МІЖНАРОДНІ МУЛЬТИДИСЦИПЛІНАРНІ НАУКОВІ ІНТЕРНЕТ-КОНФЕРЕНЦІЇ

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# Світ наукових досліджень

Збірник наукових публікацій міжнародної мультидисциплінарної наукової інтернет-конференції

Випуск 25

14-15 грудня 2023 р.

ISSN 2786-6823 (print)





Тернопіль, Україна – Ополе, Польща 2023 УДК 001 (063)

**Світ наукових досліджень. Випуск 25:** матеріали Міжнародної мультидисциплінарної наукової інтернет-конференції (м. Тернопіль, Україна, м. Ополе, Польща, 14-15 грудня 2023 р.) / за ред.: О. Патряк та ін. ГО "Наукова спільнота", WSZIA w Opolu. Тернопіль: ФО- П Шпак В.Б. 2023. 362 с.

Збірник наукових публікацій укладено за матеріалами доповідей наукової мультидисциплінарної інтернет-конференції «Світ наукових досліджень. Випуск 25», які оприлюднені на інтернет-сторінці www.economy-confer.com.ua

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Адреса оргкомітету: 46005, Україна, м. Тернопіль, а/с 797 тел. +380977547363 e-mail: economy-confer@ukr.net

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**ISSN 2786-6823 (print)** 

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## THE ROLE OF GEOGRAPHICAL INFORMATION SYSTEMS METHODS IN STUDYING THE EPIDEMIOLOGY OF DISEASES OF THE URINARY SYSTEM

#### Viktor Sergeevich Biryukov

Candidate of Medical Sciences, Odessa National Medical University

#### Milana Myhailovna Myinia

applicant for higher education, Odessa National Medical University

Internet address of the article on the web-site: <a href="http://www.economy-confer.com.ua/full-article/5177/">http://www.economy-confer.com.ua/full-article/5177/</a>

Three compelling reasons force medical managers in Ukraine to delve deeper into the methods and capabilities of Geographic Information Systems (GIS). Firstly, the ongoing healthcare reform, which changes the state budgetary type to an insurance one. This requires a revision of the principles of distribution and logistics of medical personnel, funds, diagnostic and transport equipment and drug supplies.

The second reason is the digitalization and intensification of information channels, since medical professionals and patients themselves want to receive immediate, comprehensive information about health-related events. The development of evidence-based medical management, as well as the increasing cost of quality medical services, has led to the creation of the concept of the optimal "patient route" [1]. This approach has shown in practice its high effectiveness, since it really helps stakeholders and decision makers to find optimal logistics in organizing a local public health system.

The third reason is related to the growing understanding among medical workers of the importance of environmental factors in which the population lives, children are born and grow up. Epidemiological methods for studying the development and spread of infectious diseases have been successfully transferred to the study of the epidemiology of non-communicable diseases.

The latter also include diseases caused by unfavorable natural factors. For a long time, diseases of the population associated with infections, injuries, cancer, mental and nervous disorders have been in the field of view of practical medicine.

The modern British Dictionary of Terminology defines ecology as « Ecology, also called bioecology, bionomics, or environmental biology, study of the relationships between organisms and their environment. Some of the most pressing problems in human affairs—expanding populations, food scarcities, environmental pollution including global warming, extinctions of plant and animal species, and all the attendant sociological and political problems—are to a great degree ecological» [2].

Over the past 20 years, a related discipline such as the Geographic Information System has been actively developing in the healthcare of developed countries. A Geographic Information System (GIS) is a system of computer software, hardware and data, personnel that make it possible to enter, manipulate, analyze, and present

data, and the information that is tied to a location on the earth's surface. This system comprises of Software, Hardware, Data, and Personnel that make it possible to enter, manipulate, analyze and present information that is tied to a location on the earth's surface [3].

The development of a GIS system helps optimize patient routes and reduce costs in the provision of specialized and integrated medical care.

The purpose of this study is to identify the nature of the dependence of the geophysical properties of the area on the health of the population living for a long time in various natural physical and geographical zones of the Odessa region.

