

**CLINICAL-EPIDEMIOLOGICAL, ANESTHETIC-SURGICAL, AND  
HEMOTRANSFUSIONAL CHARACTERIZATION: INTRACRANIAL  
ONCOLOGICAL NEUROSURGERY**

**CARACTERIZAÇÃO CLÍNICO-EPIDEMIOLÓGICA, ANESTÉSICA-CIRÚRGICA E  
HEMOTRANSFUSIONAL: NEUROCIRURGIA ONCOLÓGICA INTRACRANIANA**

**CARACTERIZACIÓN CLÍNICO-EPIDEMIOLÓGICA, ANESTÉSICO-  
QUIRÚRGICA Y HEMOTRANSFUSIONAL: NEUROCIRUGÍA ONCOLÓGICA  
INTRACRANEAL**



<https://doi.org/10.56238/sevened2026.009-059>

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**ABSTRACT**

Elective intracranial oncological neurosurgery involves procedures of high technical and anesthetic complexity, associated with significant risks of perioperative complications, including hemodynamic instability, substantial blood loss, and the need for transfusion of blood components. In addition, clinical, sociodemographic, behavioral, and anesthetic-surgical factors may directly influence postoperative outcomes. In view of the above, this study aims to describe the clinical-epidemiological profile, anesthetic-surgical management, and hemotransfusional aspects. This is a cross-sectional study conducted in a tertiary hospital with patients who underwent elective intracranial oncological neurosurgery between January 2020 and December 2022, whose data were collected from electronic medical records. In the sample (n = 43), the following characteristics stood out: female sex (65.1%), age equal to or greater than 60 years (39.5%), white skin color (97.7%), current or previous smoking (25.6%), alcohol consumption (51.2%), non-eutrophic patients (62.5%), with comorbidities (100.0%) and previous surgeries (83.7%). In the anesthetic-surgical management, surgical time between 241 and 320 minutes (44.2%), general anesthesia (100.0%), orotracheal intubation (100.0%), and supine position (88.4%) were observed. Blood component reservation and transfusion occurred in 95.3% and 65.1% of the

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procedures, respectively. The results showed that patients undergoing elective oncological neurosurgery in the neurosurgery service in question are predominantly women, older adults, non-eutrophic, with comorbidities and previous surgeries, undergoing procedures in the supine position, with prolonged surgical time, general anesthesia, and orotracheal intubation. Elective intracranial oncological neurosurgery involves patients with high clinical complexity, in whom sociodemographic, behavioral, and anesthetic-surgical aspects influence perioperative outcomes and, consequently, may support strategies for individualized management, optimization of anesthetic and hemotransfusional protocols, and improvement of safety and quality of care.

**Keywords:** Neuroanesthesia. Intracranial Neoplasms. Surgical Oncology. Blood Transfusion. Perioperative Period.

## RESUMO

A neurocirurgia oncológica intracraniana eletiva envolve procedimentos de alta complexidade técnica e anestésica, associados a riscos significativos de complicações perioperatórias, incluindo instabilidade hemodinâmica, perda sanguínea relevante e necessidade de transfusão de hemocomponentes. Além disso, fatores clínicos, sociodemográficos, comportamentais e anestésico-cirúrgicos podem influenciar diretamente os desfechos pós-operatórios. Diante do exposto, este estudo tem como objetivo descrever perfil clínico-epidemiológico, ato anestésico-cirúrgico e aspectos hemotransfusionais. Trata-se de um estudo transversal, desenvolvido em um hospital terciário, com pacientes submetidos à neurocirurgia oncológica intracraniana eletiva entre janeiro de 2020 e dezembro de 2022, cujos dados foram coletados de prontuários eletrônicos. Na amostra (n = 43), destacaram-se sexo feminino (65,1%), idade igual ou superior a 60 anos (39,5%), cor de pele branca (97,7%), tabagismo atual ou prévio (25,6%), consumo de bebida alcoólica (51,2%), pacientes não-eutróficos (62,5%), com comorbidades (100,0%) e cirurgias prévias (83,7%). No ato anestésico-cirúrgico, evidenciaram-se tempo cirúrgico entre 241 e 320 minutos (44,2%), com anestesia geral (100,0%), intubação orotraqueal (100,0%) e decúbito dorsal (88,4%). Reserva e transfusão de hemocomponentes ocorreram em, respectivamente, 95,3% e 65,1% dos procedimentos. Os resultados evidenciaram que os pacientes neurocirúrgicos oncológicos eletivos atendidos no serviço de neurocirurgia em questão são, predominantemente, mulheres, com idade avançada, não-eutróficas, com comorbidades e cirurgias prévias, submetidas a procedimentos em decúbito dorsal, com tempo cirúrgico elevado, anestesia geral e intubação orotraqueal. A neurocirurgia oncológica intracraniana eletiva envolve pacientes de alta complexidade clínica, nos quais aspectos sociodemográficos, comportamentais e anestésico-cirúrgicos influenciam nos desfechos perioperatórios e, conseqüentemente, podem subsidiar estratégias de manejo individualizado, otimização de protocolos anestésicos e hemotransfusionais e melhoria da segurança e qualidade assistencial.

