Management of patients in brain death.



# MANAGEMENT OF PATIENTS IN BRAIN DEATH

MANEJO DOS PACIENTES EM MORTE ENCEFÁLICA MANEJO DE LOS PACIENTES EN MUERTE ENCEFÁLICA

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#### **ABSTRACT**

Objective: to analyze the knowledge of nurses of the Emergency and Intensive Care Unit in the management of the patient in Brain Death. *Method*: this is a quantitative, descriptive, exploratory study of 18 nurses. Data were collected using a structured questionnaire based on guidelines of the Brazilian Intensive Medicine Association and presented in tables. *Results*: nurses demonstrated favorable knowledge about the general aspects and hemodynamic support such as temperature limits, blood pressure goals, vasopressors used and the indication of resuscitation. Regarding the endocrine/metabolic control and the hematological and infectious aspects, it is important to know only the suspension of the enteral diet and the use of antibiotic therapy. *Conclusion*: the interviewed nurses knowledge about management with the potential donor is deficient, and training on the subject is necessary. *Descriptors*: Brain Death; Nursing Care; Knowledge; Delivery of Health Care; Critical Care; Tissue and Organ Procurement.

#### RESUMO

Objetivo: analisar o conhecimento dos enfermeiros da Emergência e Unidade de Terapia Intensiva em relação ao manejo do paciente em Morte Encefálica. *Método*: estudo quantitativo, descritivo, exploratório com 18 enfermeiros. Os dados foram coletados utilizando questionário estruturado a partir das diretrizes da Associação de Medicina Intensiva Brasileira e apresentados em tabelas. *Resultados*: os enfermeiros demonstraram conhecimento favorável sobre os aspectos gerais e suporte hemodinâmico, dentre eles: limites de temperatura, metas pressóricas, agentes vasopressores utilizados e a indicação de reanimação. Em relação ao controle endócrino/metabólico e aos aspectos hematológicos e infecciosos, destaca-se conhecimento apenas acerca da suspensão da dieta enteral e sobre o uso de antibioticoterapia. *Conclusão*: o conhecimento dos enfermeiros entrevistados acerca do manejo com o potencial doador é deficitário, sendo necessárias capacitações a respeito do tema. *Descritores*: Morte Encefálica; Cuidados de Enfermagem; Conhecimento; Assistência à Saúde; Cuidados Críticos; Obtenção de Tecidos e Órgãos.

## RESUMEN

Objetivo: analizar el conocimiento de los enfermeros de la Emergencia y Unidad de Terapia Intensiva en relación al manejo del paciente en Muerte Encefálica. Método: estudio cuantitativo, descriptivo, exploratorio con 18 enfermeros. Los datos fueron recogidos utilizando cuestionario estructurado a partir de las directrices de la Asociación de Medicina Intensiva Brasilera y presentados en tablas. Resultados: los enfermeros demostraron conocimiento favorable sobre los aspectos generales y soporte hemodinámico dentro de ellos: límites de temperatura, metas de presión, agentes vasopresores utilizados y la indicación de reanimación. En relación al control endócrino/metabólico y a los aspectos hematológicos e infecciosos se destaca el conocimiento apenas acerca de la suspensión de la dieta enteral y sobre el uso de antibioticoterapia. Conclusión: el conocimiento de los enfermeros entrevistados acerca del manejo con el potencial donador es deficitario, siendo necesarias capacitaciones al respecto del tema. Descriptores: Muerte Encefálica; Atención de Enfermería; Conocimiento; Prestación de Atención de Salud; Cuidados Críticos; Obtención de Tejidos y Órganos.

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#### INTRODUCTION

Brain Death is regulated in Brazil by the Federal Medical Council through Resolution 1480/97, defined as the total and irreversible cessation of encephalic functions, of a known and indisputable cause. With the evolution of this concept, there has been a progress in Intensive Care to support the basic functions of the organism for as long as necessary when the brain functions are not functioning.

