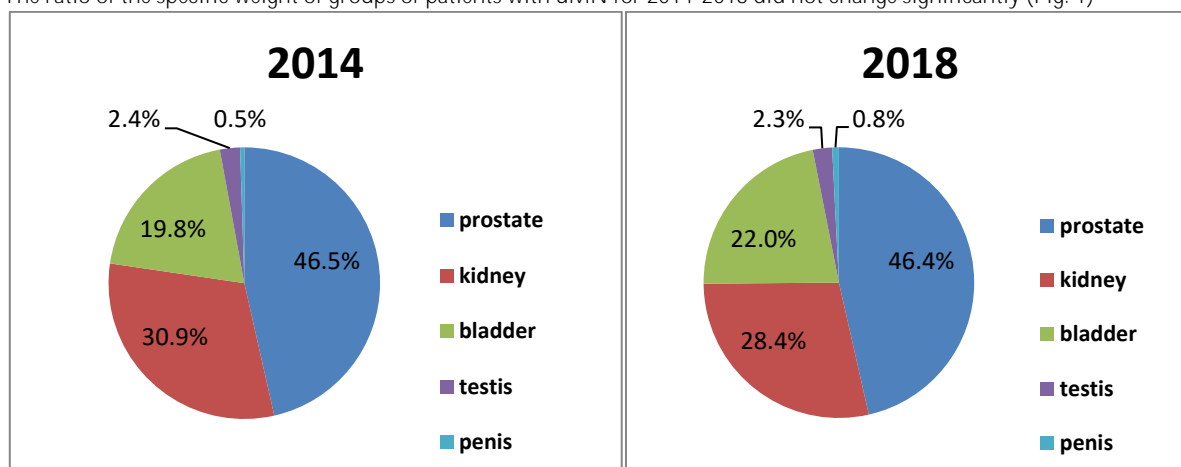


Figure 1: The proportion of groups of patients with uMN for 2014-2018

The indicators of uMN incidence among the male and female population for 2014-2018 are presented in the tables 2 and 3. The most significant increase in the number of patients with first-time ultrasound was observed in 2015, followed by a constant positive exponent. This is probably

due to both the improvement of the quality of the MN diagnostics in general, and the improvement of the system for collecting and processing statistical data (which has been observed in SPb Central statistical burro – Medical Informative and Analytical Center of St. Petersburg).

Table 2: "Rough" incidence rate of uMN among males in St.-Petersburg

Years	The number of males population	The number of uMN cases per 100 thous. inhab.				
		prostate	kidney	bladder	testis	penis
2014	2 327 507	54,3	18,4	16,5	2,8	0,6

2015	2 356 023	67,1	21,3	22,2	3,2	0,9
2016	2 384 888	64,2	21,6	21,3	3,6	1,2
2017	2 386 814	66,3	20,8	22,3	3,4	1,0
2018	2 422 075	66,3	22,67	22,2	3,34	1,2

Table 3: "Rough" incidence rate of uMN among women in St.-Petersburg

Years	The number of female population	The number of uMN cases per 100 thous. inhab.	
		почка kidney	мочевой пузырь bladder
2014	2 804 435	14,6	5,5
2015	2 835 667	17,2	7,3
2016	2 867 025	15,8	7,8
2017	2 894 765	16,4	7,8
2018	2 929 860	14,85	7,68

We perform the analysis of statistical indicators among residents of SPb with rare uMN – testicular (C62) and penile cancer (C60). During the period of observation, we identified 388 patients with testicular MN at the age of 20-49 years, most often at 25-39 y.o. A certain exponent characterized the incidence rate in 2014-2016 (65–85 people /year, resp.). Penile cancer cases verified among 114 men at 55-69 years with relative stability of the incidence rate.

There was an increase in the active detection of prostate and kidney MN in 2015: by 3.36 (from 93 to 312 cases) and by 2.26 (from 53 to 120 cases), resp. It is possible that this situation was also due to the increased cancer alertness of General practitioners. The growth dynamics of this indicator was continued during next years, till 2018 (table. 4).

