ISSN: 1981-8963 https://doi.org/10.5205/1981-8963-v12i01a25130p51-58-2018

Journal of Nursing
Revista de Enfermagem
UFPE On Line
ISSN: 1981-8963

ORIGINAL ARTICLE

BRAIN DEATH AND ORGAN MAINTENANCE: KNOWLEDGE OF INTENSIVE CARE PROFESSIONALS

MORTE ENCEFÁLICA E MANUTENÇÃO DE ÓRGÃOS: CONHECIMENTO DOS PROFISSIONAIS INTENSIVISTAS

MUERTE ENCEFÁLICA Y MANTENIMIENTO DE ÓRGANOS: CONOCIMIENTO DE LOS PROFESIONALES INTENSIVISTAS

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ABSTRACT

Objective: to evaluate the knowledge of the health professionals who work in the Intensive Care Unit on the diagnosis of brain death and the maintenance of organs in potential donors. ***Method:*** quantitative-qualitative, evaluative, descriptive and exploratory study with 21 health professionals in a referral hospital. The data were collected with a questionnaire and submitted to the Content Analysis Technique, in the Categorical Analysis modality. ***Results:*** two categories emerged after the analysis << Knowledge about organ maintenance >> and << Knowledge about the brain death protocol >>. ***Conclusion:*** Intensivist professionals presented adequate knowledge about the brain death protocol, however, training focusing on organ maintenance and contraindications for transplantation should be carried out to provide a higher professional qualification and increase the number of effective donors. ***Descriptors***: Brain Death; Tissue and Organ Procurement; Transplants; Intensive Care Units; Protocols; Nursing.

RESUMO

Objetivo*:** avaliar o conhecimento dos profissionais da saúde que atuam na Unidade de Terapia Intensiva acerca do diagnóstico de morte encefálica e da manutenção de órgãos em potenciais doadores. ***Método: estudo quanti-qualitativo, avaliativo, descritivo e exploratório, realizado com 21 profissionais da saúde em um hospital de referência. Os dados foram coletados com um questionário e submetidos à Técnica de Análise de Conteúdo, na modalidade Análise Categorial. ***Resultados:*** duas categorias emergiram após a análise << Conhecimento sobre a manutenção de órgãos >> e <<Conhecimento sobre o protocolo de morte encefálica >>. ***Conclusão***: os profissionais intensivistas apresentaram conhecimento adequado sobre o protocolo de morte encefálica, entretanto, capacitações enfocando a manutenção de órgãos e as contraindicações para transplantes devem ser realizadas no intuito de possibilitar maior qualificação profissional e elevar o número de doadores efetivos. ***Descritores*:** Morte Encefálica; Obtenção de Tecidos e Órgãos; Transplantes; Unidades de Terapia Intensiva; Protocolos; Enfermagem.

RESUMEN

Objetivo: evaluar el conocimiento de los profesionales de la salud que actúan en la Unidad de Terapia Intensiva acerca del diagnóstico de muerte encefálica y del mantenimiento de órganos en potenciales donantes. ***Método:*** estudio cuantitativo cualitativo, evaluativo, descriptivo y exploratorio, realizado con 21 profesionales de la salud en un hospital de referencia. Los datos fueron recolectados con un cuestionario y sometidos a la Técnica de Análisis de Contenido, en la modalidad Análisis Categorial. ***Resultados:*** dos categorías emergieron después del la análisis << Conocimiento sobre el mantenimiento de órganos >> y << Conocimiento sobre el protocolo de muerte encefálica >>. ***Conclusión:*** los profesionales intensivistas presentaron conocimiento adecuado sobre el protocolo de muerte encefálica, sin embargo, las capacitaciones enfocando el mantenimiento de órganos y las contraindicaciones para trasplantes deben ser realizadas, con el fin de posibilitar mayor calificación profesional y elevar el número de donantes efectivos**.** ***Descriptores***: Muerte Encefálica; Obtención de Tejidos y Órganos; Trasplantes; Unidades de Cuidados Intensivos; Protocolos; Enfermería.

