Multidisciplinary Case Studies of Neuro-Oncology Disorders: Administration, Clinical and Pharmacological, Organizational and Legal, Pharmaceutical Management

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Abstract. This article presents a series of multidisciplinary case studies on neuro-oncology disorders, encompassing aspects such as administration, clinical and pharmacological approaches, organizational and legal frameworks, and pharmaceutical management. A comprehensive plan has been developed for studying neuro-oncology disorders amid comorbid conditions in the context of military conflicts. The research outlines key directions, including the scientific hypothesis, objectives, anticipated innovations, research design, study subjects, methodologies, endpoints, evidence levels, and descriptions of scientific and technical products. Various facets of project effectiveness are detailed, emphasizing the discovery of new correlations between neuro-oncology disorders and comorbid conditions, paving the way for innovative therapeutic methods. The research design includes specific indicators of treatment effectiveness, covering assessment, diagnosis, pharmacotherapy, psychosocial support, psychocorrection, and strategies for professional reintegration. The degree of evidence and effectiveness is thoroughly evaluated. The study is expected to yield highly credible results that will enhance the optimization of neuro-oncology disorder treatments, improving medical, pharmaceutical, social, and economic outcomes. By integrating these multidisciplinary approaches, the research aims to significantly advance the understanding and management of neuro-oncology disorders, particularly in challenging environments such as military conflict zones.

Keywords: ICD-11, neuro-oncology disorders, administration, pharmaceutical management, pharmacotherapy.

Introduction. Neuro-oncology is constantly developing. The understanding of primary and metastatic brain tumors, spinal cord diseases, and complications of the peripheral nervous system is constantly improving. There are more than 100 different types of primary brain tumors according to ICD-11 [1-3]. Brain tumors are divided into benign and malignant. Benign tumors, as a rule, do not represent a serious threat. Although they can cause discomfort, especially when they grow. Malignant tumors grow uncontrollably. They can spread to other tissues [4-6].

It is forensic and pharmaceutical risks in the organization of pharmacotherapy of covid, post-covid, long-covid and comorbid disorders. Multidisciplinary and interdisciplinary study of medical errors in the system of legal relations between "Doctor-Patient-Pharmacist-Advocate" during cancer pharmacotherapy affects for quality and safety of patients [7-13].

According to WHO estimates, the global burden of cancer will increase to 19.3 million new cases and 10.0 million deaths in 2020 [14]. To solve the problem of the spread of neuro-oncology disorders, it is necessary to improve the mechanisms of prevention, screening, early detection of tumors, the introduction of new medical technologies, the provision of physical and psychological support to patients and the improvement of their quality of life. The majority of developed European countries work precisely on such principles, which allows to optimally achieve the goal of reforming the health care sector in the interests of society with equal access to high-quality, effective, safe medical and pharmaceutical care. If the rate of morbidity continues to increase, then by 2030 the number of people who have contracted cancer for the first time will reach 27 million, and 17 million ordinary citizens will die of cancer, and 75 million inhabitants of the planet will become carriers of this pathology [15, 16].

Leading scientists of Ukraine claim that at the national level, it is necessary to start active work on the creation of a program-target scientifically based document, which will determine the

national policy and strategy in oncology, will reflect national needs and priorities for a long period [17]. Awareness of doctors of various specialties regarding the main risk factors in the diagnosis of neuro-oncology disorders, effective interprofessional communication contribute to the early detection of brain tumors and quick referral of the patient to a specialized hospital. A multidisciplinary approach based on the interaction of a multidisciplinary team of specialists making coordinated clinical decisions according to the specific needs of the patient is the most important factor for ensuring effective treatment [18].

Neuro-oncology disorders, such as brain cancer and spinal cord cancer, are a serious problem worldwide. They are a significant cause of death and disability. Their distribution continues to grow. Studying these diseases allows us to understand the mechanisms and develop effective treatment strategies. The cost of cancer drugs may vary in different countries [19].

