Cogitare Enfermagem

QUALITY ASSESSMENT TOOL: MAPPING CLINICAL SIGNS OF BRAIN DEATH

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ABSTRACT

Objective: to identify characteristics of deaths and clinical signs of brain death in patients with neurological lesions admitted to critical care units, using a tool to support the active search.

Method: a descriptive, retrospective study conducted from January to August 2017 in the critical units of two hospitals in southern Brazil. Data were collected from the medical records of patients who died using the instrument of the National Transplant Organization of Spain and analyzed by descriptive statistics.

Results: the clinical signs of brain death identified before death were Glasgow three; cough reflexes absent; intracranial hypertension present, mydriatic pupils and polyuria. It is noteworthy that 14.8% presented all the criteria to start the diagnosis of brain death but were not notified to the State Transplant Center.

Conclusion: the professionals working in these units must have knowledge of the clinical signs of brain death for an early identification of these patients, consequently increasing the notifications.

DESCRIPTORS: Brain Death; Health Profile; Quality Management; Tissue and Organ Procurement; Nursing.

HERRAMIENTA DE LA EVALUACIÓN DE LA CALIDAD: MAPEO DE LOS SIGNOS CLÍNICOS DE LA MUERTE CEREBRAL

RESUMEN:

Objetivo: identificar las características de las muertes y los signos clínicos de muerte cerebral de los pacientes con lesión neurológica ingresados en unidades de pacientes críticos, a partir de una herramienta de apoyo a la búsqueda activa. Método: estudio descriptivo y retrospectivo realizado de enero a agosto de 2017 en las unidades críticas de dos hospitales del sur de Brasil. Los datos se recogieron en los prontuarios de pacientes que evolucionaron al óbito utilizando el instrumento de la Organización Nacional de Trasplantes de España, analizados por la estadística descriptiva. Resultados: os sinais clínicos de morte encefálica identificados antes do óbito foram Glasgow três; reflexos de tosse ausente; hipertensão intracraniana presente, pupilas midriáticas e poliúria. Destaca-se que 14,8% apresentaram todos os critérios para iniciar o diagnóstico de morte encefálica, mas não foram notificados à Central Estadual de Transplante. Resultados: los síntomas clínicos de muerte encefálica identificados antes del óbito fueron Glasgow tres; reflejos de tos ausentes; hipertensión intracraneal presente, pupilas midriáticas y poliuria. Cabe destacar que el 14,8% presentaba todos los criterios para iniciar el diagnóstico de muerte cerebral, pero no fueron notificados al Centro Estatal de Trasplantes. Conclusión: los profesionales que trabajan en estas unidades deben tener conocimiento de los signos clínicos de la muerte cerebral para la identificación temprana de estos pacientes, aumentando así las notificaciones.

DESCRIPTORES: Muerte Encefálica; Perfil de Salud; Gestión de la Calidad; Obtención de Tejidos y Órganos.

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INTRODUCTION

Brain death (BD) has been studied over the years under different aspects due to the physiological changes caused by this condition[1]. The understanding of health professionals to act with these patients, together with the development of effective care, speed up the diagnosis and notification of BD to the State Transplant Center (CET)[1-2].

Considering the various aspects studied on the topic of ME, the question is: is there a need to investigate issues related to BD? It is possible to think, briefly, that there is not. However, data from the Brazilian Association of Organ Transplantation (ABTO) of 2019 evidenced underreporting of approximately 3,800 MEs per year to CETs in Brazil[3]. A similar reality is observed in a Brazilian study developed in three neurology referral hospitals, which evidenced that 25% of BDs were not identified and notified to the CETs[4].

In addition to the underreporting of BD, there are difficulties for teams working in Critical Care Units (CCUs) regarding the identification, evaluation, and validation of patients with clinical criteria to initiate and perform the diagnosis of BD[5-7], which reinforce the importance of the topic.

It is noteworthy that there are ethical controversies related to the ignorance and differentiation of the concepts of death by cardiac arrest, the concept of BD and hemodynamic maintenance of the patient in BD. This happens because this patient remains with the physiological functions preserved, even if temporarily. Moreover, the team is faced with cultural, religious and ethical issues when artificially maintaining a patient without brain function[8-9].