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INTRODUCTION

The search for health and the increase of life expectancy is a constant in the history of man. Thus, the rise of medical-scientific development has improved the prospect of life, and although it has not yet overcome death, it has achieved the cure of diseases that were previously considered incurable, but there is still much to be done in this context.[1] Thus, organ and tissue transplants arise as an alternative for the treatment of some of these pathologies, presenting a safe and effective therapeutic option in the treatment of several end-stage diseases, allowing an improvement in the quality and perspective of life. Brazil has the largest public transplant system in the world and is responsible for the 95% subsidy for this treatment, which includes the surgical procedure, medication and follow-up needed in the post-transplantation.[2-3]

Law No. 9434, in force in the country since February 4, 1997, provides for the removal of organs, tissues and parts of the human body for the purpose of transplantation, and is regulated by Decree No. 2268, of June 30, 1997, which established, within the Ministry of Health, the National System of Transplants, responsible for the administration of transplants financed by the Brazilian Unified Health System.[4]

Despite having an evolved transplant program, the current situation evidences the discrepancy between the number of potential donors and actual donors. In Brazil, according to the Brazilian Transplant Registry, of 2014, 9351 potential donors were notified, but, only 2713 donations were made, considering that there were 28,969 active patients on the waiting list by the end of the year in question.[5-6]

In the state of Piauí, only kidney and corneal transplants were performed, which had been showing growth in the rates of notification and donations made until the year 2013. However, the year 2014 presented a slight decrease in these numbers, with 230 transplants performed, taking into account that there were an estimated 565 transplants performed in that year.[5] Thus, organ transplantation in Brazil can only be performed after confirmation of the diagnosis of encephalic, natural or accidental death, and there must be a simultaneous operation of the organs that will be donated, after family consent, which is mandatory.[7] In this assumption, it is necessary that there is adequate knowledge on the part of the professionals to identify the suspected brain death and, from this, to have the knowledge of the procedures needed to initiate the brain death protocol, which is crucial for confirmation of the diagnosis.[5]

The application of the various information available for the maintenance of the potential deceased donor is clearly associated with the increase of effective donations and the quality of the transplants. Thus, the importance of the recognition of brain death, the adequate approach of the family and the clinical maintenance of the deceased donor by the professionals involved.[8]

OBJECTIVE

- To evaluate the knowledge of the health professionals who work in the Intensive Care Unit on the diagnosis of brain death and the maintenance of organs in potential donors.

METHOD

Quantitative-qualitative, evaluative, descriptive and exploratory study, carried out in a public reference hospital in Piauí, located in the city of Teresina, PI, Brazil.

The research consisted of 21 professionals who work in the Intensive Care Unit (ICU) of the institution. Inclusion criteria were health professionals (physicians and nurses), who had been in the ICU for more than six months and who accepted to participate in the study. Those who were on leave or leave, who were temporarily replacing an employee and those who had not completed the appropriate questionnaire, were excluded.

Data collection was carried out in May and June of 2016, using a questionnaire composed of two blocks, covering subjective and objective questions, built by the authors of the study, based on current research and pertinent to the theme, contemplating the characterization knowledge of brain death and the maintenance of organs in the potential donor.

In the subjective questions, the answers were recorded, using an MP3 player type audio device, with the consent of the interlocutor and later transcribed in full. Already the objective questions were filled by the participant himself. To maintain the

anonymity of the participants, these were identified by E I, E II and, so on, according to the order of the interviews.

After data collection, the interviews were transcribed and a detailed reading of each participant's speech was performed. The objective data were organized into tables using simple frequency. The responses were analyzed, organized into thematic groups and categorized by similarities, expressing the professionals' knowledge about the topics addressed, based on content analysis.[9]

In compliance with the ethical precepts of Resolution 466/2012, of the National Health Council, this study had the research project approved by the Research Ethics Committee of the State University of Piauí with CAAE 54721516.0.0000.5209 and opinion no. authorized by the hospital conducting the research.

RESULTS

Table 1 highlights the characteristics of professionals, with participants aged 35 or older (57.1%), female (71.4%), with five years or more in the sector (66.7%). and 61.9% have specialization in intensive care.

