

Brain death: knowledge of physiotherapists about the concepts and protocol in an emergency hospital

Morte encefálica: conhecimento dos fisioterapeutas a respeito dos conceitos e protocolo em um hospital de urgências

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ABSTRACT | INTRODUCTION: Brain death (BD) is characterized by the presence of apertceptive coma and the absence of brainstem reflexes. The success of the organ donation process is complex and depends on the active involvement of professionals in the process of active search and notification of potential donors (PD). The physiotherapist deals directly with the critical patient and, among other functions, manages mechanical ventilation, being essential in the process of maintaining the PD. **OBJECTIVE:** To assess the knowledge of physiotherapists regarding the concepts and protocol of BD in an emergency hospital. **METHODOLOGY:** Cross-sectional, analytical study carried out using sociodemographic questions and a questionnaire consisting of nine objective questions, prepared based on CFM Resolution No. 2,173/2017. **RESULTS:** The study included 27 physiotherapists who obtained an average score of 4.74 (SD \pm 1.65) in the questionnaire. The questions with the highest error rates were those that asked about the minimum time to open the BD protocol (92.6%) and maintenance of life support in non-donor (66.7%). **CONCLUSION:** The physical therapists evaluated showed limited knowledge about BD concepts and protocol in view of the borderline number of correct answers. In addition, most professionals did not receive any type of training, which could be one of the determinants of low performance in the questionnaire.

KEYWORDS: Brain Death. Organ Transplantation. Knowledge. Physiotherapists.

RESUMO | INTRODUÇÃO: A morte encefálica (ME) é caracterizada pela presença de coma apertceptivo e ausência de reflexos de tronco encefálico. O sucesso no processo de doação de órgãos é complexo e depende do envolvimento ativo dos profissionais no processo de busca ativa e notificação de potenciais doadores (PD). O fisioterapeuta lida diretamente com o paciente crítico e, dentre outras funções, gerencia a ventilação mecânica, sendo fundamental no processo de manutenção do PD. **OBJETIVO:** Avaliar o conhecimento dos fisioterapeutas sobre os conceitos e protocolo de ME em um hospital de urgências. **METODOLOGIA:** Estudo transversal, analítico, realizado por meio de perguntas sociodemográficas e um questionário constituído por nove questões objetivas, elaborado com base na resolução nº 2.173/2017 do CFM. **RESULTADOS:** Participaram do estudo 27 fisioterapeutas que obtiveram uma pontuação média de 4,74 (DP \pm 1,65) no questionário. As perguntas com maiores índices de erros foram as que indagaram sobre o tempo mínimo para abertura do protocolo de ME (92,6%) e a manutenção do suporte de vida em não doador (66,7%). **CONCLUSÃO:** Os fisioterapeutas avaliados demonstraram possuir conhecimento limitado acerca dos conceitos e protocolo de ME diante do número limitrofe de acertos. Além disso, a maioria dos profissionais referiu não ter recebido nenhum tipo de capacitação, podendo configurar um dos determinantes para o baixo desempenho no questionário.

PALAVRAS-CHAVE: Morte Encefálica. Transplante de Órgãos. Conhecimento. Fisioterapeutas.

Introduction

Brain death (BD) is defined as the irreversible loss of all brain functions. It is characterized by a state of deep apperceptive coma and the absence of brainstem reflexes, even after exclusion of reversible coma factors. Despite the maintenance of heartbeat and spinal cord reflexes, BD is equivalent to death. The causes of BD are similar in several countries, mostly due to vascular or traumatic causes; other causes include brain tumors, central nervous system infections, and post-cardiac arrest anoxia.¹

Act 9.434/1997 provides for the removal of organs, tissues, and parts of the human body for transplantation and treatment, determining that all health establishments must inform the notification, capture, and distribution centers of organs about possible patients with BD.² Resolution 1.826/2007 of the Conselho Federal de Medicina - CFM (Federal Council of Medicine) provides on the legality and ethical character of the suspension of therapeutic support procedures when, after determining BD, individuals are classified as non-donors.³

According to CFM Resolution 2.173 of 2017, the procedures for determining BD in adults consist of two clinical examinations performed by two different duly trained physicians, with a minimum time interval of one hour between examinations. The apnea test and the clinical exams must be supported by a complementary exam that proves the absence of blood flow and activity in the brain.⁴

The demand for organs is growing every year and is incompatible with the donation capacity due to the insufficient number of donors. There are several reasons for the low procurement of organs; among them, we can highlight the lack of human resources available in hospital units, in addition to the lack of training for assistance employees in emergency departments (ED) and Intensive Care Units (ICU). These factors can delay notifications of potential donors (PD).⁵

