Cogitare Enfermagem

ORIGINAL ARTICLE

POTENTIAL BRAIN-DEAD ORGAN DONORS: CHARACTERIZATION AND IDENTIFICATION OF NURSING DIAGNOSES

HIGHLIGHTS

1. The majority of nursing diagnoses for potential donors are of risk.
2. There is a lack of discussion of nursing care systematization in the organ transplantation.
3. Diagnostics support targeted, individualized care for the potential donor.

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ABSTRACT

Objective: To identify the nursing diagnoses of potential organ donors in brain death according to the NANDA-I Taxonomy. **Method:** Observational, cross-sectional study conducted in a public hospital in the interior of Ceará, Brazil. Data collection was realized in October and November 2021 in 23 medical records of potential organ donors. Descriptive statistics analyzed data. **Results:** Twenty-two diagnoses were identified in five of the 13 domains of the NANDA-I taxonomy. The following were prevalent: risk of unstable blood glucose; risk of impaired liver function; impaired gas exchange; impaired bed mobility; ineffective breathing pattern; risk of infection; risk of pressure injury; risk of aspiration; risk of decreased cardiac output; risk of falls, impaired urinary elimination; risk of electrolyte imbalance and risk of unstable blood pressure. **Conclusion:** The identification of diagnoses may favor the improvement of practice and the application of the nursing process in the care of potential organ donors.

Keywords: Nursing Diagnosis; Tissue and Organ Procurement; Brain Death; Transplantation; Nursing.

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INTRODUCTION

Organ transplantation is characterized by a complex and multifaceted process in which the organ and tissue are removed from the donor and then implanted in the recipient; this process is called donation-transplantation. This procedure begins with identifying the Potential Donor (PD) and ends with organ transplantation[1-2].

The beginning of the process, donation-transplantation, is characterized by identifying PDs, diagnosed with brain death (BD), proven through clinical and neurological examinations. From this individual, organs, and tissues can be removed for transplantation. With the effective removal of the organ or tissue to be transplanted, the PD becomes an effective donor[3-5].

The Federal Council of Medicine (CFM) is the body that regulates the entire legal process involving the ME, according to Resolution No. 1,489 of 1997 of the same entity that meets the provisions of Law No. 9,434/97. BD is defined as total and irreversible loss of brain and brainstem function. However, heart rate and blood pressure are maintained artificially and temporarily, even though the donor individual in BD has irreversible loss of all brain functions[6-7].

Consubstantially, throughout the donation-transplantation process, the nurse's role stands out since he directly assists the PD and the transplant recipient. It is worth emphasizing that the success of the process is deeply related to the proper maintenance of the organ donor, reinforcing the exquisite role that the professional nurse must develop in this assistance for a satisfactory outcome[8-10].

Given the growing role of nurses in the donation-transplantation process, the Federal Nursing Council (COFEN), through Resolution No. 292/2004, standardized the role of nurses in organ and tissue procurement and transplantation through the application of the Nursing Care Systematization (SAE) in the process of organ and tissue donation[10-13]. In addition, COFEN Resolution No. 358/2009 also provides for the SAE and the implementation of the Nursing Process (NP) and determines its phases[13-14].

The nursing diagnosis (ND), as one of the stages of the NP, consists of identifying human responses that require nursing interventions by a clinical judgment and care plan and expected results, thus providing a better quality of care[14]. The Nanda International ED taxonomy (NANDA-I) is a nursing language that plays an important role in the profession, standardizing the terms the team uses, and facilitating communication[14].

Considering that a single donor could benefit many patients, adequate preservation is necessary for the viability of these organs until extraction, and knowledge of ED contributes to the actions of care and preservation of organs to be donated. Thus, this study can contribute to planning nursing care practice and elaborating the individualized care plan for victims of SCI and organ donors.

Therefore, according to the NANDA-I Taxonomy, this study aims to identify the nursing diagnoses of potential organ donors in BD in a public hospital in the interior of Ceará, Brazil.