The research material was data from the Regional Health Department for the period of geological research in the Odessa region in 1985-1991. Epidemiological research methods were used in combination with local GIS methods. The GIS included a geophysical layer in the form of territorial cadastres and maps of geological anomalies of the Odessa region, compiled according to the data of the Black Sea expedition, and a medical and social layer in the form of data on regional morbidity of various profiles. The results of the clinical and epidemiological study were entered into the medical and social layer of the local GIS and mapped by overlaying the data of the geophysical layer.

Main part. According to geological studies conducted in 1985-1990 [4], a number of structural-geological, geophysical, landscape-geological and hydrogeochemical anomalies were identified on the territory of the Odessa region (the latter include zones of technogenic origin). So-called "medical-geological anomalies" were identified - zones with areas of mass diseases. The most well-known and studied are anomalies and affected areas associated with an imbalance and behavior of chemical elements in water, soil, atmosphere, etc. These are areas with abnormal levels of fluorine, lead, strontium and other elements. Geochemical reasons explain the massive occurrence of diseases in people such as caries, silicosis, diseases of the spine, digestive organs, blood diseases, etc.

The data presented in Table 1 show a pronounced heterogeneity in the distribution of mortality and morbidity rates among districts of the Odessa region. Thus, the highest mortality from diseases of the urinary system is observed in the Podolsk (22.30) and Lyubashovsky (15.25) regions of the Forest-Steppe zone. In the steppe zone, the highest mortality rate is observed in the Nikolaevsky (13.35) and Berezovsky (12.05) regions. In the Transnistria zone, this indicator is expressed in Reni (11.85), Ovidiopol (11.75) and Artsyz districts (11.12).

The highest prevalence of urolithiasis was detected in the Ovideopolsky (178.70) and Tarutinsky (165.35) districts of the Transnistria zone, as well as in two districts of the Steppe zone: Zakharyevskaya (131.15) and Ivanovskaya (128.85). The prevalence of nephritis in children was found to be is maximally expressed in two regions of the Transnistrian zone: Renisky (17.11) and B.-Dnestrovsky (10.01), as well as in one region of the Steppe zone, Nikolaevsky (10.9).

Taking into account the dispersion of data for each pathology within one region, a rating of the total risk of urinary system diseases was compiled. The result of the risk analysis is presented in Figure 1.

As can be seen from the presented figure, residents of the Transnistrian zone have the highest incidence of urinary system diseases, especially in the Ovidiopolsky (5.59), Renisky (5.53) and Tarutinsky (4.54) regions.

Table 1. Mortality rate and features of the spread of diseases of the genitourinary system among the population of the Odessa region in 1985-1991.

D1.1.1.001	Mortality rate	Prevalence of urolithiasis	Nephritis in children (per 10		
Districts of Odessa	(per 100 thousand total	(per 100 thousand total population)	thousand child		
region	population)	population)	population)		
			population)		
Forest-steppe zone of Odessa region					
Ananyevsky	6,65	78,56	1,31		
Baltskiy	3,50	10,93	1,01		
Kodimsky	6,41	35,92	2,73		
Podolsky	22,30	25,61	5,82		
Oknyansky	4,03	37,45	6,84		
Lyubashovsky	15,25	21,65	7,66		
Savransky	8,15	5,05	2,74		
Steppe zone of Odessa region					
Berezovsky	12,05	91,5	6,62		
VMikhailovsky	3,06	6,15	1,11		
Ivanovsky	4,62	128,85	4,73		
Nikolaevsky	13,35	35,16	10,92		
Rozdelnyansky	3,15	17,45	3,27		
Zakharyevsky-	8,45	131,15	5,37		
Shiryaevsky	3,13	20,95	7,82		
Transnistria zone of Odessa region					
Artsizsky	11,12	63,74	0,90		
Belyaevsky	8,75	78,95	4,71		
Bolgradsky	4,40	63,35	1,95		
BDnestrovsky	9,95	12,66	10,34		
Izmailsky	8,30	66,57	2,92		
Kilian	8,95	58,18	2,51		
Limansky	6,65	42,13	9,73		
Ovidiopolsky	11,75	178,70	5,93		
Renisky	11,85	45,65	17,15		
Saratsky	6,55	36,82	5,17		
Tarutinsky	6,03	165,35	5,26		
Tatarbunarsky	8,45	104,45	1,34		