In Brazil, between January and September 2015, according to data from the Brazilian Registry of Transplantation, there were 7,269 potential donors notified, of which only 2,121 were classified as effective donors. A total of 4,431 interviews were performed, the main factor being donation failure (43%), followed by other reasons (18%), medical contraindication (15%), and cardiac arrest was responsible for 12% of the not effective ones.<sup>3</sup>

Up to September 2015, there were 31,762 people on the waiting list for a transplant in Brazil, 692 of them were from the state of Pernambuco. In Petrolina - PE, between January and February 2015, there were 23 potential donors notified, of which only 07 donations were made. Among the main reasons for the non-effectiveness of the transplantation in Petrolina there are the family refusal (13 cases), and the medical contraindication (02 cases), not differing from the national scene to family refusal.<sup>3</sup>-<sup>4</sup>

Brain death is characterized by an inflammatory syndrome that can lead to serious complications, which may render organ donation unfeasible. These repercussions alter all organic systems, leading to hypotension, endocrine changes such as diabetes insipidus, hypernatremia, and loss of temperature control at the hypothalamic level, besides the pulmonary edema and cardiac arrhythmias.<sup>5</sup>

Adequate understanding of brain death, its pathophysiological processes, its identification and clinical management of the donor, have a positive impact on the increase in the number of donors and effective donations, which needs to be developed by all members of the multi-professional team, including nurses.<sup>2</sup>

It is in the Intensive Care Units (ICU) or in the Emergency sector that the process of transforming the Donor Potential (DP) into an effective donor is developed, and in these sectors, the nurse is the professional responsible for elaborating and supervising the care developed for the DP. In this context, it is necessary that the nurses know the physiological changes that occur, so together Management of patients in brain death.

with the health team, they can lead the proper and successful handling of the DP.<sup>6-7</sup>

As a result of an adequate systematized nursing care, a greater chance of donation effectiveness is expected, resulting in a reduction in transplant waiting lists, and meeting the basic physiological needs of the potential donor, the donation process, and aftercare, the transplantation of organs and tissues, aiming at the care of donors, recipients, and relatives. However, there are still obstacles. Facing the problems that are still linked to brain death in the world, and not being different in our region, it was questioned:

What are the behaviors of nursing professionals in the management of patients in BD? Are these behaviors in accordance with the recommendations by the Association of Brazilian Intensive Medicine (AMIB)?

It is noteworthy that in the Region, the number of cases of patients with Brain Death has been increasing, but studies on the reality of the care provided to these public health patients are still insufficient. Thus, it was important to carry out this study since its results may contribute to the construction of mechanisms to improve the care of health professionals inserted into the reality of public services.

# **OBJECTIVE**

• To analyze the knowledge of nurses of the Emergency and ICU in the management of the patient in Brain Death.

# **METHOD**

This is a quantitative, descriptive, exploratory study, part of the results of the study "Analysis of the Brain Death Process in a University Hospital of the Region of the Vale do São Francisco".

The study was carried out in the Emergency and Intensive Care Unit (ICU) of a University Hospital in Petrolina-PE, under the administration of the Brazilian Hospital Services Company (EBSERH).

The place of the study is a reference in the region in the care of patients suffering from traumatic and neurological accidents, which can progress to Brain Death and become Potential Organ Donors.<sup>10</sup>

The research individuals were all nurses who act directly and indirectly in the care of patients, who work in the Yellow and Red Room of the emergency department of the hospital, and the ICU. As inclusion criteria, there were: people acting as a nurse in the Adult Intensive Care Unit, Yellow or Red Room

of the emergency of the hospital; time in these sectors greater or equal to three months. The exclusion criteria were nurses who were not in service at the time of collection (either on leave or on vacation) and who were not part of the staff of the sectors, providing service in the sector sporadically.

The participants were 27 nurses in the sectors planned for the study, in which 19 of them met the inclusion criteria. However, a nurse refused to respond to the questionnaire. Thus, the sample size of the study was 18 nurses.

The data were collected between August and October 2015 in the nurses' workplaces and in shifts that allowed the previous contact with all them, so they were clarified on all the stages of the research.

