Original article

Knowledge of postgraduate nursing students on the diagnosis of brain death and the management of the potential organ donor

Conhecimento de enfermeiros pós-graduandos sobre diagnóstico de morte encefálica e manejo do potencial doador

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ABSTRACT | OBJECTIVE: To identify the knowledge of postgraduate nursing students regarding the brain death protocol and the management of potential donors. **METHODOLOGY:** A descriptive and exploratory quantitative study was conducted with 68 nurses regularly enrolled in postgraduate courses in Intensive Care and High Complexity and in Urgency and Emergency, at a private higher education institution in Brazil. Data were collected using a structured questionnaire and analyzed using descriptive statistics, with calculation of absolute and relative frequencies. **RESULTS:** It was observed that 100% of the participants recognize the importance of mastering the brain death protocol, although only 66.2% correctly identified the requirements for initiating the protocol and 63.2% are unaware of the correct procedures for making the diagnosis. All participants believe in the need for continuous training, but 83.8% report low confidence in managing potential donors. The lack of understanding of the diagnosis is a challenging factor for nursing professionals, as it is cited as a major reason for family refusal (80.9%). **CONCLUSION:** The study highlights knowledge gaps regarding the diagnosis of brain death and donor management, which go beyond initial academic training. The insecurity reported by professionals confirms the urgency of continuous training and specific training to ensure compliance with protocols.

KEYWORDS: Brain Death. Tissue and Organ Procurement. Students. Nursing. Knowledge.

RESUMO | OBJETIVO: Identificar o conhecimento de enfermeiros pós-graduandos sobre o protocolo de morte encefálica e sobre o manejo do potencial doador. **METODOLOGIA:** Pesquisa quantitativa, descritiva e exploratória realizada com 68 enfermeiros regularmente matriculados em cursos de pós-graduação em Terapia Intensiva e Alta Complexidade e em Urgência e Emergência, em instituição de ensino superior privada no Brasil. Os dados foram coletados por meio de questionário estruturado pelos autores e analisados por estatística descritiva, com cálculo de frequências absolutas e relativas. **RESULTADOS:** Observou-se que 100% dos participantes reconhecem a importância do domínio do protocolo de morte encefálica, embora apenas 66,2% tenham acertado os requisitos para abertura do protocolo e 63,2% desconheçam os procedimentos corretos para efetivação do diagnóstico. Todos os participantes acreditam na necessidade de treinamentos contínuos, mas 83,8% relatam baixa confiança no manejo do potencial doador. A não compreensão do diagnóstico é um fator desafiador para os profissionais de enfermagem, já que é apontado como agente principal da recusa familiar (80,9%). **CONCLUSÃO:** O estudo evidencia lacunas de conhecimento sobre o diagnóstico de morte encefálica e sobre o manejo do doador, que transcendem a formação acadêmica inicial. A insegurança relatada pelos profissionais ratifica a urgência de capacitação contínua e treinamentos específicos para assegurar o cumprimento dos protocolos.

PALAVRA-CHAVE: Morte Encefálica. Doação de Órgãos e Tecidos. Estudantes de Enfermagem. Conhecimento.

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1. Introduction

Brain death (BD) is understood as the complete and irreversible loss of brain functions and, as such, is adopted as the legal definition of death[1]. Given its relevance, suspicion or confirmation of BD implies mandatory notification to the state control body responsible for coordinating organ and tissue donation[2]. The Federal Council of Medicine (Conselho Federal de Medicina - CFM), understanding the complexity of establishing a diagnosis of BD, has developed a protocol of clinical and complementary examinations to be instituted upon suspicion of BD and subsequent confirmation[3].

In Brazil, during the year 2023, out of a total of 4,073 notifications of brain death, 1,087 (26.7%) did not obtain confirmation of the diagnosis[4]. In the same period, the non-confirmation of the diagnosis of BD was 20%, among 924 notifications[4]. These data suggest that identifying suspected BD to initiate the protocol may represent a challenge for the health team. Organ donation is a process by which organs can be removed from a living or deceased person, so that they can be donated and used in the treatment of other individuals in order to restore the functions of a diseased organ or tissue[5]. A single individual is capable of contributing to the treatment of up to 10 individuals, donating, for example, kidneys, heart, pancreas, liver, skin, tendons, cartilage and cornea[6]. Donation from deceased people can occur after cardiorespiratory arrest or after confirmation of brain death[5].

