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Prevalence of severe neurological damage and clinical profile of patients in Intensive Care Unit*

Prevalência de danos neurológicos graves e perfil clínico de pacientes em Unidade de Terapia Intensiva

Prevalencia de daños neurológicos graves y perfil clínico de los pacientes en la Unidad de Cuidados Intensivos

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Abstract: Objective: to identify the prevalent neurological damage in patients admitted to an Intensive Care Unit and their relationship with social and clinical characteristics, care, and clinical outcome. **Method**: cross-sectional study with analysis of 83 medical records of patients with neurological damage and hospitalized in the period from 2016 to 2018. **Results**: predominance of Hemorrhagic Stroke (55.4%). Traumatic Brain Injury affected only men (16.9%). Systemic Arterial Hypertension was the main comorbidity evidenced (51.8%). Altered muscle strength was the main sign of severe neurological damage (36.2%). Analgesia prevailed among intensive care dedicated to patients with severe neurological damage (95.1%). Death as clinical outcome predominated (85.6%). **Conclusion**: Hemorrhagic stroke predominates, especially in women. Analgesia is the main care evidenced, and the mortality rate was higher than the rates found in the literature.

Descriptors: Nervous System Diseases; Neurologic Manifestations; Health Profile; Intensive Care Units; Adult

Resumo: Objetivo: identificar os danos neurológicos prevalentes em pacientes internados em Unidade de Terapia Intensiva e a relação destes com as características sociais e clínicas, os cuidados e o desfecho clínico. **Método:**

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estudo transversal com análise de 83 prontuários de pacientes com danos neurológicos e internados no período de 2016 a 2018. **Resultados:** predomínio do Acidente Vascular Encefálico Hemorrágico (55,4%). O Traumatismo Cranioencefálico acometeu apenas homens (16,9%). A Hipertensão Arterial Sistêmica foi a principal comorbidade evidenciada (51,8%). A alteração da força muscular foi o principal sinal de dano neurológico grave (36,2%). A analgesia prevaleceu entre os cuidados intensivos dedicados aos pacientes com danos neurológicos graves (95,1%). Predomínio do óbito como desfecho clínico (85,6%). **Conclusão:** predomina o Acidente Vascular Encefálico Hemorrágico, especialmente em mulheres. A analgesia é o principal cuidado evidenciado, e a taxa de mortalidade foi superior à dos índices encontrados na literatura.
Descritores: Doenças do Sistema Nervoso; Manifestações Neurológicas; Perfil de Saúde; Unidades de Terapia Intensiva; Adulto

Resumen: Objetivo: identificar el daño neurológico prevalente en los pacientes ingresados en una Unidad de Cuidados Intensivos y su relación con las características sociales y clínicas, los cuidados y el resultado clínico. **Método:** estudio transversal con análisis de 83 historias clínicas de pacientes con daño neurológico e ingresados en el periodo de 2016 a 2018. **Resultados:** predominio del Ictus Hemorrágico (55,4%). El traumatismo craneoencefálico sólo afectaba a los hombres (16,9%). La hipertensión arterial sistémica fue la principal comorbilidad evidenciada (51,8%). La alteración de la fuerza muscular fue el principal signo de daño neurológico grave (36,2%). La analgesia prevaleció entre los cuidados intensivos dedicados a los pacientes con daño neurológico grave (95,1%). Predominó la muerte como resultado clínico (85,6%). **Conclusión**: Predomina el ictus hemorrágico, especialmente en las mujeres. La analgesia es el principal cuidado evidenciado, y la tasa de mortalidad fue superior a las tasas encontradas en la literatura.
Descriptores: Enfermedades del Sistema Nervioso; Manifestaciones Neurológicas; Perfil de Salud; Unidades de Cuidados Intensivos; Adulto

Introduction

Neurological damage is a situation that leads the patient to a poor general condition, manifested mainly by loss of consciousness or deep coma.1 A national survey based on epidemiological data from Brazilian Intensive Care Units (ICU) found that more than 13% of hospitalizations are associated with neurological causes.[2]