For a collection instrument, a questionnaire with 23 questions was used, structured according to the Protocol of Hemodynamic Maintenance of the Donor Potential of the Brazilian Intensive Medicine Association, divided into topics: Part I - General Aspects and Hemodynamic Support and Part II - Metabolic Endocrine Control and Hematological and Infectious Aspects.<sup>11</sup>

In 19 questions, there were five alternatives, where only one had the correct answer as determined by the above protocol, being exposed to the results according to the relevance of the answers. The other 04 questions were elaborated directly, in which the alternatives were only yes and no.

All questionnaires were duly answered, and the result was considered deficient when less than 50% of the nurses answered the question, moderate when the score was between 51 to Management of patients in brain death.

69% and satisfactory when a number equal or greater than 70% of the nurses answered the question.

The research project was submitted to the Ethics and Deontology Committee on Studies and Research (CEDEP) of the Federal University of the Vale de São Francisco (UNIVASF) and in accordance with Resolution 466/2012 of the National Health Council number 1,155,141, with the Certification of Presentation for Ethical Assessment (CAAE) of 46688015.30000.5196.

The data collection was done by the researcher after the authorization of the Research Ethics Committee and by signing the Informed Consent Term (TCLE) by the participants.

The data were consolidated and analyzed in Excel 2010, Windows®, where they were evaluated in a descriptive way using relative and absolute frequencies of the data, presented in tables for better visualization.

## **RESULTS**

Of the 18 nurses participating in the study, 83.3% were female, with age mostly between 26 and 30 years old (77.8%). Regarding the training time, the interval between 5 and 9 years of training (55.6%) stood out. Regarding specialization, most participants claimed to have a specialist degree (83.3%), with 44.5% in the areas related to the study places (Table 1).

Table 1. Sociodemographic and Labor Profile of ICU and Emergency Nurses of a University Hospital in Petrolina/PE. Petrolina (PE), Brazil, 2015.

Variables		n	%
Gender	Female	15	83.3
	Male	3	16.7
Age	26 - 30 years old	14	77.8
	31 - 35 years old	3	16.7
	More than 35 years	1	5.5
Time being graduated	1-4 years	4	22.2
	5-9 years	10	55.6
	> 10 years	4	22.2
Specialization	Yes	15	83.3
	No	3	16.7
Titration	Urgency	5	27.8
	ICU	3	16.7
	Others	5	27.8
	None	3	16.7

Management of patients in brain death.

Data were collected regarding the parameters recommended in the maintenance of DP. Regarding the temperature limits in which DP should be maintained and regarding

prevention measures and ways to reverse hypothermia, the response patterns of those surveyed in Table 2 can be observed.

Table 2. Distribution of aspects related to the temperature of the potential donor. Petrolina (PE), Brazil, 2015.

Variables		n	%
Body Temperature Limits to be maintained	Central Temperature> 35°C and Ideal between 36°C and 37.5°C*	15	83.3
	Central Temperature> 38 ° C and Ideal between 37 ° C and 38.5 ° C	3	16.7
What can be used to maintain	Only use thermal blankets	13	72.2
the temperature	Gastric and colonic irrigation with heated solutions and crystalloid infusions at 43°C in the central vein at 150 to 200 ml/h* Heating the air, heating the fan gases,	0	0
	using thermal blankets, infusing heated liquids are not indicated.	5	27.8
*correct alternative			

Regarding the laboratory tests to be performed in the DP, only 16.7% marked the correct answer, which includes blood culture, uroculture, electrolytes and gasometry, as recommended. Then, 72.2% opted for the alternative describing tests that will only be performed in specific cases or before the suspicion of some communicable disease.

Regarding the hemodynamic support to the DP, several elements deserve special attention from the multi-professional team and also from the nurses, such as the mean arterial pressure (MAP). On this parameter, several questions were raised to the participants, being the results described in Table 3.

Table 3. Distribution of aspects related to blood pressure. Petrolina (PE), Brazil, 2015.

