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MINISTRY OF HEALTH OF UKRAINE
ODESA NATIONAL MEDICAL UNIVERSITY

Department of Neurology and Neurosurgery



CONFIRMED by

Acting vice-rector for scientific and pedagogical work

Eduard BURIACHKIVSKYI

September 1st, 2024

WORKING PROGRAM IN THE DISCIPLINE
«NEUROSURGERY»

Level of higher education: second (master's)

Field of knowledge: 22 "Health care"

Specialty: 221 "Dentistry"

Educational and professional program: Dentistry

The work program consisted of: prof. A.S. Son, based on the educational-professional program of the second level of higher education for the preparation of masters in the specialty 221 "Dentistry" ONMedU, approved by the Academic Council of ONMedU (Protocol No. 10 dated June, 27 2024).

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The working program is approved at the meeting of the department
Protocol № 1 dated August, 26 2024

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Approved by the guarantor of
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Approved by the subject-cycle methodological commission for humanities of ONMedU
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Protocol № _____

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1. Description of the discipline:

Name of indicators	Field of knowledge, specialty, specialization, level of higher education	Characteristics of the discipline
Total number:	Field of knowledge 22 «Health care»	<i>Full-time (day) education</i>
Credits of ECTS: 1		<i>Compulsory discipline</i>
Hours: 30	Specialty 221 «Dentistry»	<i>Course: 4</i>
Content modules: 5	Level of higher education second (master's degree)	<i>Semester: VII - VIII</i>
		<i>Lectures (4 hours)</i>
		<i>Seminars (0 hours)</i>
		<i>Practical classes (14 hours)</i>
		<i>Laboratories (0 hours)</i>
		<i>Independent work (12 hours)</i>
		<i>including individual tasks (0 hours)</i>
		<i>Form of final control – differentiated credit</i>

2. The purpose and tasks of the educational discipline, competencies, program learning outcomes

Purpose: Acquisition by the student of higher education of knowledge and formation of elements of professional competences in the field of neurology and improvement of skills and competences acquired during the study of previous disciplines.

Task:

1. Formation of skills and abilities: differential diagnosis, the most common diseases of the nervous system.
2. Improving the skills of substantiating a clinical diagnosis, drawing up a plan for laboratory and instrumental research,
3. Mastering the ability to determine the tactics of emergency care, treatment and prevention of the most common diseases of the nervous system.

The process of studying the discipline is aimed at forming elements of the following competencies:

The process of studying the discipline is aimed at forming elements of following competencies:

- **General competencies (GC):**

IC. The ability to solve typical and complex specialized tasks and problems in the field of health care in the specialty "Dentistry", in professional activities or in the learning process, which involves conducting research and/or implementing innovations and is characterized by the complexity and uncertainty of conditions and requirements.

GC 1. Ability to abstract thinking, analysis and synthesis

GC 7. Ability to search, process and analyze information from various sources.

GC 8. Ability to adapt and act in a new situation

GC 11. Ability to work in a team

GC 13. The ability to act socially responsibly and consciously

- **Special competencies (SC):**

SC1. Ability to collect medical information about the patient and analyze clinical data.

SC2. The ability to interpret the results of laboratory and instrumental research.

SC3. Ability to diagnose: determine preliminary, clinical, final, accompanying diagnosis, emergency conditions.

SC8. Ability to perform medical and dental manipulations.

SC11. Ability to determine tactics, methods and provision of emergency medical assistance.

Program learning outcomes (PLO) are:

PLO 5. Diagnose emergency conditions under any circumstances (at home, on the street, in a medical facility), in emergency situations, martial law, lack of information, and limited time (according to list 4)

PLO 13. Determine the tactics of providing emergency medical care, using the recommended algorithms, under any circumstances based on the diagnosis of an emergency condition in limited time (according to list 4)

PLO 16. To form goals and determine the structure of personal activity based on the result of the analysis of certain social and personal needs

PLO 19. To observe the rules of ethics, bioethics and deontology in their professional activities.