Studies show Stroke (CVA) as the main prevalent neurological injury among patients in adult ICU[3-7] with a predominance of the ischemic type (CVA) (63%) versus hemorrhagic type (HAE) (32.9%).[8] Traumatic Brain Injury (TBI) as a cause of ICU admission has a high rate compared to other traumas and critical life situations that require intensive care.[4,9-10]

Regarding the social profile of patients with severe neurological damage, research shows the prevalence of males, aged with low education, married or in a stable union and of white

ethnicity. The aged population is the most affected by severe neurological damage, because it is in this age group that comorbidities predominate, especially Systemic Arterial Hypertension (SAH) and Diabetes Mellitus (DM), which are considered the main causes of cerebrovascular diseases.[1-2,7,11-16]

Neurosurgeries aim to treat the cause of the damage by means of craniotomy and/or trepanation procedures. They also allow the insertion of intracranial catheters for ventricular drainage and/or intracranial pressure (ICP) monitoring in cases of cranial hypertension.4 After neurosurgical procedures, almost 90% of elective and 60% of non-elective patients require intensive care in the immediate postoperative period in the ICU.

The main complications and alterations in the postoperative period of neurosurgeries involve intracranial hypertension, pupillary alteration, and hemodynamic instability that must be carefully monitored in order to reduce the number of deaths and encephalic deaths.[17] In the presence of hypotension, administration of vasoactive drugs is required, aiming to reestablish hemodynamic stability.[1,16] In addition to vasoactive drugs, during the critical phase, patients with neurological damage receive analgesics and sedatives, widely used for comfort, control of invasive mechanical ventilation and ICP.[1] Moreover, during ICU stay patients, especially those with severe neurological damage, are exposed to several invasive procedures, prolonged length of stay, and isolation in a care environment, which may generate other complications such as muscle weakness, physical immobility, pressure injuries, sepsis, acute kidney injury, ventilator-associated pneumonia, and *delirium*.[1]

Despite the epidemiology of neurological diseases and their evolution to the most severe phenotypes, which require intensive care with advanced support technologies and assistance by a multi-professional team,[18] it is evident in the literature the incipiency of studies focused on the analysis of the health profile and the care provided. Thus, the need to develop research focusing on the clinical and social profile of neurocritical patients and the prevalence of severe

neurological damage assisted in the ICU is perceived, to expand the possibilities to qualify care and ensure the best prognosis for patients.[12]

It is noteworthy that patients with severe neurological damage require complex assistance that involves pre-hospital care by the Mobile Emergency Care Service (SAMU); in-hospital units: emergency, operating room, and ICU; and rehabilitation services. Nursing is present in all scenarios of the care network for these patients.[1,11] Thus, this study is relevant because the construction of knowledge in neurocritical care may support the systematization of assistance, qualifying the care with the reduction of hospitalization time, associated complications, and mortality rates.[1,4,18] We aimed to identify the prevalent neurological damage in ICU patients and its relationship to social and clinical characteristics, care, and clinical outcome.

Method

Cross-sectional and retrospective study that is part of a matrix research entitled "Clinical and social profile of patients admitted to the Type II Adult Intensive Care Unit of a hospital in the Western Border of Rio Grande do Sul (RS)". It was developed in an ICU of the Western Border of Rio Grande do Sul with ten beds for the care of adult patients in critical life situations in a medium-sized hospital that is a reference in high complexity in neurosurgery.

The population of the matrix survey was 419 patients admitted to that unit during the years 2016 to 2018. Considering a margin of error of 5%, the random sample was 259 patients based on the availability of medical records. For this study, a convenience sampling was carried out based on the inclusion criteria: having neurological damage as the reason for admission to the ICU; and being classified in the specialty of neurology or neurosurgery. Exclusion criteria were being younger than 18 years old. Thus, the sample of the present study was of 83 patients, representing 19.8% of the population, a rate higher than that indicated in a study on the incidence of admissions of patients with severe neurological damage in the ICUs in Brazil (13.8%).[2]