Variables		n	%
MAP measure	Invasive*	1	5.6
	Non-Invasive	8	44.4
	Invasive or non-invasive	9	50
Drugs used in hypertension	Sodium Nitroprusside and Beta Blockers* Hydralazine and Sodium Nitroprusside	8	44.4
		7	38.8
Minimum blood pressure goal	MAP > 75 mmHg and PAS > 80 mmHg	5	27.8
	MAP > 65 mmHg and PAS > 90 mmHg *	9	50
First measure to reverse hypotension	Crystalloid infusion*	8	44.4
	Crystalloid infusion and vasopressor drugs	10	55.6
Evaluation of the Voluntary Replacement	PVC, Swan-Ganz catheter, and dynamic variables*	5	27.8
	PVC and MAP	10	55.6
Vasopressor and Inotropic Agents	Only Dobutamine and Noradrenaline Noradrenaline, adrenaline, dopamine,	1	5.6
	vasopressin and dobutamine*	16	88.8
	Atropine, adrenaline and dobutamine	1	5.6

<sup>\*</sup>correct alternative

Regarding the therapies used to maintain cardiac functions in normality in donor potentials, it was questioned whether the use of beta-agonist drugs at high doses contraindicated heart transplantation and 61.1% of the participants agreed that they did not.

Regarding the indication of cardiopulmonary resuscitation (CPR) in potential donors, most (72.2%) stated correctly that yes. However, it is important to note that 27.8% of the nurses stated that the CPR maneuvers in DP are not indicated, a considerable number that requires attention.

Part II - Metabolic Endocrine Control and Hematologic and Infectious Aspects

This step includes the nurses' knowledge about the care required for DP to maintain metabolic homeostasis, as shown in Table 4.

Management of patients in brain death.

Table 4. Distribution of endocrine, metabolic, hematologic and infectious aspects. Petrolina (PE), Brazil, 2015.

Variables		n	%
When to stop nutrition	Use of vasoactive drugs at high doses and signs of hypoperfusion* Use of analgesic drugs with high doses and	16	88.8
	signs of hypoperfusion. Use of analgesic drugs with low doses and signs of hypoperfusion.	1	5.6
		1	5.6
Glucose Control	Yes, 4h/4h and start insulin when glycemic levels> 180mg/dl Yes, 6h/6h and start insulin when glycemic	5	27.8
	levels> 180mg/dl*	11	61.1
Drugs for Diabetes Insipidus	Desmopressin (DDAVP)* Regular Insulin	3 13	16.6 72.2
Ideal serum Na <sup>+</sup> values	135 to 145 mEq/L 130 to 150 mEq/L*	12 1	66.6 5.6
Correction of Hypernatremia	Administer 0.5% saline solution IV Administer 0.4% saline IV IV Administer 5% glycosidic solution IV *	3 7 7	16.6 38.8 38.8
acceptable pH	pH> 7.20 * pH> 7.35	8	44.5 50
Use of Antibiotic Therapy	Yes * No	15 3	83.3 16.7

<sup>\*</sup>correct alternative

#### DISCUSSION

Considering the growing importance of Brain Death and the Maintenance of Potential Donors in the world and in the region where the study was done, this study sought to evaluate the knowledge of nursing professionals about this problem. Therefore, the recommendations of the AMIB Guidelines, which up to the present time they are addressed and recognized as reference literature in Intensive Medicine in Brazil, have been considered.

This topic of discussion has become frequent in recent years in the scientific area as well as in health work environments, especially in the hospital network. One of the topics involved in this discussion is the management of potential donors. In this respect, studies show that these patients need continuous maintenance care since they present several alterations, both endocrine, metabolic and cardiovascular.<sup>12</sup>

Such changes need to be known to all nurses who work with severe patients and who may progress to the BD picture. Since the nurse is responsible for his team and according to Resolution 292/2004 of the Federal Nursing Council, it is up to this professional to plan, execute, coordinate, supervise and evaluate the nursing procedures provided to the donor of organs and tissues.<sup>13</sup>

Regarding the sociodemographic and occupational profile of the nurses, a similar survey brought some data in common, such as the female gender in general and similar age group. However, the same study diverges in the area of specialization, since most

participants stated that they have some kind of post-graduation.<sup>14</sup>

Most of the nurses who were the subjects of the research claimed to have less than 10 years of training. However, they had specialization and this in the areas of activity that is Emergency and ICU. This leads to the inference that they had an acceptable level of knowledge about the management in the BD and therefore the care that should be provided to these patients, which was not confirmed throughout the study.