Neuro-oncology disorders are difficult to diagnose and treat. Their symptoms can be non-specific and vary depending on the type and location of the lesion. Research in this field is aimed at improving diagnostic methods, identifying molecular markers and developing new therapeutic approaches. One of the important problems in the treatment of neuro-oncology disorders is that different patients may have different responses to the same forms of treatment. The development of new technologies and research in neuro-oncology allow us to move to personalized treatment, taking into account the individual characteristics of patients and their genetic characteristics. Advances in molecular biology, genetics, immunotherapy, and imaging technologies are expanding our knowledge of neuro-oncology disorders. The development of new diagnostic imaging methods that allow more accurate determination of tumor types and stages, as well as the use of new treatment methods, can improve patient prognosis and treatment outcomes. Neuro-oncology disorders also have overlaps with other fields of medicine, such as neurology, oncology, genetics, and immunology. The study of these diseases helps to expand our understanding of the mechanisms of neuro-oncology disorders in general and promotes interaction between different specialists to find comprehensive solutions [20, 21]. All these factors support the relevance of multidisciplinary research on neuro-oncology disorders and the desire to develop more effective methods of prevention, diagnosis and treatment of these diseases.

All these factors support the relevance of multidisciplinary research on neuro-oncology disorders and the desire to develop more effective methods of prevention, diagnosis and treatment of these diseases.

To date, comprehensive studies encompassing the administration, management, organizational and legal aspects, clinical and pharmacological approaches, and social patient-oriented pharmacotherapy of neuro-oncology disorders in conflict conditions globally and in Ukraine have not been conducted. This gap underscores the relevance, scientific value, and practical significance of this research. Consequently, the anticipated scientific goals of this work are unique and without parallel worldwide.

The purpose of the study was to conduct administration, clinical and pharmacological, organizational and legal management of social patient-oriented pharmacotherapy, recent case studies of neuro-oncology disorders in conflict conditions; to analyze clinical and pharmacological therapy, psychosocial support and psychotherapy to improve neuro-oncology disorders, support victims and promote their recovery. To prepare a plan for a multidisciplinary study of clinical and pharmacological, social patient-oriented pharmacotherapy of neuro-oncology disorders against the background of the main somatic diseases in the context of concomitant comorbid addictive conditions that have not been studied before. The complexity of the problem, the integration of pharmacotherapy, an individual view of the victims, social and professional violations, efficiency, innovations against the background of conflicts in the world and in Ukraine – these are the questions that the research addressed.

To achieve the purpose of the study, it was necessary to solve the following tasks:

- to manage neuro-oncology disorders using ICD-11 guidelines;
- to study the organizational and legal management of neuro-oncology disorders and pharmacotherapy based on evidence-based medicine and pharmacy. Medications such as

analgesics, anxiolytics, antidepressants, anticonvulsants, and others can be used to alleviate symptoms, improve mood, reduce anxiety, and control hypergaining;

- to determine the direction of professional reintegration, a crucial task for patients. Support in job searching, skills training, education, employment, and adjusting to civilian life can aid in successful adaptation. Legal assistance within the "doctor-patient-pharmacist-lawyer" system ensures a comprehensive and multidimensional approach to medical and pharmaceutical care for patients with neuro-oncology disorders;
- to research clinical and pharmacological management in pharmacotherapy, providing a rationale for new pharmacological agents for treating neuro-oncology disorders. For instance, antidepressants like sertraline and paroxetine have shown effectiveness in reducing symptoms. Other medications, such as anti-anxiety drugs and mood stabilizers, may also help improve the mental state of patients;
- to substantiate the further pharmaceutical development of a new drug composition based on known active pharmaceutical ingredients, combining an analgesic and an antipsychotic.