Table 4: Information on the number of patients with uMN, actively verified in St. Petersburg in 2014-2018

Localization of uMN	The absolute number of patients verified actively at the observation period				
	2014	2015	2016	2017	2018
bladder	21	37	64	132	154
kidney	53	120	149	254	239
prostate	93	312	315	433	346

According to the data of the table 4, the number of patients with kidney cancer during preventive examinations increased by 1.6 in 2016-2018 (from 149 to 239 cases), with bladder MN – by 2.4 (from 64 to 154 cases). Among other things, that was due to the improvement of the quality of statistical accounting of MN, registration of accounting and

reporting documentation by specialists of the oncological outpatient's.

The analysis of one-year mortality of patients with uMN (the frequency of deaths within a year from the moment of tumor verification) is important for the routine clinical practice and the quality of diagnostic measures (Fig. 2).

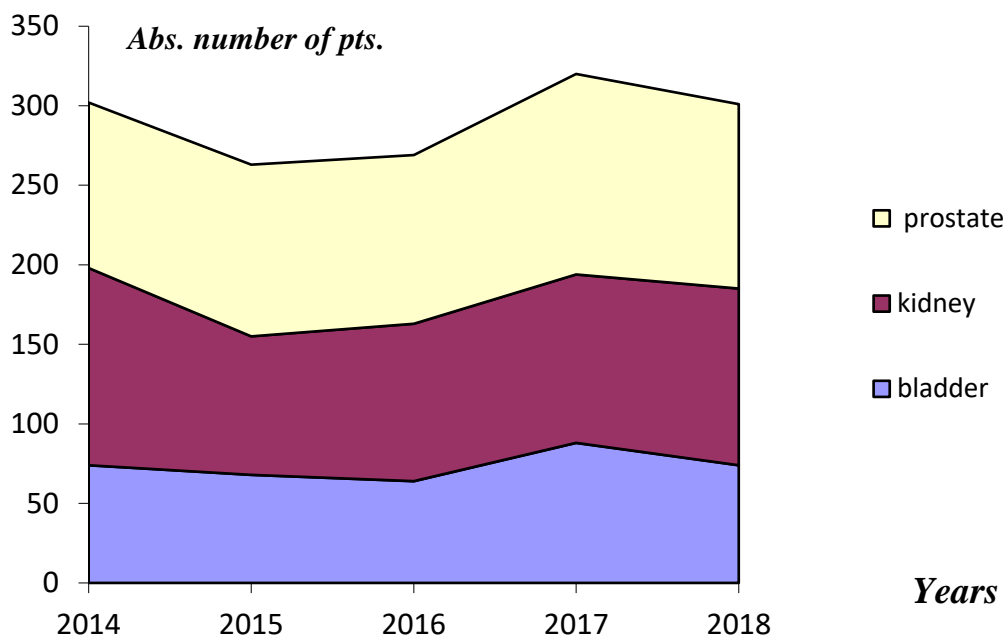


Figure 2: The absolute number of patients with uMN in SPb, who've died within a year of verifying neoplasm (both sexes)

In 2016-2018 the number of patients with bladder cancer who've died within a year increased by 37.5%. Taking into account the facts about the growth of active detection of this pathology for the same period (table 4), it can be assumed that the majority of patients with actively identified bladder MN, died within a year (Fig. 2). This indirectly indicates

potentially aggressive forms of this tumor and the problem of early diagnosis of neoplasms of this localization. According to the facts published in table 5, there was a tendency to increase the number of morphologically confirmed cases of MN of the main urological localizations (prostate, kidney, and bladder).

Table 5: Morphological verification of uMN in SPb in 2014-2018

Localization of uMN	The number of cases by year of observation (abs. / %)				
	2014	2015	2016	2017	2018
prostate	1102 / 93,5	1347 / 92,7	1326 / 94,5	1421 / 95,9	1461/96,6
kidney	572 / 81,1	686 / 81,5	671 /81,7	735 / 84,4	790/87,8
bladder	380 / 81,4	548 / 84,3	591 / 89,1	622 / 90,5	648/92,2

That data (table 5) indicates an increase in interaction between specialists of the clinical base and morphological units of medical institutions.