PLO 21. Perform medical manipulations on the basis of a preliminary and/or final clinical diagnosis (according to lists 2, 2.1) for different segments of the population and in different conditions (according to list 6)

PLO 23. Perform medical manipulations of providing emergency medical care, using standard schemes, under any circumstances based on the diagnosis of an emergency condition (according to list 4) in conditions of limited time (according to lists 6, 7)

In a result of studying the academic discipline, the student has to:

Know: Etiology, pathogenesis, clinic, diagnosis, differential diagnosis, treatment, prevention of common diseases of the nervous system.

Be able:

- Communicate with the patient and his relatives, collect complaints, anamnesis of life and diseases.
- Conduct a clinical neurological examination according to standard methods.
- To analyze the results of laboratory, functional and instrumental studies in patients with diseases of the nervous system.
- Carry out differential diagnosis and establish a probable nosological or syndromic preliminary clinical diagnosis.
- Establish a diagnosis of urgent conditions in the conditions of an emergency situation.

3. Content of the academic discipline

Content module 1.

Traumatic lesions of the nervous system.

Theme 1. Development stages of neurosurgery.

The main stages of formation and development of neurosurgery. Scientific school in Ukraine. Development of neurosurgery in the south of Ukraine. Structure and organization of medical care for neurosurgical patients.

Theme 2. Additional methods of examination in neurosurgery.

Theme 3. Traumatic lesions of the nervous system.

Closed craniocerebral injury (TBI).

Closed TBI. Classification. Clinic, diagnosis and treatment. Providing first aid to patients with TBI at the scene of the accident and at the pre-hospital stage. Modern diagnostic methods, assessment of their informativeness. Indications for surgical treatment of TBI. Complications of closed TBI. Principles of treatment.

Open TBI, clinic, diagnosis.

Combined and combined TBI, clinical and diagnostic features. Principles of providing emergency care to patients with open, combined and combined TBI at the scene and at various stages of evacuation. Auxiliary methods of research in the diagnosis of TBI. Primary surgical treatment of open penetrating and non-penetrating wounds of the skull and brain. Early and late complications of open TBI, principles of surgical treatment.

Spinal cord injury (SCI). Traumatic injuries of the peripheral nervous system.

Etiopathogenesis of traumatic lesions of the spine and spinal cord. Classification. Clinic of various types of spinal cord and spine injuries, depending on the level of damage. Clinical and instrumental diagnostics. Evaluation of detected changes in the application of auxiliary methods of diagnosis of traumatic injuries of the spinal cord and spine. Emergency care for patients with traumatic lesions of the spine and spinal cord, basic methods and principles of transport immobilization of patients depending on the level of damage. Indications for surgical treatment in spinal cord injury. Modern methods of treatment of spinal cord and spine injuries. Prevention and treatment of complications in the acute and remote periods.

Theme 4. Gunshot wounds of the skull and brain.

Classification and clinic. First aid for skull injuries on the battlefield. Medical sorting and content of medical care at the stages of medical evacuation.

Content module 2.

Brain tumors. Hydrocephalus.

Theme 5. Brain tumors. Hydrocephalus.

Classification. Clinic. Diagnostics. Pathophysiological mechanisms of hypertensive syndrome formation. Postbrain and focal symptoms. Pathogenesis of primary and secondary symptoms in brain tumors. The value of auxiliary examinations (ophthalmological examination, craniography, ultrasound, echocardiography, EEG, pneumoencephalography, angiography, computer tomography, MRI, SPECT) in the diagnosis of brain tumors. Principles of surgical treatment of brain tumors depending on histostructure and localization. Radical and palliative operations, their principles. Combined and radiosurgical treatment of brain tumors. Emergency care for acute intracranial hypertension syndrome and dislocation syndromes. Rehabilitation and reintegration of patients after brain tumor surgery. The importance of bad habits in patients with pathology of the vessels of the brain and spinal cord.

Hydrocephalus. Pathogenesis. Clinic. Diagnostics. Classification. Modern methods and principles of surgical treatment of hydrocephalus. The main types of liquid shunt operations, indications for their performance and the method of carrying them out. Emergency care for shunt dysfunction. Rehabilitation and social reintegration of patients.