Data collection occurred in the Medical Archives and Statistics Service in the first half of March 2020 by two researchers. For data collection, the technique of document analysis of the medical records of patients who comprised the study sample was used. To this end, a structured instrument was used that included the following variables: gender, education, religion, color/race, marital status, profession/occupation, International Statistical Classification of Diseases and Health Related Problems (ICD), age, comorbidities, signs and symptoms, changes evidenced in imaging exams, sedatives used, use of tracheostomy, use of endotracheal tube, conducts and care adopted, complications during hospitalization, opening of brain death (BD) protocol and organ harvesting, days of hospitalization, clinical outcome. Regarding the ICD, the variable "others" includes the ICD of amyotrophic lateral sclerosis, brain tumor, and meningitis. At the end of the collection, the data were checked, ensuring the completeness of the collection of variables.

The database was set up by means of independent double entry in a Microsoft Office Excel version 16.0 file. Statistical Package for Social Sciences® (SPSS) 20.0 *software* was used for descriptive analysis with frequency distribution, univariate, and bivariate analysis. The relationship between the social and clinical profile of patients and the comparison between the types of neurological damage presented by patients was analyzed by bivariate analysis using the Chi-square test with a value of $p<0.05$ for statistical significance to obtain the risk factors for the types of neurological damage and the prevalence of care and complications for each phenotype studied.

The study follows the rules of Resolution No. 466 of December 12, 2012, of the National Health Council that regulates research with human beings. The matrix research was approved by the Research Ethics Committee of the Federal University of the Pampa, obtaining a favorable opinion, under opinion no. 3,404,096, CAAE 12237519.4.0000.5323 and approved on June 20, 2019.

Results

Table 1 shows the social profile of the patients with neurological damage admitted to the ICU. A predominance of males, complete elementary education, catholic religion, white, married and retired individuals is observed.

Table 1 - Social characteristics of patients with severe neurological damage admitted to an ICU in the countryside of Brazil (n=83).

Variables	%	n
Gender		
Male	50.6	42
Female	49.4	41
Schooling		
Illiterate	2.4	2
Primary incomplete	2.4	2
Elementary School complete	62.5	52
High School Complete	20.4	17
College or university completed	2.4	2
Education not recorded in the medical record	9.6	8
Religion		
Catholic	61.4	51
Evangelical	10.8	9
Other religions	2.4	2
Religion not recorded in medical record	25.3	21
Ethnicity		
White	74.8	62
Black	4.8	4
Brown	19.2	16
Ethnicity not recorded in the medical record	1.2	1
Marital Status		
Single	31.2	26
Married	34.9	29
Widowed	21.6	18

Divorced	6	5
Marital Status not recorded in the medical record	6	5
Occupation		
Retired	32.5	27
Self-employed	16.8	14
Unemployed	9.6	8
Other occupations	36.1	30

Regarding the type of neurological damage suffered, the results indicate a predominance of CVAH 55.4% (n=46), followed by CVAI 18.1% (n=15) and TBI 16.9% (n=14). Other neurological damage was also evidenced in 9.6% (n=8) of the patients, related to brain tumor, meningitis, and amyotrophic lateral sclerosis. Table 2 presents the relationship between the social and clinical characteristics of the patients and the type of neurological damage.

Table 2 - Relationship between social and clinical characteristics and the type of neurological damage (n=83).

	ICVA*		HCVA†		TBI‡		Others§		Total	Total	p value‖
	n	%	n	%	n	%	n	%	n	%	p
Female gender	10	12	28	33.7	-	-	3	3.6	41	49.3	0.000
Male gender	5	6	18	21.7	14	16.9	5	6	42	50.6	0.000
Age group up to 50 years old	2	2.4	8	9.6	7	8.4	5	6	22	26.5	0.037
Age range 50 to 63 years old	3	3.6	13	15.7	4	4.8	2	2.4	22	26.5	0.037
Age range 63 to 74 years old	4	4.8	13	15.7	3	3.6	1	1.2	21	25.3	0.037
Age group over 74 years old	6	7.2	12	14.5	-	-	-	-	18	21.7	0.037
Systemic Arterial Hypertension	9	10.8	29	34.9	2	2.4	3	3.6	43	51.8	0.010
Diabetes Mellitus	5	6	6	7.2	-	-	1	1.2	12	14.4	0.079
Cardiopathies	2	2.4	-	-	-	-	-	-	2	24	0.026
Chronic Renal Insufficiency	1	1.2	-	-	1	1.2	-	-	2	2.4	0.281
Previous Cerebral Vascular Accident	1	1.2	4	4.8	-	-	1	1.2	6	7.2	0.665