Medical and statistical indicators of uMN, first identified in the reporting year in localized (T<sub>1</sub>-T<sub>2</sub>) stages are presented in diagrams and clearly allows us to assess the quality of uMN diagnosis in residents of SPb (Fig. 3, tables 6, 7).

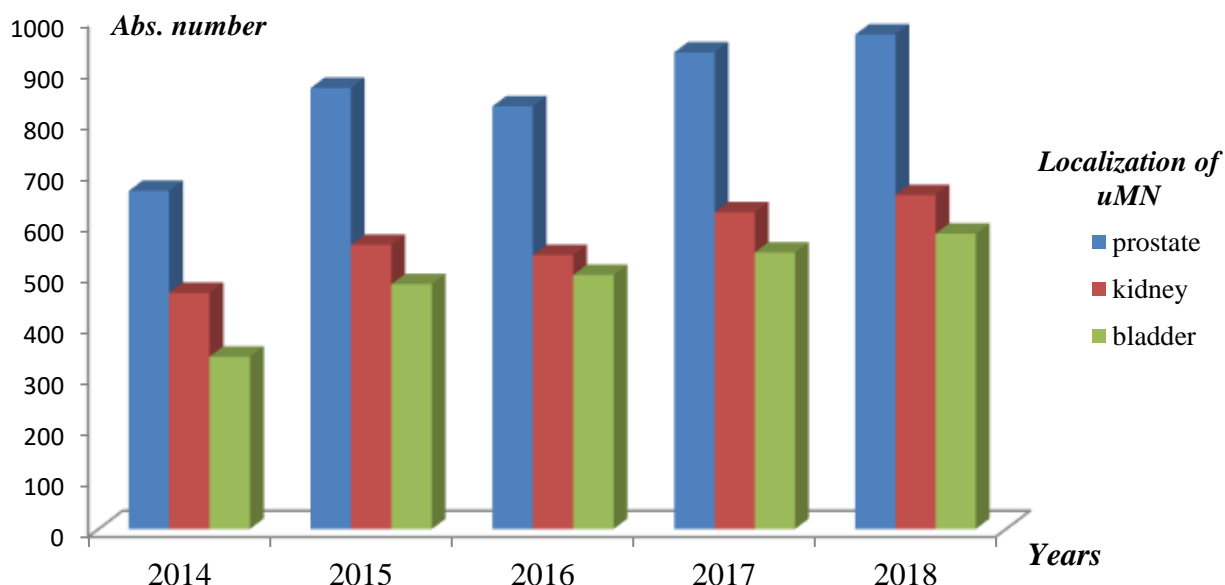


Figure 3: The absolute number of patients with uMN, verified in the localized stages (T1-2) in 2014-2018

Table 6: The number of patients with uMN verified in localized stages (T1-2) in 2014

Localization of uMN	Total uMN cases (without postmortal recorded)	The number of patients with uMN by stages (abs.)				The proportion of the number of patients in stages T1-2 (%)
		1	2	3	4	
prostate	1178	117	546	369	106	56,3
kidney	705	334	129	102	103	65,7
bladder	467	208	130	77	32	72,4

Table 7: The number of patients with uMN verified in localized stages (T1-2) in 2018

Localization of uMN	Total uMN cases (without postmortal recorded)	The number of patients with uMN by stages (abs.)				The proportion of the number of patients in stages T1-2 (%)
		1	2	3	4	
prostate	1513	240	691	323	249	61,5
kidney	900	465	175	113	133	71,1
bladder	703	401	163	78	47	80,2

According to the presented data (Fig. 3, table 6), there is an exponential increase in the detection of early stages of the prostate, kidney, and bladder MN. In 2014-2018, the number of patients with prostate cancer in stage IV increased by 2.4 (from 106 to 249 people, or from 8.99% to 16.5%,  $p < 0.05$ ). When we compare this information with the results of active detection of this pathology (table. 4), the main contingent of patients was detected in the advanced stages of the tumor process. However, these stages did not

affect the indicator of one-year mortality of patients (Fig. 2) - patients are alive and continue to receive treatment. In this case, there are questions about establishing the real tumor stage by primary oncologists.

