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ORGANIZATION OF NEUROSURGICAL CARE IN A LARGE CITY (ON THE EXAMPLE OF SAINT PETERSBURG)

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ABSTRACT. The author presents the analysis of the structure of neurosurgical patients in in-patient departments of Saint-Petersburg in 2021. Parameters of in-patient and out-patient units and the status of neurosurgical care staffing were studied. The urgency of the investigation is determined by high level of nervous system morbidity and necessity of increasing quality and effectiveness of the neurosurgical service activity. The total and primary morbidity rates in the end of 2021 in St. Petersburg were 51.9 and 5.5‰, respectively. Transportation accidents became the leading external causes of morbidity and mortality. Twenty-three percent of discharged patients were diagnosed with episodic and paroxysmal disorders. The average duration of a patient's stay in a neurosurgical department was 8.8 days. The provision of the population with profile beds was $9{,}9^{0}/_{0000}$, but the inpatient units showed overload activities (the average duration of a bed exceeded 340 days and the capacity of the inpatient unit was more than 100%). The average duration of bed work was 359 days per year, the average duration of treatment per patient was 8.8 days, bed turnover was 35.9, and mortality rate was 1.7%. There were 23% of patients under outpatient observation. Specialized outpatient care is underdeveloped. The staffing level was 83.5% (83.7% in the inpatient unit, 75% in the outpatient unit). The coefficient of compatibility was 1.2. The highest qualification category was presented by 30,2% of doctors, the first category — by 13,2%, the second — by 5%; 51,7% of doctors-neurosurgeons were not certified.

KEY WORDS: neurosurgical service; inpatient care; outpatient care; neurosurgical staffing.

ОРГАНИЗАЦИЯ НЕЙРОХИРУРГИЧЕСКОЙ ПОМОЩИ В КРУПНОМ ГОРОДЕ (НА ПРИМЕРЕ Г. САНКТ-ПЕТЕРБУРГ)

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РЕЗЮМЕ. Представлен анализ структуры пациентов нейрохирургического профиля в стационарах г. Санкт-Петербург в 2021 году. Изучены показатели работы стационарного и амбулаторно-поликлинического звеньев и состояние кадров нейрохирургической службы. Актуальность исследования определяется высоким уровнем заболеваемости нервной системы и необходимостью повышения качества и эффективности оказания специализированной высококвалифицированной медицинской помощи данной категории пациентов. Общая и первичная заболеваемость на конец 2021 года в Санкт-Петербурге составили 51,9 и 5,5‰ соответственно. Транспортные происшествия стали основными из внешних причин заболеваемости и смертности. У 23% выписанных пациентов был диагноз «эпизодические и пароксизмальные расстройства». Средняя продолжительность пребывания пациента на нейрохирургическом отделении — 8,8 дней. Обеспеченность населения профильными койками — 9,9‱, однако стационары работали с перегрузкой (средняя длительность работы койки превышала 340 дней и пропускная способность стационара была больше 100%). Средняя длительность работы койки — 359 дней в год, средняя длительность лечения одного пациента — 8,8 дней, оборот койки — 35,9 больных, летальность — 1,7%. Под диспансерным наблюдением находилось 23% пациентов. Специализированная амбулаторная помощь развита недостаточно. Укомплектованность штатов — 83,5% (в стационаре — 83,7%, в амбулаторном звене — 75%). Коэффициент совместительства — 1,2. Высшую квалификационную категорию имели 30,2% врачей, первую — 13,2%, вторую — 5%; 51,7% врачей-нейрохирургов были не аттестованы.

КЛЮЧЕВЫЕ СЛОВА: нейрохирургическая служба; стационарная помощь; амбулаторно-поликлиническое звено; кадры нейрохирургической службы.

INTRODUCTION

Relevance of the research is determined by a high level of morbidity associated with lesions of the nervous system and a necessity to improve the quality and efficiency of neurosurgical care [2–4, 6, 8]. At the end of 2021, morbidity in St. Petersburg amounted to 51.9 per 1 thousand people, primary morbidity — 5.5 per 1 thousand people. The hospitalization rate amounted to 2.8 per 1 thousand people. The growth of general morbidity and morbidity among neurosurgical patients is associated with the aging of the population of St. Petersburg, which determines the need to improve a current model of specialized neurosurgical care taking into account regional peculiarities. Nowadays, a basic program of compulsory medical insurance (CMI) is being actively expanded and inpatient medical care is no longer funded from different state budgets [19], which raises a need to modernize the outpatient neurosurgical service. In addition, no detailed studies of the neurosurgical service in St. Petersburg have been conducted since the COVID-19 pandemic. The article analyzes the composition of neurosurgical patients in St. Petersburg hospitals in 2021, the performance indicators of inpatient and outpatient neurosurgical care, and an assessment of the neurosurgical service personnel.