Chronic Obstructive Pulmonary Disease	4	4.8	4	4.8	-	-	-	-	8	9.6	0.061
Cancer	1	1.2	-	-	1	1.2	-	-	2	2.4	0.281
Headache	2	2.4	10	12	-	-	3	3.6	15	18	0.123
Vomiting	1	1.2	5	6	2	2.4	1	1.2	9	10.8	0.927
Alteration in muscle strength	12	14.5	17	20.5	-	-	1	1.2	30	36.2	0.000
Seizures	-	-	7	8.4	2	2.4	1	1.2	10	12	0.465
Alteration in respiratory pattern	5	6	13	15.7	3	3.6	2	2.4	23	27.7	0.908
Glycemic alteration	9	10.8	32	38.6	10	12	3	3.6	54	65	0.320

*Ischemic Cerebrovascular Accident †Hemorrhagic Cerebrovascular Accident ‡Cranioencephalic Trauma §Meningitis, Brain Tumors and Amyotrophic Lateral Sclerosis (ALS‖ Chi-square test of association.

Considering the relationship between the type of neurological damage and gender, statistical significance was observed for the predominance of CVA and HCVA in females and TBI in males. The relationship between age group and stratification by type of neurological damage indicates that: patients aged up to 50 years prevailed in the diagnosis of TBI and HCVA; HCVA was the main diagnosis in the 50 to 63 years and 63 to 74 years age groups. The ICVA had a higher incidence in patients over 74 years old.

Some comorbidities also showed statistical significance when related to the type of neurological damage. SAH presented as a clinical characteristic with prevalence in patients with HCVA and ICVA. Cardiopathies (acute myocardial infarction, congestive heart failure) were comorbidities evidenced only in patients diagnosed with ICVA. Diabetes mellitus, chronic renal failure, previous stroke, cancer, and chronic obstructive pulmonary disease were comorbidities that did not show statistical significance for the association with the types of severe neurological damage.

Regarding the signs and symptoms that the patients presented at the time of admission to the ICU, only the alteration in muscle strength was related to the prevalence of HVCA and not related to TBI. Other symptoms were also identified in patients with severe neurological

data, such as headache, vomiting, seizures, altered breathing pattern and altered blood glucose levels, but without statistical significance when compared to the type of neurological damage.

Table 3 presents the relation between the alterations in cranial imaging exams, comparing them with the type of neurological damage. Significance was evidenced for: alterations involving bone fractures, indicating structural damage in TBI; HCVA, in which subdural hematoma and intracerebral hematoma prevailed; and cerebral ischemia, which prevailed in patients diagnosed with both ICVA and HCVA. Regarding the other changes visualized on imaging exams, such as cerebral edema, erasure of sulci and cerebral hernias, there was no statistical significance when related to the types of neurological damage.

Table 3 - Relationship between the type of neurological damage and changes on skull imaging (n=83).