In cases of brain death, if organ donation is authorized by the family, the maintenance of the potential donor follows the recommendations set out in Brazilian guidelines, promoting homogeneity in conduct related to body homeostasis, such as control of blood pressure, body temperature, mechanical ventilation and medications, in order to maintain the viability of organs and tissues and, in this way, mitigating the disproportion between the need for transplants and the effectiveness of organ donation[7].

Throughout this process, the nurse, as a professional directly involved in patient care, must assist in the care of potential donors, minimizing the occurrence of cardiac arrest or other homeostatic imbalances during the brain death determination process. It is up to the nursing professional to have mastery over clinical situations that may arise because of brain death, considering the principles of physiology up to organ dysfunction[8]. Therefore, early recognition of the main complications is necessary to provide greater organ preservation[8].

Although Brazil is a world reference in transplants, occupying second place in the number of procedures performed[9], there is a significant number of family refusals to the donation process, especially due to a lack of understanding of the brain death diagnosis[4].

Considering that family refusal is the main factor preventing organ donation in Brazil, it is up to health professionals to (re)cognize the feelings of relatives when faced with the communication of brain death and the possibility of donation, in order to minimize the moments of anguish experienced[10]. Thus, the approach to family members should be carried out as soon as the suspicion of brain death arises, in a humane way, clarifying the concepts involved in this protocol to be instituted, to better support decision-making[10,11].

In view of the above, the need to develop strategies that assist in welcoming and approaching family members by the health team is evident, factors that can interfere with the early refusal of family members regarding organ donation[12]. Understanding the relevance of knowledge about the concepts and protocols that encompass the subject, this work aims to identify the knowledge of postgraduate nurses about the brain death protocol and about the management of the potential donor.

2. Methods

This is a descriptive and exploratory quantitative study conducted with a sample consisting of 68 nurses, students of postgraduate nursing courses in intensive care and high complexity and in emergency and urgent care, at Bahiana School of Medicine and Public Health (Escola Bahiana de Medicina e Saúde Pública - BAHIANA), located in the municipality of Salvador, Bahia, Brazil. The inclusion criterion used was: being a nurse regularly enrolled in postgraduate courses in Intensive Care and High Complexity or in Emergency and Urgent Care at BAHIANA. Incomplete questionnaires were excluded.

The study data were collected from August to September 2024, using a printed questionnaire; the invitation and recruitment were carried out in person, in the classroom and with the approval of the professor responsible for the component, on the BAHIANA campuses in the aforementioned courses. On this occasion, the Informed Consent Form was presented and explained.

The questionnaire consisted of twenty-four objective questions and two subjective questions, divided into three parts. The first part contains six questions aimed at obtaining sociodemographic data such as: age, sex, years of training, time and area of expertise, and current specialization. The second part consists of ten questions aimed at obtaining information about the participant's knowledge of the steps for establishing a diagnosis of brain death, based on the brain death protocol established by the Federal Council of Medicine[3]. The last part of the questionnaire consists of ten questions about the management of the potential donor for maintaining the viability of organs and tissues, supported by the guidelines for evaluating and validating the potential organ donor in brain death[7].

The data obtained in the study were analyzed descriptively using Microsoft Excel. The data were described in absolute and relative numbers.

The research was evaluated and approved by the CEP - Bahiana, under CAAE: 81290724.5.0000.5544.

3. Results

The participants were 52 students from the postgraduate course in Emergency and Urgent Care Nursing and 16 from the Intensive Care and High Complexity course, totaling 68 participants. 92.6% of the participants were female, with the predominant age range between 20 and 30 years. Regarding the length of time since graduation, 52.9% of the students have between one and three years of experience, and 36.8% do not work in the nursing field (Table 1).