The task of a multidisciplinary study of clinical and pharmacological, social patient-oriented pharmacotherapy of neuro-oncology disorders against the background of the main somatic diseases in the context of accompanying comorbid addictive conditions is presented:

1. Conduct assessment and diagnosis: process the patient's medical history, including information on neuro-oncology disorders, major somatic diseases, and comorbid addictive conditions. Carry out a physical examination of the patient to assess the general state of health and identify possible signs of complications. Perform additional diagnostic procedures, such as a brain scan (such as an MRI) to assess the size and location of the tumor, a biopsy to determine the type of tumor, and other necessary tests.
2. Study pharmacotherapy: to study the availability and effectiveness of pharmaceutical drugs for the treatment of neuro-oncology disorders against the background of the main somatic diseases and comorbid addictive conditions. Take into account possible interactions between different drugs and the patient's health conditions, as well as possible side effects. Conduct clinical trials to determine the efficacy and safety of new pharmacotherapy methods.
3. Determine: the optimal treatment strategy, taking into account neuro-oncology disorders, main somatic diseases and comorbid addictive conditions. An individualized approach to treatment, taking into account the characteristics of the patient, his medical history and priorities. Prediction of possible risks and complications of treatment, including interactions with other drugs and impact on the patient's quality of life.
4. Conduct: patient testing to determine practice, diagnosis, pharmacotherapy and rehabilitation.
5. Carry out: pharmacotherapy according to the defined treatment strategy. Regular monitoring and assessment of treatment effectiveness, side effects and general condition of the patient.
6. Provide patient support and rehabilitation, including psychological support and social support.
7. Determine directions of professional reintegration: Professional reintegration is an important task for patients. Job search support, skills training and adjustment to civilian life can all contribute to successful adaptation.
8. It was planned to develop multidisciplinary patient-oriented and analytical-oriented approaches to clinical-pharmacological, oncological therapy.
9. Organizational and legal, marketing, pharmacoeconomic studies: Pharmaceutical development of the composition of a new drug based on known active pharmaceutical ingredients.
10. Multidisciplinary research: a combination of clinical oncology, clinical psychology, narcology, clinical pharmacy, clinical pharmacology, pharmacotherapy, drug technology, forensic pharmacy, pharmaceutical case management, pharmaceutical development of new drugs, medical and pharmaceutical law, psychotherapy, cognitive linguistics and term management, and as well as the inclusion of various methods of support and rehabilitation, such as social support, education and employment, legal support in the system of legal relations "doctor - patient - pharmacist - lawyer" to achieve a comprehensive and multidimensional approach to medical and pharmaceutical care of patients with neuro-oncological diseases.

Materials and methods. The current research was carried out using the system approach during March 2024-June 2024.

Materials: regulatory and legal framework, clinical protocols, guidelines, standards of treatment of neuro-oncology disorders associated with drug-related conditions, medical records, medical histories, medicinal products, instructions for medical use, questionnaires (of doctors, patients, different age groups of the population) and other local documents.

Directions:

- According to the data of clinical and instrumental research methods of various contingents of the population who received neuro-oncology disorders, it is planned to establish a multidisciplinary approach to pharmacological therapy, psychosocial therapy, and oncological treatment for patients with comorbid conditions of neuro-oncology diseases.
- Conducting neuroimaging, radiological, histological, immunohistochemical, diagnostic, randomized controlled, pathopsychological studies.
- Development of clinical and pharmacological, social patient-oriented pharmacotherapy of neuro-oncology disorders against the background of major somatic diseases in the context of concomitant comorbid addictive conditions.

Methods of the research. Management, administration, organizational and legal, normative, documentary, clinical and pharmacological, comparative, pathopsychological, classification and legal, nomenclature and legal, marketing, pharmacoeconomic, social, psychological, analytical, forensic and pharmaceutical, technological, graphic analysis were used in the study.

Performance indicators. The basic concepts of evidence-based medicine and evidence-based pharmacy will be observed in the study. Researchers: evaluate literature data, examine Neuro-oncology codes, determine clinical and pharmacological groups of drugs in the pharmacotherapy of Neuro-oncology, determine psychosocial support and directions of professional reintegration, characterize psychocorrection, develop research design.

Level of evidence for the expected results: grade B, level 3. Evidence based on data from at least one study with a high degree of quality, in which there was a control group – evidence will be based on clinical assessment of the course of associated addictive disorders against the background of neuro-oncological diseases, clinical-instrumental, pathopsychological, clinical and pharmacological, classification and legal, nomenclature and legal, marketing, pharmacoeconomic, social, psychological, analytical, organizational and legal, forensic and pharmaceutical, technological research.

