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Features of the prevalence and incidence of urolithiasis among the adult population of Ukraine in their relationship with the effectiveness of specialized care and social consequences

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SUMMARY

The work is based on official reporting data covering 2013–2020, depending on the availability of certain information, given the abolition of certain forms of reporting. The conducted comparative, analytical-synthetic analyzes, statistical processing of results allowed to prove directly, partially logically indirectly causal connections between the nature of the dynamics of prevalence, incidence of urolithiasis of the adult population in Ukraine, changes in the effectiveness of key indicators of specialized care and their consequences of the medical and social aspect (disability, mortality). Against the background of the general tendency to decrease the different intensity of registered and newly detected cases of the disease among all segments of the population, the ratio indicates the continued accumulation of patients in need of specialized care and the issue of prevention, early detection of urolithiasis. Everywhere people of working age, females, and locals predominated. This nature of the changes affected hospitalization, their duration with a simultaneous increase in surgery, mortality. The decline in nephrectomies has led to a decrease in the number of people recognized as disabled for the first

time due to pathology. Of the socially significant indicators, the negative is the increase in mortality from 2016 by 11.3% to 0.697 per 100 thousand in 2019, which is twice as high among urban (14% vs. 6.7% rural to 0.762 vs. 0.572) with obvious predominance among the former – women (by 29.0% to 0.813), while among the latter – men (by 39.0% to 0.539).

РЕФЕРАТ

Особливості поширеності, захворюваності сечокам'яної хвороби серед дорослого населення України в їх взаємозв'язку із результативністю спеціалізованої допомоги та соціальними наслідками. Сайдакова Н.О., Шуляк О.В., Стусь В.П., Пасєчників С.П., Ключ А.Л., Кононова Г.Є. Робота ґрунтується на даних офіційної звітності, що охоплюють 2013–2020 рр. у залежності від наявності тієї чи іншої інформації з огляду на скасування окремих форм звітності. Проведений порівняльний, аналітико-синтетичний аналізи, статистичне опрацювання результатів дозволили напряму, частково логічно опосередковано довести причинно-наслідкові зв'язки між характером динаміки поширеності, захворюваності на сечокам'яну хворобу (СКХ) дорослого населення України, змінами результативності основних показників спеціалізованої допомоги та їх наслідками медико-соціального аспекту (інвалідності, смертності). На тлі загальної тенденції до зменшення різної інтенсивності зареєстрованих та вперше виявлених випадків захворювання серед усіх верств населення співвідношення показників свідчить про продовження накопичення пацієнтів, що потребують спеціалізованої допомоги і залишаються актуальними питання профілактики, раннього виявлення СКХ. Всюди переважали особи працездатного віку, жіночої статі, місцеві жителі. Подібний характер змін відбився на госпіталізації, їх тривалості з одночасним зростанням хірургічних втручань, летальності. Спад нефректомій призвів до зменшення чисельності вперше визнаних інвалідами внаслідок патології. Із соціально значущих показників негативним є зростання з 2016 р. смертності на 11,3% до 0,697 на 100 тис. у 2019 р., що удвічі вище серед міського (на 14% проти 6,7% сільського до 0,762 проти 0,572) з очевидною перевагою серед перших – жінок (на 29,0% до 0,813), тоді як серед других – чоловіків (на 39,0% до 0,539).

INTRODUCTION

Urolithiasis – as one of the leading urological pathologies with a known frequency of visits, hospitalizations due to the nature of its course, remains the focus of the medical community and is a priority in terms of developing new, improved diagnostic methods, and even more so, surgical care, followed by metaphylaxis. Modern achievements in these areas over time dictate the need to assess their effectiveness, especially in terms of social issues. After all, urolithiasis is the cause of serious complications that lead to chronic kidney disease, and with it, disability and mortality. The criteria for such an assessment can be considered, first of all, the basic data on the nature of the dynamics of patients who are registered and cases with a first diagnosis. Significant is the information about the number of patients treated in the hospital, its duration, with indicators of the volume of surgical care, mortality, including postoperative. Possession of such information in the comparative aspect of Ukraine as a whole, taking into account administrative territories in terms of different segments of the population will allow not only the real situation, but an individual approach to clinical and organizational, management decisions aimed at improving it.