	ICVA*		HCVA†		TBI‡		Others§		Total	Total	p value‖
	n	%	n	%	n	%	n	%	n	%	p
Presence of bone fractures	-	-	-	-	7	8.4	-	-	7	8.4	0.000
Epidural hematoma	-	-	-	-	1	1.2	-	-	1	1.2	0.173
Subdural hematoma	-	-	21	25.3	8	9.6	1	1.2	30	36.1	0.002
Intracerebral hematoma	1	1.2	21	25.3	5	6	1	1.2	28	33.7	0.024
Cerebral edema	1	1.2	14	16.9	5	6	2	2.4	22	26.5	0.260
Intracerebral ischemia	8	9.6	5	6	2	2.4	2	2.4	17	20.4	0.050
Furrow erasure	2	2.4	9	10.8	3	3.6	1	1.2	15	18	0.903
Gray matter obliteration	1	1.2	1	1.2	-	-	-	-	2	2.4	0.635
Cerebral hernias	1	1.2	7	8.4	1	1.2	1	1.2	10	12	0.761

*Ischemic Brain Vascular Accident †Hemorrhagic Cerebrovascular Accident ‡Cranioencephalic Trauma §Meningitis, Brain Tumors and Amyotrophic Lateral Sclerosis (ALS‖ Chi-square test of association.

The relationship between the care implemented in the ICU directed to patients with severe neurological damage is shown in Table 4. It is observed the predominance of analgesia for pain control in patients with HCVA. The other intensive care procedures analyzed did not

present statistical significance when associated to the type of neurological damage. However, it is noteworthy that invasive mechanical ventilation was used by 89.1% of the patients with severe neurological damage and by all patients with TBI. Tracheostomy was the advanced airway used by patients diagnosed with TBI.

Table 4 - Relationship between the type of neurological damage and the intensive care implemented for patients in the ICU (n=83).

Implemented Care	ICVA*		HCVA†		TBI‡		Others§		Total	Total	p value‖
	n	%	n	%	n	%	n	%	n	%	p
Midazolam Usage	2	2.4	10	12	5	6	3	3.6	20	24	0.406
Fentanyl Use	-	-	-	-	1	1.2	-	-	1	1.2	0.173
Tracheostomy Use	1	1.2	6	7.2	3	3.6	1	1.2	11	13.2	0.709
Orotracheal Tube Use	14	16.9	40	48.2	14	16.9	6	7.2	74	89.1	0.277
Invasive Mechanical Ventilation Use	14	16.9	40	48.2	14	16.9	6	7.2	74	89.1	0.277
Analgesia Use	13	15.7	46	55.4	12	14.5	8	9.6	79	95.1	0.049
Maintenance of 30º Headboard	12	14.5	39	47	13	15.7	7	8.4	71	85.5	0.795
Use of External Ventricular Bypass	1	1.2	3	3.6	1	1.2	2	2.4	7	8.43	0.369
Use of ventricular peritoneal shunt	-	-	1	1.2	-	-	-	-	1	1.2	0.846
Realization of Glycemic Control	11	13.3	39	47	9	10.8	8	9.6	67	80.7	0.148

*Ischemic Brain Vascular Accident †Hemorrhagic Cerebrovascular Accident ‡Cranioencephalic Trauma §Meningitis, Brain Tumors and Amyotrophic Lateral Sclerosis (ALS‖ Chi-square test of association.

Considering the relationship between the types of neurological damage and the complications developed by patients in the ICU, no statistical significance was observed. The brain death protocol was opened for all patients found to be brain dead, and organ harvesting occurred in only one patient previously diagnosed with HCVA.

Table 5 also shows that there was no statistical significance for the length of stay and association with stratification by neurological damage. It is noteworthy that the length of stay

ranged from one to 124 days, with a mean of 11.33 days and a standard deviation of 18.48. Most patients remained hospitalized for less than three days. Also, no statistical significance was found for the relationship between the type of neurological damage and death. The mortality rate was 85.6% (n=71) for patients with severe neurological data, being the HCVA with 45.8% (n=38) of the deaths, followed by ICVA with 18.1% (n= 15) and TBI 14.5% (n= 12).

Table 5 - Relationship between the type of neurological damage and clinical outcome (n=83).