**Palavras-chave:** Neuroanestesia. Neoplasias Intracranianas. Oncologia Cirúrgica. Transfusão Sanguínea. Período Perioperatório.

## RESUMEN

La neurocirugía oncológica intracraneal electiva implica procedimientos de alta complejidad técnica y anestésica, asociados a riesgos significativos de complicaciones perioperatorias, incluyendo inestabilidad hemodinámica, pérdida sanguínea relevante y necesidad de transfusión de hemoderivados. Además, factores clínicos, sociodemográficos, conductuales y anestésico-quirúrgicos pueden influir directamente en los desenlaces postoperatorios. Ante lo expuesto, este estudio tiene como objetivo describir el perfil clínico-epidemiológico, el acto anestésico-quirúrgico y los aspectos hemotransfusionales. Se trata de un estudio transversal, desarrollado en un hospital terciario, con pacientes sometidos a neurocirugía

oncológica intracraneal electiva entre enero de 2020 y diciembre de 2022, cuyos datos fueron recolectados de historias clínicas electrónicas. En la muestra (n = 43), se destacaron sexo femenino (65,1%), edad igual o superior a 60 años (39,5%), color de piel blanca (97,7%), tabaquismo actual o previo (25,6%), consumo de bebidas alcohólicas (51,2%), pacientes no eutróficos (62,5%), con comorbilidades (100,0%) y cirugías previas (83,7%). En el acto anestésico-quirúrgico, se evidenciaron tiempo quirúrgico entre 241 y 320 minutos (44,2%), anestesia general (100,0%), intubación orotraqueal (100,0%) y decúbito supino (88,4%). La reserva y transfusión de hemoderivados ocurrieron en el 95,3% y 65,1% de los procedimientos, respectivamente. Los resultados evidenciaron que los pacientes neuroquirúrgicos oncológicos electivos atendidos en el servicio de neurocirugía en cuestión son predominantemente mujeres, de edad avanzada, no eutróficas, con comorbilidades y cirugías previas, sometidas a procedimientos en decúbito supino, con tiempo quirúrgico elevado, anestesia general e intubación orotraqueal. La neurocirugía oncológica intracraneal electiva implica pacientes de alta complejidad clínica, en los cuales aspectos sociodemográficos, conductuales y anestésico-quirúrgicos influyen en los desenlaces perioperatorios y, en consecuencia, pueden respaldar estrategias de manejo individualizado, optimización de protocolos anestésicos y hemotransfusionales, y mejora de la seguridad y calidad asistencial.

**Palabras clave:** Neuroanestesia. Neoplasias Intracraneales. Oncología Quirúrgica. Transfusión Sanguínea. Período Perioperatorio.