Based on these positions, the aim of the work is to study the dynamics of epidemiological processes, the main indicators of specialized care for patients with urolithiasis in Ukraine and its separate administrative territories, taking into account the place of residence of different age groups of adults.

MATERIALS AND METHODS

The work was based on official statistics for 2013-2020 (in connection with the abolition of the relevant reporting forms from 2018, the incidence and prevalence are analyzed for 2013-2017; for objectively known reasons, the effectiveness of specialized care for patients – for 2013-2017-2020, as well as 2016-2020). Analytical-synthetic, comparative analyzes are subject to indicators (absolute and special coefficients per 100 thousand of the population), prevalence, morbidity, number of hospitalized caused by urolithiasis and related duration of surgery, mortality, including postoperative, percentage of those who were under active supervision and those who received a disability recognized for the first time and led to mortality. The work provides for the study of the dynamics of these phenomena among people of working age and retirement age, taking into account gender, place of residence in Ukraine and in terms of its regions. The obtained results were processed according to the known typical methods of variation statistics (absolute increase / decrease, growth rate / decrease), in case of need of comparison of two values the Student's t test was applied, and for the purpose of estimation of levels of prevalence, morbidity of pathology. medium and higher than them, the recognized limit value of fluctuations in the amount of $\pm 13.0\%$ of the all-Ukrainian value was involved.

RESULTS AND DISCUSSION

In Ukraine for 5 years there was a decrease in both registered and first-time patients, which is traced to the dynamics of absolute values and special coefficients per 100 thousand population, then for convenience we will refer to the values of indicators. In particular, the number of the former decreased by 9% to 261832, the latter by 13.7% to 52539 in 2017. Stably over 50% of those and other cases occurred in 8 oblasts (Dnipropetrovsk, Vinnytsia, Lviv, Odesa, Poltava, Kharkiv, Khmelnytsky, Mykolayiv) and the capital. The established positive dynamics is confirmed by changes in prevalence levels, the decline of which was less intense than the incidence (by 3.4% and 12.0%, respectively), and their values were 752.4 and 1510.0 in 2017. That is, as in previous years, the accumulation of patients in need of active supervision. Over the years of study, the percentage of

coverage of this type of medical care has increased slightly (from 59.5% to 61.0%), but in terms of administrative territories ranged from 43.1% in Kyiv to 86.9% in Vinnytsia oblast 5 years in a row from 30.1% to 83.2% (in Mykolayiv and Vinnytsia oblasts, respectively). It should be emphasized that in a quarter of oblasts this percentage did not exceed 50.0%. In the course of the study, the administrative territories of Ukraine were divided according to the prevalence and morbidity indicators according to the criteria: below average levels, average, i.e. close to the average Ukrainian values and above average. We consider this approach important from the point of view of carrying out appropriate medical and organizational measures, making managerial decisions on the ground by health care bodies together with government agencies, given the possibility of decentralization. The results are presented in Tables 1 and 2.

TABLE 1. Distribution of regions by the level of prevalence of urolithiasis among the adult population of Ukraine (per 100 thousand), 2017

Below average		Average		Above average	
Oblasts	Indicator	Oblasts	Indicator	Oblasts	Indicator
Volyn	617.9	Kyiv oblasts	726.4	Vinnytsia	1340.3
Donetsk	838.5	Mykolayiv	741.6	Dnipropetrovsk	947.8
Zhytomyr	618.0	Ternopil	766.2	Odesa	1084.1
Transcarpathian	553.5	Kherson	683.7	Poltava	1308.8
Zaporizhzhia	480.0	Cherkasy	666.1	Rivne	1126.2
Ivano-Frankivsk	565.1			Sumy	950.7
Kirovohrad	752.4			Kharkiv	927.4
Luhansk	435.0			Chernihiv	1156.7
Lviv	573.4			Kyiv city	975.8
Chernivtsi	434.6				
Ukraine	752.4				