Table 1. Characterization of the professionals who work in the Intensive Care Unit in a referral hospital. Teresina (PI), Brazil, 2016.

Variables	n	%
Age		
< 35 years	9	42.9
≥ 35 years	12	57.1
Sex		
Male	6	28.6
Female	15	71.4
Time working in the sector		
< 5 years	7	33.3
≥ 5 years	14	66.7
Specialization in ICU		
Yes	13	61.9
No	8	38.1

After the analysis, it was possible to list two categories: knowledge about organ maintenance and knowledge about the brain death protocol.

♦ Knowledge about organ maintenance

When questioned about the ideal temperature to be maintained in the patient who is a potential donor, it is noticed that some professionals consider that the temperature should be maintained differently in relation to the other patients.

> *Minimum 32ºC and maximum 37,8ºC. (E I and E XX)*
> *35.5-37.5 ° C. (E IX)*
> *[...] 35-37.5 ° C. E XIX)*

Regarding cardiac arrest in the potential donor, it was possible to verify that most of the professionals know the protocol and know that it is allowed and indicated the resuscitation of this patient, as a measure that aims at the conservation of the organs for the donation, being that only one respondent was opposed to resuscitation.

> *Yes, [...] we need to maintain the patient's hemodynamics and "life", in order to donate organs to those who need them. (E I)*
> *Yes, to ensure the perfusion of organs and tissues, enabling the functionality of the same. (E XII)*
> *No, because it is a patient in brain death, with consequent evolution to systemic failure. (E VI)*
> *When asked about situations of absolute contraindication to organ donation, it is evident that many participants still consider sepsis to be an absolute contraindication (42.9%).*
> *Encephalic death due to unknown cause or when it presents an infectious disease. (E I)*
> *Severe sepsis, [...], age. (E IV)*
> *Malignant neoplasm, positive serology for HIV, HTLV I and II, [...], active tuberculosis, death of unknown cause. (E VIII)*

In addition, 61.9% of the professionals reported that they did not receive training on conducts for organ maintenance in potential donors. In addition, they emphasized that they acquired information about these patients through the experience in the service itself.

♦ Knowledge about the brain death protocol

Table 2 shows that 85.7% of the professionals answered that the declaration of brain death is made when there is irreversible loss of cortical and brainstem function, and 100% emphasized the need for complementary tests to establish the diagnosis. Unanimously, they answered that the opening of the brain death protocol is performed when the cause of death is known and the patient is without the use of drugs depressing the Central Nervous System. As for the procedures involving the

brain death protocol for over two years, 90.5% defined two clinical exams, with a minimum interval of six hours between them, an apnea test and a complementary exam.

Table 2. Knowledge of the professionals who work in the Intensive Care Unit on the brain death protocol. Teresina (PI), Brazil, 2016.

Variables	n	%
What brain functions must be absent in order to declare a patient suffering brain death?		
Irreversible loss of all cerebral cortical function	3	14.3
Irreversible loss of all cortical and brainstem function	18	85.7
Variable according to law	-	-
Does not know	-	-
Is there a legal need for complementary tests to establish the diagnosis of brain death?		
Yes	21	100
No	-	-
What criteria are considered indispensable for opening the brain death protocol?		
Cause of known brain death, without use of drugs depressants of the Central Nervous System	21	100
Apperceptive coma, with grade III score on the Glasgow scale and temperature below 32 ° C	-	-
Coma, with grade IV score on Glasgow scale and serum sodium levels within normal range	-	-
Apperceptive coma, with grade III score on the Glasgow scale and severe dyspnea	-	-
What are the procedures that contemplate the protocol of brain death for patients older than two years?		
Two clinical exams, with a minimum interval of 24 hours between them, one apnea test and two electroencephalograms, with a 24-hour interval between the two	2	9.5
Two clinical exams, with a minimum interval of 6 hours between them, an apnea test and a complementary	19	90.5
Two clinical exams, with a minimum interval of 8 hours between them, one apnea test and two complementary complementary tests	-	-
A clinical examination, an apnea test, and a confirmatory test	-	-