AIM

Statistical evaluation of performance indicators of neurosurgical service in St. Petersburg in 2021.

MATERIALS AND METHODS

Reports (forms 12, 14, 30) for 2021 have been analyzed in the research. A continuous method of research has been performed. According to Form 12, 278,983 cases of neurological diseases have been examined, according to Form 14, 15,146 cases of neurological diseases have been studied, and according to Form 30, 16,682 visits of patients with neurosurgical diseases made by primary care physicians have been examined.

RESULTS

Neurosurgical medical care is provided as primary medical and sanitary care, emergency, including specialized emergency medical care, and specialized, including high-tech medical care [8, 12, 15, 22, 24, 27] (Fig. 1).

In 2021, transport accidents occupied the leading position among external causes of morbidity and mortality associated with lesions of the nervous system in St. Petersburg; more than half of them are road traffic accidents. The main cause of hospitalization at neurosurgical departments was eye and eye socket trauma (ICD-10 code — S05), intracranial trauma (ICD-10 code — S06) took the second place (Table 1).

Three main ways of patient admission to neurosurgical departments have been identified (Fig. 2): patient self-referral ("gravity flow"), patient referral by other specialists, and patient delivery by ambulance [2, 3, 11, 12, 15, 16, 21].

In 2021 in St. Petersburg there were 15,146 people with diseases of the nervous system — 57.8% of patients were hospitalized in neurosurgical departments for emergency indications. Of these, 76.6% of patients were delivered by ambulance (Table 2).

The largest share among the hospitalized patients (12,675 patients) was accounted for by patients diagnosed with episodic and paroxysmal disorders (ICD-10 code — G40–G47) (Fig. 3).

The average duration of a patient's stay at the neurosurgical department was 8.8 days (Table 3). The average duration of stay in medical organizations under the jurisdiction of the Health Committee was 7.97 days, in medical organizations under the jurisdiction of the Ministry of Health — 10.88 days. Longer periods can be explained by hospitalization of mainly planned patients referred for high-tech surgical interventions.

The mortality rate at neurosurgical departments in St. Petersburg in 2021 was 1.7%. Most of them were patients diagnosed with degenerative diseases of the nervous system (ICD-10 code — G30–G31) (Fig. 4).

By the end of 2021, inpatient care in St. Petersburg consisted of 385 beds for the adult population (60.5% of them are located in medical organizations under the jurisdiction of the Health Committee, 39.5% — in medical organizations under the jurisdiction of the Ministry of Health), with a bed capacity of 9.90/0000. The average duration of a hospital bed operation is 359 days per year, the average bed turnover

Fig. 1. Routing of neurosurgical patients

Рис. 1. Маршрутизация пациентов нейрохирургического профиля

Table 1

External causes of morbidity and mortality related to nervous system damage (adults — 18 years and older), Saint Petersburg, 2021 (%)

Таблица 1

Внешние причины заболеваемости и смертности, связанные с повреждением нервной системы (у взрослых — 18 лет и старше), Санкт-Петербург, 2021 г. (%)

Травмы от воздействия внешних причин / Injuries from external causes	**Код по МКБ 10-го пересмотра / ICD-10 revision code**	**Внешние причины заболеваемости и смертности, всего / External causes of morbidity and mortality, total**		**Транспортные несчастные случаи / Transportation accidents**			
				всего (из 3) / total (of 3)		**дорожно-транспортные несчастные случаи (из 4) / traffic accidents (of 4)**	
		абс. / abs.	**относ. (%) / rel. (%)**	**абс. / abs.**	**относ. (%) / rel. (%)**	**абс. / abs.**	**относ. (%) / rel. (%)**
1	2	3		4		5	
Всего / Total	S00–T98	516 839	100	7705	1,5	4237	55
Травмы головы, всего / Head trauma, total	S00–S09	66 163	12,8	1366	2,1	709	51,9
Перелом черепа и лицевых костей / Fracture of the skull and facial bones	S02	5190	1	74	1,4	49	66,2
Травма глаза и глазницы / Trauma to the eye and eye socket	S05	22 317	4,3	32	0,1	7	21,9
Внутричерепная травма / Intracranial trauma	S06	13 542	2,6	785	5,8	403	51,3
Травмы шеи, всего / Neck trauma, total	S10–S19	3111	0,6	204	6,6	127	62,3
Перелом шейного отдела позвоночника / Fracture of the cervical spine	S12	345	0,1	22	6,4	11	50
Травма нервов и спинного мозга на уровне шеи / Nerve and spinal cord trauma at the level of the neck	S14	35	0	2	5,7	2	100
Прочие / Other	S20–T98	447 565	86,6	6135	1,4	3401	55,4

is 35.9 patients, and the bed downtime is 0.2 days. Throughput capacity of the hospital is 100.1% (Table 4).