In this context, the legal issues of initiating the procedures for BD diagnosis in all patients who present with no perceptive coma and apnea, regardless of donor status or not, are involved. From the Law 9434/1997, it was established that the notification of BD to the CETs would be compulsory [1-2]. This action is essential, because the effectiveness of organ and tissue donation is related to the early notification to avoid the loss of the potential donor.

To facilitate the identification of patients with clinical criteria for BD, Ordinance 2600/2009 indicates that an active search in loco is mandatory in intensive care units, emergency rooms, and other inpatient units that care for these patients. Visits to these units should be performed daily by professionals of the Hospital Transplant Commissions (CHT)[10-11], which, for the most part, are composed of nurses.

The Resolution of the Federal Council of Medicine highlights the ethical and legal commitment that the healthcare team, especially physicians, should have in identifying patients with clinical criteria for BD, so that this diagnosis can be initiated as soon as possible[2]. It is noteworthy that the neurological evaluation of patients with potential progression to BD is supported by several clinical criteria[12-13].

It is noteworthy that the organ shortage is a worldwide problem and the development of strategies to know the number of BDs, the underreporting and the causes of loss of potential donors are essential to improve the donation-transplantation process[4,14]. In addition, the maintenance of this patient should be adequate, so that he/she is not lost before the family is consulted about organ donation[15].

Thus, it is important that the healthcare team knows the main clinical criteria for BD, especially nurses and their teams, because they are involved 24 hours a day in patient care in CCUs, following all changes in the prognosis of a critically ill neurological patient[1].

This study used the instrument of the Quality Assurance Program (QAP) in the process of organ donation and transplantation in Spain. The choice of the instrument for application

in the Brazilian context was due to the prominence that Spain has gained in the organ donation process, going from a rate of 14.3 notifications of potential donors (pmp) in 1989 to 48.9 pmp in 2019, becoming a world reference in organ donation and transplants[16].

Given the above, the objective of this study is to identify the characteristics of deaths and clinical signs of brain death in patients with neurological damage hospitalized in critical care units, using a tool to support the active search.

METHOD

This is a quantitative, retrospective, descriptive study developed in the critical care units (CCU), emergency service and Intensive Care Unit (ICU) of two large neurology hospitals in the south of Brazil, Hospital 1 and Hospital 2. The choice of the two institutions occurred due to the high demand for neurosurgical patients, the number of ICU beds, the number of notifications of potential donors to the State Transplant Center and especially the number of losses of potential donors[17].

The first institution is a reference in neurosurgery, with 260 beds, 20 of which are ICU beds. The CHT is composed of five nurses and one physician. The active search is performed by this team, daily, on three schedules, in the critical care units with patients with neurological damage, using the instrument of Ordinance No. 2600/2009 adapted by the CET-SC, checking all the variables of the instrument (cause of neurological damage, pupil, Glasgow Scale, sedation yes or no, presence of polyuria, yes or no; ICP yes or no. What is the Value?). In 2017, 52 potential donors were notified to CET, and 27 became actual donors.

The second institution is in the Northern region of Santa Catarina, serving as a reference in adult Urgent Care and Emergency care, high complexity in neurosurgery, orthopedics and traumatology, oncology, and transplants. It has 255 beds, 20 of which are ICU beds. In 2017, 43 patients were notified to the CET as possible donors and 24 were effective donors[17]. The CHT team is composed of five nurses and two physicians, who perform the active search daily, in three schedules, using the above-mentioned instrument.

Data were collected from medical records of patients who died in these CCUs between January and August 2017 in Hospital 1 and from February to July 2017 in Hospital 2. All medical records of patients who died during the pre-established period were included in the study. However, those with incomprehensible information were excluded. The justification for the time cut occurred because the implementation of quality tools in the process of organ and tissue donation in Santa Catarina started in this period.