Theme 6. Peculiarities of management of incurable patients and the use of palliative treatment methods in neurosurgical practice.

Theme 7. Abscesses of the brain, epiduritis.

Etiology of brain and spinal cord abscesses. Clinic of brain abscesses of various localization. Diagnosis of brain abscesses. The value of auxiliary examination methods in the diagnosis of this pathology. Principles of surgical treatment of brain abscesses and epiduritis. Prevention of brain and spinal cord abscesses.

Content module 3.

Vascular diseases of the brain and spinal cord.

Theme 8. Vascular pathology of the brain, accompanied by hemorrhagic type of HPMC.

Classification. Clinic. Etiopathogenesis. Methods of diagnosis of cerebral vascular pathology. Vascular diseases of the brain requiring surgical treatment. Clinic, diagnosis and treatment of aneurysms, arteriovenous malformations, carotid-cavernous junction in the acute and remote periods.

Emergency care for patients with acute hemorrhagic cerebral circulation disorders. Modern methods of surgical treatment of patients with cerebral vascular pathology. Restorative treatment in the postoperative period. Prevention of vascular diseases of the brain. Rehabilitation and reintegration of patients with cerebral vascular pathology.

Theme 9. Vascular pathology of the brain accompanied by ischemic PMK. Pathology of spinal cord vessels.

Types of pathology of main vessels, manifested by acute and chronic ischemia of the brain. Classification. Etiopathogenesis. Atherosclerosis of blood vessels as the main risk factor for cerebral blood circulation disorders of the ischemic type. Clinic, diagnosis and treatment of stenoses, thrombosis and thromboembolism of cerebral vessels. Emergency care for patients with acute cerebral circulation disorders of the ischemic type. Modern methods of surgical treatment of ischemic lesions of the brain. Restorative treatment in the postoperative period. Prevention of vascular diseases of the brain. Rehabilitation and reintegration of patients with cerebral vascular pathology. The main clinical manifestations of vascular pathology of the spinal cord. Diagnostics.

Content module 4.

Tumors of the spine and spinal cord. Osteochondrosis

Theme 10. Tumors of the spinal cord.

Classification. Features of the clinic depending on the localization of the tumor and the nature of its growth. Modern methods of diagnosis of spinal cord tumors. The importance of auxiliary methods in the examination of patients with tumors of the spinal cord and differential diagnosis of this pathology. Methods of surgical treatment of spinal cord tumors. Prevention of complications in spinal cord tumors (urosepsis, sepsis, bedsores). Restorative treatment in the postoperative period. Rehabilitation of patients after removal of spinal cord tumors.

Theme 11. Osteochondrosis.

Classification. Pathogenesis. Clinic. Diagnostics. Emergency care for radicular pain syndrome. Indications for surgical treatment in osteochondrosis and its principles depending on the level and degree of damage. Restorative treatment in the postoperative period, rehabilitation of patients. Prevention of osteochondrosis. Rehabilitation and social reintegration of patients.

Content module 5.

Functional and restorative neurosurgery. Pain surgery

Theme 12. Functional and restorative neurosurgery.

Principles of stereotaxic operations. Indications for their use in brain diseases. Basic principles and indications for surgical treatment of epilepsy, parkinsonism, cerebral palsy, etc. Principles of reconstructive neurosurgery. The main types of surgical interventions used in restorative neurosurgery. Prospects for the development of functional and restorative neurosurgery. Surgical treatment of pain syndromes.

The concept of intractable pain syndromes. Mechanisms of formation of the main pain syndromes. Classification. Clinic. Diagnostics. Differential diagnosis. Emergency care for trigeminal neuralgia, causalgia, phantom and amputation pain syndromes. Indications for surgical treatment of pain syndromes and its principles. Rehabilitation and social reintegration of patients with intractable pain syndromes.

Theme 13. Malformations of the brain and spinal cord.

Classification. Clinic. Diagnostics. Auxiliary methods of diagnosis of malformations of the brain and spinal cord. Prenatal diagnosis. Indications for surgical treatment and its principles. Restorative treatment of patients in the postoperative period. Rehabilitation and reintegration of patients with developmental disabilities of the brain and spinal cord. Prevention of malformations of the brain and spinal cord.