The frequency of outpatient visits to neurosurgeons in St. Petersburg in 2021 was 3.37 per 1000 population (Table 5). The main focus of medical specialists is regular follow-up monitoring according to the profile of pathology. 23% of patients were under follow-up monitoring, 11% were diagnosed for the first time. At the end of 2021, 54,516 people were under medical follow-up monitoring (Table 6).

Availability of neurosurgeons in St. Petersburg in 2021 was equal to 0.50/0000. The staffing level was 83.5% (83.7% in inpatient care and 75% in outpatient care) (Tables 7, 8). The compatibility rate was 1.2.

Professional characteristics of neurosurgical specialists in St. Petersburg in 2021 have been assessed. The analysis showed that a fairly large percentage of doctors do not have a qualification category. The distribution of specialists by qualification categories suggests low interest of neurosurgeons in improving their qualifications (Table 9).

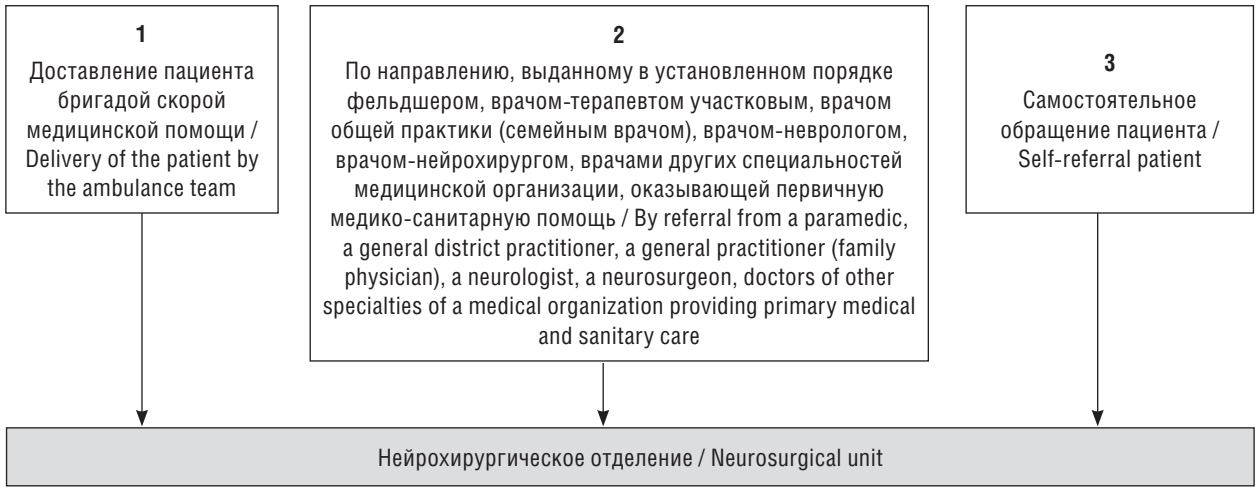

Fig. 2. Pathways of admission to the neurosurgery department

Рис. 2. Пути поступления пациентов на отделение нейрохирургического профиля

Table 2

Distribution of discharged patients with diseases of the nervous system by type of medical organization and the number of patients delivered from them for emergency indications (adults — 18 years and older), Saint Petersburg, 2021 (%)

Таблица 2

Распределение выписанных пациентов с болезнями нервной системы по типам медицинских организаций и количество доставленных из них по экстренным показаниям (взрослые — 18 лет и старше), Санкт-Петербург, 2021 г. (%)

Типы медицинских организаций и пути госпитализации пациентов / Types of medical organisations and ways of hospitalisation of patients		**Группы / Groups**	**Абс. / Abs.**	**Относ. (%) / Rel. (%)**
Всего / Total	Всего выписанных пациентов / Total discharged patients	1	15 146	100
	Из них доставленных по экстренным показаниям (из 1) / Of these, delivered on emergency basis (of 1)	2	8759	57,8
	Из них пациентов, доставленных скорой медицинской помощью (из 2) / Of these, patients delivered by ambulance (of 2)	3	6705	76,6
МО КЗ / Medical organizations of the health committee	Всего выписанных пациентов / Total discharged patients	4	11 083	73,2
	Из них доставленных по экстренным показаниям (из 4) Of these, delivered on emergency basis (of 4)	5	8626	77,8
	Из них пациентов, доставленных скорой медицинской помощью (из 5) / Of these, patients delivered by ambulance (of 5)	6	6663	77,2
МО МЗ / Medical organizations of the Ministry of Health	Всего выписанных пациентов / Total discharged patients	7	4063	26,8
	Из них доставленных по экстренным показаниям (из 7) / Of these, delivered on emergency basis (of 7)	8	133	3,3
	Из них пациентов, доставленных скорой медицинской помощью (из 8) / Of these, patients delivered by ambulance (of 8)	9	42	31,6