Regarding the main aspects related to the support of these patients, the maintenance of temperature is fundamental for hemodynamic control. Regarding this issue, most of the showed satisfactory knowledge regarding the temperature limits at which the DP should be maintained. Regarding the of preventing and reversing hypothermia, the knowledge those surveyed showed a deficit.

agreement with described the temperature, a similar study showed that most of the nurses were right to bring the central temperature limits higher than 35°C and ideal between 36°C and 37.5°C. Also, most of the professionals emphasize as the main measure for prevention and reversal of hypothermia the use of only the thermal blanket, when the guidelines bring other measures as effective and even more accessible in the services. It is important to confirm that the control of this parameter can prevent several complications that could make a donation unfeasible, such as cardiac dysfunction, arrhythmias, and coagulopathies, and it is essential that the interviewees have this knowledge.15

Regarding the routine laboratory tests to which the patients should undergo DB, the guidelines indicate that the electrolyte and gasometry dosages are performed to maintain the normalized physiological parameters, as it brings as a strong recommendation the accomplishment of two blood cultures and a uroculture already at the opening of the protocol. However, only 16.7% of the interviewees had this knowledge, and most of them scored as options that have weak recommendations and will only be performed in specific cases or in the presence of suspected transmissible disease.<sup>11</sup>

Another parameter widely discussed by the guidelines in hemodynamic support is blood pressure, the best form of monitoring, optimal and acceptable levels, treatment for hypertension and hypotension, the means to assess volume replacement and which drugs to use during hemodynamic resuscitation of these patients.

Therefore, the participants showed deficient knowledge in the indicated way of MAP, since the guidelines recommend the invasive measure to be more reliable, and only 5.6% answered correctly. However, this may be related to what happens in the practice of the institution, since 50% affirm that it can be assessed either in an invasive or non-invasive way, evidence that they work with the material available to them and it is not always recommended. Regarding the minimum blood pressure goal that should be achieved in the WFP DP> 65 mmHg and SBP> 90 mmHg, 50% of the participants opted for the correct response. These indices should be maintained to prevent cardiac dysfunction and hemodynamic instability of DP.

The research showed that the knowledge of the participants regarding the pressure aspects is insufficient since in both questions on the treatment of hypertension and hypotension only 44.4% of them marked the correct alternatives. It is important to note that 55.6% of nurses reported as a first step to invert hypotension to crystalloid infusion in association with vasopressor drugs, and these should only be initiated after certification that volume expansion is not sufficient. <sup>16</sup>

For the analysis of the efficacy of volume expansion, the guidelines include the use of parameters such as PVC, Swan-Ganz catheter dynamic variables as recommendation. However, only 27.8% of the nurses answered the question, most of them marked the alternative that excluded the dynamic variables, which are considered as preferential parameters in this analysis. Research indicates that hemodynamic Management of patients in brain death.

cardiovascular support presupposes euvolemia and depends on the joint analysis of several parameters through all available means. Knowing these possibilities, the professional can contribute together with the medical team by suggesting ways to measure such parameters and remember that these together allow a better analysis.<sup>2</sup>

If volume expansion is not sufficient to reverse hypotension, some drugs are indicated for treatment, such as norepinephrine, adrenaline, dopamine, vasopressin, and dobutamine in cases of compromised cardiac contractility. The study showed to be the knowledge of 88.8% of the subjects of the research. Knowing the indication of these drugs is important and meets one of the prohibitions of the Code of Ethics of Nursing Professionals that prohibits the nurse from administering drugs without knowing their action.<sup>17</sup>