Information about the completion of radical treatment in the reporting year indicates the timeliness of the beginning of treatment, as well as the completeness of the specialized (oncological) treatment (table. 8).

Table 8: Number of patients with uMN completing radical treatment during the reporting year

Localization of uMN	Number of patients (abs./%)				
	2014	2015	2016	2017	2018
prostate	314 / 51,8	443 / 57,7	573 / 59,0	693 / 63,6	675/64,7
kidney	498 / 98,8	576 / 98,1	578 / 95,7	631 / 97,5	663/98,1

bladder	338 / 97,1	461 / 94,5	495 / 92,2	518 / 90,7	562/94,5
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According to the table. 8, there is a consistent decrease in the proportion of patients with bladder cancer whose radical treatment was not completed in the reporting year. It may be due to delayed detection of first-time cases of this pathology and the peculiarities of collecting medical

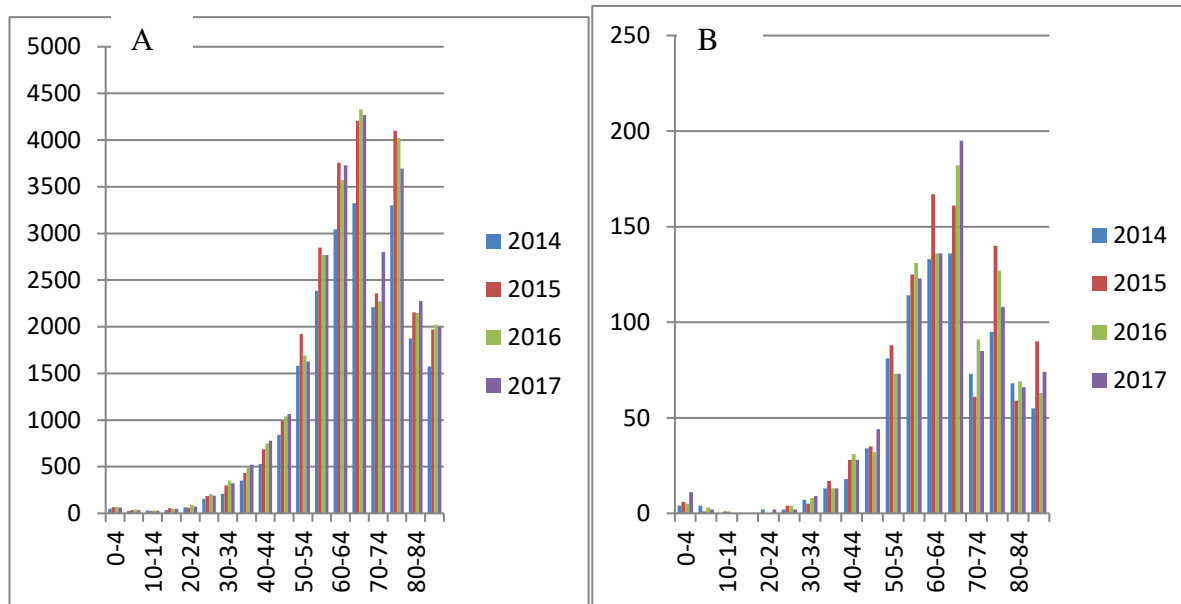
information, since the treatment of patients is carried out by specialists from different institutions (both specialized and General medical network). We analyzed the indicators related to the medical care for patients with bladder MN (Table. 9).

Table 9: Treatment options for patients with bladder MN, completed the treatment in the reporting period

Period of observation	Absolute number of cases due to the treatment					Total
	surgical	radiotherapy	chemotherapy	combined	chemoradiotherapy	
2014	275	-	-	63	-	338
2015	343	-	-	118	-	461
2016	404	-	-	91	-	495
2017	366	-	-	152	-	518
2018	405	-	-	157	-	562

According to our facts, we stated the increase in the number of patients with bladder neoplasms who underwent only surgical treatment (Table 9). It is well-known fact that radical surgical intervention (radical cystectomy) is a "gold standard" for the muscle-invasive form of that disease. However, in specially selected patients the organ-preserving treatment with chemo/chemoradiotherapy can be used alternatively [9, 10]. According to medical statistics, for

2014-2017, none of patients received organ-preserving treatment. Medical specialists with clinical recommendations can regard the situation as non-compliance, deviation from the Guidelines or incorrect formation from medical reporting forms. Those circumstances need at least a thorough analysis. The age of patients with uMN who were treated in 2014-2017 is shown in Figure 4 (A, B, and C, respectively).