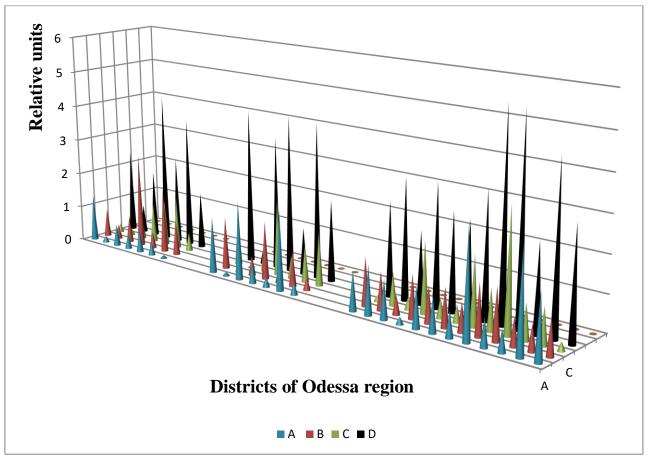


Figure 1. Risk indicators for urinary system diseases by district of the Odessa region. Designations: A—risk of urolithiasis; B—risk of an unfavorable outcome from diseases of the urinary system. C—risk of nephritis in children. D—final risk rating (A\*B\*C). The graph shows the ratio of local data to general regional indicators. Forest-steppe zone: 1. Ananyevsky, 2. Baltsky, 3. Kodimsky, 4. Podolsky, 5. Oknyansky, 6. Lyubashovsky 7. Savransky. Steppe zone: 8. Berezovsky, 9. V.-Mikhailovsky, 10. Ivanovsky, 11. Nikolaevsky, 12. Rozdelnyansky, 13. Zakharyevsky, 14. Shiryaevsky. Transnistrian zone: 15. Artsizsky, 16. Belyaevsky, 17. Bolgradsky, 18. B.-Dnestrovsky, 19. Izmailsky, 20. Kiliysky, 21. Limansky, 22. Ovidiopolsky, 23. Reniysky, 24. Saratsky, 25. Tarutinsky, 26. Tatarbunarsky.

According to the cadastres of geological survey work of the Black Sea expedition (4), the geophysical layer of the local GIS of the Forest-steppe zone includes geological and geophysical anomalies (GGFA) and hydro-geological anomalies (HGA), such as the Baltic-Ananyevskaya GGFA, Ananyevskaya GGA, Kodymskaya GGA, Savransko-Lyubashovskaya GGFA and Oknyanskaya GGFA. Features of the geophysical layer of the local GIS of the Forest-Steppe zone are the presence of the Odessa and Gvozdavsky faults of the earth's crust, altered magnetic and gravitational fields, hydrogeological disturbances, point increases in the content of uranium, radon, radium, mercury, lead and a deficiency of Zn, Co, Mo.

#### Conclusions.

- 1. The use of GIS principles in medical management helps to form optimal epidemiological logistics: monitoring the health status of the population, distributing medical services and creating patient routes.
- 2. The presence of natural harmful factors implies the organization of a continuous and multidisciplinary local service to support public health.
- 3. Organization of truthful, objective information about the geo-physical features of the area of residence, the presence of geo-pathogenic factors and methods of preventing health damage caused by them.

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## OUR EXPERIENCE IN MANAGING CHILDREN WITH NONUNION OF THE SCAPHOID BONE

#### Volodymyr Dubas

Ph.D., Associate Professor, Department of Traumatology, Orthopedics and Emergency Military Surgery, Ivano-Frankivsk National Medical University ORCID: 0000-0001-7189-6295

#### Uluana Kuz

Ph.D., Associate Professor, Department of Traumatology, Orthopedics and Emergency Military Surgery, Ivano-Frankivsk National Medical University ORCID: 0000-0001-5987-400X

Internet address of the article on the web-site: <a href="http://www.economy-confer.com.ua/full-article/5137/">http://www.economy-confer.com.ua/full-article/5137/</a>

**Backgrounds.** The prevalence of pediatric fractures of the carpal bones of the wrist is 0.2% per 10,000 children, however, scaphoid bone fractures are predominant among them nearly 65%. Scaphoid fractures hardly ever happen with young children, below 10 years old because the bone is mainly cartilage until 13 - 15 years [1]. The most common complication of scaphoid bone fracture is non-union. The treatment