Table 3

Average length of stay for various illnesses in hospital (adults — 18 and over), Saint Petersburg, 2021 (bed-days)

Таблица 3

Средняя продолжительность пребывания при различных заболеваниях в стационаре (взрослые — 18 лет и старше), Санкт-Петербург, 2021 г. (койко-дни)

Наименование болезни / Name of the disease	**Код по МКБ 10-го пересмотра / ICD 10 revision code**	**Всего / Total**	**МО КЗ / Medical organizations of the Health Committee**	**МО МЗ / Medical organizations of the Ministry of Health**
Болезни нервной системы / Diseases of the nervous system	G00–G98	8,75	7,97	10,88
Воспалительные болезни центральной нервной системы / Inflammatory diseases of the central nervous system	G00–G09	20,97	22,50	14,25
• бактериальный менингит / bacterial meningitis	G00	18,88	20,00	10,50
• энцефалит, миелит и энцефаломиелит / encephalitis, myelitis and encephalomyelitis	G04	20,38	21,49	15,00
Системные атрофии, поражающие преимущественно центральную нервную систему / Systemic atrophies affecting mainly the central nervous system	G10–G12	13,89	17,38	9,41
Экстрапирамидные и другие двигательные нарушения / Extrapyramidal and other motor disorders	G20, G21, G23–G25	9,41		
• болезнь Паркинсона / Parkinson's disease	G20	10,18		
• другие экстрапирамидные и двигательные нарушения / other extrapyramidal and motor disorders	G25	9,27		
Другие дегенеративные болезни нервной системы / Other degenerative diseases of the nervous system	G30–G31	24,23		
• болезнь Альцгеймера / Alzheimer's disease	G30	56,63		
Демиелинизирующие болезни центральной нервной системы / Demyelinating diseases of the central nervous system	G35–G37	17,74		
• рассеянный склероз / multiple sclerosis	G35	19,34		15,47
Эпизодические и пароксизмальные расстройства / Episodic and paroxysmal disorders	G40–G47	4,72		10,35
• эпилепсия, эпилептический статус / epilepsy, epileptic status	G40–G41	3,98		12,10
• преходящие транзиторные церебральные ишемические приступы (атаки) и родственные синдромы / Transient transient cerebral ischemic attacks and related syndromes	G45	5,94		9,13
Поражения отдельных нервов, нервных корешков и сплетений, полиневропатии и другие поражения периферической нервной системы / Lesions of individual nerves, nerve roots and plexuses, polyneuropathies and other lesions of the peripheral nervous system	G50–G64	11,95		10,24
• синдром Гийена–Барре / Guillain–Barre syndrome	G61.0	19,99		18,20
Болезни нервно-мышечного синапса и мышц / Diseases of the neuromuscular synapse and muscles	G70–G73	21,37		11,90
• миастения / myasthenia	G70.0, 2	13,80		11,60

Ending of the table 3

Окончание табл. 3

Наименование болезни / Name of the disease	Код по МКБ 10-го пересмотра / ICD 10 revision code	Всего / Total	МО КЗ / Medical organizations of the Health Committee	МО МЗ / Medical organizations of the Ministry of Health
• мышечная дистрофия Дюшенна / Duchenne muscular dystrophy	G71.0	17,33		10,00
Церебральный паралич и другие паралитические синдромы / Cerebral palsy and other paralytic syndromes	G80–G83	8,18		9,31
• церебральный паралич / cerebral paralysis	G80	5,58		6,78
Расстройства вегетативной (автономной) нервной системы / Disorders of the autonomic nervous system	G90	0,00		0,00
Сосудистые миелопатии / Vascular myelopathies	G95.1	19,88		19,27