4. The structure of the academic discipline

Names of Themes	Number of hours					
	That's all	including				
		Lectures	Seminars	Practical	Laboratory	ISW
Content module 1.						
Traumatic lesions of the nervous system.						
Theme 1. Stages of development of neurosurgery.	2	0	0	0	0	2
Theme 2. Additional methods of examination in neurosurgery.	2	0	0	0	0	2
Theme 3. Traumatic lesions of the nervous system. Closed craniocerebral injury (CCI). Open CCI, clinic, diagnostics. Spinal cord injury (SCI). Traumatic injuries of the peripheral nervous system.	4	2	0	2	0	0
Theme 4. Gunshot wounds to the skull and brain.	2	0	0	0	0	2
<i>Total in content module 1</i>	<i>10</i>	<i>2</i>	<i>0</i>	<i>2</i>	<i>0</i>	<i>6</i>
Content module 2.						
Brain tumors. Hydrocephalus.						
Theme 5. Brain tumors. Hydrocephalus.	2	0	0	2	0	0
Theme 6. Peculiarities of management of incurable patients and the use of palliative methods of treatment in neurosurgical practice.	2	0	0	0	0	2
Theme 7. Abscesses of the brain, epiduritis.	2	0	0	0	0	2
<i>Total in content module 2</i>	<i>6</i>	<i>0</i>	<i>0</i>	<i>2</i>	<i>0</i>	<i>4</i>
Content module 3.						
Vascular diseases of the brain and spinal cord						
Theme 8. Vascular pathology of the brain, accompanied by hemorrhagic stroke.	3	1	0	2	0	0
Theme 9. Vascular pathology of the brain accompanied by ischemic stroke. Pathology of spinal cord vessels.	3	1	0	2	0	0
<i>Total in content module 3</i>	<i>6</i>	<i>2</i>	<i>0</i>	<i>4</i>	<i>0</i>	<i>0</i>
Content module 4.						
Tumors of the spine and spinal cord. Osteochondrosis						
Theme 10. Tumors of the spinal cord.	2	0	0	2	0	0
Theme 11. Osteochondrosis.	2	0	0	2	0	0
<i>Total in content module 4</i>	<i>4</i>	<i>0</i>	<i>0</i>	<i>4</i>	<i>0</i>	<i>0</i>
Content module 5.						
Functional and restorative neurosurgery. Pain surgery						
Theme 12. Functional and restorative neurosurgery. Surgical treatment of pain syndromes.	2	0	0	2	0	0

Theme 13. Malformations of the brain and spinal cord.	2	0	0	0	0	2
<i>Total in content module 5</i>	<i>4</i>	<i>0</i>	<i>0</i>	<i>2</i>	<i>0</i>	<i>2</i>
Individual tasks	0	0	0	0	0	0
Differentiated credit	on the last class					
Total hours	30	4	0	14	0	12

5. Themes of lectures / seminars / practical / laboratory classes

5.1. Themes of lectures

№	Theme name	Number of hours
1.	Lecture 1. Traumatic lesions of the nervous system. Closed craniocerebral injury (CCI). Open CCI, clinic, diagnostics. Spinal cord injury (SCI). Traumatic injuries of the peripheral nervous system.	2
2.	Lecture 2. Vascular pathology of the brain, accompanied by hemorrhagic stroke. Vascular pathology of the brain, accompanied by ischemic stroke. Pathology of spinal cord vessels.	2
	Total hours	4

5.2. Themes of seminar classes

Seminar classes are not provided.