Information was collected using one of the QAP instruments in the process of organ donation and transplantation in Spain. The QAP instruments were developed by professionals of the National Transplant Organization (ONT) and were translated and adapted to Brazil[18]. Prior authorization was obtained for the use of the instrument.

The QAP is composed of three instruments. In this study, we used the instrument entitled "Death Information", which deals with the characterization of the patient who evolved to BD and has the following objectives: to define the capacity of organ donation according to the type of hospital; to evaluate whether the medical records were of patients with clinical criteria to start the BD protocol, or yet, represented a medical record of a patient who had a diagnosis of BD, but was not notified to the CET.

In the first stage of the instrument, information is collected from the first evolution of the multi-professional health team, identifying: Age; Sex; if there is presence of neurological lesion and what is the cause of the neurological lesion; Glasgow of entry (it raises answers

regarding eye opening, best verbal response and best motor response, the score may vary between 3 and 15, with a score lower than 8 indicating a severe lesion, 9 to 12 moderate lesion and 15, minimal lesion[19]. Is intracranial pressure (ICP) monitoring installed? If yes, what is the ICP value? Characteristic of the pupil; Presence of cough reflex and polyuria. The old version of the Glasgow Coma Scale was used in the research.

In the second stage of the instrument, information is sought in the last developments of the health team before the patient's death. At this point, the data involve: If he was without sedation and for how long; the last Glasgow; the ICP value; pupil characteristic; presence of cough reflex and polyuria; the diagnosis of BD had been initiated. If a possible BD is confirmed, this tool allows us to identify the causes for not opening the BD protocol and the causes for not reporting BD to the CET. However, in this study, the proposal was to identify the clinical signs that indicate a possible BD.

The filling of this instrument was performed by nurses of the CHT, previously trained, with an average time of 10 minutes. The data were organized in a database of the Excel® 2010 program, and simple descriptive statistical analysis was performed.

It is worth mentioning that this study is linked to the macro project entitled: "Management tools to analyze the causes of loss of possible and potential organ and tissue donors" and was approved by the Research Ethics Committee, under opinion number 1.410.164.

RESULTS

The results will be presented in two stages: first, the characterization of the deaths that occurred in Hospital 1 and 2 regarding the gender of the patients and clinical condition/reason for hospitalization. And then, the clinical signs of BD of patients with neurological injury.

We identified 504 medical records of patients who progressed to death. In Hospital 1, 303 medical charts were found, where 175 (57.8%) were men, 124 (41%) women, and in four (1.2%) charts there was no record regarding the patient's gender. In Hospital 2, 201 medical records were found, of which 118 (58.7%) were men and 83 (41.3%) were women.

As for the reasons for admission, in Hospital 1, 88 (29%) were due to neurological causes, 33 (10.9%) to cardiac causes, 26 (8.6%) to shock and 156 (51.5%) distributed among other causes (renal, cancer, respiratory, cardiac arrest, digestive, hepatic, trauma, vascular, endocrine, burns, HIV and unknown causes). In Hospital 2, there were 36 (17.9%) for respiratory causes, 33 (16.4%) for neurological causes, 24 (11.9%) for renal causes, and 108 (53.8%) distributed in other causes. Of the 121 patients who were hospitalized for neurological causes, 36 (29.7%) were for head trauma, 36 (29.7%) for hemorrhagic stroke, 21 (17.3%) for ischemic stroke, and 28 (23.14%) for other causes (Table 1).

Table 1 - Causes of hospitalization in Hospital 1 and Hospital 2. Florianópolis, SC, Brazil, 2017 (continues)

Causes of hospitalization		Hospital 1		Hospital 2	
		N	%	n	%
Neurological causes	Traumatic Brain Injury	36	11,9	4	2
	Hemorrhagic stroke	29	9,5	13	6,4

	Ischemic stroke	14	4,6	7	3,5
	Convulsive Crisis	0	0	4	2
	Others	9	3	5	2,5
Other causes	Cardiac causes	33	10,9	16	8
	Shocks	26	8,6	7	3,5
	Kidney Causes	24	7,9	24	11,9
	Cancer	18	5,9	15	7,5
	Breathing causes	16	5,3	36	17,9
	Cardiac arrest	15	4,9	9	4,5
	Digestive causes	14	4,6	0	0
	Hepatic causes	12	4	12	6
	traumas	10	3,3	5	2,5
	No registration	0	0	9	4,5
	Others	47	15,6	35	17,5
Total neurological causes		88	29	33	16,4
Total of other causes		215	71	168	83,6
TOTAL		303	100	201	100

Source: Authors (2017).