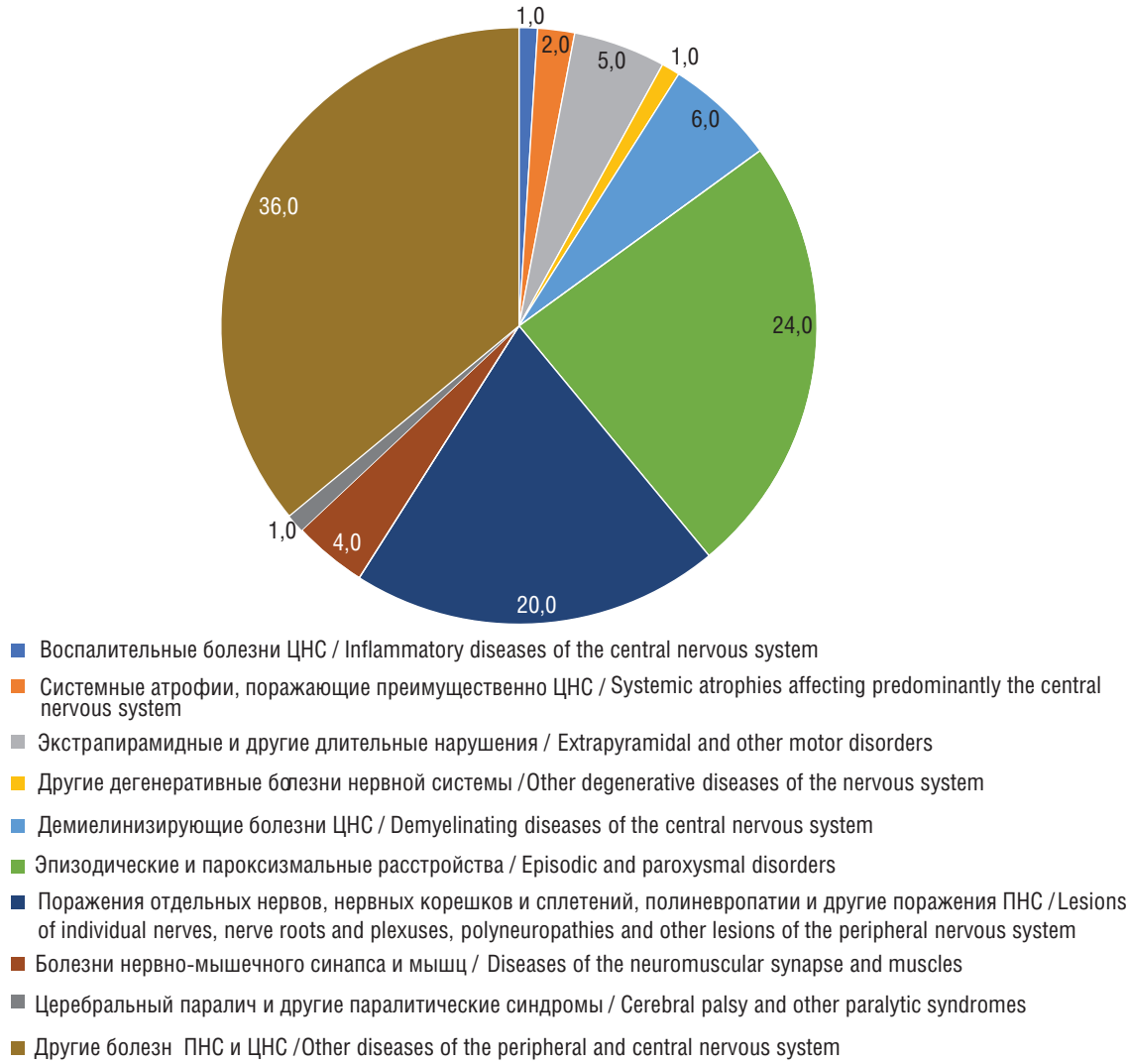

Fig. 3. Distribution of patients discharged from hospital by diagnosis (adults — 18 years and older), Saint Petersburg, 2021 (%)

Рис. 3. Распределение пациентов, выписанных из стационара, по диагнозам (взрослые — 18 лет и старше), Санкт-Петербург, 2021 г. (%)