In an evaluation carried out with 240 medical students, referring to knowledge about BD, only 35% reported having already participated in a course or class on the subject, and 24.1% self-assessed with a poor level of knowledge. In another study carried out with physiotherapists regarding their knowledge of BD, 42.8% did not properly recognize the criteria

for choosing a patient with signs suggestive of BD, and 61% knew their role in maintaining PD.⁶ The data mentioned above demonstrate the difficulty of students and professionals with topics related to BD; in addition, there are no legal citations about the mandatory inclusion of BD subjects and organ transplantation in the curricula of higher education courses in the health area.⁷

The physiotherapist is inserted in a consolidated way in the ICU and ED environments, helping the team in the multidisciplinary care of the critical patient. Among other functions, they manage mechanical ventilation, being fundamental in the process of maintaining the PD. Therefore, the professional's quick perception of a patient with signs suggestive of BD can be useful in optimizing the notification process since, until December 2020, Brazil had 43.642 thousand patients on the waiting list, with an index of only 10.618 notifications resulting in only 3.323 actual donors.⁸

Therefore, given the scarcity of studies on the subject, this study aimed to evaluate the knowledge of physiotherapists about the concepts and protocol of BD in an emergency hospital that is a reference in trauma in the city of Goiânia.

Methods

This is an observational, cross-sectional, and analytical study. This study, registration CAAE 53496621.5.0000.0033, was approved by the Research Ethics Committee of Hospital de Urgências de Goiás – Dr. Valdemiro Cruz (HUGO) under number 5.186.648 in accordance with resolution 466/12 of the National Council for Ethics in Research involving human beings.

Data collection was carried out between February and June 2022 in the ICUs of Hospital de Urgências de Goiás – Dr. Valdemiro Cruz (HUGO), considered a hospital of medium to high complexity, and a reference in urgency and emergency. In all, the hospital had 34 professionals, 27 of whom were physiotherapists who met the inclusion criteria: completed or ongoing post-graduation studies in the field of intensive care, with a minimum experience of six months in the ICU. Seven professionals were excluded because they refused to sign the Free and Informed Consent Form

(FICF) or because they worked exclusively in wards. In the interview, the objective of the research was explained, and after signing the FICF, the researchers presented the research instrument.

Initially, a pilot study was carried out with five professionals in the institution's ICUs to calibrate the collection instruments in order to carry out the necessary revisions and changes in the instrument to proceed with the collection. The questionnaires collected in this phase were not part of the sample.

The data collection instrument was developed by the authors of this article and has not been validated, except for the pilot mentioned in the previous paragraph. The process was divided into two stages, the first of which refers to sociodemographic information. The second part consisted of nine closed multiple-choice questions, based on Resolution 2.173/2017⁴, prepared by the authors themselves based on similar studies, making occasional adjustments to evaluate the concepts and protocol of BD, in addition to questioning the role of the physiotherapist in maintaining the PD. A value of 1.0 was considered for each question, totaling 9.0 points. From the responses, the mean and standard deviation were calculated.

Data were categorized and tabulated in an electronic spreadsheet in Microsoft Excel 2016 software and then analyzed in the statistical program Statistical Package for Social Sciences (IBM Corporation, Armonk, USA), version 26.0. For the analysis of categorical variables, absolute frequency and relative frequency were used, and for continuous variables, mean and standard deviation. The data normality was verified using the Shapiro-Wilk test. The comparison of knowledge with the technical and socio-demographic profile was performed using Student's t-test for two variables, Analysis of Variance (ANOVA) for more than two variables, with Scheffé post hoc when necessary, Fisher's exact test, and Pearson's chi-square test. The significance level adopted was 5%.

Results

Twenty-seven physiotherapists participated in the study. The sociodemographic characteristics of the study participants are shown in Table 1. It was observed that none of the evaluated participants had a postgraduate degree in the multidisciplinary residency modality nor the title of specialist recognized by the Conselho Federal de Fisioterapia e Terapia Ocupacional - COFFITO (Federal Council of Physical Therapy and Occupational Therapy).

