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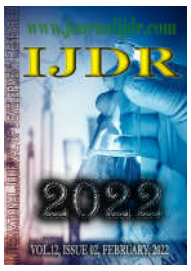

RESEARCH ARTICLE OPEN ACCESS

ANALYSIS OF THE BRAIN DEATH PROTOCOL APPLIED IN A HOSPITAL IN THE SÃO FRANCISCO VALLEY REGION IN BRAZIL: METHODOLOGICAL APPROACH DEVELOPED BY NURSES

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ABSTRACT

Brain Death (BD) is the total and irreversible stoppage of brain functions proven by clinical and complementary exams to verify the absence of flow, electrical and metabolic activity of the brain. The objective was to analyze the protocol for the diagnosis of Brain Death in a University Hospital in the city of Petrolina-PE. This is a descriptive, documentary, exploratory, retrospective, quantitative study, from January 2014 to July 2015. 115 medical records were analyzed, the average time for closing the protocol was 17:00 and 9:00 for the complementary examination, 227 were not presented hypothermia and 225 did not use depressant drugs before neurological evaluations, 54 underwent Transcranial Doppler (TCD), 44 Electroencephalogram (EEG) and 17 DTC and EEG as a complementary exam, 117 were evaluated by neurosurgeons, 98 clinicians and 15 intensive care physicians. Knowing and properly applying the BD diagnosis protocol is very important from the opening process to the possible organ donation, since these patients have a greater potential. But errors are still detected in the BD diagnostic processes, delay in completing the protocol, inadequate infrastructure and professionals involved in the process who are unaware of the criteria to establish BD.

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INTRODUCTION

The end of vital functions is considered as death, the exact moment of which is difficult to say, but it presents a sequence of gradual processes that occur in the organs and systems that maintain life. However, death is not only associated with cessation of breathing and asystole, but also the loss of brain stem and cortex functions, thus Brain Death (BD) is the irreversible statement of nerve damage (Souza *et al*., 2019). The Federal Council of Medicine in Brazil defined, through Resolution nº 1.396/91, defined brain death as the total and irreversible stop of brain functions, of a known and confirmed cause in an indisputable way established by the complementary exam to prove absence of blood flow, metabolic activity , and electrical brain (Brasil, 2017). It is estimated that for every million people there are 60 brain deaths per year, and the main causes of BD are Stroke, followed by Traumatic Brain Injury (TBI), central nervous system tumor and anoxic encephalopathy. In addition to these causes, it can also occur due to large ischemic lesions, meningoencephalitis and fulminant encephalopathies (Brasil, 2014). Complementary tests, mandatory in Brazil, that can be used in the protocol of patients in BD are: electroencephalogram, transcranial

Doppler, intracranial pressure monitoring, computed tomography, cerebral angiography, scintigraphy, chemical Markers of cerebrospinal fluid and auditory evoked potentials of the brainstem (Brasil, 2021). Legally, through Resolution 292/2004 of the Federal Nursing Council (COFEN), nurses are supported to act in the process of capturing and transplanting organs and tissues. According to Ramos; Silva and Silva (2010), it is not the role of nurses to diagnose BD, however they are responsible for documenting the occurrence of BD and knowing how to recognize. The existence of a high number of medical professionals and nurses who are unaware of the BD criteria, who are directly involved in the process, as well as errors in the verification of death, sometimes declared at the time of organ removal, contribute to an unorganized and uniform assistance to patients. patients in ME (Souza, Tostes and Silva, 2019). The medical professional, responsible for the diagnosis of BD, sometimes presents incomplete preparation and lack of information about the management to detect possible victims in brain death, performing unnecessary interventions in dead patients; presenting even a limited knowledge about the diagnosis of BD, which hamper the proper application of the protocol (Souza, Tostes and Silva, 2019). Faced with these problems, also experienced in hospital practice in the region, the question is: The execution of the BD protocol has been carried out as legally recommended? It is believed that in Petrolina-PE there are a large number of cases of BD, but little evidence and studies directed towards the process of diagnosis of these victims, which is very present in the admissions of hospitals in the municipality, which sometimes have poorly qualified professionals, as well as infrastructure. unsuitable for diagnosis. Thus, it is important to carry out the present study, since its results may contribute to the improvement of health professionals in the region, in addition to greater exposure and clarification on the subject to the population, which, due to the great demand of patients with brain death, can until lead to better organization and assistance to these victims. In this way, this work intends to identify the sensitive aspects in the assistance provided in the diagnosis of BD, as well as to contribute to the field of scientific production on the subject. The general objective of the study was to analyze the Brain Death protocol applied at a University Hospital in Petrolina - PE, having as specific objectives to know and describe the Brain Death protocol applied at the University Hospital and discuss the process of implementation of this protocol.