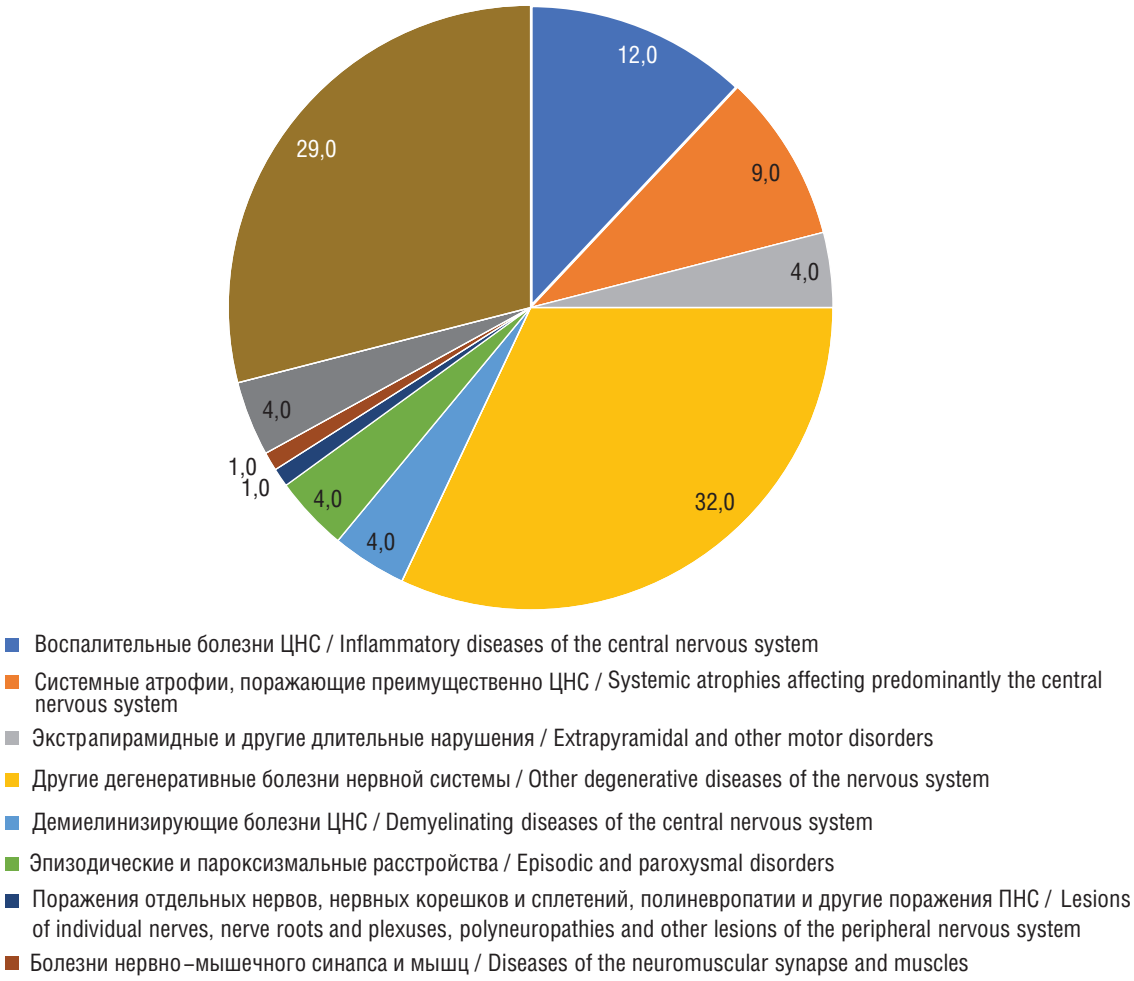

Fig. 4. Structure of mortality cases in neurosurgical departments (adults — 18 years and older), Saint Petersburg, 2021 (%)

Рис. 4. Структура летальности в отделениях нейрохирургического профиля (взрослые — 18 лет и старше), Санкт-Петербург, 2021 г. (%)

Table 4

Neurosurgical bed capacity for adults, Saint Petersburg, 2021 (%)

Таблица 4

Нейрохирургический коечный фонд для взрослых, Санкт-Петербург, 2021 г. (%)

Типы медицинских организаций / Types of medical organisations	**Койки для взрослых / Beds for adults**		**Среднегодовое количество коек / Average number of beds per year**	
	абс. / abs.	**относ. (%) / rel. (%)**	**абс. / abs.**	**относ. (%) / rel. (%)**
Всего в Санкт-Петербурге / Total in Saint Petersburg	385	100	340	100
МО КЗ / Medical organizations of the health committee	233	60,5	235	69,1
МО МЗ / Medical organizations of the Ministry of Health	152	39,5	105	30,9

Table 5

Neurosurgeons' of medical organization work in outpatient settings (adults — 18 years and older), Saint Petersburg, 2021 (%)

Таблица 5

Работа врачей-нейрохирургов медицинской организации в амбулаторных условиях (взрослые — 18 лет и старше), Санкт-Петербург, 2021 г. (%)

Типы медицинских организаций / Types of medical organisations	**Число посещений врачей, включая профилактические / Number of doctor visits, including preventive**		**Число посещений врачей по поводу заболеваний / Number of visits to doctors for illnesses**	
	1		**2**	
	абс. / abs.	**относ. (%) / rel. (%)**	**абс. / abs.**	**относ. (%) / rel. (%)**
Всего / Total	16 682	100	14155	84,9
МО КЗ / Medical organizations of the health committee	7090	42,5	5429	76,6
МО МЗ / Medical organizations of the Ministry of Health	9592	57,5	8726	91

Table 6

The level of medical examinations, Saint Petersburg, 2021 (%)

Таблица 6

Уровень диспансеризации, Санкт-Петербург, 2021 г. (%)

Всего зарегистрировано заболеваний нервной системы / Total registered diseases of the nervous system	**Взято под диспансерное наблюдение / Taken under dispensary observation**		**С впервые в жизни установленным диагнозом / With a first-time diagnosis**	
	абс. / abs.	**относ. (%) / rel. (%)**	**абс. / abs.**	**относ. (%) / rel. (%)**
278 983	64 145	23	29 387	11

Table 7

Personnel distribution in neurosurgical departments, Saint Petersburg, 2021 (%)

Таблица 7

Распределение кадров нейрохирургических отделений, Санкт-Петербург, 2021 г. (%)