METHOD

This is an observational, cross-sectional and descriptive study with a quantitative approach, carried out through access to patient records to map and identify the EDs recorded by nurses, through assistance to patients in BD, in a high complexity hospital, reference for trauma, and which hosts an Organ Procurement Organization (OPO). It is

located in the interior of the Northeast, Ceará, Brazil. Data collection took place in October and November 2021.

We followed the guidelines for conducting an observational study as directed by the Equator network, using the STROBE*(Strengthening the Reporting of Observational Studies in Epidemiology)* checklist.

Data were extracted from printed medical records of patients hospitalized from January to October 2021, with a medical diagnosis of brain death. The medical records were identified with the contribution of the Organ Procurement Organization (OPO) of Cariri. This organization holds the medical records data of patients diagnosed with brain death. In this way, it was possible to identify the medical records to be selected for the study.

The sample included the medical records of patients diagnosed with brain death, regardless of age, of both sexes, who were admitted to the hospital in 2021 and had a profile for organ donation, evaluated based on CFM regulations. Exclusion criteria were medical records with illegible records or absence of essential data for the research development and those that did not present nursing records related to clinical judgment performed in the NP's second stage.

Twenty-three medical records of patients diagnosed with brain death and potential organ donors were found during the period established for the study. When applying the inclusion and exclusion criteria, all met the established to be part of the sample without excluding medical records.

To guide data collection in medical records, a previously structured instrument was used by the researchers, consisting of sociodemographic data (gender, date of birth, skin color, marital status, education, occupation, and place of birth), clinical data (admission sector, admission diagnosis, comorbidities and history of brain death) and data from the BD protocol (date and time of protocol initiation and closure, apperceptive coma, level of consciousness, interval between evaluations, neurological examinations, apnea test, complementary examinations, eligibility for potential donor). The instrument was also structured to record nursing diagnoses with their respective related factors and defining characteristics according to the NANDA-I taxonomy and, finally, the outcome of the effectiveness of donation/transplantation.

In the validation of the instrument for data collection, seven *experts* in the area of study were consulted, considering experience, academic production, and care work in the context of critical patient care and organ donation to analyze the adequacy of the content of the instrument, with subsequent application of the pre-test.

The data were organized in *Microsoft Excel* spreadsheets version 2016, and analyzed using descriptive statistics, with central tendency and dispersion measures for continuous variables, and absolute and relative frequencies for categorical variables, using the *Statistical Package for the Social Sciences* (SPSS)®, version 26. Data were presented in tabular form to better interpret the corresponding absolute frequency and percentage values.

The ethical-legal precepts were respected under the norms and guidelines in Resolution 466/2012[15]. Data collection took place after approval of the project by the Ethics and Research Committees (CEP) of the Regional University of Cariri and the Institute of Health and Hospital Management - CEP/ISGH, under opinion No. 4,878,896 on July 18, 2021.

RESULTS

Regarding the sociodemographic characterization of the patients, of the 23 medical

records analyzed, a mean age of 38.5 (± 15.8) years was identified, with 13 (56.52%) aged < 38 years and 10 (43.48%) ≥ 38 years; 11 (43.4%) female and 12 (56.6%) male; 17 (73.9%) single, four (17.4%) married and two (8.7%) divorced; 16 (69.6%) brown and seven (30.4%) white; 13 (43.5%) with up to eight years of schooling and 10 (56.5%) with nine years or more of schooling; 17 (73.9%) without employment and six (26.1%) with employment; and, considering the place of residence, 12 (52.2%) lived outside the urban set of the Metropolitan Region of Cariri (Crato, Juazeiro, and Barbalha) and 11 (47.8%) in this region.