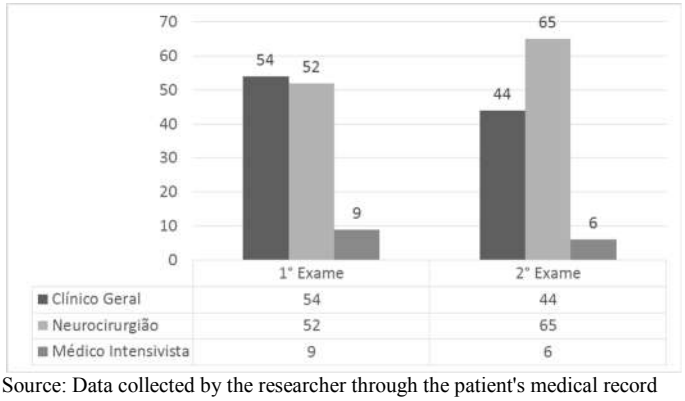
MATERIALS AND METHODS

This is a descriptive, documentary, exploratory, retrospective and quantitative study, having its entire methodological course prepared and characterized by nurses training professionals, which is extremely relevant to point out, for the perspicacious improvement of Nursing research. The study was carried out in the Emergency Room (yellow and red room) and in the Adult Intensive Care Unit (ICU) of a University Hospital in the São Francisco Valley region. The locus of study is a reference in the region in the care of patients who are victims of traumatological and neurological accidents, who can progress to Brain Death and thus also become Potential Organ Donors. The Organ and Tissue Procurement Organization (OPO) is located in this hospital and its physical structure for organ procurement (Opo, 2015). The documents used in the research were the medical records of 115 patients diagnosed with BD between January 2014 and July 2015 who were hospitalized at HUWAB. Data collection took place from August to November 2015. Using medical records of patients diagnosed with BD, over 12 years old, as inclusion criteria, having the opening and closing of an BD protocol signed by physicians of the institution. And as exclusion criteria: medical records with incomplete data, the outcome was not brain death and that prevented the completion of the research form. To perform data collection, a research instrument similar to the one used in the institution in which the medical records were transcribed, containing information on necessary conditions, criteria for diagnosis and tests performed in the brain death protocol.

The data were organized in spreadsheets in the Microsoft Excel 2010 program, and a list of the codes used ("codebook") was prepared, each of the variables containing their respective codes. A descriptive analysis of the data was carried out with the objective of characterizing the sample in terms of: hypothermia, use of central nervous system depressant drugs, times of clinical examinations, reflexes and tests performed, hospital exams and procedures performed, and protocol closing time, through the Biostat 5.0 statistical package. The research project was submitted to the Ethics and Deontology Committee in Studies and Research - CEDEP of the Federal University of Vale do São Francisco (UNIVASF) and in accordance with Resolution 466/2012 of the National Health Council, being approved by protocol n. 1155141, with the Certificate of Presentation for Ethical Consideration (CAAE) of 46688015.3.0000.5196. The study did not offer any cost to the hospital institution, since it used resources from the researchers themselves. The participating institution was guaranteed the preservation of the image, as well as the confidentiality and anonymity of the data collected.