Характеристика кадров нейрохирургических отделений / Characterization of the staff of neurosurgical departments	**Санкт-Петербург / Saint Petersburg**		**МО КЗ / Medical organizations of the Health Committee**		**МО МЗ / Medical organizations of the Ministry of Health**	
	штатных / staff	**занятых / accupied**	**штатных / staff**	**занятых / occupied**	**штатных / staff**	**занятых / occupied**
Число должностей в целом, ед. / Number of positions in total, units	338,8	283,0	245,8	194,8	93,0	88,3
Стационарная помощь, ед. / Inpatient care, units	333,8	279,3	242,0	191,8	91,8	87,5
Амбулаторная помощь, ед. / Ambulatory care, units	5,0	3,8	3,8	3,0	1,3	0,8
Число физических лиц основных работников на занятых должностях, человек / The number of physical persons out of the main employees in the occupied positions, people	242		168		74	

Table 8

Staffing of neurosurgical departments, Saint Petersburg, 2021 (%)

Таблица 8

Укомплектованность штатов нейрохирургических отделений, Санкт-Петербург, 2021 г. (%)

Условия оказания медицинской помощи / Conditions of medical care	Санкт-Петербург / Saint Petersburg	МО КЗ / Medical organizations of the Health Committee	МО МЗ / Medical organizations of the Ministry of Health
Всего / Total	83,5	79,3	94,9
Стационарная помощь / Inpatient care	83,7	79,2	95,4
Амбулаторная помощь / Ambulatory care	75	80	60

Table 9

Distribution of neurosurgeons by qualification characteristics, Saint Petersburg, 2021 (%)

Таблица 9

Распределение врачей-нейрохирургов по квалификационным характеристикам, Санкт-Петербург, 2021 г. (%)

Квалификационные характеристики / Qualification characteristics		Санкт-Петербург / Saint Petersburg		МО КЗ / Medical organizations of the Health Committee		МО МЗ / Medical organizations of the Ministry of Health	
		абс. / abs.	относ. (%) / rel. (%)	абс. / abs.	относ. (%) / rel. (%)	абс. / abs.	относ. (%) / rel. (%)
Всего врачей-нейрохирургов / Total number of neurosurgeons		242		168		74	
Из них: / Of these:							
Имеют сертификат специалиста / Have a specialist certificate		221	91,3	152	90,5	69	93,2
Имеют свидетельство об аккредитации / Have a certificate of accreditation		20	8,3	16	9,5	4	5,4
Имеют квалификационную категорию / Have a qualification category	Высшую / Superior	73	30,2	57	33,9	16	21,6
	Первую / First	32	13,2	21	12,5	11	14,9
	Вторую / Second	12	4,9	10	6	2	2,7
Не имеют квалификационной категории / Do not have a qualification category		125	51,7	80	47,6	45	60,8

DISCUSSION

Transport accidents were the main causes of morbidity and mortality among external causes (1.5%) in St. Petersburg in 2021. The main reason for hospitalization on neurosurgical wards was eye and eye socket trauma (ICD-10 code — S05), with intracranial trauma (ICD-10 code — S06) ranking second. The significance of traumatism in the structure of neurosurgical pathologies is confirmed by the data of other studies. Intracranial trauma accounted for the majority of external causes of death and hospitalization to neurosurgical beds in the Russian Federation in 2015–2017 [4, 9, 14, 17, 21]. A total of 321.1 thousand people were hospitalized with this pathology in 2015 and 305.0 thousand people in 2016. During the COVID-19 pandemic, there was an average of 12.8 hospitalizations for every head injury death in 2019 and 9.6 hospitalizations in 2020 [13].

The mortality rate at neurosurgical departments in St. Petersburg in 2021 amounted to 1.7%. Most of the patients were diagnosed with

degenerative diseases of the nervous system (ICD-10 code — G30-G31). Although the neurosurgical departments of St. Petersburg face difficult tasks — relatively high morbidity of the population with diseases of the nervous system and a variety of nosological forms of diseases — it can be concluded, based on the low mortality rate in the city, that neurosurgical care is rendered in an adequate volume [3, 10, 12, 26]. The same is true for the post-Covid period: in 2019, the hospital-wide mortality rate among neurosurgical patients in the Russian Federation was 1.2%, in 2020 — 1.4% [13]. The high mortality of patients with degenerative diseases of the nervous system in St. Petersburg may be related, on the one hand, to their significant prevalence due to the difficulty of early diagnosis of diseases and the impossibility of their complete cure, and, on the other hand, to the increase in the elderly population, mostly affected by these diseases. In addition, it is already known that coronavirus infection caused by the SARS-CoV-2 virus, in addition to affecting the respiratory system, can lead to involvement of the nervous system, which undoubtedly causes decompensation of patients' existing conditions and possibly influences the development of new disorders [1, 7].