The degree of proven effectiveness and expediency of conducting the research: class I, level C (consensus of the beliefs of experts based on the results of research and practice) – the results of the research will be analyzed and compared with the data of other authors.

The research of the article is a fragment of research works of Private Scientific Institution "Scientific and Research University of Medical and Pharmaceutical Law" on the topic "Multidisciplinary research of post-traumatic stress disorders during war among patients (primarily combatants)" (state registration number 0124U002540, implementation period 2024-2029); Lviv Medical Institute on the topic of "Improving the system of circulation of drugs during pharmacotherapy on the basis of evidentiary and forensic pharmacy, organization, technology, biopharmacy and pharmaceutical law" (state registration number 0120U105348, implementation period 2021-2026); Kharkiv Medical Academy of Postgraduate Education on "Improving the organizational and legal procedure for providing patients with drugs from the standpoint of forensic pharmacy, organization and management of pharmacy" (state registration number 0116U003137, terms 2016-2020) and "Pharmaceutical and medical law: integrated approaches to the system of drug circulation from the standpoint of forensic pharmacy and organization of pharmaceutical business" (state registration number 0121U000031, terms 2021-2026); Luhansk State Medical University "Conceptual interdisciplinary approaches to pharmaceutical provision and availability of drugs, taking into account organizational and legal, technological, analytical, pharmacognostic, forensic and pharmaceutical, clinical and pharmacological, pharmacoeconomic, marketing, social and economic competencies" (state registration number 0123U101632, terms 2023-2027); Petro Mohyla Black Sea

National University on the topic "Conceptual interdisciplinary approaches to the drug circulation system, taking into account organizational and legal, technological, biopharmaceutical, analytical, pharmacognostic, forensic and pharmaceutical, clinical and pharmacological, pharmacoeconomic, pharmacotherapeutic aspects" (state registration number 0123U100468, implementation period 2023-2028).

Results and discussion. Before starting work on a multidisciplinary research plan for clinical-pharmacological, social patient-oriented pharmacotherapy of neuro-oncology disorders against the background of major somatic diseases in the context of accompanying comorbid addictive conditions, a scientific hypothesis was developed:

- ✓ In the context of concomitant comorbid addictive conditions, patients with neuro-oncology disorders who also suffer from underlying somatic diseases may be more vulnerable and require a special approach to diagnosis and treatment.
- ✓ Addictive disorders can make it difficult to comply with the doctor's recommendations, in particular, taking medications and carrying out the treatment regimen.
- ✓ In addition, addictive disorders can have a negative impact on the immune system and the patient's general health, which can complicate the process of treating neuro-oncology disorders.
- ✓ It is important to have an integrated approach to treatment, including both medical and psychological support for patients with such comorbid conditions.
- ✓ In order to achieve successful treatment results for patients with neuro-oncology disorders and comorbid addictive conditions, it is important to take into account all aspects of their health and take into account possible interactions between diseases when prescribing treatment.
- ✓ Collaboration between different specialists, such as oncologists, neurosurgeons, psychologists and narcologists, is a key factor in achieving the best outcomes for patients with such complex conditions.
- ✓ In this regard, the scientific hypothesis is that the treatment of neuro-oncological diseases should be specialized, taking into account all these features.
- ✓ Multidisciplinary research that combines clinical-pharmacological, social patient-oriented pharmacotherapy of neuro-oncology disorders is of great importance in many clinical aspects of patient treatment.

The design of a multidisciplinary study of clinical-pharmacological, social patient-oriented pharmacotherapy of neuro-oncology disorders against the background of major somatic diseases in the context of accompanying comorbid addictive conditions is shown in Fig. 1.

Clinical and pharmacological management.

Establishing the pathogenetic mechanisms of the influence of neuro-oncology disorders on the formation of addictive states in different contingents of the population, studying the nature of morpho-functional changes in the emotional state on a model experimental system, will allow the development of effective means of clinical-pharmacological, social patient-oriented pharmacotherapy of neuro-oncology disorders against the background of the main somatic diseases in the context of concomitant comorbid addictive conditions. The program of medical guarantees for patients with oncological diseases, taking into account the principles of ethics, deontology, evidence-based medicine, evidence-based pharmacy.