Table 1 - Sociodemographic characterization of patients in BD, potential organ donors, from Hospital Regional do Cariri, January to October, 2021. Juazeiro do Norte, CE, Brazil, 2022

Variables	f (%)
Age (years)	38.5 ± 15.8 (Mean ± SD)
Sex	
Male	12 (56.6)
Female	11 (43.4)
Marital status*	
Single	17 (73.9)
Married	4 (17.4)
Separate	2 (8.7)
Skin color	
Brown	16 (69.6)
White	7 (30.4)
Schooling	
Up to 8 years	13 (43.5)
9 years or more	10 (56.5)
Occupation*	
No employment relationship	17 (73.9)
Employed	6 (26.1)
Place of residence	
Metropolitan Region of Cariri - Ceará	12 (52.2)
Outside the Metropolitan Region of Cariri - Ceará	11 (47.8)

Source: The Authors (2022).

Regarding the clinical characterization of organ PDs (Table 2), 100% of patients accessed the hospital through the emergency department. Of the 23 patients, 12 (52.2%) had no comorbidities or unhealthy habits. All patients received invasive mechanical ventilation.

Regarding the history of brain death, 12 (52.2%) had cerebrovascular accident (CVA) and 10 (43.5%) had traumatic brain injury (TBI), with the opening of the sepsis protocol for one PD (4.3%) and not being necessary for 22 (95.7%).

Table 2 - Clinical characterization of patients in BD - potential organ donors of the Regional Hospital of Cariri, from January to October, 2021. Juazeiro do Norte, CE, Brazil, 2022

Variables	f (%)
Comorbidities and lifestyle habits*	
No comorbidity/harmful habits	12 (52.2)
More than one comorbidity	04 (17.4)
HAS	2 (8.7)
Alcoholism	2 (8.7)
Câncer	1 (4.3)
Psychiatric disorder	1 (4.3)
Epilepsy	1 (4.3)
Background to the MoU	
Cerebrovascular Accident	12 (52.2)
Traumatic brain injury	10 (43.5)
Other	1 (4.3)
Sepsis Protocol opened for this patient**	
No	22 (95.7)
Yes	1 (4.3)

Source: The Authors (2022).

Concerning organ and tissue PD donation (Table 3), only five patients (21.7%) in the sample were effective organ and tissue donors. Of the donors, five (21.7% PD) were tissue donors (corneas), and four (17.4% PD) were organ donors (kidneys and liver). There was no evidence of lung, heart or pancreas donation.

Table 3 - Characterization of organ and tissue donation from BD patients at Hospital Regional do Cariri, from January to October, 2021. Juazeiro do Norte, CE, Brazil, 2022

Variables	f (%)
Organ and tissue donation**	
No	18 (78.3)
Yes	5 (21.7)
Impediment to donation*	
Family authorization	15 (65.2)
COVID-19	2 (8.7)
Cancer	1 (4.3)
Organs harvested (n=04)	
Kidneys	4 (17.4)
Liver	4 (17.4)

Source: The Authors (2022).

It was possible to identify the nursing diagnoses recorded by nurses. The diagnoses

are found in a specific part of the medical records intended for ED registration. These are organized into domains and classes belonging to the NANDA-I (Table 1).

Twenty-two different diagnoses were identified in five of the 13 domains of the taxonomy, of which nine were real and 13 were risk diagnoses.

The following EDs prevailed: risk of unstable glycemia; risk of impaired liver function; impaired gas exchange; impaired bed mobility; ineffective respiratory pattern; risk of infection; risk of pressure injury; and risk of aspiration, and this ED could be observed in 100% of the medical records analyzed. The ED risk of decreased cardiac output; risk of falls; impaired urinary elimination and risk of electrolyte imbalance, ranged from 82% to 91% among the sample analyzed. Risk of unstable blood pressure appears in 52% of the sample.