Clinical Outcome	ICVA*		HCVA†		TBI‡		Others§		Total	Total	p value‖
	n	%	n	%	n	%	n	%	n	%	p
Cerebrovascular Accident in hospitalization	1	1.2	2	2.4	-	-	-	-	3	3.6	0.730
Pressure Injuries	2	2.4	7	8.4	1	1.2	2	2.4	12	14.4	0.715
Cardiorespiratory arrest	9	10.8	20	24.1	4	4.8	2	2.4	35	42.1	0.260
Brain Death	-	-	2	2.4	1	1.2	1	1.2	4	4.8	0.578
Acute Respiratory Failure	-	-	1	1.2	1	1.2	1	1.2	3	3.6	0.369
Cardiogenic shock	-	-	1	1.2	-	-	-	-	1	1.2	0.846
Septic shock	1	1.2	5	6	1	1.2	2	2.4	9	10.8	0.546
Acute renal failure	-	-	1	1.2	1	1.2	1	1.2	3	3.6	0.369
Opening of the Brain Death Protocol	-	-	3	3.6	1	1.2	-	-	4	4.8	0.655
Organ harvesting	-	-	1	1.2	-	-	-	-	1	1.2	0.846
Hospitalization time less than 3 days	8	9.6	21	25.3	6	7.2	1	1.2	36	43.4	0.471
Hospitalization time from 3 to 4 days	2	2.4	5	6	-	-	1	1.2	8	9.6	0.471
Hospitalization time from 5 to 11 days	4	4.8	10	12	4	4.8	2	2.4	20	24.1	0.471
Hospitalization time more than 11 days	1	1.2	10	12	4	4.8	4	4.8	19	22.9	0.471
Death	15	18.1	38	45.8	12	14.5	6	7.2	71	85.6	0.402

*Ischemic Brain Vascular Accident †Hemorrhagic Cerebrovascular Accident ‡Cranioencephalic Trauma §Meningitis, Brain Tumors and Amyotrophic Lateral Sclerosis (ALS‖ Chi-square test of association.

Discussion

The social profile of patients with severe neurological damage is configured by characteristics like those evidenced in other studies conducted in Brazil. Studies[1,9,14] have identified that more than 50% of the patients admitted to ICU with neurological disorders are male. The predominance of men with severe neurological disorders may be associated with the lack of adherence of this population to activities of prevention of risk factors and complications and health promotion. Most seek health services when the disease is already at an advanced stage.[1,9]

A study carried out with 73 patients with neurological disorders and attended by a pre-hospital mobile emergency service found that 31.5% (n= 23) were illiterate and that 28.8% (n= 21) had incomplete elementary school education.11 An analysis of 126 patients in an ICU in northeastern Brazil disclosed that 63.5% (n= 80) had education up to elementary school. These findings are like the results of this survey, in which there was an incidence of patients with only elementary school education.[19]

Aiming to detect the social, clinical, and hemodynamic profile of 200 patients in an ICU, it was found that among them there was a predominance of the Catholic religion 6.5% (n=11). However, a large part of the surveyed patients had no records concerning their religion 87% (n= 174).[20] This fact also occurred in this survey, in which there was a predominance of the Catholic religion, followed by no records.

The prevalence of white people and of married marital status corroborates the results of Brazilian publications that have addressed the sociodemographic characteristics of critically ill patients.[15,19,21] Regarding the patients' occupation, two surveys: one conducted at a university hospital; and the other at a pre-hospital mobile emergency service and focused on the social profile of patients found that retirees are the class most affected by neurological diseases, as in this study.[11,14]

CVA is among the main neurological diseases found in adult ICU.[3-7] Studies[12,14,16,22] that investigated the epidemiological and clinical profile of neurological patients showed that CVA is the most prevalent severe neurological injury. In the present study, however, HCVA

predominated. This data may be associated with the reality of the research setting, which is a regional reference in neurosurgery and cares for many patients who require surgical intervention, a fact widely observed in the diagnosis of HCVA.[23]

Regarding TBI, a study has pointed out its prevalence in ICU in 46.2%, when compared to other neurological injuries, and 79% of these patients are male. Among the factors that may be associated with this prevalence are car accidents, currently considered a serious public health problem in Brazil, which affect mostly males in the adult age group.[9] This fact may explain the percentage found in this survey, in which only males were affected by TBI, predominantly in the adult age group.