Table 1. Sociodemographic and professional characteristics of the participants. Salvador - BA - 2024 (*n*=68)

Variable	*n*	%
Sex		
Female	63	92.6
Male	5	7.4
Years since graduation		
> 10 years	2	2.9
7 – 10 years	6	8.8
4 – 6 years	9	13.2
1 – 3 years	36	52.9
< 1 year	15	22.0
Unit of work		
Intensive Care/High Complexity care	4	5.8
Emergency room	9	13.2
Pre-hospital care	7	10.2
Ward	23	33.8
Not working in the area	25	36.7
Years working in the area		
> 10 years	1	1.4
7 – 10 years	1	1.4
4 – 6 years	2	2.9
1 – 3 years	19	27.9
< 1 year	20	29.4
Not working	25	36.7

Of the participants, 40 (58.8%) had classes on the topic during their undergraduate studies, 16 (23.5%) during their postgraduate studies, and 12 (17.6%) had no classes on brain death. All stated that it is important for nurses to have knowledge of the protocol for diagnosing BD. However, only 11 (16.2%) feel very confident to participate in the implementation of the protocol, 13 (19.1%) feel confident, and 44 (64.7%) feel somewhat confident.

Table 2 presents the nurses' knowledge (in number of correct answers) about the brain death protocol. Regarding the requirements necessary to initiate the brain death protocol, 66.2% of the participants were correct. However, 63.2% did not know how to identify the correct procedures for determining brain death, and 70.6% did not know how to indicate the purpose of the complementary examination to confirm the diagnosis of brain death. Despite the low percentage of correct answers to questions related to the topic, 100% of participants believe in the importance of nurses mastering the protocol.

Table 2. Participants' knowledge of the brain death protocol. Salvador - BA - 2024 (*n*=68)

Knowledge	Right *n*(%)	Wrong *n*(%)	Unknown *n*(%)
Regarding the parameters for initiating procedures to determine brain death.	15(22.1)	43(63.2)	10(14.7)
Regarding the prerequisites necessary for the diagnosis of BD.	45(66.2)	12(17.6)	11(16.2)
Regarding the tests to be performed, in addition to confirming unresponsive coma.	41(60.3)	11(16.2)	16(23.5)
Regarding brainstem function.	22(32.4)	39(57.4)	7(10.3)
Regarding the purpose of performing the complementary examination.	14(20.6)	48(70.6)	6(8.8)

The main challenges reported by participants during the BD diagnosis process were communicating brain death to the family (25%) and lack of professional knowledge (11.7%). Interestingly, 22% were unable to identify a challenge (Table 3).

Table 3. Main challenges during the brain death diagnosis process, according to participants. Salvador - BA - 2024 (*n*=68)

Challenges	*n*(%)
Lack of experience.	5(7.3)
Communicating brain death to the family.	17(25)
Explaining/Addressing the importance of organ donation.	5(7.3)
Clinical management.	1(1.4)
Lack of professional knowledge.	8(11.7)
Emotional control (dealing with the family's grief).	6(8.8)
Family acceptance.	5(7.3)
Family's lack of understanding of the diagnosis.	1(1.4)
Early identification of brain death.	6(8.8)
Difficulty with the medical team during the brain death protocol.	1(1.4)
Unable to say.	15(22)

Note: one participant cited more than one challenge during the brain death diagnosis process.

Regarding the management of potential organ donors, it was found that 22 participants (32.4%) reported that the topic was covered in the classroom during their undergraduate studies; 11 (16.2%) during postgraduate studies; and 35 (51.5%) stated that they did not experience the subject while they were students. In contrast, only 2.9% feel very confident to participate in the implementation of guidelines for maintaining potential donors, 13.2% feel confident, and 83.8% feel somewhat confident. All respondents ratified the importance of continuous training on the management of potential donors.