We will focus on oblasts where the corresponding values of indicators are higher than the average Ukrainian. At prevalence such includes 36% of the territories of Ukraine (9 oblasts). In the case of morbidity – 44%, they fall on 11 oblasts. Note that about half coincide (5 of 11, 45%). The reasons, at first glance, it is logical to include coverage by active

observation of such patients, in the process of which metaphylaxis is envisaged. It turned out that the percentage of such supervision among the registered was $74.8 \pm 1.9\%$, among the detected – $63.1 \pm 1.4\%$ ($p < 0.05$), the average Ukrainian – 61.0%. Under such conditions, we can talk about the need to expand the scope of supervision, but more attention needs to be

paid to assessing its quality. It is important to note that the majority of patients, both among those registered and diagnosed for the first time, are people of working age, accounting for 52.0% and 64.4%, respectively, in the study years. There is a general tendency to reduce the number of patients; among all by 15.2% to 137,175 people, among others – by 14.3% to 33,837. This nature of the changes is confirmed by the prevalence rates, which decreased from 584.5 to 566.4 (by 3.1%), and the incidence – from 154.2 to 139.7 (by 9.4%). As for people of working age, their number decreased by only 1.4% to 125,698 patients in 2017, firstly diagnosed – by 12.6% to 19018. Respectively responded to the levels: prevalence – by 6.0 to 1111.7, morbidity by 16.7% to 168.2. The

presented data indicate a more intensive process in the working age, while in the disabled, on the contrary, its pace has slowed down significantly. This can to some extent be explained by socio-economic conditions with the beginning of the reorganization of medical care, which had a negative impact on the appeals of the elderly. With regard to people of working age, we can assume the possibility of treatment, supervision in medical institutions of private structures, which spreads over time. Of the total number of registered patients, 34.7% accounted for 3 oblasts (Dnipropetrovsk, Odesa, Kherson) and the city of Kyiv for the first time, and they accounted for about 25% of newly diagnosed patients.

TABLE 2. Distribution of regions by the level of morbidity of urolithiasis among the adult population of Ukraine (per 100 thousand), 2017

Below average		Average		Above average	
Oblasts	Indicator	Oblasts	Indicator	Oblasts	Indicator
Vinnytsia	190.3	Volyn	132.8	Zhytomyr	174.9
Donetsk	136.6	Dnipropetrovsk	169.2	Ivano-Frankivsk	184.3
Transcarpathian	89.7	Zaporizhzhia	158.8	Lviv	205.1
Luhansk	110.3	Kyiv oblasts	170.4	Mykolayiv	178.1
Kharkiv	134.5	Kirovohrad	146.6	Odesa	173.8
Kherson	135.0	Kyiv city	144.5	Poltava	184.7
Cherkasy	135.3			Rivne	209.1
Chernivtsi	121.0			Sumy	202.5
				Ternopil	187.7
				Khmelnysky	213.9
				Chernihiv	279.4
Ukraine	151.0				

The analysis of data by sex shows the predominance of women, among registered patients, they accounted for 56.7±0.1% against 43.3±0.1% of men (148562 and 113270 patients), among persons with newly diagnosed pathology – 52.5±0.1% and 47.5±0.1% (27601 and 24938, respectively). Significantly higher proportion of men among the first detected was reflected in the level of morbidity, which was 158.4 against 144.7 among women. At

prevalence of size among the last were big, namely 774.0 against 720.4 among men.

Urban residents predominate: among the registered they accounted for 70.8%, among the first identified 71.7%, respectively; rural accounted for 28.2% and 28.3%; in 2017, the former numbered 186291 and 37677, among the latter 75541 and 14862, respectively. Against the background of a decrease in the total number of patients with

uroolithiasis among urban residents by 8.3%, their level was higher than among the rural population (768.8 vs. 714.8, respectively), it was higher in incidence (155.5 vs. 140.6 respectively) with a decrease in such cases by 6.1%. Thus, the contingent that needs increased attention, which can be considered people of working age, females living in urban areas, has been objectified.