5.3. Themes of practical classes

№	Theme name	Number of hours
1.	Theme 3. Traumatic lesions of the nervous system. Closed craniocerebral injury (CCI). Open CCI, clinic, diagnostics. . Spinal cord injury (SCI). Traumatic injuries of the peripheral nervous system.	2
2.	Theme 5. Brain tumors. Hydrocephalus.	2
3.	Theme 8. Vascular pathology of the brain, accompanied by hemorrhagic type of stroke.	2
4.	Theme 9. Vascular pathology of the brain accompanied by ischemic stroke. Pathology of spinal cord vessels.	2
5.	Theme 10. Tumors of the spinal cord.	2
6.	Theme 11. Osteochondrosis.	2
7.	Theme 12. Functional and restorative neurosurgery. Surgical treatment of pain syndromes.	2
	The total number of hours in the discipline	14

5.4. Themes of laboratory classes

Laboratory classes are not provided.

6. Independent work of a student of higher education

№	Title of the Theme / types of tasks	Number of hours
	Independent study of Themes that are not part of the classroom lesson plan:	
1	Theme 1. Stages of development of neurosurgery.	1
2	Theme 2. Additional methods of examination in neurosurgery.	1

3	Theme 4. Gunshot wounds to the skull and brain.	2
4	Theme 6. Peculiarities of management of incurable patients and the use of palliative treatment methods in neurosurgical practice.	2
5	Theme 7. Abscesses of the brain, epiduritis.	2
6	Theme 13. Malformations of the brain and spinal cord.	2
	Total in discipline	12

7. Teaching methods

Lectures.

Practical classes: conversation, solution of clinical situational problems, practice of patient examination skills, demonstration and practice of neurological examination skills, training exercise on differential diagnosis of the most advanced diseases of the nervous system.

Independent work: independent work with recommended basic and additional literature, with electronic information resources, independent work with the bank of test tasks Step-2, independent solution of clinical tasks and mastering of clinical protocols.

8. Forms of control and evaluation methods (including criteria for evaluating learning outcomes)

Ongoing control: oral survey, testing, assessment of performance of practical skills, solution of situational clinical tasks, assessment of activity in class.

Final control: differentiated credit.

Assessment of the ongoing learning activity at the practical class:

- Evaluation of theoretical knowledge on the subject of the lesson:
 - methods: survey, solving a situational clinical problem
 - maximum score – 5, minimum score – 3, unsatisfactory score – 2.
- Evaluation of practical skills and manipulations on the subject of the lesson:
 - methods: assessment of the correctness of the performance of practical skills
 - maximum score – 5, minimum score – 3, unsatisfactory score – 2.
- Evaluation of work with the patient on the subject of the lesson:
 - methods: assessment of:
 - communication skills of communication with the patient,
 - correctness of appointment and assessment of laboratory and instrumental studies,
 - adherence to the differential diagnosis algorithm,
 - substantiation of clinical diagnosis,
 - drawing up a treatment plan;
 - maximum score – 5, minimum score – 3, unsatisfactory score – 2.

The grade for one practical session is the arithmetic average of all components and can only have a whole value (5, 4, 3, 2), which is rounded according to the statistical method.

Criteria of ongoing assessment at the practical class

Score	Assessment criterion
Excellent «5»	The student is fluent in the material, takes an active part in discussing and solving a situational clinical problem, confidently demonstrates practical skills during patient examination and interpretation of clinical, laboratory and instrumental research data, expresses his opinion on the subject of the lesson, demonstrates clinical thinking.
Good «4»	The student has a good command of the material, participates in the discussion and solution of a situational clinical problem, demonstrates practical skills during a patient examination, interpretation of clinical, laboratory and

	instrumental research data with some errors, expresses his opinion on the subject of the class, demonstrates clinical thinking.
Satisfactory «3»	The student does not have sufficient knowledge of the material, is unsure of participating in the discussion and solution of the situational clinical problem, demonstrates practical skills during the examination of the patient and the interpretation of clinical, laboratory and instrumental research data with significant errors.
Unsatisfactory «2»	The student does not possess the material, does not participate in the discussion and solution of the situational clinical problem, does not demonstrate practical skills during the examination of the patient and the interpretation of clinical, laboratory and instrumental research data.

Evaluation of the results of the students' training during the final control – differentiated assessment

Only those applicants who have fulfilled the requirements of the training program in the discipline, have no academic debt and their average score for the current educational activity in the discipline is at least 3.00 are admitted to the final control in the form of a differentiated credit.