Regarding age and age range of the inpatients, a research aiming to recognize the social and clinical profile of patients admitted to ICU with neurological disorders and carried out with 225 medical records of inpatients in the North of the country found that the mean age was 47 years old for males and 54 years old for females. In addition to the average age, the study found that the largest proportion of inpatients was aged, with prevalence of the age range between 70 and 79 years old.[9] These data are like this survey, in which the average age was 59 years old for both genders, with a prevalence of patients over 60 years old, which characterizes that a large part of the ICU inpatients are aged.

Among the factors associated with the increased incidence of stroke in the population, the increased life expectancy, longer exposure to risk factors, and comorbidities stand out.[9] Among these, hypertension is considered a risk factor for stroke, affecting 74% of patients.18 Besides hypertension, diabetes has high rates of complications, such as cerebrovascular complications that can cause irreversible damage to the patient's health.[3,9,16]

In consonance with the present study that analyzed the clinical profile of patients hospitalized in neurology units by means of 184 medical charts, it was possible to observe that among the signs and symptoms with higher prevalence among neurological patients are: fractures (15.8%; n= 29), convulsions (7.6%; n= 14) and headache (7.1%; n= 13).24 On the other

hand, the present study evidenced the alteration in muscular strength as the main symptom, which is associated to the high number of patients diagnosed with CVA. However, convulsion (12%; n= 10) and headache (18%; n= 15), were also present among the signs and symptoms presented by patients during hospitalization.

Regarding the changes, visualized in imaging exams, that indicate neurological damage, subdural hemorrhage prevails in 5.4% of patients. On the other hand, intracerebral hemorrhage was present in 0.6% of the inpatients.[9] The analysis of the clinical profile of 184 medical records of patients admitted to neurological units highlighted the predominance of fractures (15.8%; n= 29) and hemorrhages (3.8%; n= 7).[24] These studies, when compared to the present research, had a lower percentage of neurological changes evidenced in imaging exams.

As described in a study, more than 80% of neurocritical patients admitted to the ICU underwent sedation and 75.3% were pain free.[25] Among the drugs administered to perform such care, there is a predominance of the association of Fentanyl and Midazolam, administered concomitantly (67.4%; n= 91), followed by administration of only Fentanyl (17%; n= 23) and Midazolam (14.8%; n= 20).1 These data differ from the current survey that shows greater use of Midazolam (24%; n= 20) when compared to Fentanyl. It is important to point out that Fentanyl is an opioid analgesic, while Midazolam is a benzodiazepine. In the clinical evaluation of the patient with severe neurological damage it is necessary to identify the situations in which pain causes agitation and, therefore, analgesia care is essential to ensure patient comfort.

Ventilatory support is one of the essential intensive cares and was evidenced in 89.2% of the cases analyzed, used by all patients with TBI. This result is like that of a study, which dealt with the clinical profile of patients with neurological damage in the ICU, in which the mean time of invasive mechanical ventilation was eight days.[9]

Regarding the complications that occurred during the patients' stay in the intensive care unit, it was observed that cardiorespiratory arrest (CRA) was predominant, followed by pressure

injuries and septic shock. There is a frequency of the following conditions developed by patients during ICU stay: muscle weakness in 60% (n= 51) of the inpatients, followed by pressure injuries (68.2%; n= 58) and sepsis (44.7%; n= 38).[15] Another study, based on the profile of adult ICU admissions in Goiás, portrays CRA as one of the main complications observed during stay. It is noteworthy that 68% of its patients died from this complication.[5]

Regarding neurological damage, the ones most associated with BD are meningitis, brain tumor, and amyotrophic lateral sclerosis. A research directed to the epidemiological profile of the notifications of 680 medical records found that, among the main causes that lead patients to coma and to the diagnosis of BD, are the stroke (46.9%; n=319) and the TBI (33.8%; n= 230). On the other hand, brain tumors (3.7%; n= 25) and infections (2.9%; n= 20) differ from the present study. CRA is the main difficulty encountered in organ harvesting. However, the disagreement between family members when opting for organ donation, the lack of knowledge about the potential donor's wishes, the desire to see an intact body, and the refusal of family members are also among the main difficulties encountered during the procedure.[26-27]