## 1 INTRODUCTION

Elective intracranial oncological neurosurgery represents one of the most challenging fields of contemporary neurosurgical practice, involving procedures that require not only neurosurgical technical skill, but also a meticulous anesthetic approach adapted to the physiological demands of the central nervous system. Intracranial tumors, including gliomas, meningiomas, and brain metastases, constitute a considerable proportion of central nervous system neoplasms and often require extensive surgical resection for symptom relief, improved survival, and functional preservation. Recent studies highlight that neuroanesthesia plays a central role in optimizing cerebral perfusion, maintaining intracranial pressure, and hemodynamic stabilization during these complex procedures, which can directly influence perioperative outcomes and patient recovery after surgery (BERSOT *et al.*, 2025; GONZÁLEZ *et al.*, 2025).

In the perioperative context, in addition to the technical demands, patients undergoing resection of elective intracranial tumors often exhibit a highly complex clinical profile, characterized by advanced age and multimorbidity associated with conditions such as hypertension, diabetes mellitus, and preexisting neurological dysfunctions, which can increase the risk of perioperative complications and influence the need for intraoperative transfusion support. The literature points out that approximately one fifth of patients undergoing meningiomas resection require blood transfusion due to significant blood loss during surgery, highlighting the importance of well-established blood transfusion protocols and rigorous monitoring (ISMAIL *et al.*, 2024; RAJAGOPALAN *et al.*, 2019)

Sociodemographic and behavioral variables also play a significant role in the prognosis of these patients. Factors such as smoking, alcohol consumption, and altered nutritional status have been associated with a higher incidence of postoperative complications in different surgical contexts, influencing the systemic inflammatory response, tissue healing, and the ability of individuals to recover after highly complex procedures. Identifying and quantifying these factors in real-world clinical settings is key to enhancing risk stratification and developing individualized perioperative management strategies (BERSOT *et al.*, 2025).

In addition, the characteristics of the anesthetic-surgical procedure, including the choice of anesthetic technique, airway management, duration of the procedure, and patient positioning, influence not only the recovery time, but also the intraoperative hemodynamic and metabolic profile (DHINGRA *et al.*, 2025).

The safe transport of blood components and their judicious administration are also a relevant aspect of comprehensive care. Although specific practical guidelines for transfusion

in oncological neurosurgery are not yet fully consolidated, evidence suggests that greater blood loss and the need for frequent transfusions are associated with poorer functional prognosis and adverse outcomes, including increased perioperative morbidity and mortality (ISMAIL *et al.*, 2024; RAIL *et al.*, 2022). In view of this scenario, the concept of *Patient Blood Management* (PBM) stands out in the literature, defined as a multidisciplinary and evidence-based approach, aimed at optimizing the management of the patient's blood and reducing the need for transfusions. PBM integrates strategies that include preoperative optimization of hemoglobin levels, the adoption of surgical and pharmacological techniques to minimize intraoperative blood loss, and the judicious use of blood components (LENET *et al.*, 2023). In the context of oncological neurosurgery, in which procedures are often associated with significant blood loss and greater transfusion needs, the application of these strategies can contribute to reducing exposure to allogeneic transfusions and improving clinical outcomes in the perioperative period.

Despite the clinical and care importance of these topics, there is a lack of studies that comprehensively integrate the sociodemographic profile, clinical health factors, anesthetic-surgical aspects, and hemotransfusion practices in patients undergoing elective intracranial oncological neurosurgery in Brazil. Descriptive observational investigations based on hospital data can contribute to filling this gap, providing evidence that supports the improvement of care, the optimization of anesthetic and blood transfusion protocols, and the development of preventive interventions aimed at reducing perioperative complications and improving clinical outcomes.

Therefore, this study aims to describe the sociodemographic, behavioral, and health aspects of patients undergoing elective intracranial oncological neurosurgery, as well as to characterize the anesthetic act, the surgical procedure, and the hemotransfusion aspects.

## 2 METHODOLOGY

This was a cross-sectional study conducted in a tertiary hospital located in Passo Fundo, Rio Grande do Sul, Brazil, with ethical approval (opinion No. 6,282,730) and in accordance with the Declaration of Helsinki. The conduct of the study and the presentation of the results were described in accordance with the guidelines of *the Strengthening the Reporting of Observational Studies in Epidemiology* (VON ELM *et al.*, 2008)

To compose the sample, a list of the hospitalization management system was obtained, considering the data by medical specialty. Patients who underwent elective intracranial oncological neurosurgery between January 2020 and December 2022, of both

sexes, aged 18 years or older, and with documents descriptive of the surgery available in the electronic medical record, were defined as eligible for this study.