Chart 1 - Nursing diagnoses identified in patients in BD who are potential organ and tissue donors at the Hospital Regional do Cariri, from January to October, 2021. Juazeiro do Norte, CE, Brazil, 2022

Domains	Classes	Variables	f (%)
2. Nutrition	4. Metabolism	Risk of unstable blood glucose	23 (100)
2. Nutrition	4. Metabolism	Risk of impaired liver function	23 (100)
2. Nutrition	5. Hydration	Risk of electrolyte imbalance	21 (91.3)
2. Nutrition	5. Hydration	Risk of poor fluid volumes*	3 (13.0)
3. Disposal and exchange	1. Urinary function	Impaired urinary elimination	20 (87.0)
3. Disposal and exchange	4. Respiratory function	Impaired gas exchange	23 (100)
4. Activity / rest	2. Activity / exercise	Impaired bed mobility	23 (100)
4. Activity / rest	4. Cardiovascular / pulmonary responses	Ineffective breathing pattern	23 (100)
4. Activity / rest	4. Cardiovascular / pulmonary responses	Risk of decreased cardiac output*	19 (82.6)
4. Activity / rest	4. Cardiovascular / pulmonary responses	Risk of unstable blood pressure	12 (52.2)
4. Activity / rest	4. Cardiovascular / pulmonary responses	Decreased cardiac output	7 (30.4)
9. Coping / stress tolerance	3. Neurobehavioral stress	Decreased intracranial adaptive capacity*	5 (21.7)
11. Safety / security	1. Infection	Risk of infection	23 (100)
11. Safety / security	2. Physical injury	Risk of pressure injury	23 (100)
11. Safety / security	2. Physical injury	Risk of aspiration	23 (100)
11. Safety / security	2. Physical injury	Risk of falls*	20 (87.0)
11. Safety / security	2. Physical injury	Risk of impaired tissue integrity*	6 (26.1)
11. Safety / security	2. Physical injury	Risk of bleeding*	3 (13.0)
11. Safety / security	2. Physical injury	Ineffective airway clearance*	2 (8.7)
11. Safety / security	2. Physical injury	Risk of corneal damage*	2 (8.7)

| 11. Safety / security | 6. Thermoregulation | Hypothermia | 10 (43.5) |
| 11. Safety / security | 6. Thermoregulation | Hyperthermia* | 3 (13.0) |

Source: The Authors (2022).

DISCUSSION

In this study, data from 23 medical records of brain-dead patients, potential organ and tissue donors, showed that the predominant characterization of the patients participating in the study was male, adult population, prevalence of stroke as cause of death, being possible to observe agreement with national data published by the Brazilian Association of Organ Transplants regarding gender and the most prevalent causes of BD[3].

Regarding the race/skin color of these PDs, brown color is predominant, which may be supported by the predominance of people who declare themselves brown in the Northeast and Ceará[16]. Regarding marital status, singles represented the highest frequency among PDs of both sexes (73.9%), indicating similarity with a study carried out in the state of Rio Grande do Norte on the characterization of potential organ and tissue donors for transplants, where 46.7% of the sample was composed of single individuals[17].

When analyzing the opening of the sepsis protocol, it is observed that 95.7% did not require the opening of this protocol, this fact diverges from the results presented in a study carried out between 2011 and 2016, in the state of Paraná, which aimed to verify the effectiveness of donation in that region. The study pointed to sepsis as the major cause of ineligibility for organ donation, 162 patients (5.2%) had this condition[9]. Notably, the hospital surveyed has strong strategies for preventing and early identification of sepsis, which may be reflected in this finding.

Regarding comorbidities and unhealthy habits, half of the PDs had no comorbidity, and among those with more than one, systemic arterial hypertension and alcoholism were prevalent. Thus, the literature indicates that the main underlying diseases present in PD are hypertension, atrial fibrillation, diabetes, coronary and cerebrovascular disease, smoking, alcoholism and dyslipidemia[18].

Hypertension is therefore a major risk factor for cerebrovascular disease, particularly stroke, posing a risk to brain tissue and neuronal function[19].

The findings of this study indicate that of the 23 PDs, 78.3% did not donate and that the major impediment to organ donation corresponded to family non-acceptance (65.2%), as well as the results presented in a study carried out in Rio Grande do Sul (2012-2017), which presented 91 interviews with family members of PDs, obtaining that 48.4% were positive for donation and 51.6% presented refusal. The family member's refusal to donate is the leading cause of non-effective donation/transplantation[20].