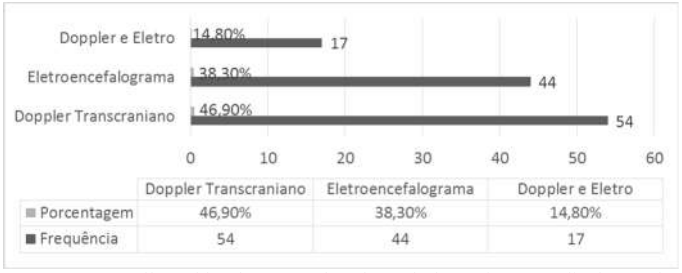
RESULTDS AND DISCUSSION

To perform the clinical exams, the patient cannot have hypothermia and is using central nervous system depressant drugs, so in the study, 114 (99.1%) did not have hypothermia and 113 (98.3%) did not use depressant drugs before the first clinical exam., and 100% non-hypothermic and 114% (99.1%) without depressant drug before the second clinical examination. When performing the first and second clinical examinations, the following are repeatedly evaluated: Apperceptive coma, Fixed and reactive pupils, Absence of corneal-palpebral, oculocephalic and cough reflexes, absence of response to caloric tests and apnea test, with 100% (115) of positivity for the tests both in the first and in the second clinical examination. With reference to the specialty of the physician who performed the neurological assessment of the 115 patients in the study (Graph I).



Source: Data collected by the researcher through the patient's medical record

Graphic I. Medical specialty that performed the first and second clinical examination, respectively, at the University Hospital. Between Jan/2014 to Jul/2015. Petrolina, 2015. (In Portuguese)

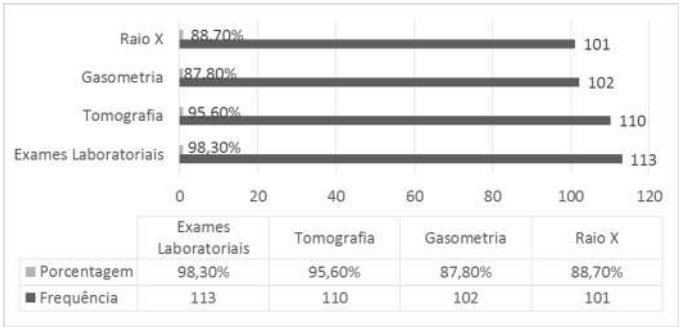


Source: Data collected by the researcher through the patient's medical record.

Graphic II. Frequency and complementary exams used as an aid for the diagnosis of BD at the University Hospital. Petrolina, 2015. (In Potuguese)

The average time from opening the protocol to closing and diagnosing Brain Death was 17 hours, with a maximum time of 51 hours and a minimum of 6 hours. And the average time of opening the BD protocol to perform the complementary exam was 9 hours, with a maximum time of 51 hours and a minimum of 5 minutes. As for the complementary exam used in the hospital (Graph II).

As for the exams performed at the hospital to help in the evaluation of BD, Graph III.

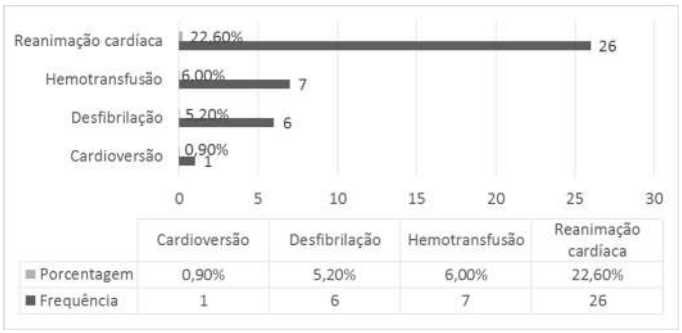


	Exames Laboratoriais	Tomografia	Gasometria	Raio X
Porcentagem	98,30%	95,60%	87,80%	88,70%
Frequência	113	110	102	101

Source: Data collected by the researcher through the patient's medical record.