Data collection covered two periods: the clinical-epidemiological profile was analyzed in the medical records of the hospital admission consultation, while the characteristics of the anesthetic-surgical procedure and the blood transfusion aspects were investigated intraoperatively.

The clinical-epidemiological profile included sex, age, skin color, marital status, origin, exercise of paid activity, education, religion, smoking, alcoholism, use of illicit drugs, nutritional status classified by body mass index (BRASIL, 2011), drug atopy, continuous use medications, comorbidities and previous surgeries. The anesthetic-surgical procedure encompassed surgical time, anesthetic technique, orotracheal intubation and patient positioning, while in the blood transfusion aspects, the use of reserved and transfused blood components during the surgical procedure was analyzed.

For data analysis, descriptive statistics were used based on mean and standard deviation estimates for numerical variables, and absolute (n) and relative (%) frequencies for categorical variables.

### 3 RESULTS

The sample consisted of 43 participants from 30 municipalities, predominantly from the north of Rio Grande do Sul. As shown in Table 1, the following stood out: female (65.1%), age 60 years or older (39.5%;  $54.0 \pm 2.11$  years), white skin color (97.7%), individuals with a spouse (58.1%), from municipalities other than Passo Fundo (81.4%), with paid activity (53.8%), 9 years or less of schooling (63.1%), and Catholics (67.4%). Regarding behavioral aspects, 25.6% were or were smokers, 51.2% reported current or previous consumption of alcoholic beverages and 97.7% had never used illicit drugs. Regarding health, 62.5% were not eutrophic, 16.3% had drug atopy, 48.8% used 3 to 6 daily medications (mean  $3.3 \pm 0.4$  daily medications) and all had comorbidities, especially systemic arterial hypertension (53.5%), neurological diseases (46.5%), psychiatric disorders (34.9%), diabetes mellitus (18.6%) and dyslipidemia (16.3%). In addition, 88.4% had two or more comorbidities and 83.7% had undergone previous surgeries.

**Table 1**

*Clinical-epidemiological profile of patients undergoing elective intracranial oncological neurosurgery at a tertiary hospital in Passo Fundo, Rio Grande do Sul, Brazil, 2020 to 2022 (n = 43)*

<b>Variables</b>	<b>n</b>	<b>%</b>
Gender		
Male	15	34,9
Women	28	65,1
Age, in full years		
18 - 39	9	20,9
40 - 49	6	14,0
50 - 59	11	25,6
≥ 60	17	39,5
Skin color		
White	42	97,7
Other	1	2,3
Marital status		
With spouse	25	58,1
No spouse	18	41,9
Provenance		
Passo Fundo	8	18,6
Other municipalities	35	81,4
Paid activity (n = 39)		
Yes	21	53,8
No/not informed	18	46,2
Schooling (in years of study; n = 38)		
≤ 9	24	63,1
10 - 12	9	23,7
≥ 13 years of study	5	13,2
Religion		
Catholic	29	67,4
Other/Not Informed	14	32,6
Smoking		
Yes	4	9,3
Former smoker	7	16,3
No/not informed	32	74,4
Alcoholism		
Yes	18	41,9
Former drinker	4	9,3
No/not informed	21	48,8
Illicit drug use		
Yes	0	0,0
Former user	1	2,3
No/not informed	42	97,7
Nutritional status (n = 40)		
Eutrophic	15	37,5
Non-eutrophic	25	62,5
Drug atopy		
Yes	7	16,3