DISCUSSION

Brain death is a complex process that culminates in physiological changes in all organ systems, including biochemical and cellular changes that lead to multiple organ dysfunction. These changes, both early and late, influence the viability of organs, as they compromise perfusion and increase ischemic injury. In this way, it is necessary to have adequate knowledge on the part of the professionals to provide effective assistance to these patients.[10]

The ideal temperature, to be maintained in the potential donor patient, is between 36 and 37.5º C, that is, the same parameter considered ideal of central temperature in the other individuals, with the proviso that it is higher than 35º C, thus, considering a limit of temperature between 35 and 37.5 ° C.[8]

In the potential donor, greater care should be taken in this regard, since, in brain death there is loss of thermoregulatory function, resulting, in progressive hypothermia, tending to equalize body temperature at room temperature. Thus, temperature maintenance must be performed in order to keep the organs to be transplanted viable, avoiding the undesirable effects of hypothermia, such as coagulopathies and hemodynamic instability, which may compromise transplantation.[8,11]

Encephalic death culminates in a series of autonomic, metabolic and hemodynamic disorders responsible for deterioration of cardiocirculatory stability and tissue perfusion that result in cardiac arrest. After the onset of brain death, cardiocirculatory function can be maintained through supportive measures, such as mechanical ventilation, vasoactive drugs and artificial heating, for variable times.[12]

According to an observational study carried out in the city of Natal (RN), the maintenance of several functions, among them the cardiovascular, minimizes the loss of organs for transplantation, since it promotes adequate supply of oxygen to the tissues, hemodynamic stabilization, the energy supply and the hydroelectrolytic control.[13-4]

One study showed that cardiac arrest occurs in about 10% of the potential donors

in the maintenance phase, requiring cardiac resuscitation in this phase, with basic and advanced maneuvers that must follow the same protocols traditionally established. In case of cardiac arrest in the potential donor, the immediate removal of this patient to the surgical center with maintenance of chest compressions should be considered in order to remove the viable organs.[15-6]

There are few situations that make organ and tissue donation unfeasible for transplantation and, among these conditions, are malignant tumors, as can be observed through the E VIII speech, with the exception of basal cell carcinomas of the skin, in situ carcinoma of the colon uterine and primary tumors of the Central Nervous System. Other contraindicated situations are serologies positive for HIV or for HTLV I and II, also found in the statements of E I and E VIII, active and uncontrolled sepsis and active tuberculosis.[15]

Tumors that make transplantation unfeasible include: Anaplastic astrocytoma (grade III), Glioblastoma multiforme, Medulloblastoma, Anaplastic oligodendroglioma (Schmidt C and D), Ependymoma maligno, Pineoblastoma, Anaplastic and malignant meningeoma, Intracranial sarcoma, Germ cell tumor well differentiated teratoma), chordoma, primary cerebral lymphoma. Thus, other types of tumors, other than those mentioned, do not exclude the feasibility of transplantation.[16]

It was pointed out that many participants still consider sepsis as an absolute contraindication. However, positive blood cultures do not contraindicate organ donation, but appropriate antibiotic therapy should be initiated in cases of suspected or proven infection. In this sense, a study pointed out that donors with bacteremia and septic shock by Acinetobacter baumannii had their organs successfully transplanted, being assisted by antimicrobial treatment before and after transplantation, without the presence of additional morbidity to the recipients.[10-8]

Most recommendations for different types of solid organ transplants present, as contraindications, systemic viral infections (HIV, HTLV I and II). However, with regard to HIV infection, the descriptions of four cases of renal transplantation between donors and recipients with HIV, with good clinical evolution, were presented. Therefore, it is recommended that other non-bacterial infections be analyzed on a case-by-case basis with the organ procurement center and the transplantation teams.[8]

Absolute contraindications are the responsibility of the hospital coordinator or the Organ Procurement Organization or Center for Notification, Training and Distribution of Organs. The decision on the use of a particular organ or tissue belongs to the transplant team, which will carry out a case-specific evaluation.[16]