Of the patients with neurological injury at the time of hospitalization, 37 (31%) were hospitalized with Glasgow three; 28 (23%) had anisocorics pupils and eight (7%) had bilateral mydriasis, 32 (26.4%) had absent cough reflexes, and 26 (21.5%) had intracranial hypertension. None of the patients had polyuria at the time of admission (Figure 1).
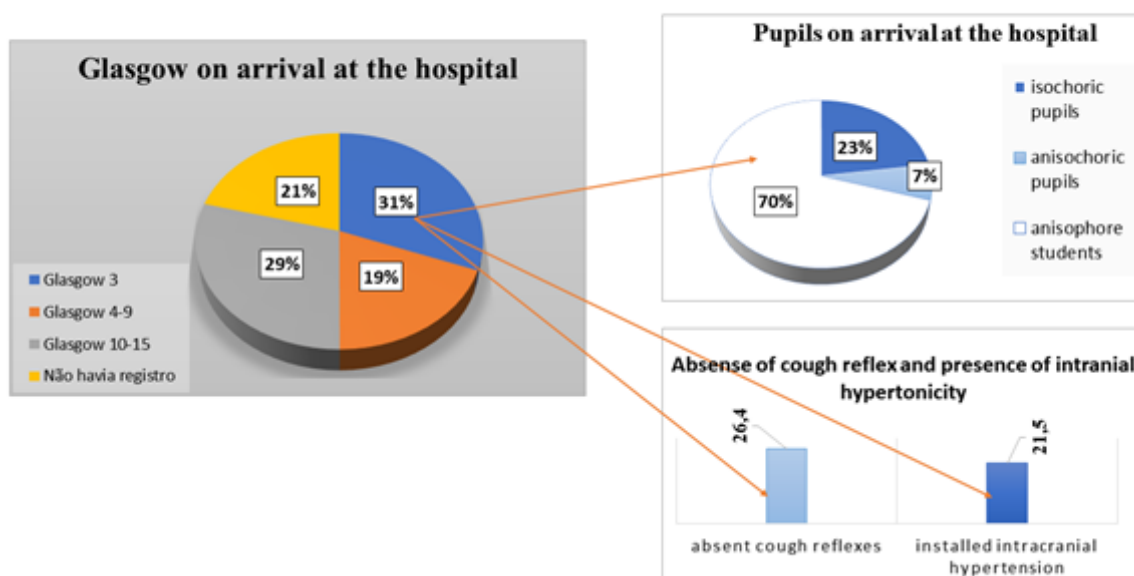

Figure 1 - Characteristics of patients with neurological injury at the time of hospital admission. Florianópolis, SC, Brazil, 2017. Source: authors (2017).

The average length of stay between hospital arrival and death in patients with neurological injury was four days. Regarding the information obtained in the medical records, which represent clinical signs of BD before death, 75 (62%) had Glasgow three, five (4%) Glasgow between four and nine, six (5%) with Glasgow 10-15, and in 12 (10%) there was no record of Glasgow; 23 (19%) patients were sedated at the time of death (Figure 2).
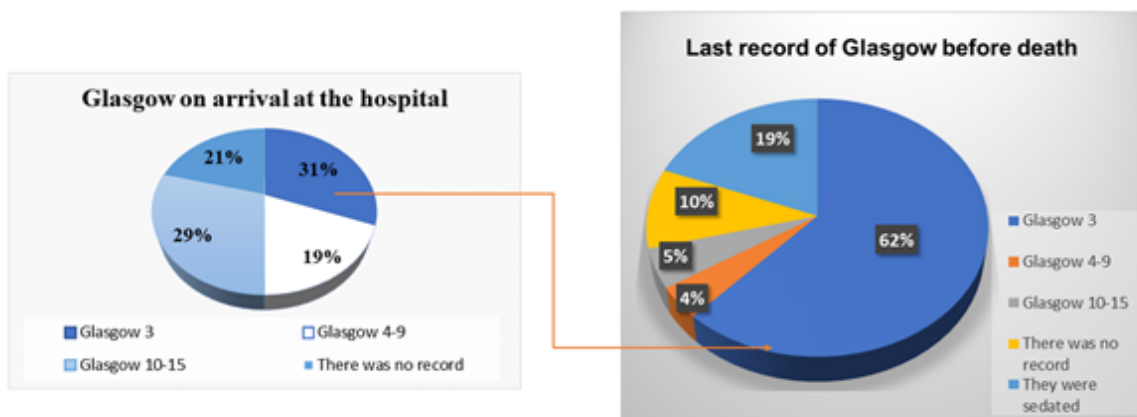