Table 1. Brain death: knowledge of physiotherapists regarding evaluation concepts and protocol. Characterization of the demographic profile of physiotherapists (n=27) (to be continued)

	n (%)
Sex	
Female	23 (85.2)
Male	4 (14.8)
Age group	
22 to 29	17 (63.0)
30 to 43	10 (37.0)
Age (years)	29.7±6.3*
University	
Private	24 (88.9)
Public	3 (11.1)
Time since graduation	
1 to 4 years	16 (59.3)
5 to 14 years	11 (40.7)

Table 1. Brain death: knowledge of physiotherapists regarding evaluation concepts and protocol. Characterization of the demographic profile of physiotherapists (n=27) (conclusion)

	n (%)
ICU time	
< 1 year	8 (29.6)
1 to 2 years	11 (40.7)
>2 years	8 (29.6)
Postgraduate	
Not completed	13 (48.1)
Completed	14 (51.9)
BD training	
No	25 (92.6)
Yes	2 (7.4)
Followed protocol	
No	2 (7.4)
Yes	25 (92.6)
Organ donor	
No	9 (33,3)
Yes	18 (66,7)

Caption: n = absolute frequency; % = relative frequency; * average \pm standard deviation.
Source: the authors (2023).

Table 2 shows the general number of questions with their respective errors and correct answers, with an average level of correct answers of 4.74 (SD \pm 1.65) points. The questions with the highest error rates referred to the minimum time for opening the BD protocol after admission to the hospital unit (92.6%), followed by non-donor life support (66.7%), apnea test (55.6%), and criteria for further evaluation of brainstem reflexes (51.9%).

Table 2. Brain death: knowledge of physiotherapists regarding evaluation concepts and protocol. Characterization of knowledge (n=27)

	Right n (%)	Wrong n (%)
Clinical condition suspected of BD	20 (74.1)	7 (25.9)
Minimum time to open the protocol	2 (7.4)	25 (92.6)
Qualified diagnostic professional	19 (70.4)	8 (29.6)
Protocol Steps	18 (66.7)	9 (33.3)
Non-donor life support	9 (33.3)	18 (66.7)
Complementary exams	18 (66.7)	9 (33.3)
Apnea test	12 (44.4)	15 (55.6)
Assessment of reflexes	13 (48.1)	14 (51.9)
Role of the physiotherapist	17 (63.0)	10 (37.0)
Total score (Average \pm SD)	4.74 \pm 1.65	

Caption: n = absolute frequency; (%) = relative frequency
Source: the authors (2023).

In Table 3, when evaluating the total average score obtained in the questionnaire by the variables selected in the study, it can be seen that there was no statistically significant difference.

Table 3. Brain death: knowledge of physiotherapists regarding evaluation concepts and protocol. Result of comparing the total score with the profile (n=27)

	Average	Standard deviation	Minimum	Maximum	<i>p</i>
Age group					
22 to 29	4.71	1.72	2.0	7.0	0.89*
30 to 43	4.80	1.62	3.0	7.0	
University					
Private	4.58	1.61	2.0	7.0	0.16*
Public	6.00	1.73	4.0	7.0	
Time since graduation					
1 to 4 years	4.69	1.70	2.0	7.0	0.84*
5 to 14 years	4.82	1.66	3.0	7.0	
ICU time					
< 1 year	4.50	1.69	3.0	7.0	0.52* *
1 to 2 years	5.18	1.40	3.0	7.0	
>2 years	4.38	2.00	2.0	7.0	
Postgraduate					
Completed	5.21	1.58	3.0	7.0	0.12*
In progress	4.23	1.64	2.0	7.0	

Caption: n = absolute frequency; (%) = relative frequency
Source: the authors (2023).

In Table 4, when comparing the questions separately with the variables ICU time and their subgroups, it was possible to observe a greater number of correct answers in the question that asked about the concept of BD, being higher in participants with one year or more of experience in the ICU with a statistically significant difference ($p = 0.02$). In the question about the evaluation of brainstem reflexes, participants with time < 1 year in the ICU obtained a greater number of correct answers compared to > 2 years, with a statistically significant difference ($p=0.04$).

Table 4. Brain death: knowledge of physiotherapists regarding evaluation concepts and protocol. Comparison of ICU time with knowledge (n=27) (to be continued)

	Postgraduate		<i>p</i>
	Completed	In progress	
Brain death concept			
Right	13 (92.9)	7 (53.8)	0.02
Wrong	1 (7.1)	6 (46.2)	
Minimum time to open the protocol			
Right	1 (7.1)	1 (7.7)	0.95
Wrong	13 (92.9)	12 (92.3)	

Table 4. Brain death: knowledge of physiotherapists regarding evaluation concepts and protocol. Comparison of ICU time with knowledge (n=27) (conclusion)