In Brazil, encephalic death is established with the irreversible cessation of brain functions, that is, of the cerebral cortex, telencephalon and brainstem, determined by a catastrophe on the central part of the nervous system. It is necessary and obligatory that additional tests be performed on patients with suspected brain death. According to CFM Resolution 1480/97, complementary examinations must clearly demonstrate absence of brain electrical activity, absence of cerebral metabolic activity or lack of cerebral blood perfusion.[15]

The most reliable and accepted confirmatory complementary tests, for brain death are those that demonstrate the total absence of cerebral blood perfusion, such as cerebral arteriography, electroencephalogram and transcranial Doppler. The interpretation of the findings should be performed only by a professional experienced in this situation.[17-8]

The criteria for the opening of the brain death protocol, are: the arrative and apperceptive coma, with Glasgow 3; the patient should be on mechanical ventilation; the cause of the coma should be known, through the clinical history, physical examination and complementary exams; the vital structures of the encephalon must be irreversible, diagnosed by imaging method; the use of depressant drugs of the Central Nervous System, with levels capable of causing the coma and mimicking the encephalic death, should be excluded; absence of hypothermia; do not present severe acid-base metabolic disorders and / or electrolytes capable of leading to coma and mimicking brain death; and is not suffering from hypotension.[19]

Clinical evaluations should be performed by different physicians, with a minimum interval between them. One of the evaluations should be done by a neurologist,

neurosurgeon or neuropediatrician and the other can be performed by the intensivist physician or assistant physician who has adequate technical training. It is worth mentioning that these doctors can not be part of teams of capture and / or transplantation.[18-20]

The clinical examination consists in the verification of a diagnostic triad, being the deep coma arreative and apperceptive, the absence of brain stem reflexes and the apnea. In the case of coma, the diagnosis of brain death only concerns supra-spinal arratividade.[21]

Apnea is probably one of the most important clinical signs to diagnose brain death. The apnea test is mandatory in the determination of brain death and can not be dissociated from the neurological exam.[22-3]

Even presenting a high index of correct answers, the results suggest the need to update on the physiology of brain death, in order to improve assistance to the potential donor.

CONCLUSION

Intensivist professionals presented satisfactory knowledge about the protocol for the diagnosis of brain death, and all the professionals agreed on the complementary tests and the criteria for opening the protocol. However, knowledge of absent brain functions and procedures involving the brain death protocol should be strengthened.

Regarding the maintenance of organs of the potential donor, most of the professionals stressed the importance of the maintenance of the cardiocirculatory function, however they were doubts about the ideal temperature of conservation of the potential donor and regarding the contraindications for transplants. In addition, most intensive care professionals reported that they did not receive training in organ maintenance, highlighting the need for training to improve the qualification of these professionals and increase the number of effective donors.

Thus, this study aimed to subsidize knowledge to improve care in the transplant process. In addition, because organ and tissue donation is a current theme and involves several ethical issues, it is of utmost importance to develop new research, courses and training in this area, with the aim of clarifying the professionals and society.

REFERENCES

1. Cappellaro J, Silveira RS, Lunardi VL, Corrêa LVO, Sanchez ML, Saioron I. Comissão intra-hospitalar de doação de órgãos e tecidos para transplante: questões éticas. Rev Rene [Internet]. 2014 Nov/Dec [cited 2016 June 22];15(6):949-56. Available from: http://repositorio.ufc.br/ri/bitstream/riufc/11272/1/2014_art_jcappellaro.pdf

2. Conceição MPS, Oliveira AJB, Pontes RWF, Brito NB. Análise dos aspectos epidemiológicos dos candidatos à doação de órgãos no Estado do Pará. Rev Soc Bras Clín Méd [Internet]. 2013 Apr/June [cited 2016 June 22];11(2):123-128. Available from: http://files.bvs.br/upload/S/1679-1010/2013/v11n2/a3562.pdf