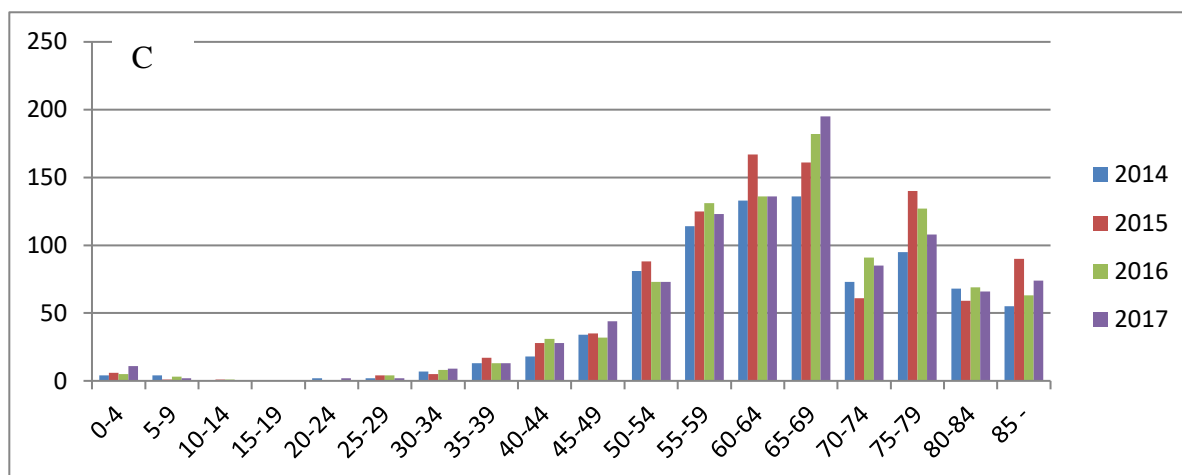


Figure 4: Age indicators of patients with uMN of prostate (A), kidney (B) and bladder (C)

According to the diagrams, the maximum age of SPb residents with newly detected prostate and bladder cancer was 64-70 years, and this data is comparable to the world literature [11, 12]. Kidney MN was diagnosed in patients at any age (Fig. 4B).

## CONCLUSION

According to the data provided, in the Russian Federation and, in particular, among the residents of SPb, there is an unfavorable dynamics of a number of statistical indicators for malignant tumors of the genitourinary system. The reason of that is not only in improving the quality of diagnosis of MN of these localities and the tendency to increase life expectancy. High rates of one-year mortality of patients with uMN – perhaps this is an evidence of insufficient use of medical supplies for patients.

Based on the above information, it is advisable to:

1. Use modern achievements of radical treatment of patients with newly identified muscle-invasive bladder cancer, taking into account the high values of one-year mortality and the lack of data in the data of primary medical reporting of combined treatment (surgical method + chemotherapy, radiation/chemoradiotherapy) for those patients.
2. Improve the results of early diagnosis of prostate cancer and significant increase of the number of advanced stages: to ask family doctors to perform a blood test for a specific prostatic antigen in a population older than 50 years; to study the composition of familiar prostate cancer for an early examination of males; to study of the possibilities and implementation of molecular diagnostic programs (assessment of the probability of the BRCA, especially 2<sup>nd</sup> gene type).
3. Optimize the quality of information collection about newly diagnosed patients with uMN by outpatient's oncologists and other medical specialists (primary medical centers, family doctor outpatient's, ambulatories): form a block of information and send it to the Central cancer registry burro (Medical Informative and Analytical Center of St. Petersburg).
4. Ensure proper tumor staging (compliance with the TNM system and modern morphological classifications).
5. Perform the epidemiological studies to prevent the development of new cases of MN in SPb based on the high

population density and significant number of elderly people and the characteristics of the impact of waste "harmful" production [13] in that region.