The outlined situation, together with other well-known events of the last two years, which cannot be ignored (reduction of bed stock, their partial reprofiling for patients with COVID-19), significantly affected the number of patients with urolithiasis who received inpatient treatment. Thus, in 5 years they decreased by 23% to 84,546, in another 3 years by 26% to 62,587 in 2020. That is, since 2013, the figure has approached 50%. The share of hospitalized patients registered was 38.4% in 2013 and 32% in 2017. The term of treatment in the hospital is intensively reduced, for 5 years by 6.5% to 8.46 days and from 2017 to 2020 by 14% to 7.23 days. This process affected the mortality rate, which increased (by 8.0%, 14.8%) and reached 0.27% in 2017 and 0.31 in 2020, respectively. This is logical to explain the more severe composition of patients with kidney and ureteral calculi, which is confirmed by comparing these areas, which are distinguished by the value of both of these indicators (Dnipropetrovsk, Transcarpathian, Zaporizhzhia, Odesa, Kharkiv oblasts) and Kyiv. It should be noted that with the decrease in hospitalization, the percentage of operated patients increases, in 2013 it was 45% in 2017 – 46%, in 2020 – 65%. The number of transactions per 10,000,

which was 9.0 in 2013, increased to 9.18 in 2017 (by 2.0%) and to 9.77 in 2020 (by 6.4%). The noted positive fact is strengthened by data of decrease in an indicator of postoperative lethality, thanks to modern methods of treatment. Namely, from 0.55% in 2013 to 0.52% and 0.48% in 2020 (by 5.14 and 7.7%). 6-10 oblasts are distinguished by high indicators, more often Zaporizhia, Ivano-Frankivsk, Odesa, Kharkiv, Khmelnytsky. With the development of diagnostics, modern methods of stone removal and metaphylaxis schemes, the proportion of nephrectomies for kidney and ureter calculi decreased by 10.2%, 9.3% and 7.5% in the respective years of study. In 2020 they were 188. Thus, the number of patients at risk of developing chronic kidney disease, which eventually become the cause of disability, decreases. It is noteworthy that urolithiasis accounted for the first place in the structure of primary access to disability in 2020, $26.8 \pm 3.6\%$ against $45.0 \pm 3.2\%$ ($p < 0.05$) in 2016. The data are based on the results of a special study and 100% of cases are accepted except for chronic pyelonephritis. With age, the percentage decreases: up to 39 years from 39.5% to 19.6% in pre-retirement age from 47.5% to 31.0%, in retirement from 55.6% to 50%. There was an increase in the presence of calculi from both kidneys from $13.9 \pm 2.2\%$ to $16.1 \pm 3.0\%$, significantly decreased in a single kidney (from $24.2 \pm 2.8\%$ to $7.1 \pm 2.1\%$) and in the case of operated (from $6.9 \pm 1.6\%$ to $3.3 \pm 1.4\%$). The second socially important aspect is the mortality rate. The dynamics of indicators over the years of study are presented in Table 3.

TABLE 3. Dynamics of mortality rates of the population of Ukraine (per 100 thousand) due to diseases of the kidneys and urinary tract

Years	The whole population			Urban			Rural		
	Total	Men	Women	Total	Men	Women	Total	Men	Women
2016	0.627	0.609	0.643	0.668	0.713	0.630	0.536	0.384	0.6702
2019	0.697	0.641	0.746	0.762.	0.699	0.813	0.572	0.534	0.607
Тп/з	11.3	5.2	10.7	14.0	-2.0	29.0	6.7	39.0	-10.0

As can be seen from Table 3, in Ukraine, with the deterioration of certain indicators of specialized care against the background of the allegedly positive dynamics of the decrease in patients with urolithiasis, registered and first detected, there was an increase in mortality. Namely: by 11.3% in three years to 0.697 per 100 thousand among the total adult population twice as much among women (10.7% to 0.746 against

5.2% to 0.641 – men), which is quite logical given preference of patients of this sexual category. Due to similar reasons, the fact of a double increase in mortality among the urban population (by 14.0% against 6.7% of rural population to 0.762 against 0.572 in 2019), as well as females (+ 29%) and men is also predicted (by 39%) among rural residents.

During the study, the regions were divided by mortality rates: below average, average, above average (Table 4).

As can be seen, 26% of administrative territories have higher than average mortality rates (Vinnytsia, Volyn, Kirovohrad, Odesa, Kharkiv, Kherson oblasts).