In this context, it is important to think about nursing care that involves welcoming and caring for the family of the possible donor, that is, aligning the NP to meet the demands of maintaining the PD and the family. It is necessary to reflect the nursing care regarding the binomial donor-family before the process of organ transplants.

As for the organs/tissues retrieved from the five donors, corneas (21.7%), followed by kidneys (17.4%) and liver (17.4%). The literature[16-18] points to kidneys and liver as the most commonly captured organs, while the most commonly captured tissue is the cornea. On the other hand, the reduced number of donations of other organs such as lungs, heart and pancreas can be explained by the fact that they have more stringent criteria for extraction and donation, such as age, absence of trauma, previous history of PD, and organ-specific contraindications[21-23].

EM brings physiological changes to the various organ systems and neurohormonal disturbances that can damage the quality of the organs to be transplanted. The degree of alteration in these systems will depend on intracranial hypertension and cerebral herniation speed. Thus, when identifying nursing diagnoses, nursing professionals can observe cardiovascular, pulmonary, endocrine, hepatic and coagulation changes, as well as temperature changes and thus draw up an individualized care plan, benefiting the viability of organs[21].

Twenty-two nursing diagnoses and five domains of the NANDA-1 taxonomy were identified in the study population. The diagnoses appearing in more than 50% of the sample surveyed are: risk of unstable blood glucose; risk of impaired liver function; impaired gas exchange; impaired bed mobility; ineffective breathing pattern; risk of infection; risk of pressure injury; risk of aspiration; risk of decreased cardiac output; risk of falls, impaired urinary elimination; risk of electrolyte imbalance and risk of unstable blood pressure.

The risk of unstable glycemia, diagnosed in the brain-dead patient, is related to the progressive failure of the hypothalamic-pituitary axis that evolves into a decline in hormone concentrations. Given the above, diabetes insipidus affects approximately 80% of these patients, producing numerous electrolyte disturbances such as secondary hypovolemia, hypotension, hypernatremia and serum hyperosmolarity. In addition, insulin secretion is also impaired, which can produce hyperglycemia and increased peripheral insulin resistance[24].

The risk of impaired liver function is determined as the susceptibility to liver function depletion. Although NANDA does not associate this ED with individuals with BD, this situation presents a reduction in glycogen stores and reduced liver perfusion, compromising liver functionality, including the ability to produce coagulation and fibrinolytic factors, which also justifies, in part, the ED of bleeding risk[25].

Given the repercussions caused by brain death, the lung becomes susceptible to changes in acid-base balance and consequently in ventilation/perfusion, and the nursing diagnosis of impaired gas exchange can be observed. This diagnosis leads the nurse to direct care: monitoring PaO_2, SaO_2, hemoglobin, cardiac output, arterial blood sampling for blood gas every four hours and maintenance of ventilatory parameters[26].

Furthermore, the diagnosis of impaired bed mobility was also prevalent in these potential donors, since they cannot perform any movement, and thus prevent skin lesions, depending entirely on the care of the nursing team.

Thus, Santos (2012) points out as interventions for the patient with this diagnosis of impaired mobility: placing suitable therapeutic mattresses, positioning the body aligned, bathing in bed with heated water, maintaining the decubitus elevated to 45°, using cushions in bony prominences to prevent pressure injuries, monitoring areas of pressure and friction of the skin, as well as dryness and excessive moisture of the skin.

In the case of diagnoses of ineffective breathing pattern, the patient in BD may experience worsening of their lung performance within hours. Pulmonary alteration is associated with the severity of primary brain injury, requiring the promotion of adequate ventilatory support[25].

The diagnosis of infection risk is frequent in patients admitted to intensive care, given that health care-related infections (HAIs) are serious adverse events that affect hospitalized patients, especially those in critical condition. The use of invasive procedures and equipment in intensive care, such as deep venous catheters, arterial catheters, enteral and bladder catheters and ventilatory prostheses, together with the exposure of a wide variety of pathogenic microorganisms, contribute significantly to the occurrence of infection, justifying the existence of several infectious typologies such as respiratory, urinary, bloodstream and gastrointestinal[27].