Graphic III. Frequency and routine exams performed in patients undergoing BD at the University Hospital. Petrolina, 2015. (In Potuguese)

Of the procedures performed in the hospital, most patients did not perform any of them, 83 (72.2%), so of the rest of the sample, 32 (27.8%) performed (Graph IV).



	Cardioversão	Desfibrilação	Hemotransfusão	Reanimação cardíaca
Porcentagem	0,90%	5,20%	6,00%	22,60%
Frequência	1	6	7	26

Source: Data collected by the researcher through the patient's medical record.

Graphic IV. Frequency and routine exams performed in patients undergoing BD at the University Hospital. Petrolina, 2015. (In Portuguese)

In 26 (22.6%) cases of the sample, the complementary exam was responsible for closing the BD protocol, and in 89 (77.4%) of the protocols they were closed with the second clinical exam. The criteria for the establishment of BD according to Resolution 1480/97 is based on the presence of specific clinical signs in two clinical exams, namely: apperceptive coma, fixed and reactive pupils, absence of corneal palpebral, oculocephalic and oculovestibular reflexes, cough test and apnea, and a complementary imaging test to prove brain inactivity, excluding patients who were victims of intoxication and hypothermia (Brasil, 1997). Clinical examination is paramount in the diagnosis of BD without the need for a complementary exam, which, due to the delay found to perform the clinical and complementary exams, delay the diagnosis, even in situations where cerebral blood flow was demonstrated, the patient progressed to encephalic circulatory collapse (Brasil, 2017). In the study, the reason for the delay in closing the protocol was the time taken to perform the second clinical examination, which took an average of 17 hours to be performed, and was responsible for closing the protocol in 77.4% of cases, unlike the complementary examination, which took an average of 9 hours. to be done. Despite the delay in diagnosis, the clinical examination delayed the completion of the protocol more than the complementary examination, which is mandatory in Brazil. In the study by Teixeira, Gonçalves and Silva 2012, it is stated that the population of Pará did not trust the medical diagnosis of BD and believed in the misunderstanding, that the patient was not dead, there was a disbelief in the medical diagnosis for not demonstrating safety and knowledge. Just as most of the population does not know what BD is and has the belief that the patient will survive even with this diagnosis. Nurses from two hospitals in the city of Santos, most were unaware of the criteria that define brain death and did not routinely report these patients, even with the legislation determining compulsory notification, they were unaware of what was presented in the BD protocols, even that present in the services (Meneses, Castelli and Junior, 2018). The lack of knowledge on the part of professionals involved in the criteria for the diagnosis of BD can prolong the life of patients in Intensive Care Units (ICUs), causing dysthanasia, and consequently, the length of stay and longer occupancy of beds by patients with no prognosis of improvement and no perform organ harvesting for transplantation in a timely manner (Silva *et al*., 2018).

In the study, it was observed that, before the first neurological evaluation, protocols were opened in two patients with hypothermia and one using depressant drugs, and one case also opened the second clinical examination with the victim using depressant drugs. Showing little knowledge or inattention of medical professionals responsible for diagnoses. One of the complementary exams used in the diagnosis of BD is the Electroencephalogram (EEG), which needs great care, because to detect the presence of electrical activity, it is only necessary to find it, but the absence requires greater attention to be guaranteed, and a false result (Telemedicina, 2018). Transcranial Doppler (TCD) is a complementary exam widely used in Brazil, in 10% of BD patients it is inconclusive, but clinically it fulfills all the criteria for the diagnosis of brain death, thus resulting in the need to repeat the exam, that in this country it is necessary to have the exam and the execution is not fast, delaying the diagnosis (Pimenta, Amorim and Silva, 2012). Both exams are portable and can be performed at the bedside, not needing to transport the patient to another location, non-invasive and without the use of contrast. The EEG evaluates the electrical activity of the brain and has the disadvantage of interfering with other electronic equipment, whereas the DTC detects the cerebral blood flow, but presents false negatives easily (Einstein, 2020). A problem also found in the study, in which 17 cases required two complementary exams, because the first one proved to be inconclusive, being the DTC, requiring the repetition of the exam, the electroencephalogram (EEG) of choice, being conclusive in all, but the delay for its realization was up to 2 days and 8 hours and a minimum of 6 hours. Paying attention to the possibility of the occurrence of a false diagnosis on the EEG. Despite the advantages of the two exams, a greater choice of exams could speed up the process, as these exams have facilities for interference. There is no global consensus for carrying out the apnea test, only specific norms and legislation in some countries.