The guidelines also raise questions about the contraindication of heart transplantation if the patient uses beta-agonist therapy to maintain cardiac functions, which is not true and 61.1% of the nurses were right. The acquisition of a satisfactory knowledge (> 70% of the nurses) in this question can collaborate in the identification of heart DP, which is the fifth-ranking organ in the transplant waiting list, with 251 patients in the Brazilian list waiting for a new heart.<sup>3</sup>

**Another** relevant the aspect is cardiorespiratory arrest in DP and the performance or not of the CPR maneuvers, about which the guidelines affirm that they should be performed as recommended by the Heart Association, American being knowledge of 72.8% of the participants of this research. This is close to the results of another study that revealed that 52.7% of the nurses recognize the importance of CPR in this type of patient. However, it is important to note that in both studies the number of nurses who do not indicate CPR is considerable. The lack of knowledge of this issue can lead to the loss of DP, failing to perform organ transplants and hindering for lives to be saved. 14

One of the basic and often neglected care in DP patients is nutrition, which may be enteral or parenteral, most commonly enteral. However, this should be interrupted on some occasions, such as when high-dose vasoactive drugs are required and signs of hypoperfusion are necessary, 88.8% of the nurses answered the question correctly. This is because the enteral diet under conditions of hemodynamic instability will not be absorbed effectively, which may lead to abdominal

distension and increase of the gastric residue and should, therefore, be suspended. 18

Regarding endocrine disorders, one of the main ones is Diabetes Insipidus that occurs in the majority of patients in DB as shown in surveys.8 The nurses in this study mostly agreed that the blood glucose test should be performed routinely and with minimal every 6 but few of them knew Desmopressin is the recommended treatment in these cases. It is important to know how much time is spent to plan nursing care for these patients, as well as the form of treatment and how the drug should be administered to prevent and reverse this leading hemodynamic condition to disorders.8,11

**Another** common disorder hypernatremia, which according to the study present in 62.5% of DB patients hospitalized in a hospital in Pernambuco.4 In these patients, sodium levels are acceptable between 130 and 150 mEq/L, something that most of the nurses were unaware since only 5.5% of the respondents answered this question. Its correction is done with the administration of free water in the form of a 5% glycoside solution, which was answered correctly by only 38.8% of the participants. If this disorder is not reversed, it may cause liver dysfunction and loss of this organ if the patient becomes a donor, making a transplant impossible.8

Acidosis is another alteration that occurs commonly in DP, and its acceptable pH levels are above 7.2, known by 44.44% of respondents. It is worth mentioning that the majority marked as correct the option that brought pH> 7.35, which is considered ideal for patients who are not in such a situation. By having this view, nurses will not attempt to correct this disorder, leading to a worsening of these patients' condition.

Finally, a parameter of important discussion is the use of antibiotic therapy, which is empirical or guided by culture, should be prescribed according to guidelines if there is a clinical indication. About that, 83.3% of participants were aware, which shows that most know that this parameter has to be controlled to maintain homeostasis of DP. Studies have stated that antibiotic therapy should be indicated in cases where the infection process has been proven and also suspected.8

# CONCLUSION

The interviewed nurses' knowledge about management with the potential donor is deficient. It important to analyze the care

Management of patients in brain death.

given to these patients and to infer that it needs to undergo changes and improvements, since effective care may enable a greater number of transplants performed with quality.

From this study, it is clear the need of health institutions to promote training to their professionals regarding Brain Death and the management that should be performed in potential donor patients. In this sense, it is worth emphasizing the role of Permanent Education in Health, which should offer moments for professionals to acquire new knowledge and improve existing ones.

It is inferred also from the results, the need to implement a protocol of maintenance of the potential donor in the hospital institution. With this instrument, it will be possible to direct the main Nursing care to be performed by the team to provide effective assistance and contribute to the increase in the number of abstractions performed in the region.

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Management of patients in brain death.

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