	Postgraduate		<i>p</i>
	Completed	In progress	
Qualified diagnostic professional			
Right	11 (78.6)	8 (61.5)	0.33
Wrong	3 (21.4)	5 (38.5)	
Protocol steps			
Right	8 (57.1)	10 (76.9)	0.27
Wrong	6 (42.9)	3 (23.1)	
Non-donor life support			
Right	7 (50.0)	2 (15.4)	0.04
Wrong	7 (50.0)	11 (84.6)	
Complementary exams			
Right	10 (71.4)	8 (61.5)	0.58
Wrong	4 (28.6)	5 (38.5)	
Apnea test			
Right	8 (57.1)	4 (30.8)	0.17
Wrong	6 (42.9)	9 (69.2)	
Assessment of reflexes			
Right	5 (35.7)	8 (61.5)	0.18
Wrong	9 (64.3)	5 (38.5)	
Role of the physiotherapist			
Right	10 (71.4)	7 (53.8)	0.34
Wrong	4 (28.6)	6 (46.2)	

Caption: *Pearson chi-square; †Fisher's exact test; n = absolute frequency; % = relative frequency
Source: the authors (2023).

In Table 5, the participants with completed post-graduation had a higher rate of correct answers in the question that asked about the concept of BD, being 92.9%, when compared to those with post-graduation in progress, 53.8% ($p=0.02$), and in the question that asked about withdrawing life support, with 50% of correct answers ($p=0.04$).

Table 5. Brain death: knowledge of physiotherapists regarding evaluation concepts and protocol. Comparison of graduate studies with knowledge (n=27) (to be continued)

	Postgraduate		<i>p</i>
	Completed	In progress	
Brain death concept			
Right	13 (92.9)	7 (53.8)	0.02
Wrong	1 (7.1)	6 (46.2)	

Table 5. Brain death: knowledge of physiotherapists regarding evaluation concepts and protocol. Comparison of graduate studies with knowledge (n=27) (conclusion)

	Postgraduate		p
	Completed	In progress	
Minimum time to open the protocol			
Right	1 (7.1)	1 (7.7)	0.95
Wrong	13 (92.9)	12 (92.3)	
Qualified diagnostic professional			
Right	11 (78.6)	8 (61.5)	0.33
Wrong	3 (21.4)	5 (38.5)	
Protocol steps			
Right	8 (57.1)	10 (76.9)	0.27
Wrong	6 (42.9)	3 (23.1)	
Non-donor life support			
Right	7 (50.0)	2 (15.4)	0.04
Wrong	7 (50.0)	11 (84.6)	
Complementary exams			
Right	10 (71.4)	8 (61.5)	0.58
Wrong	4 (28.6)	5 (38.5)	
Apnea test			
Right	8 (57.1)	4 (30.8)	0.17
Wrong	6 (42.9)	9 (69.2)	
Assessment of reflexes			
Right	5 (35.7)	8 (61.5)	0.18
Wrong	9 (64.3)	5 (38.5)	
Role of the physiotherapist			
Right	10 (71.4)	7 (53.8)	0.34
Wrong	4 (28.6)	6 (46.2)	

Caption: *Pearson chi-square; n = absolute frequency; % = relative frequency
Source: the authors (2023).

Discussion

The main objective of this study was to evaluate the knowledge of physiotherapists regarding the concepts and protocol of BD, since success in organ donation and transplantation is complex and depends on the active involvement of trained professionals, from the reception and family embracement of the PD to the systematization in the search for PD through the recognition of patients who can meet the criteria for BD, through active search in ED and ICUs.⁹

According to Ordinance nº 2.600/2009, the National Transplantation Coordination, through Organizações de Procura de Órgãos - OPO (Organ Procurement Organizations) and Comissões Intra-Hospitalares de Doação de Órgãos e Tecidos para Transplante - CIHDOTT (Intra-Hospital Commissions for Organ and Tissue Donation for Transplantation), is responsible for implementing training programs for BD care teams. It should be noted that the diagnosis and protocol of BD is an exclusively medical act; however, the process of identifying critically ill

patients with signs suggestive of BD can be carried out by any trained professional, communicating with the physician in charge to speed up the notification of a PD and later opening of the protocol.¹⁰

There is a marked scarcity of studies that have addressed the knowledge of professional physiotherapists about BD⁷ and the procedures involving this condition, the main motivation for carrying out this research, which had the physiotherapist as the main object of study since he is a professional who can early perceive the suggestive signs of BD, and thus communicate the team. Another justification is directly related to the care of the airways of critically ill patients with regard to tracheal aspiration and ventilatory adjustments, although this is not a specific task for this professional and can also be performed by a doctor or a nurse. Therefore, despite the role of the physiotherapist being different from that of the physician or the nurse, it is expected that all professionals working in an urgency and emergency hospital units have the highest level of knowledge to assist the team in the active search and notification of PD.¹¹