This being 100% oxygenation for 10 minutes, blood gas analysis with PaCO2 between 35-45 mmHg, disconnect the ventilator and place an O2 catheter in the trachea above the carina with a flow of 6-8l/min, positive, that is, in absolute apnea, if there is no respiratory movement for 10min and PaCO2 greater than or equal to 55 mmHg (Westphal *et al*., 2020). All the apnea tests in which the protocol was closed during the research period were positive for the apnea test, the instrument used in the hospital does not show values, such as PaCO2 before and after 10 minutes, only if "yes" or " no", giving room for error since there is no global consensus, only laws, norms and protocols. In addition, only 88.7% of the patients in the sample underwent arterial blood gas analysis. The lack of adequate knowledge of the medical team in carrying out the BD protocol, without commitment and doubts about how and when to perform the neurological tests generate conflicts for the nursing team and family members, who are sometimes informed before the end of the protocol. And there is still a divergence of opinion among the medical team about the correct way to perform the diagnosis of BD (Lima *et al*., 2019). It is considered as a strong recommendation in the maintenance of the potential donor the measurement of arterial blood gas analysis every 6 hours and laboratory tests in general, such as the dosage of electrolytes, with the objective of verifying or normalizing the physiological parameters in all laboratory tests based on the periodic biochemical dosage. . As

well as blood and urine cultures in all patients open to the ME protocol (Hubbard *et al*., 2016). In the study, it was found that laboratory tests were performed in almost all patients (98.3%), whereas arterial blood gas analysis was performed in a lower percentage in 88.7% of the sample, but due to the importance of monitoring and maintaining this patient, Gasometry does not corroborate the need, although the instrument only checks if it was performed, not containing its periodicity, which is every 6 hours to be collected.

CONCLUSION

Knowledge and proper application of the BD protocol is very important from the diagnostic process to possible organ donation, since these patients have a greater potential. But errors are currently detected in the diagnostic processes of BD, delays in completing the protocol and professionals involved in the process who sometimes know little about the criteria to establish BD. In the protocol applied in the hospital, errors were found in the criteria for opening the protocol, according to the current legislation they would be illegal, limitation in the options of complementary exams performed on patients, high protocol closing time and performance of the complementary exam, factors that make the longer BD diagnosis process. At the hospital, all laboratory and imaging tests necessary to assist in the diagnosis of BD are available, indicated in the instrument used at the institution, but they were not used or described in all patients diagnosed with BD, very important tests, such as blood gas analysis, with a small number of achievements. This presents the need for uniformity of the team in knowing and ordering the necessary tests to assist in the control of patients with this diagnosis. A lack of knowledge on the part of the team or inattention at the time of analysis of the BD was detected, mainly by the medical professional, directly involved in the entire evaluation, legally responsible for diagnosing the patient's brain death, presenting simple but illegitimate errors. Thus, it loses credibility in the entire BD diagnosis process; if the family member is really dead and the population's disbelief about this diagnosis. The presence of protocols in the units and/or educational lectures could contribute to a greater organization and knowledge of the health team directly involved in the process of applying the BD protocol. As well as reducing the presence of punctual errors, which is very important throughout the process and familiarizing professionals with the concept, definitions, criteria and identification of BD.

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