No/not informed	39	83,7
Number of medicines for continuous use		
0	4	9,3
1 - 2	15	34,9
3 - 6	21	48,8
≥ 7	3	7,0
Comorbidity		
Yes	43	100,0
No	0	0,0
Comorbidities		
Systemic arterial hypertension	23	53,5
Neurological disease	20	46,5
Psychiatric disorder	15	34,9
Diabetes mellitus	8	18,6
Dyslipidemia	7	16,3
Cardiovascular disease	6	14,0
Endocrine disease	6	14,0
Obesity	5	11,6
Cerebrovascular disease	2	4,7
Liver disease	2	4,7
Lung disease	1	2,3
Haematological disease	1	2,3
Renal disease	0	0,0
Number of comorbidities		
0 - 1	5	11,6
≥ 2	38	88,4
Previous surgeries		
Yes	36	83,7
No/not informed	7	16,3

Regarding the anesthetic-surgical procedure, described in Table 2, there was a predominance of surgical time between 241 and 320 minutes (44.2%), general anesthesia (100.0%), orotracheal intubation (100.0%) and supine (88.4%).

**Table 2**

*Characterization of the anesthetic-surgical procedure of patients undergoing elective intracranial oncological neurosurgery at a tertiary hospital in Passo Fundo, Rio Grande do Sul, Brazil, 2020 to 2022 (n = 43)*

Variables	n	%
Surgical time, in minutes		
≤ 60	1	2,3
61 - 120	1	2,3
121 - 180	2	4,7
181 - 240	4	9,3
241 - 320	19	44,2
> 320	16	37,2
Anesthetic technique		

General anesthesia	43	100,0
Local anesthesia	34	79,1
Sedation	0	0,0
Orotracheal intubation		
Yes	43	100,0
No	0	0,0
Patient positioning		
Supine position	38	88,4
Prone position	1	2,3
Lateral decubitus	2	4,7
Other positioning	2	4,7

As shown in Table 3, blood component reserve occurred in 95.3% of the neurosurgeries, with a single unit (9.3%) and two units of packed red blood cells (86.0%), while blood transfusion was performed in 65.1% of the procedures, with a single unit (4.7%) and two units of packed red blood cells (60.5%). It is noteworthy that the transfusion of blood components without prior reservation did not occur in any of the procedures analyzed.

**Table 3**

*Hemotransfusion aspects of patients undergoing elective intracranial oncological neurosurgery at a tertiary hospital in Passo Fundo, Rio Grande do Sul, Brazil, 2020 to 2022 (n = 43)*

Variables	n	%
Reserved blood components	41	95,3
Red blood cell concentrate	41	95,3
1 unit of packed red blood cells	4	9,3
2 units of packed red blood cells	37	86,0
Platelet concentrate	0	0,0
Cryoprecipitate	0	0,0
Fresh plasma	0	0,0
Whole blood	0	0,0
Transfused blood components	28	65,1
Red blood cell concentrate	28	65,1
1 unit of packed red blood cells	2	4,7
2 units of packed red blood cells	26	60,5
Platelet concentrate	0	0,0
Cryoprecipitate	0	0,0
Fresh plasma	0	0,0
Whole blood	0	0,0

## 4 DISCUSSION

Regarding the clinical-epidemiological variables, there was a higher frequency of females in the sample (65.1%), a result that was also reported by different national and international studies (ANINDITHA *et al.*, 2021; LENGA *et al.*, 2024; RODRIGUES *et al.*, 2014;

SANTOS *et al.*, 2021). This distribution can be partially attributed to biological aspects, considering that certain intracranial tumors, such as meningiomas, have expression of hormone receptors, which is associated with a higher incidence in women (AGOPIANTZ *et al.*, 2023; OSTROM *et al.*, 2022). Added to this is the fact that women, in general, have a greater demand for medical follow-up (COBO *et al.*, 2021), favoring the early recognition of clinical manifestations and, consequently, referral for elective surgical procedures, such as those contemplated in this sample.

The predominance of patients aged 60 years or older observed among the research participants is supported by other previous epidemiological studies on intracranial neoplasms, which demonstrated a higher incidence of these lesions in older age groups (LENGA *et al.*, 2024; YANG *et al.*, 2021; RODRIGUES *et al.*, 2014).