In this study, an average score of 4.74 overall correct answers was observed; in addition, there was no correct answer rate greater than 74.1% in any of the alternatives, and consequently, none of the participants correctly answered the questionnaire in its entirety. In a study carried out with physiotherapists, 14.2% answered all the questions correctly, with the alternative with the highest rate of correct answers being clinical signs suggestive of BD with 95.2%.⁷ In an analysis to assess the knowledge of 38 physicians who work in an adult ICU, the overall number of correct answers for the questions was 8.07 points, with 31.5% of the participants getting all the alternatives right. An intermediate error level of 10.5% was found in the questions about validated exams for BD, correct time of death, and the necessary time interval between clinical exams.¹²

Only 7.4% of the physiotherapists reported having received some type of training on BD, a fact that may be associated with the low rates of correct answers in the questionnaire. In a study carried out with 100 nursing students, the level of knowledge in BD and their respective position on organ donation was evaluated before and after an educational action. Before the educational activities, the students

obtained an average of 67.7% of correct answers, 17.6% of errors, and 14% did not know how to answer the questions. After the educational activity, 87% were correct, 11.8% were wrong, and only 1% were unable to answer the questions, demonstrating the importance of the continuing education process.¹³

In the question with the highest rate of correct answers in this study, which asked about the clinical signs of BD, 74% of the physiotherapists answered the question adequately. It is inferred that this higher number of assertions is related to the fact that professionals are used to the main suggestive signs of BD (aperceptive coma, absence of coughing reflexes, and respiratory drive) since the hospital where the research was carried out receives numerous head trauma patients. Similar results were found in a study that assessed the knowledge of 90 intensive care physicians, in which 85.6% correctly defined the concept of BD, a finding that correlated with the length of time in the hospital profession; however, there was no association with time of performance in the ICU.¹⁴

In a quantitative assessment through interviews with intensive care nurses about their knowledge of the BD diagnosis process, it was possible to observe that the nurses were able to respond adequately to the questions about the conceptualization of BD, procedures for confirming the BD diagnosis, and their respective role in the process, demonstrating their importance for effecting organ donation and the need for constant improvement.¹⁵

In addition to the difficulties mentioned above, professionals from the CIHDOTT refer to have difficulties regarding their lack of technical knowledge, a fact that they observe in their pairs in assistance; furthermore, 67% of the participants suggest the need for continuing education for CIHDOTT members and other professionals. In view of the above, it is necessary to implement themes related to BD and organ donation for transplantation in undergraduate and graduate institutions, to form a solid base for students. Additionally, there is a need to increase the number of professionals in the OPO and CIHDOTT aiming at a greater expansion of active searches for PD in hospital units, in addition to the expansion of continuing education programs for professionals who are already in the regular health assistance.¹⁶

Despite the technical limitations of professionals on topics related to BD, it is considered that the variable “knowledge” should not be characterized in isolation as the main contributor to the discrepancy between supply and demand for organs, since it constitutes a complex and multifactorial matter. The trained multidisciplinary team plays an important role in the process of welcoming family members and providing patient information, aiming at a good relationship between the hospital and the PD’s family.¹⁷

As a limitation of the study, it is worth mentioning that until the present moment (after the completion of this study), it was not possible to find, in the searches carried out by the researchers of this work, any validated questionnaire made for physiotherapists assessing their knowledge in BD, besides the small number of studies with physiotherapists with the theme of BD, preventing a greater comparison of results in the discussion. The instrument developed and used for evaluation addresses a broad view of BD and may not reflect the knowledge and attitude of professionals in routine situations in its reality. Another point that deserves attention is the fact that the study was carried out in a single center, which may not actually reflect the general knowledge of physiotherapists on the subject. Given the scarcity of studies, further research is needed to improve the elucidation of the subject.

Conclusion

The assessed physiotherapists demonstrated limited knowledge about the BD process, given the borderline number of correct answers obtained in the questionnaire. There was also a correct response rate of less than 50% in almost half of the entire questionnaire. Most of the professionals reported not having had any type of training in BD, both during graduation and in the hospital environment, which could be one of the determinants of low performance in the questionnaire.

Authors’ contributions

Silva LSB participated as the main author of the study, preparing the research question, questionnaire, data collection, and writing the scientific essay. Nogueira AP and Moreira SS worked on data collection. Nunes ELG contributed to data collection and methodological design. Pereira LS assisted in the analysis and interpretation of the results and in the scientific writing of the introduction and discussion topics. Gardenghi G participated as an advisor, assisted in the analysis and interpretation of results and scientific writing on the topics of methodology, study limitations, and conclusion. All authors reviewed and approved the final version and agreed with its publication.

Conflicts of interest

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

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