Thus, the positive nature of changes in prevalence and morbidity, the intensity of reduction of the latter indicate the accumulation of patients in need of active special supervision, and the problem of early detection and prevention of the disease requires further attention. The contingent of high risk is also outlined: people of working age, females, local residents. The peculiarities of inpatient care are traced, which consist in the reduction of the number of treated patients, reduction of the term of hospitalization, but with the increase of mortality. That is, we

can assume the concentration of more severe patients. This is confirmed by the increase in the number of surgical interventions, but with a decrease in post-operative mortality, as a consequence of the use of modern medical technologies. The positive decrease in the proportion of nephrectomies is directly related to the decline in the development of chronic kidney disease, disability. In the structure of the causes of the latter among other diseases (chronic glomerulonephritis and chronic pyelonephritis) urolithiasis occupies a leading place. The distribution of oblasts by levels of prevalence, morbidity, and mortality is valuable information for health authorities, which, together with data on the effectiveness of specialized care, reveal ways to change the situation for the better, providing an opportunity to focus on the most vulnerable areas. This guarantees the necessary individualized approach to drawing up real plans.

TABLE 4. Mortality rates due to urolithiasis among the adult population of Ukraine (per 100 thousand), 2019

Below average		Average		Above average	
Oblasts	Indicator	Oblasts	Indicator	Oblasts	Indicator
Dnipropetrovsk	0.565	Rivne	0.607	Vinnytsia	0.712
Zhytomyr	0.576	Ternopil	0.674	Volyn	0.164
Transcarpathian	0.240	Khmelnysky	0.716	Kirovohrad	1.286
Zaporizhzhia	0.531	Chernihiv	0.707	Odesa	2.070
Ivano-Frankivsk	0.219	Kyiv city	0.754	Kharkiv	1.056
Kyiv oblasts	0.452			Kherson	1.067
Lviv	0.360				
Mykolayiv	0.178				
Poltava	0.272				
Sumy	0.466				
Cherkasy	0.502				
Chernivtsi	0.222				
Ukraine	0.697				

CONCLUSIONS

1. There is a decrease in registered and newly diagnosed patients with urolithiasis: from 2013 to 2017 by 9% and 13.7% to 261832 by 52539, per 100 thousand – by 3.4% and 12.0% up to 752.4 and

2. 151.0 respectively. There were established areas with prevalence and incidence rates above average, they cover 36.0% and 44.0% of the administrative territories of the country. With the

predominance of people of working age, their number decreased by 15.2% (to 137,175) and by 14.3% (to 33,837), by 3.1% and 9.4% to 566.4 and 1,397 able-bodied by 1.4% (up to 125698) and by 12.6% up to 19018; per 100 thousand – by 6.0% to 1111.7 and by 16.7% to 168.2, respectively. Among the registered more women (56.7±0.1% vs. 43.3±0.1%; $p<0.05$), namely 148562 or 778.8 vs. 113270 or 720.4, with a numerical advantage of women with first established diagnosis, their levels were lower than in men (27601 – 144.7 vs. 24938 – 158.6 in men). Urban residents accounted for 70.8% and 71.7% of all and newly identified (18,629) and 37,677 against 75,341 and 14,862 rural or 768.8 and 155.0 and 714.8 and 140.6, respectively). The decrease in urban population among the contingent of patients is more intense than in rural areas (by 8.3% and 6.1%).

3. There is a decrease in hospitalized patients with urolithiasis: for 5 years by 23% to 84,546 cases in 2017 and another 26% to 62,587 in 2020; their share among the registered became smaller – 32% in 2017 against 38% in 2013, the reduction of the period of hospitalization is more pronounced: by 6.5% from

2013 to 2017 to 8.46 days by 2020 by 14% up to 7.23 days. At the same time, mortality increased by 8.0% and 14.8% to 0.27% and 0.31% in 2017 and 2020, respectively; the percentage of operated patients increased from 45% to 46% in 2017 to 65% in 2020, by 10 thousand performed surgical interventions - by 2.0% and 6.4% to 9.18 and 9.74, respectively, with a decrease postoperative mortality from 0.55% to 0.52% in 2017 and 0.48% in 2020.

4. The decrease in the proportion of urolithiasis in the structure of nephrectomies as its causes was observed: by 10.2%, 9.3%, 7.5% in 2013, 2017 and 2020. The direct dependence of pathology on the frequency of primary disability, which has a similar tendency, was found; as well as the main results of specialized assistance with mortality, which increased over three years by 14.3% to 0.697 per 100 thousand in 2019, due to women living in urban areas and men – rural.

CONFLICT OF INTERESTS

The authors declare no conflict of interest.

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