Pharmaceutical management.

Organizational and legal, marketing, pharmacoeconomic studies: Pharmaceutical development of a new drug based on known active pharmaceutical components. Multidisciplinary approach: a combination of clinical oncology, clinical narcology, clinical pharmacy, clinical pharmacology, pharmacotherapy, drug technology, forensic pharmacy, pharmaceutical case management, pharmaceutical development of new drugs, medical and pharmaceutical law, psychotherapy, as well as the inclusion of various methods of support and rehabilitation, such as as social support, education and employment, legal support in the system of legal relations "doctor -

patient - pharmacist - lawyer" to achieve a comprehensive and multidimensional approach to medical and pharmaceutical care for patients with various types of neuro-oncological diseases.

Social patient-oriented pharmacotherapy.

Studying the risks of occurrence, pharmacotherapy, and pharmaceutical support of neuro-oncology disorders in different contingents of patients is one of the urgent tasks of social pharmacy and medicine. A new approach to the problem of neuro-oncology disorders against the background of accompanying comorbid conditions will contribute to the accumulation of knowledge about a multidisciplinary approach to the clinical-pharmacological, social patient-oriented pharmacotherapy of neuro-oncology disorders

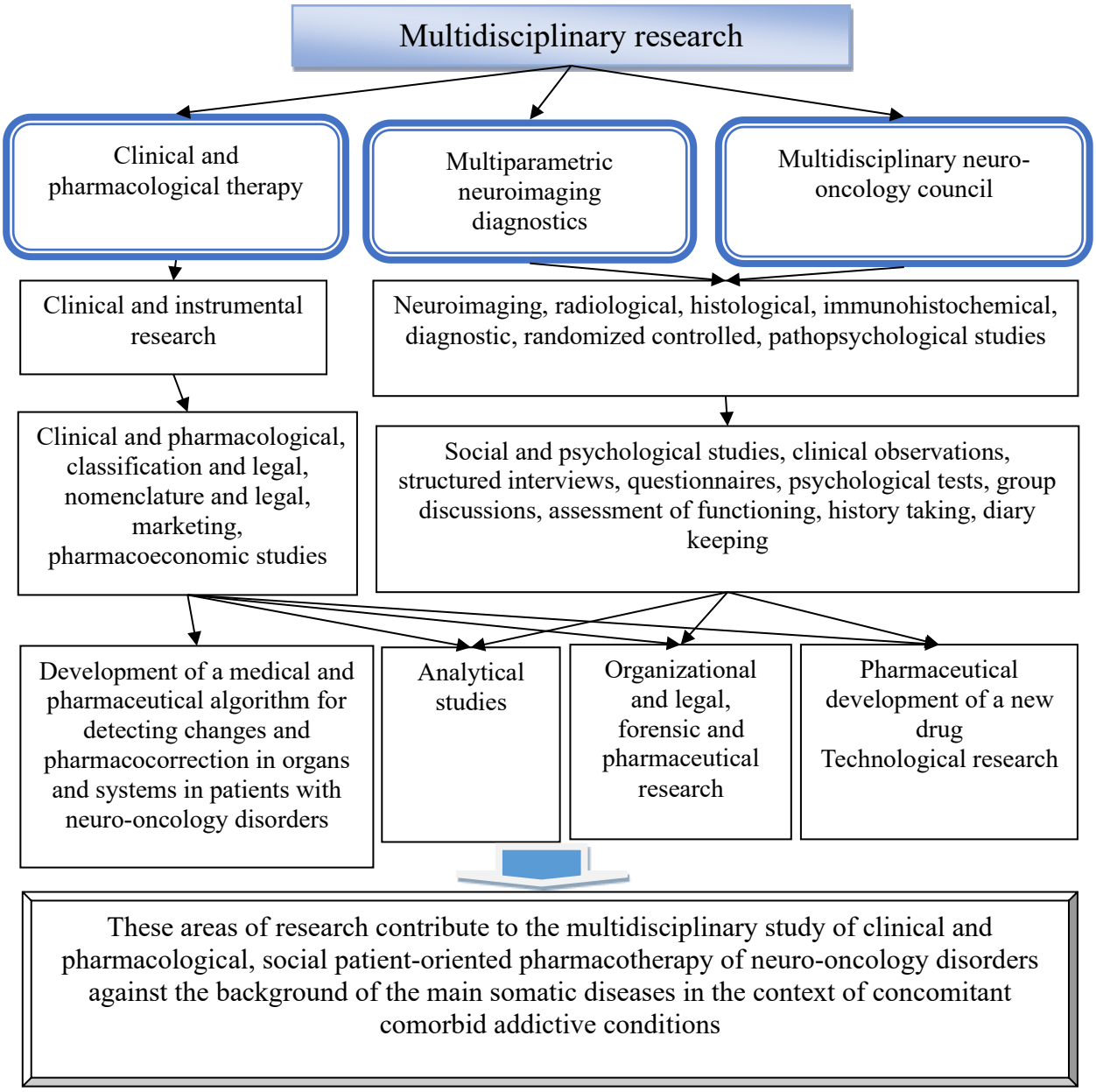

Fig. 1. Research design.

Systematic review International Classification of Diseases of the 11th revision (ICD-11).

On January 1, 2022, the eleventh edition of the International Classification of Diseases of the Eleventh Edition (ICD-11) began to operate in the world. ICD-11 was developed by the World Health Organization. The development of ICD-11 took more than ten years. More than 300 experts from 55 countries participated in it, who also considered 10,000 additional proposals from people from all over the world. The classification was updated in accordance with advances in science and medical

practice [3]. In the 2th section of ICD-11, disorders of the neuro-oncology are indicated [22-26]. Systematic review from the section 2A00 is given in Table 1.

Table 1. Systematic review from the section 2A00 [22-26].

2A00 Primary brain tumors		
	2A00.0 Brain gliomas	