3. Machado EL, Gomes IC, Acurcio FA, César CC, Almeida MCM, Cherchiglia ML. Fatores associados ao tempo de espera e ao acesso ao transplante renal em Belo Horizonte, Minas Gerais, Brasil. Cad Saúde Pública [Internet]. 2012 Dec [cited 2016 June 23];8(12):2315-26. Available from: http://www.scielo.br/pdf/csp/v28n12/10.pdf

4. Decreto nº 2268 de 30 de junho de 1997 (BR). Regulamenta a Lei nº 9.434, de 4 de fevereiro de 1997, que dispõe sobre a remoção de órgãos, tecidos e partes do corpo humano para fim de transplante e tratamento, e dá outras providências [Internet]. Brasília: Assembleia legislativa; 1997 [cited 2016 June 20]. Available from: http://www2.camara.leg.br/legin/fed/decret/1997/decreto-2268-30-junho-1997-341459-norma-pe.html

5. Registro Brasileiro de Transplantes. Dimensionamento dos Transplantes no Brasil e em cada estado [Internet]. 2014 [cited 2016 June 25]. Available from: http://www.abto.org.br/abtov03/Upload/file/RBT/2014/rbt2014-lib.pdf

6. Freire LS, Mendonça AEO, Dantas BAS, Silva MF, Gomes ATL, Torres GV. Process of organ and tissue donation for transplant: reflections about its effectiveness. J Nurs UFPE online [Internet]. 2014 July [cited 2016 July 26];8(1):2533-8. Available from: http://www.revista.ufpe.br/revistaenfermagem/index.php/revista/article/view/6352/pdf_5770

7. Freire ILS, Vasconcelos QLDAQ, Melo GSM, Torres GV, Araújo EC, Miranda FAN. Facilitadores e barreiras na efetividade da doação de órgãos e tecidos. Texto &

Contexto Enferm [Internet]. 2014 Oct/Dec [cited 2017 July 12];23(4):925-934. Available from: http://www.scielo.br/pdf/tce/v23n4/pt_0104-0707-tce-23-04-00925.pdf

8. Westphal GA, Caldeira Filho M, Vieira KD, Zaclikevis VR, Bartz CM, Wanzuita R, et al. Diretrizes para manutenção de múltiplos órgãos no potencial doador adulto falecido. Rev Bras Ter Intensiva [Internet]. 2011 [cited 2016 June 28];23(4):410-25. Available from: http://www.scielo.br/pdf/rbti/v23n3/v23n3a04.pdf

9. Campos CJG. Método de análise de conteúdo: ferramenta para a análise de dados qualitativos no campo da saúde. Rev Bras Enferm [Internet]. 2004 Sept/Oct [cited 2016 June 30];57(5):611-4. Available from: http://www.scielo.br/pdf/reben/v57n5/a19v57n5.pdf

10. Souza BSJ, Lira GG, Mola R. Notificação da morte encefálica em ambiente hospitalar. Rev Rene [Internet]. 2015 Mar/Apr [cited 2017 July 10];16(2):194-200. Available from: http://repositorio.ufc.br/ri/bitstream/riufc/12653/1/2015_art_bsjsouza.pdf

11. Rech TH, Moraes RB, Crispim D, Czepielewski MA, Leita CB. Management of the Brain-Dead Organ Donor: A Systematic Review and Meta-Analysis. Transplantation [Internet]. 2013 Apr [cited 2016 July 26];95(7):966-974. Available from: http://journals.lww.com/transplantjournal/Fulltext/2013/04150/Management_of_the_Brain_Dead_Organ_Donor___A.11.aspx

12. Manual do núcleo de captação de órgãos: iniciando uma comissão intra-hospitalar de doação de órgãos e tecidos para transplantes. Instituto Israelita de Responsabilidade Social [Internet]. Barueri: Minha Editora; 2014 [cited 2017 July 25]. Available from: https://www.einstein.br/Documentos%20Compartilhados/manual-ncap.pdf

13. Freire ILS, Vasconcelos QLDAQ, Torres GV, Araújo EC, Costa IKF, Melo GSM. Estrutura, processo e resultado da doação de órgãos e tecidos para transplante. Rev Bras Enferm [Internet]. 2015 Sept/Oct [cited 2016 July 11];68(5):837-845. Available from: http://www.scielo.br/pdf/reben/v68n5/0034-7167-reben-68-05-0837.pdf

14. Escudero D, Valentin MO, Escalante JL, Sanmartin A, Perez-Basterrechea M, Gea J. Intensive care practices in brain death diagnosis and organ donation. Anaesthesia [Internet]. 2015 Oct [cited 2016 July 26];70(1):1130–1139. Available from: https://www.ncbi.nlm.nih.gov/pubmed/26040194.