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## CONFLICT OF INTEREST

The authors do not declare a conflict of interest.

## FINANCIAL DISCLOSURE

No author has a financial or property interest in any material or method mentioned

## REFERENCES

1. Order of the Ministry of Health of Russia from 04.07.2017 N 379H "On Amendments to the Procedure for Providing Medical Assistance to the Population on the" Oncology "Profile, Approved by Order of the Ministry of Health of the Russian Federation of November 15, 2012 N 915H" URL: <http://www.consultant.ru/law/hotdocs/50397.html/> (In Russian)
2. *The status of cancer care for the population of Russia in 2018*. Eds. A.D. Kaprin, V.V. Starinsky, G.V. Petrova. Moscow, MNI OI named of P.A. Herzen - branch of the Federal State Budgetary Institution Scientific Research Center for Radiology of the Ministry of Health of Russia, 2019, 236 p. (In Russian)
3. *Malignant tumors in Russia in 2018*. Eds. A.D. Kaprin, V.V. Starinsky, G.V. Petrova. Moscow, MNI OI named of P.A. Herzen - branch of the Federal State Budgetary Institution Scientific Research Center for Radiology of the Ministry of Health of Russia, 2019, 250 p. (In Russian)
4. Kaprin, A.D. Analysis of the uro-nephrology morbidity and mortality in the Russian Federation for 2003-2013 / Kaprin A.D., Apolikhin O.I., Sivkov A.V., Moskaliova N.G. [et al.] / *Experimental and clinical urology*. 2015 no. 2. P. 4-12. (In Russian)

5. Orlov G.M., Movchan K.N., Startsev V.Yu., Dolgov V.P. [et al.] The main medical and statistical indicators of oncological care for residents of St. Petersburg in 2009-2013. St.-Petersburg: Medical information and analytical center. 2014. 124 p.
6. Startsev, V.Yu. Indicators of the effectiveness of cancer care for residents of St. Petersburg with malignant tumors of the genitourinary system / V.Yu. Startsev, V.V. Khizha, G.N. Ivanov, R.E. Sen'kov / Effective pharmacotherapy. 2014. Vol. 37. P.36-39. (In Russian)
7. Startsev V., Sen'kov R. Statistical results of monitoring residents of St. Petersburg for prostate cancer. Poster at the 3<sup>rd</sup> Friends of Israel Urological symposium. Tel-Aviv, Israel, 5-7 July 2016. P. 20.
8. The age-sex composition of the population of St. Petersburg on January 1, 2018. Statistical Bulletin. St. Petersburg: Office of the Federal State Statistics Service for St. Petersburg and the Leningrad Region (Petrostat). St.-Petersburg, 2018.58 p. (In Russian)
9. Durdax C., Fabiano E., Mejean A. Organ preservation by chemoradiation for bladder cancer. Cancer Radiother. 2019 Aug 7. pii: S1278-3218(19)30291
10. Schulz G.B., Stief C.G., Schlenker B. Follow-up surveillance of muscle-invasive urinary bladder cancer after curative treatment. Urologe A. 2019 Aug 9. pii: 10.1007/s00120-019-1012
11. Droz J.P., Albrand G., Gillessen S., Hughes S. et al. Management of Prostate Cancer in Elderly Patients: Recommendations of a Task Force of the International Society of Geriatric Oncology. Eur Urol 2017 Oct;72(4):521-531. doi: 10.1016/j.eururo.2016.12.025
12. Carlsson S., Benfante N., Alvim R., Sjoberg D.D. et al. Long-Term Outcomes of Active Surveillance for Prostate Cancer - The Memorial Sloan Kettering Cancer Center Experience. J. Urol. 2019 Dec 23;101097JU0000000000000713. doi: 10.1097/JU.0000000000000713
13. Koval V.V. Improving the organization of medical care for the province residents with a high incidence of bladder cancer among workers of hazardous industries: Ph.D. dissertation. St.-Petersburg, 2008. 22 p. (In Russian)