Critically ill patients who evolve to BD also have compromised skin tissue perfusion

due to immobility in bed due to the absence of consciousness. This is one of the factors that can cause the development of ischemia, hypoxia, tissue acidosis, edema and consequent cell necrosis, causing pressure injury (PI)[28]. From this perspective, the nursing professional lists the diagnosis of risk of pressure injury with great frequency, usually associating it with physical immobilization.

Indeed, the risk of aspiration was one of the most recurrent EDs among the study population. Critically ill patients have a higher risk of secretions entering the airways, this factor is mainly associated with an endotracheal tube, Glasgow scale equal to or less than three, and deep sedation. Most of these patients have clinical conditions that contraindicate oral feeding, requiring the use of other routes, among which gastrointestinal tube nutrition stands out, which presents a high risk of aspiration of gastric contents into the lungs, leading to the emergence of respiratory infections, one of the factors that promotes the risk of infection[24].

The diagnosis of unstable blood pressure risk was present in 52.2% of the sample, thus, it can be stated that among the most frequent pathophysiological changes of BD is arterial hypotension, due to the intense vasodilation and changes in afterload and preload that lead to coronary hypoperfusion. To treat this hypotension, which can lead to organ impairment, a combination of intravenous fluids and vasoactive drugs is established, as well as constant monitoring of central venous pressure (CVP) and mean arterial pressure (MAP), which should be appropriate for each age[21].

EDs with high frequencies in patients in BD involved risk of decreased cardiac output; risk of falls; impaired urinary elimination and risk of electrolyte imbalance, and should be considered in the care given to patients in BD, aiming at a qualified nursing care.

Thus, most of the EDs found are associated with risks. The SNC has been implemented in the care practice of the potential organ donor, as a way to organize and operationalize nursing care and the nursing process. Still, many nurses have shown difficulty in using this systematization in practice. Thus, it is up to the nurse to plan care for this public, using the NP as a tool, standardizing the language through nursing diagnoses.

Because of the above, it is possible to observe the existence of several EDs that can be and have been attributed to the potential donor of organs and tissues, however, specific studies are needed to point out which EDs would be most appropriate for the maintenance of organ PD, to optimize assistance, providing safety and quality of nursing care to this specific public.

The limited number of publications addressing ED for potential organ and tissue donors in BD stands out as a limiting factor for this study, thus dialoguing with the relevant literature was challenging, presenting limited in-depth capacity.

FINAL CONSIDERATIONS

The present study made it possible to know the prevalent nursing diagnoses in the patient's care in BD/PD and sociodemographic, clinical and organ and tissue procurement characteristics.

The survey of ED and the knowledge of the epidemiological and clinical characteristics of PD in BD are fundamental tools for nurses to plan and implement targeted, individualized and more specific actions for the maintenance of PD in BD, enabling greater chances of organ viability for donation and, consequently, the effectiveness of transplantation.

Thus, it is necessary to expand studies of the same theme that contribute to the nurse's knowledge to recognize the physiological changes, possible risk conditions and

deleterious effects that EM can cause, so that it can outline the nursing diagnoses and a specialized care plan, since it is up to the professional nurse to plan, execute, coordinate and evaluate nursing care.

Identifying EDs provides input for targeted and individualized patient care while maintaining organ donor potential. The study contributes to the clinical practice of nursing professionals who work directly in the assistance that involves especially the maintenance of the DP in BD, since the elaboration of nursing diagnoses allows the knowledge of the basic needs affected and confer positive impacts on the management of the patient. This study also adds to the body of literature that addresses this issue.

The present study serves as a reference for nurses who come to deal with this profile of patients, helping the reflection that can improve the practice and application of the NP.

ACKNOWLEDGMENTS

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