15. Freire SG, Freire ILS, Pinto JTJM, Vasconcelos QLDAQ, Torres GV. Alterações fisiológicas da morte encefálica em potenciais doadores de órgãos e tecidos para transplantes. Esc Anna Nery Rev Enferm [Internet]. 2012 Oct/Dec [cited 2016 July 15];16(4):761-766. Available from: http://www.redalyc.org/pdf/1277/127728365017.pdf

16. Sistema Nacional de Transplantes (BR). Central nacional de transplantes [Internet]. Brasília: Ministério da Saúde; 2016 [cited 2017 July 10]. Available from: http://portalsaude.saude.gov.br/index.php/o-ministerio/principal/secretarias/sas/transplantes/sistema-nacional-de-transplantes

17. Hirschheimer MR. Morte encefálica e doação de órgãos e tecidos. Resid Pediatr [Internet]. 2016 [cited 2017 July 15];6(1):29-45. Available from: http://residenciapediatrica.com.br/detalhes/234/morte-encefalica-e-doacao-de-orgaos-e-tecidos

18. Secretaria de Estado da Saúde (BR). Manual para notificação, diagnóstico de morte encefálica e manutenção do potencial doador de órgãos e tecidos [Internet]. Curitiba: Central Estadual de Transplantes; 2016 [cited 2017 July 10]. Available from: http://www.saude.pr.gov.br/arquivos/File/ap_protocolo_morte16FINAL.pdf

19. Westphal GA, Caldeira Filho M, Vieira KD, Zaclikevis VR, Bartz MCM, Wanzuita R, et al. Diretrizes para manutenção de múltiplos órgãos no potencial doador adulto falecido. Parte II. Ventilação mecânica, controle endócrino metabólico e aspectos hematológicos e infecciosos. Rev Bras Ter Intensiva [Internet]. 2011 [cited 2016 July 10];23(3):269-82. Available from: http://www.rbti.org.br/artigo/detalhes/0103507X-23-3-4

20. Bonfadini G, Roisman V, Prinz R, Sarlo R, Rocha E, Campos M. Doação e fila de transplante de córnea no Estado do Rio de Janeiro. Rev Bras Oftalmol [Internet]. 2014 [cited 2016 July 25];73(4):237-42. Available from: http://www.scielo.br/pdf/rbof/v73n4/0034-7280-rbof-73-04-0237.pdf

21. Costa CR, Costa LP, Aguiar N. A enfermagem e o paciente em morte encefálica na UTI. Rev Bioét [Internet]. 2016 [cited 2017 July 10];24(2):368-373. Available from: http://www.redalyc.org/pdf/3615/361546419020.pdf

22. Westphal GA, Garcia VD, Souza RL, Franke CA, Vieira KD, Birckholz VRZ, et al. Diretrizes para avaliação e validação do potencial doador de órgãos em morte encefálica. Rev Bras Ter Intensiva [Internet]. 2016 [cited 2017 July 10];28(3):220-255. Available from: http://www.scielo.br/pdf/rbti/v28n3/0103-507X-rbti-28-03-0220.pdf

23. Ahlawat A, Carandang R, Hear SO, Muehlschlegel S. The modified apnea test during brain death determination: an alternative in patients with hypoxia. J Intensive Care Med [Internet]. 2016 [cited 2017 July 16];31(1):66-69. Available from: http://journals.sagepub.com/doi/pdf/10.1177/0885066615599086

Submission: 2017/09/03
Accepted: 2017/11/30
Publishing: 2018/01/01

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