		2A00.00 Glioblastoma of the brain
		2A00.0Y Other specified gliomas of the brain
		2A00.0Z Brain gliomas, unspecified
	2A00.1 Embryonic brain tumors	
		2A00.10 Medulloblastoma
		2A00.11 Primitive neuroectodermal tumor of the central nervous system
		2A00.1Y Other specified embryonal brain tumors
		2A00.1Z Embryonic brain tumors, unspecified
	2A00.2 Tumors of neuroepithelial tissue of the brain	
		2A00.20 Tumors of the pineal gland or pineal region
		2A00.21 Mixed neuronal-glial tumors
		2A00.22 neoplasms of the choroid plexus
		2A00.2Y Other specified tumors of neuroepithelial tissue of the brain
		2A00.2Z Tumors of neuroepithelial tissue of the brain, unspecified
	2A00.3 Central neurocytoma of the brain	
	2A00.4 Astroblastoma of the brain	
	2A00.5 Primary brain neoplasm of unknown or unspecified type	
2A01 Primary neoplasms of the meninges		
	2A01.0 Meningiomas	
		2A01.00 Primary malignant meningioma
		2A01.0Y Other specified meningiomas
		2A01.0Z Meningiomas, unspecified
	2A01.1 Mesenchymal tumors of the meninges	
	2A01.2 Primary meningeal neoplasm of unknown or unspecified type	
2A02 Primary neoplasm of the spinal cord, cranial nerves or other parts of the central nervous system		
	2A02.0 Gliomas of the spinal cord, cranial nerves or other parts of the central nervous system	
		2A02.00 Glioblastoma of the spinal cord, cranial nerves or other parts of the central nervous system
		2A02.0Y Other specified gliomas of the spinal cord, cranial nerves or other parts of the central nervous system
		2A02.0Z Gliomas of the spinal cord, cranial nerves or other parts of the central nervous system, unspecified
	2A02.1 Neoplasms of cranial or spinal nerves	
		2A02.10 Malignant neoplasm of the peripheral nerve sheath of cranial or spinal (paraspinal) nerves
		2A02.11 Paraspinal neuroblastoma
		2A02.12 malignant neoplasm of the optic nerve
		2A02.1Y Other specified tumors of cranial or spinal nerves
		2A02.1Z Tumors of cranial or spinal nerves, unspecified
	2A02.2 Primary spinal cord neoplasm of unknown or unspecified type	
	2A02.3 Benign neoplasm of cranial nerves	
	2A02.4 Benign neoplasm of the spinal cord	
2A0Z Other and unspecified neoplasms of the brain or central nervous system		

Systematic review of guidelines based on evidence-based medicine from the section "Neuro-oncology" is given in Table 2.