Differentiated credit is given at the last lesson of the educational component based on the results of the final interview.

The grade obtained for the answer to the differentiated assessment and the average current success rate during the study of the educational component are used to calculate the arithmetic average, which makes up the overall grade for the educational component (the grade for the discipline consists of 50% of the grade for the current success rate and 50% of the grade according to the results of the interview on the differentiated test).

Criteria for evaluating the results of the students' training during the final control - differentiated assessment

Score	Evaluation criteria
Excellent «5»	The student correctly, clearly and logically answered the questions posed by the examiners. Thoroughly and comprehensively knows the content of theoretical issues, fluent in professional and scientific terminology. Thinks logically and constructs an answer, freely uses acquired theoretical knowledge when analyzing practical tasks.
Good «4»	The student answered the questions posed by the examiners sufficiently fully, clearly and logically. He knows the content of theoretical issues deeply and comprehensively, and has professional and scientific terminology. Thinks logically and constructs an answer, uses acquired theoretical knowledge when analyzing practical tasks. But when teaching some questions, there is not enough depth and argumentation, it makes insignificant mistakes, which are eliminated by the applicant himself when the examiner points them out.
Satisfactory «3»	The student answered the examiner's questions incompletely, the answers to additional and leading questions are vague and vague. Possesses a basic amount of theoretical knowledge, uses professional and scientific terminology inaccurately. Experiences significant difficulties in constructing an independent logical answer, in applying theoretical knowledge in the analysis of practical tasks. There are significant errors in the answers.

Unsatisfactory «2»	The student did not answer the examiner's questions, in most cases he did not answer additional and leading questions. He did not master the basic amount of theoretical knowledge, he showed a low level of mastery of professional and scientific terminology. Answers to questions are fragmentary, inconsistent, illogical, cannot apply theoretical knowledge when analyzing practical tasks. There are a significant number of gross errors in the answers.
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9. Distribution of points, obtained by the student

The obtained average score for the academic discipline for applicants who have successfully mastered the work program of the academic discipline is converted from a traditional four-point scale to points on a 200-point scale, as shown in the table:

Conversion table of traditional to multi-point

National score for the discipline	The sum of scores for the discipline
Excellent («5»)	185 – 200
Good («4»)	151 – 184
Satisfactory («3»)	120 – 150
Unsatisfactory («2»)	Less than 120

A multi-point scale (200-point scale) characterizes the actual success of each applicant in learning the educational component. The conversion of the traditional grade (average score for the academic discipline) into a 200-point grade is performed by the information and technical department of the University.

According to the obtained points on a 200-point scale, the achievements of the applicants are evaluated according to the ECTS rating scale. Further ranking according to the ECTS rating scale allows you to evaluate the achievements of students from the educational component who are studying in the same course of the same specialty, according to the points they received.

The ECTS scale is a relative-comparative rating, which establishes the applicant's belonging to the group of better or worse among the reference group of fellow students (faculty, specialty). An "A" grade on the ECTS scale cannot be equal to an "excellent" grade, a "B" grade to a "good" grade, etc. When converting from a multi-point scale, the limits of grades "A", "B", "C", "D", "E" according to the ECTS scale do not coincide with the limits of grades "5", "4", "3" according to the traditional scale. Acquirers who have received grades of "FX" and "F" ("2") are not included in the list of ranked acquirers. The grade "FX" is awarded to students who have obtained the minimum number of points for the current learning activity, but who have not passed the final examination. A grade of "F" is assigned to students who have attended all classes in the discipline, but have not achieved a grade point average (3.00) for the current academic activity and are not admitted to the final examination.