Figure 2 - Comparison between arrival Glasgow and Glasgow before death. Florianópolis, SC, Brazil, 2017. Source: Authors (2017).

As for the other clinical signs of BD, 63 (52%) were with bilateral mydriasis, 61 (50.4%) cough reflex absent, 88 (72.7%) presence of intracranial hypertension, and 102 (84.3%) polyuria (Figure 3).
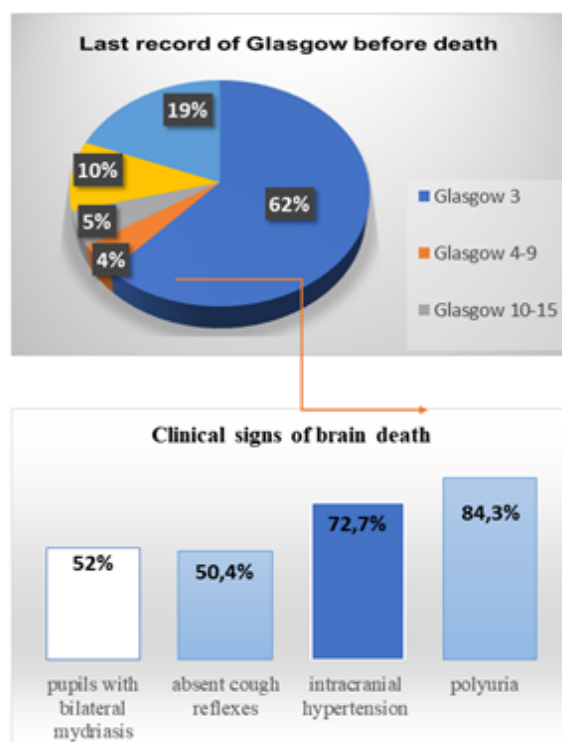

Figure 3 - Distribution of clinical signs of brain death identified in medical records. Florianópolis, SC, Brazil, 2017. Source: Authors (2017).

Of the deaths from neurological causes in the two hospitals (121), 34 (28.1%) patients with BD were identified who were notified to the CET, 23 (19%) patients had one or more criteria to progress to BD, and 18 (14.8%) had all the criteria to start the diagnosis of BD, but were not notified to the CET.

DISCUSSION

Identifying clinical signs of BD is still a great challenge for health professionals because they have been prepared in their studies to save lives. Being in front of a patient with a possible diagnosis of BD brings ethical, moral, legal, personal, cultural, and religious reflections. There are professionals who agree that BD is equivalent to death, others that death only occurs after cardiac arrest[20]. For nurses, there is uncertainty about this diagnosis, but they understand that caring for this patient in BD is part of the CCU routine and that it can help other people through organ and tissue donation[20-21].

From this perspective, we understand the importance of the health team having the knowledge, ability and attitude to early recognize patients with clinical criteria for BD. Thus, it is understood that the study shows essential information about the clinical criteria to start the diagnosis of BD that will serve as support to the professionals of CCUs and CHTs in the effective search for these patients.