Table 2. Systematic review of guidelines based on evidence-based medicine from the section "Neuro-oncology" [22-26].

No.	Name	Type of document	Registration number
1.	Malignant neoplasms of the head and neck	Guideline	2017-994
		Guideline	KN 2023-1831
		Order	MOZ 2023-1831
		Protocol	GS 2023-1831
		Protocol	GS 2023-316
		Order	MOZ 2023-316
		Protocol	GS 2022-1626
		Order	MOZ 2022-1626
2.	Pituitary tumors	Guideline	2017-994
3.	Brain and spinal cord tumors	Guideline	2015-784
4.	Glioblastoma	Protocol	GS 2023-903
		Guideline	KN 2023-903
		Order	MOZ 2023-903

Economic efficiency of pharmacotherapy.

The cost-effectiveness of the availability of pharmacotherapy and pharmaceutical provision of neuro-oncology disorders can be difficult to assess due to various factors affecting the economy and access to resources in martial law. However, the treatment of neuro-oncology disorders can have a significant positive impact on individuals, society and the economy as a whole. Some aspects that can be taken into account when evaluating economic efficiency: increase in working capacity; reduction of medical costs; social stability; improving the quality of life. Considering these factors, effective treatment of neuro-oncology disorders can have a positive impact on the economy, providing increased work capacity, reduced medical costs and improved social stability. However, it is important to remember that the evaluation of the economic effectiveness of the treatment of neuro-oncology disorders needs to take into account the context of war, available resources and individual needs of patients.

Expected novelty of the study.

For the first time, a multidisciplinary study combining clinical and pharmacological, social patient-oriented pharmacotherapy of neuro-oncology disorders was conducted. Research on the components of complex treatment of neuro-oncological diseases requires a multidisciplinary approach, including cooperation between oncologists, narcologists, psychiatrists, neurologists, pharmacologists, pharmacists, psychologists, social workers and other specialists to ensure the most effective and individualized care for victims [27, 28].

Conclusions. This article presented multidisciplinary case studies of neuro-oncology disorders: administration, clinical and pharmacological, organizational and legal, pharmaceutical management. A plan for a multidisciplinary study of neuro-oncology disorders against the background of accompanying comorbid conditions in the conditions of military conflicts has been developed. The main directions of the research are given, including the scientific hypothesis, task, expected novelty, research design, research object, research methods, endpoints, degree of evidence, description of scientific and technical products and various aspects of project effectiveness. The scientific hypothesis is that comorbid conditions significantly affect the course and treatment of neuro-oncology disorders. This will become the basis for further research. The main tasks for further study will be the determination of the impact of comorbid conditions on the prognosis of neuro-

oncology disorders, as well as the development of new approaches to their treatment. The research will contribute to the discovery of new relationships between neuro-oncology disorders and comorbid conditions, which will allow the development of innovative methods of therapy. A research design was developed: conducting a complex multidisciplinary study using modern methods of diagnosis and treatment, involving various specialists and a multi-step approach to data collection and analysis. Indicators of treatment effectiveness were determined: assessment, diagnosis; pharmacotherapy; psychosocial support; psychocorrection; determining directions of professional reintegration. The degree of evidence and effectiveness of the research is given. It is expected that the results of the research will have a high degree of evidence and contribute to the optimization of treatment of neuro-oncology disorders, improvement of medical, pharmaceutical, social and economic efficiency. The developed research plan provides a comprehensive approach to the study of neuro-oncology disorders against the background of accompanying comorbid conditions, defines clear steps to achieve the set goals and creates a basis for conducting further scientifically based research in this field.

Conflict of interest. The author has approved the article for publication and declare that the research was conducted in the absence of any conflict or potential conflict of interest.

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