Applicants who study in one course (one specialty), based on the number of points scored in the discipline, are ranked on the ECTS scale as follows:

Conversion of the traditional evaluation and and ECTS scores

Score on the ECTS scale	Statistical indicator
A	The best 10% students
B	Next 25% students
C	Next 30% students
D	Next 25% students
E	Next 10% students

10. Methodological support

- Working program of the academic discipline
- Syllabus
- Methodical developments for practical classes

- Methodical recommendations for independent work of students
- Multimedia presentations
- Electronic bank of test of the discipline

11. Questions for preparing for the final inspection

1. Closed craniocerebral injury. Classification. Clinic, diagnosis, treatment.
2. Open craniocerebral injury. Classification, diagnosis, emergency care.
3. Intracerebral hematomas. Classification. Clinic, diagnosis, treatment.
4. Fractures of the bones of the skull in case of a closed craniocerebral injury. Classification. Indications for surgery for skull fractures. Basic principles of operations.
5. Gunshot wounds to the skull and brain. Classification, clinic, emergency care.
6. Brain tumors. Hypertensive syndrome. Hydrocephalus. Clinic, diagnosis. Indications for surgical treatment and its principles.
7. Auxiliary methods of diagnosing brain tumors in a neurosurgical clinic.
8. Pathology of brain vessels. Classification, clinic, diagnosis, emergency care.
9. Ischemic strokes. Clinic, diagnostics, emergency care. Indications for surgical treatment, its principles.
10. Hemorrhagic strokes. Classification, clinic, diagnosis, emergency therapy. Indications for surgical treatment.
11. Tumors of the spinal cord. Classification, clinic, diagnosis.
12. Liquordynamic and liquorological studies in the diagnosis of spinal cord tumors.
13. Osteochondrosis. Classification. Clinic, diagnosis, indications for surgical treatment.
14. Traumatic damage to the spine and spinal cord. Classification, clinic, diagnosis. First aid and transportation of patients.
15. Functional neurosurgery. Pain syndromes (causalgia, amputation pain, phantom pain). Clinic, diagnostics, emergency care. Trigeminal neuralgia.
16. Epilepsy. Diagnostics. Removal of the patient from epistatus. Indications for surgical treatment, its principles.
17. Traumatic damage to peripheral nerves. Peculiarities of primary treatment of wounds with open injuries of peripheral nerves.
18. Pain syndromes (causalgia, amputation pain, phantom pain). Clinic, diagnostics, emergency care. Trigeminal neuralgia.
19. Defects in the development of the brain and spinal cord. Classification, clinic, diagnosis. Indications for surgical treatment.
20. Brain abscesses. Classification, clinic, diagnosis, emergency care. Indications for surgical treatment and its principles.

12. A list of literature.

Basic literature:

- Neurology: textbook / I.A. Hryhorova, L.I. Sokolova, R.D. Herasymchuk et al.; edited by I.A. Hryhorova, L.I. Sokolova. – Kyiv : AUS Medicine Publishing, 2020. – 640 p.
- Handbook of Neurosurgery (9th Edition) / Marc S. Greenberg M.S. – Thieme, 2019. – 1784 p.

Additional literature:

- Themeal Diagnosis in Neurology. Anatomy, Physiology, Signs, Symptoms / Mathias Baehr, Michael Frotscher (6 edition) – Thieme, 2019 - 332 p.
- Adams and Victor's Principles of Neurology / Allan Ropper, Martin Samuels, Joshua Klein, Sashank Prasad (11th edition). - McGraw-Hill, 2019. - 1664 p.
- Netter's Atlas of Neuroscience (3rd Edition) / David Felten, Michael O'Banion, Mary Maida. -Elsevier, 2015. – 496 p.

- DeMyer's The Neurologic Examination: A Programmed Text (Seventh Edition) / José Biller, Gregory Gruener, Paul Brazis McGraw-Hill Education, 2016. – 656 p. (Published Online December 9, 2018 [http://dx.doi.org/10.1016/S1474-4422\(18\)30488-5](http://dx.doi.org/10.1016/S1474-4422(18)30488-5))
- Harrison's Neurology in Clinical Medicine (4th Edition) / Stephen Hauser, S. Andrew Josephson McGraw-Hill Education, 2016. – 944 p.

Information resources

- Web resources for neurologists and neurosurgeons
<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4117098/>
- American academy of neurology / TOOLS & RESOURCES
<https://www.aan.com/tools-and-resources/>
- The National Institute of Neurological Disorders and Stroke
<https://www.ninds.nih.gov>