Regarding the length of stay of neurological patients in the ICU, similarity is observed with the findings of another survey, which had a mean length of stay of 9.6 days, with a minimum of one (1) day and a maximum of 69 days of stay. The maximum number of days of stay does not corroborate this study, due to a discrepant difference of 55 days.[9]

A research on the clinical evolution and survival of 1,289 neurocritical patients showed that 49.3% of the patients admitted with neurological damage died.[1] Another study on the epidemiological characteristics and causes of death in ICU patients showed that among the diagnoses that most led to death were cerebrovascular diseases (24.6%).[4]

The data obtained in the current research show that deaths predominated in more than 80% of the clinical outcome. This may be associated with the severity of the patients with neurological damage who were admitted to the ICU, which is a reference in neurosurgery for

other municipalities in the region. Many patients wait for ICU beds for several days, which leads to a worsening of their health status. However, the studies cited[1,4] corroborate the data of this research, which also showed a high number of deaths in patients diagnosed with cerebrovascular diseases or other neurological damage.

As a limitation of the study, we highlight the incompleteness of the medical records that made it difficult to find information, whose data were even absent. Information such as place of birth, municipality of residence, and family history of diseases was not described in some medical records. It is also noteworthy that there is an incipiency of studies focused on the analysis of the prevalence of neurological damage in ICU patients, as evidenced during the literature review for the preparation of the research project and discussion of results.

The results may subsidize the planning of intensive care services as a support tool for the creation of new protocols for assistance and management of the sector, providing support to identify the weaknesses and potentialities of the service. It also demonstrates the need for national research focused on the analysis of the clinical profile and care demands of patients with neurological damage admitted to the ICU. The study can be considered a theoretical support for the training of new health professionals, helping in the recognition of the main neurological disorders, comorbidities that are linked to the occurrence of these disorders, as well as the care and examinations assigned to them during the hospitalization of neurocritical patients.

A instituição na qual foi realizada a pesquisa é referência em neurocirurgia para onze municípios da região onde está situada. Com isso, almeja-se que os dados obtidos na pesquisa fortaleçam as negociações do serviço com o governo do Estado como parâmetro para o planejamento dos limites financeiros e contratualização de novos leitos de saúde, a fim de ofertar um serviço de melhor qualidade à população assistida. Vale destacar que a referida pesquisa, também serve para dar enfoque à necessidade da prevenção de comorbidades e ao monitoramento de fatores de risco, preditores de danos neurológicos.

The institution where the research was carried out is a reference in neurosurgery for eleven municipalities in the region where it is located. Thus, it is hoped that the data obtained in the research will strengthen the negotiations of the service with the state government as a parameter for planning the financial limits and contracting of new health beds, in order to offer better quality service to the assisted population. It is worth noting that this research also serves to focus on the need for the prevention of comorbidities and the monitoring of risk factors, predictors of neurological damage.

Conclusion

The predominant diagnosis was HCVA, followed by ischemic stroke and TBI. Regarding gender, TBI affected only men aged up to 50 years old, and among women, the diagnoses of TBI and HCVA prevailed. Regarding the analysis of the distribution of neurological damage by age group, HCVA was diagnosed in patients of different ages, and TBI predominated in patients older than 74 years old.

Regarding comorbidities, SAH prevailed, especially among patients with ischemic and hemorrhagic CVAs, followed by heart diseases (acute myocardial infarction, congestive heart failure) that predominated in ischemic stroke. Altered muscle strength was prevalent, especially in the stroke and HCV diagnoses. Bone fractures were observed only in the TBI diagnosis, and subdural and intracerebral hematoma in the HCV diagnosis. On the other hand, cerebral ischemia was present in both types of CVA. Regarding care, analgesia was one of the main cares evidenced in the care of the neurological patient. Death prevailed as the clinical outcome in 85% of patients with severe neurological damage

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