Table 4 presents the nurses' knowledge (in number of correct answers) about the management of potential donors. Among the main points, it is noteworthy that 61.8% of the participants demonstrated knowledge about the criteria used to identify a potential donor, as well as the necessary care to maintain organ viability, with 85.3% correct answers. However, 63.2% of participants were unable to identify the target for maintaining O_2 saturation, 26.5% were mistaken about the appropriate body temperature, and 29.4% were unable to identify correctly endocrine, electrolyte, and nutritional management. The percentage of participants who stated they did not know the answer is particularly noteworthy.

Table 4. Knowledge of participants regarding the management of potential organ donors. Salvador - BA - 2024 (*n*=68)

Knowledge	Right *n*(%)	Wrong *n*(%)	Unknown *n*(%)
Regarding the criteria used to identify a potential organ donor.	42(61.8)	26(38.2)	-
Regarding the necessary care to maintain the viability of a potential donor's organs.	58(85.3)	7(10.3)	3(4.4)
Regarding the goal of maintaining O2 saturation during ventilatory support.	8(11.8)	43(63.2)	17(25.0)
Regarding the goal of maintaining body temperature.	24(35.3)	18(26.5)	26(38.2)
Regarding endocrine, electrolyte, and nutritional management, it is necessary...	16(23.5)	20(29.4)	32(47.1)

The participants' perception of family refusal for organ donation indicated that the main reason was a lack of knowledge about the diagnosis (80.9%), followed by religious reasons (48.5%) and unpreparedness of health professionals (20.6%).

Concerning the challenges perceived by the participants in managing the potential donor (Table 5), aspects related to the nurse's competencies were highlighted, such as lack of knowledge, unpreparedness, lack of experience, emotional control, and communication skills. It is noteworthy that 8.8% stated that direct care for the maintenance of the potential donor was a challenge, and 11.7% did not know how to indicate the challenges related to the subject.

Table 5. Main challenges for participants in managing potential donors, according to the participants. Salvador – BA - 2024 (*n*=68)

Challenges	*n*(%)
Lack of professional knowledge/unpreparedness.	11(16.1)
Lack of experience.	6(8.8)
Emotional control (dealing with the family's grief).	3(4.4)
Conducting the interview/Communicating with the family.	13(19.1)
Clarifying family members' doubts.	7(10.2)
Maintaining stable patient hemodynamics.	6(8.8)
Lack of understanding from family members.	5(7.3)
Religious issues.	5(7.3)
Family members' consent.	3(4.4)
Unable to answer.	8(11.7)

4. Discussion

To support the discussion of the results obtained in this study, the recommendations of Resolution No. 2,173/2017[3], of the Federal Council of Medicine and the Guidelines of the Brazilian Association of Intensive Care Medicine were taken into consideration[7].

The results of this research indicate that nurses' knowledge of the brain death protocol is weak, corroborating global studies that identify similar challenges in understanding the diagnostic criteria[1,2]. However, Costa et al.[13], in a study conducted with a multidisciplinary team from an intensive care unit, identified that most of the professionals interviewed demonstrated adequate knowledge about the procedures necessary to initiate the brain death protocol, as well as about the clinical and complementary examinations for establishing the diagnosis. This discrepancy highlights the heterogeneity in the training and experience of the professionals evaluated.

Regarding clinical and complementary examinations, the participants in this study were able to answer correctly, demonstrating that nurses are familiar with most of the examinations and tests to be performed to confirm the diagnosis of brain death, corroborating the findings of the qualitative study conducted with nurses working in the adult intensive care unit, in agreement with a qualitative study conducted with intensive care nurses, whose discourse showed mastery of the clinical and complementary examinations necessary to ascertain brain death[14].

The results of this study revealed that the respondents' knowledge about maintaining the viability of a potential donor's organs is below what is desired. It is worth highlighting that the lack of adequate training and insufficient knowledge of professionals are factors that hinder the organ donation process, negatively affecting the effectiveness of transplants[15].

Clinical management of potential donors involves a set of procedures and care essential to preserving the functional integrity of organs intended for transplantation[7]. Nevertheless, the results of this study demonstrate that participants' knowledge of the parameters necessary for stabilizing oxygen saturation is still incipient. In this scenario, the leading role of the nurse in regulating ventilatory variables stands out, a fundamental intervention to ensure the quality of the grafts to be transplanted[5,16].