According to the Letter of the Russian Ministry of Health of 2019, the average duration of a patient's stay on a neurosurgical unit should not exceed 10.7 days [20]. In St. Petersburg, it amounted to 8.8 days.

Due to the development of hospital substitution technologies, the total bed capacity is decreasing [21]. It might be also applied to the neurosurgical service [17, 24]. In 2016, compared to 2014, the total number of neurosurgical beds decreased by 4.6%. Taking into account the population, the level of availability of neurosurgical beds in the Russian Federation averaged 9.49 and 9.01 beds per 100,000 population in 2014 and 2016, respectively [24]. The situation did not change during the COVID-19 pandemic: compared to 2019, the number of beds decreased by 18% in 2020, and the availability of neurosurgical beds in 2020 was 7.28 beds per 100,000 population [13]. In addition, neurosurgical beds are extremely unevenly distributed across individual regions: according to 2016–2020 data, half of the country's total neurosurgical bed stock was concentrated in 15 constituent entities of Russia. The largest number of specialized beds was deployed in Moscow, St. Petersburg, the Sverdlovsk and Samara Regions, and the Republic of Bashkortostan [13, 24]. If we analyze St. Petersburg and the Leningrad Region separately, in 2016–2020, as already noted, St. Petersburg appeared on the list of the regions which were most provided with specialized beds, while the Leningrad Region was undersupplied with neurosurgical beds [13, 24]. In 2021, there were 385 adult specialized beds in St. Petersburg with a bed capacity of 9.90/0000, which is considered sufficient [6, 17, 28]. However, the average duration of bed occupancy exceeds 340 days and the inpatient capacity is over 100% — this indicates that the city's inpatient facilities were overloaded [6, 10, 12, 16, 28]. The average annual neurosurgical bed occupancy in St. Petersburg was higher compared to data for the Russian Federation both before the COVID-19 pandemic (257.7±90.8 days in 2019) and after it (312.9±130.8 days in 2020) [13].

In 2021, the coverage by neurosurgeons in St. Petersburg was unsatisfactory, while the compatibility ratio was rather low (1:1.2) [2, 3]. However, it is worth noting that there is an upward trend in the number of staff positions of neurosurgeons and the number of physicians in Russia for 2015–2020, which increased by 7.5 and 8.1%, respectively [13, 24]. The outpatient neurosurgical care of St. Petersburg is underdeveloped [2, 3, 5, 25, 26]. Despite the high percentage of regular medical follow-ups and consultations for neurosurgical diseases, the staffing level of the outpatient neurosurgical service was only 75%.

As for outpatient settings, primary pre-hospital medical and sanitary care is provided by paramedics and other medical workers with secondary medical education, whereas primary medical and sanitary care is carried out by general practitioners, district general practitioners, family physicians, and neurologists [18]. In this connection, in order to improve the quality of early diagnosis of neurosurgical patients, it is advisable to preserve and develop the human resources potential of the outpatient unit by providing continuous postgraduate training in neurosurgery for the above specialists, attracting more neurosurgeons to outpatient units and introducing highly informative methods of examination of patients in a consulting room of a neurosurgeon. Promotion of rehabilitation measures may become a prospect for the deve-

lopment of outpatient care. In order to improve the efficiency of dynamic follow-up of patients at the third stage, it is necessary to reconsider the possible ways of interaction between a consultative and hospital neurosurgical service. This should be done through detailed development of neurosurgical patients' selection for the second stage of rehabilitation and their early transfer to the third stage, adherence to a multidisciplinary approach at the outpatient stage of rehabilitation treatment, expansion of the equipment of physical therapy rooms in outpatient clinics, and competent assessment of therapy results.

Worryingly, more than half of neurosurgeons had no qualifications [2, 10, 23]. Over 8% of specialists were not certified at the time of the study, although the presence of a specialist certificate is one of the obligatory conditions for admission to work [23, 24].

CONCLUSION

At the end of 2021, the overall incidence of nervous system pathology (ICD-10 code — G00-G98) in St. Petersburg amounted to 51.9 per 1 thousand people; primary morbidity is 5.5 per 1 thousand people. Episodic and paroxysmal disorders (ICD-10 code — G40–G47) accounted for the majority in discharged patients.

There are a number of positive aspects in neurosurgical care organization: availability of neurosurgical beds for adults is higher than the national average, the inpatient mortality rate is low, and the percentage of patients undergoing medical examination is high. At the same time, the beds are overloaded and neurosurgical care in outpatient settings is poorly developed. The activity of the service is ensured by qualified specialists, but 51% of doctors have not been certified; the staffing of doctors is only 83.5%.

The identified shortcomings determine the directions for further improvement of specialized neurosurgical care.

ADDITIONAL INFORMATION

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