With regard to educational level, there was a higher concentration of participants with up to nine years of schooling, which was also found by other researchers (MOURA *et al.*, 2021; PUNCHAK *et al.*, 2025). This finding may be related to structural barriers in access to the care network, which favors the late identification of the disease and, consequently, the need for a specialized neurosurgical approach (RIBEIRO *et al.*, 2015; CARSTAM *et al.*, 2020). In a convergent way, the preponderance of self-declared white individuals (CANTO *et al.*, 2025; VANI, 2021) and with a spouse (MEZA-GARCÍA *et al.*, 2022) is in line with what has been found in other investigations involving tumors of the central nervous system. A similar trend was observed regarding insertion in the labor market, with a higher proportion of employed patients (LEEPER *et al.*, 2023). Regarding religiosity, there is a gap in the literature specifically related to patients undergoing intracranial oncological neurosurgery. However, in a scoping review with cancer patients in general, a predominance of the Catholic religion was found among the participants (PATRÍCIO; CRISTINO; AQUINO, 2023).

Regarding behavioral aspects, there was a predominance of non-smokers, which was also described in a cohort of cancer patients undergoing neurosurgery (PADEVIT *et al.*, 2019). Although smoking is recognized as an important risk factor for several types of neoplasms, the development of cancer has a multifactorial character, involving the interaction between genetic, environmental, and behavioral factors (ZHANG *et al.*, 2020). In this context, occupational exposures, alcohol consumption, eating habits, sedentary lifestyle, and genetic predisposition can also contribute significantly to carcinogenesis, which may explain the occurrence of the disease even among individuals without a history of smoking (KATZKE *et al.*, 2015). In addition, the high prevalence of alcohol consumption observed in this sample reinforces the relevance of other behavioral factors in the process of

carcinogenesis, a finding also described in a large study involving patients affected by neoplasms (SHI *et al.*, 2023).

Regarding clinical conditions, most of the participants in this study were not eutrophic, which is in line with what was reported in a systematic review on patients with intracranial neoplasms (VEGA *et al.*, 2025). In the same sense, the expressive presence of systemic arterial hypertension, neurological diseases, psychiatric disorders, diabetes mellitus and dyslipidemia is also supported by previous publications (SHARMA *et al.*, 2022; ABOUBECHARA *et al.*, 2024; KUMAR *et al.*, 2025; GODOI *et al.*, 2022). In addition, the predominant occurrence of multimorbidity and history of surgical interventions may reflect the characteristics of the care of the service investigated, characterized as a macro-regional referral center for neurosurgical procedures of medium and high complexity. This profile of multimorbidity may imply greater anesthetic risk and a higher probability of perioperative complications, requiring individualized planning and multiprofessional integration in the care of these patients.

Regarding the anesthetic-surgical procedure, the operative time observed in the present sample was longer than that described in the literature. While in this study the most frequent surgical duration was between 241 and 320 minutes, international series of craniotomies for intracranial tumors reported times shorter than 240 minutes (MCHAYLE *et al.*, 2021; BHARADWAJ *et al.*, 2023; BAH *et al.*, 2025). This divergence may be related to differences in the profile of the patients, anatomical complexity of the lesions, techniques employed, use of intraoperative resources, and institutional characteristics, factors that possibly influence the longer duration of surgical procedures. However, it should be noted that prolonged operative times are associated with a higher risk of infection, thromboembolic complications, and worse functional recovery, which may have relevant prognostic implications (BAH *et al.*, 2025).

In addition, most patients underwent general anesthesia, with orotracheal intubation and position in the supine position, which is in accordance with what has been pointed out by other studies on elective intracranial oncological neurosurgery (BHARADWAJ *et al.*, 2023; KUMAR *et al.*, 2025). This pattern is expected in this type of procedure, as general anesthesia provides absolute immobility, control of the hemodynamic response to surgical stimulus, and adequate manipulation of intracranial pressure (BILOTTA *et al.*, 2013). Orotracheal intubation ensures a protected airway and controlled mechanical ventilation, allowing precise adjustment of oxygenation and partial pressure of carbon dioxide, a variable directly related to cerebral blood flow (COTTRELL; PATEL, 2017). The supine position, in turn, is widely used in intracranial oncological neurosurgeries because it favors surgical

access, patient stability, and proper head positioning in the cranial fixation system (WINN, 2022).