Regarding the maintenance of body temperature, a large number of the nurses interviewed (38.3%) are unaware of the guidelines. A study on the health team's knowledge of the brain death protocol and maintenance of potential donors found even higher percentages (63.6%), related to the knowledge gap among nurses[14]. Another study corroborates this qualitatively, indicating that hemodynamic and thermal maintenance is one of the areas with the greatest knowledge deficit[15].

Regarding the proper management of endocrine, electrolyte, and nutritional aspects, almost half of the participants were unable to answer regarding the goals to be achieved for maintaining the potential donor. Research conducted among a multidisciplinary team working in an intensive care unit also found a reduction in the level of knowledge about the subject, especially among nurses[16]. The knowledge gap among healthcare teams to work in this scenario was identified in several studies that highlighted the weaknesses in the knowledge of critical care unit teams related to the organ and tissue donation process and the lack of formal training/capacity building on the subject[8,14,15].

The participants' perception of the challenges faced in managing the potential donor pointed to the need for the development of professional competencies in a major way. Inadequate maintenance of the potential donor can limit both the number of effective donations and the quality of transplanted organs. Thus, the knowledge of the healthcare team represents an essential factor for the success and quality of care provided, requiring that each team member understands their role in preserving the viability of organs and tissues[14]. Corroborating this perspective, Akbulut et al.[12] demonstrated that higher levels of knowledge are associated with more favorable attitudes and greater engagement of nurses in the organ donation process.

Another challenge highlighted by the participants in this study was communication with the family of the potential donor. This result was similar to that of another study that evaluated obstacles faced by nurses in caring for patients declared brain dead, and which concluded that communication with the family member was one of the main challenges[17]. It is reiterated that insufficient training and knowledge constitute a relevant limiting factor in the donation process[16]. Another equally relevant aspect is that the nurse is considered a link between the health team and the family, being fundamental in the family approach and support during the donation process[13,16].

The current panorama of unfulfilled organ and tissue donations in Brazil reflects the need for greater training of health professionals, both for greater speed and assertiveness in establishing the diagnosis of brain death, and for maintaining the potential donor[18]. In this context, a randomized controlled trial demonstrated that structured educational interventions promoted significant improvements in the knowledge, attitudes, and behavior of nursing students regarding organ donation and transplantation[19]. This finding reinforces that systematized pedagogical strategies can produce a concrete impact on professional qualifications.

Thus, the implementation of structured continuing education programs focused on brain death and the organ donation process becomes essential, especially for nurses working in critical care units.

This study presents some limitations related to the period, the convenience sample, and its size, which limit the generalization of the results to other contexts and different professional profiles. Furthermore, self-reports can lead to response bias, as participants may overestimate or underestimate their own knowledge and confidence in applying the protocols.

5. Conclusion

The study reveals that nurses have significant knowledge gaps regarding both the diagnosis of brain death and donor management, demonstrating that contact with the topic during academic training is insufficient, given the complexity of the processes involved.

Furthermore, the manifested professional insecurity may constitute a silent obstacle, possibly influencing family refusal rates and organ loss due to clinical instability. In this sense, the nurse emerges as a central figure, whose technical and emotional preparation seems to be the key to a more humanized and safe approach.

Therefore, investment in continuing education strategies presents itself as a promising path to strengthening the self-confidence of these professionals, improving both clinical care and sensitive support for families.

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Authors' contributions

The authors declared that they made substantial contributions to the work in terms of the conception or design of the research; the acquisition, analysis, or interpretation of data for the work; and the writing or critical revision of relevant intellectual content. All authors approved the final version to be published and agreed to assume public responsibility for all aspects of the study.

Competing interests

No financial, legal, or political conflicts involving third parties (government, private companies and foundations, etc.) have been declared for any aspect of the submitted work (including, but not limited to, grants and funding, participation on advisory boards, study design, manuscript preparation, statistical analysis, etc.).

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