It was evidenced in the study that the highest rate of neurological causes is related to men for traumatic brain injury (TBI), followed by hemorrhagic stroke. Most of these patients, 31%, arrive at the hospital with Glasgow three, 23% anisocorics pupils, 5% absent cough reflex and 21.5% intracranial hypertension. Other studies corroborate these results as to the neurocritical patient's profile: male, victim of TBI, in addition to presenting a poor prognosis upon arrival at the hospital and Glasgow below four points[12,22-23].

It is also noteworthy that neurocritical patients with Glasgow below four and uncontrolled intracranial hypertension have a strong probability to evolve to BD[24]. In a study carried out in Italy with 569 patients, 7% presented Glasgow three, worsening during hospitalization and evolving to BD[25].

In this study, data prove the severity of neurocritical patients, as 30% arrived in the hospital with a Glasgow score of 3, 62% had a Glasgow score of 3 before death, intracranial hypertension and absence of trunk reflexes. With progressive worsening during hospitalization, the demand for care related to hemodynamic instability caused by the severe neurological injury increases. Studies indicate that neurocritical patients demand intensive care, especially when ICP is installed, which regulates cerebral blood flow and its perfusion. If ICP is not controlled, this patient may rapidly evolve to BD[22].

Such information corroborates the findings of this study, where more than 70% of the patients presented intracranial hypertension, more than 80% presented polyuria, more than 50% had absent cough reflexes and mydriatic pupils, indicating clinical signs of severe neurological injury. However, the study data show the underreporting of potential donors to the CET, corroborating the data presented by ABTO, estimating that approximately 3800 to 5000 patients with clinical signs of BD are not identified and notified annually[3]. Underreporting represents one of the main causes of the ineffectiveness of organ and tissue donation from a deceased donor[4,14].

The current legislation in Brazil determines that all patients considered possible organ and tissue donors, who are in apperceptive coma, should be identified and mapped to be followed up until there is clinical improvement, evolution to BD diagnosis or cardiac arrest, thus avoiding the loss of possible donors[11].

The loss of potential donors (patients with clinical criteria for BD) is related to

hemodynamic instability involving hypotension, polyuria, sodium above 155mEq/l, and temperature below 35.5°C[4,14,26]. To minimize these losses, guidelines and quality programs guide an effective active search in all units where neurocritical patients are admitted[12,27-28]. However, many times, due to lack or little training on how to develop the active search and which criteria to evaluate, nurses end up not screening all patients with severe neurological changes that indicate the possibility of starting BD diagnosis[29].

Thus, it is understood that the data obtained in this study allow us to map clinical signs of BD through active search, as well as to manage the immediate care of any hemodynamic changes that may arise due to the neurological injury, minimizing the risk of cardiac arrest of this possible donor, besides enabling the diagnosis of BD as soon as possible.

The participation of nurses in the active search, identification, validation, notification and maintenance of potential donors has effectively contributed to the organ and tissue donation process for transplantation purposes[29-30]. It is noteworthy that the active search for potential donors is a responsibility of the CHT/CIHDOTT, especially of nurses, as they are the most frequent members of this committee[1,30].

It is noteworthy that the lack of understanding of the clinical signs of BD by the professionals who work in the CCUs and CHT/CIHDOTT can have repercussions on the quality of the organs and tissues to be transplanted and can even lead to the loss of the possible donor.

The limitations of the study are related to being applied to specific contexts, circumscribed to two hospitals in one Brazilian state. Thus, it is suggested that new studies be implemented in different regionalities, providing comparison of findings and mapping the clinical signs and underreporting of BD in the country.

CONCLUSION

This study achieved its objective by identifying the clinical signs of patients who developed BD, using an instrument from the quality assurance program of the organ donation and transplantation process in Spain, as an alternative to optimize the active search for neurological patients.

It is important that professionals working in critical care units have knowledge of these clinical signs of BD, so that the identification and operationalization of the BD diagnosis protocol can be optimized to ensure a greater number of organ harvests and transplants.

It is believed that the results of this study will enable managers to develop strategies, such as training health professionals, for the early identification of patients with these conditions, in order to contribute to the increase in the number of notifications to the CET.

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