Regarding blood transfusion aspects, preoperative reserve of blood components was observed in 95.3% of the cases, with a predominance of packed red blood cells. In addition, 65.1% of the patients required intraoperative transfusion. This rate is higher than that described in the literature, in which the need for transfusion in intracranial neuro-oncological surgeries is, on average, around 30% of the cases (ISMAIL *et al.*, 2024; RAJAGOPALAN *et al.*, 2019). The difference observed can be explained by particularities of the sample studied, such as greater complexity of cases, predominance of bulky or hypervascularized tumors, prolonged surgical time, presence of preoperative anemia, or more liberal transfusion criteria adopted by the team (HSU; HUANG, 2016; XIAO *et al.*, 2023). These factors may contribute to greater intraoperative blood loss and, consequently, greater need for transfusion compared to the literature. In this sense, considering the high percentage of transfusions observed in the present sample, strategies aligned with the principles of PBM may represent a relevant approach to optimize perioperative management in these patients. In a case report of neurosurgery for meningioma resection, the application of PBM strategies, including preoperative autologous donation and hematinic support, made it possible to perform the procedure without the need for allogeneic transfusion and with a favorable postoperative evolution (CHAND *et al.*, 2021), evidencing the potential of these measures to reduce transfusion exposure in surgeries with a high risk of bleeding.

Finally, it is worth noting that the relevance of this study is based on the integrated analysis of the clinical and epidemiological profile of the patients, the particularities of anesthetic-surgical management, and the hemotransfusion aspects related to intracranial oncological neurosurgery, allowing a comprehensive understanding of perioperative care in this population. In addition, the results obtained are supported by the national and international literature, which reinforces their scientific consistency and thus they can contribute to the improvement of care planning, supporting safer and more individualized clinical decisions and favoring better postoperative outcomes.

However, some limitations should be considered in the interpretation of the results, especially the possibility of information and selection bias. The data were extracted from electronic medical records filled out by different professionals throughout the care, which prevents the standardization of records and may lead to inconsistencies or incomplete information, with a potential impact on the internal validity of the study. And, because this is a sample from a single hospital institution, although it is a macro-regional reference, the

findings may reflect local particularities of care and organizational profile, limiting its extrapolation to other contexts and populations.

## 5 CONCLUSION

In summary, the clinical-epidemiological profile of patients undergoing elective intracranial oncological neurosurgery shows a higher prevalence of women, age 60 years or older, white skin color, alcohol consumption, inadequate nutritional status, comorbidities, and previous surgeries. In the anesthetic-surgical procedure, there is a predominance of 241 to 320 minutes of surgical time, general anesthesia, orotracheal intubation and supine position. In addition, the reserve and transfusion of blood components has an important prevalence, particularly the red blood cell concentrate. These results are corroborated by the current scientific literature and contribute significantly to the improvement of practices in anesthesiology and neurosurgery, as they offer subsidies for the qualification of the care provided, optimization of the use of institutional resources, and strengthening of evidence-based decision-making, with a potential positive impact on patient safety and experience.

## 6 AUTHOR CONTRIBUTIONS

Lucas Dalla Maria: conception and planning of the study; data collection and processing; statistical analysis of the collected data and interpretation, conception and writing of the manuscript; critical review of the literature; critical revision of the manuscript; final approval of the manuscript.

Jamerson Fiorentin: conception and writing of the manuscript; critical review of the literature; critical revision of the manuscript; final approval of the manuscript.

Victor Luiz Ferreira Kauer: conception and writing of the manuscript; critical review of the literature; critical revision of the manuscript; final approval of the manuscript.

Eugenio Pagnussatt Neto: conception and planning of the study; critical review of the literature; critical revision of the manuscript; final approval of the manuscript.

Shana Ginar da Silva: conception and planning of the study; critical review of the literature; critical revision of the manuscript; final approval of the manuscript.

Ivana Loraine Lindemann: conception and planning of the study; statistical analysis of the collected data and interpretation, conception and writing of the manuscript; critical review of the literature; critical revision of the manuscript; final approval of the manuscript.

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