







Knowledge, attitudes and willingness to donate organs among Medical and Nursing students

Conhecimento, desejo e atitude de estudantes de Medicina e Enfermagem sobre a doação de órgãos

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ABSTRACT

Background: The increasing demand for organ donors and proficient experts is prompting fresh research endeavors aimed at clarifying societal perceptions and actions related to organ donation. Students from the healthcare area have been a focal point in these studies. Despite their favorable attitudes, a notable gap in knowledge among students has been underscored.

Objective: To assess the level of knowledge, willingness, and attitudes toward organ donation among medical and nursing students in the city of Recife, Brazil.

Methods: A cross-sectional investigation was undertaken, involving the examination of questionnaires that were answered by medical and nursing students during their last academic years.

Results: Between February and December 2022, a total of 218 questionnaires were gathered, of which 208 were included in the final sample. Among the participants, 57.2% identified as male, with an average age of 24 ± 2.7 years. In terms of academic background, 85.1% were enrolled in medical school, while 14.9% were attending nursing school. A notable observation was that only 49% of the students were aware that the diagnosis of brain death does not necessarily require the involvement of a neurologist. Furthermore, a significant proportion of students (63%) were unfamiliar with the entity responsible for initiating discussions with the potential donor's family. Interestingly, 92.3% of the students had contemplated the prospect of becoming organ donors themselves. If a family member were diagnosed with brain death, a significant majority of students, specifically 83.2%, expressed their willingness to grant consent for organ donation.

Conclusions: Despite the positive attitudes, this study revealed insufficient knowledge among students, thereby underscoring the need for universities to expand their curricula and establish courses aimed at acquiring knowledge and skills related to brain death cases and actions related to potential donors.

Keywords: Organ donation; Knowledge; Attitude; Students.

RESUMO

Introdução: A necessidade crescente de doadores de órgãos e de profissionais capacitados impulsiona novos estudos que esclareçam o entendimento e comportamento da sociedade perante a doação de órgãos. Estudantes de saúde vêm sendo alvo de estudos por seu influente papel social e, além disso, quando formados, farão parte de etapas fundamentais da doação. Contudo, evidencia-se conhecimento insuficiente dos estudantes apesar de possuírem atitude positiva.

Objetivo: Este estudo teve como objetivo avaliar o grau de conhecimento, desejo e atitude perante as doações de órgãos entre os acadêmicos de Medicina e Enfermagem na cidade de Recife, em Pernambuco.

Método: Trata-se de um estudo transversal realizado a partir da análise de questionários respondidos por estudantes de Enfermagem e Medicina nos últimos períodos acadêmicos. Além de dados demográficos, os estudantes foram questionados quanto ao entendimento sobre aspectos da validação de possível doador, diretrizes do protocolo de morte encefálica, motivações e opções pessoais em relação à doação de órgãos.

Resultado: De fevereiro a dezembro de 2022, 218 questionários foram coletados, dos quais 208 entraram para a amostra. Dentre os estudantes, 57,2% eram do sexo masculino, a média de idade foi de $24 \pm 2,7$ anos. Dos graduandos, 85,1% cursavam Medicina, e 14,9%, Enfermagem. Apenas 49% dos estudantes sabiam da não necessidade de neurologista para o diagnóstico de morte encefálica. Ademais, 63% não sabiam quem é o responsável por abordar a família do potencial doador. Grande parte dos acadêmicos já considerou a possibilidade de ser doador de órgãos, representando 92,3% do total de estudantes avaliados. Dos alunos, 67% afirmaram já ter conversado com as próprias famílias sobre a doação de órgãos e que elas conheciam essa decisão. Em caso de familiar apresentar diagnóstico de morte encefálica, 83,2% dos alunos consentiram a doação. Em relação aos possíveis benefícios materiais ou emocionais para a família do doador, 86,1% julgaram que a doação de órgãos pode trazer algum benefício.

Conclusão: Apesar da atitude positiva, o estudo evidenciou conhecimento insuficiente dos alunos, reforçando a necessidade de ampliação do currículo das universidades e criação de cadeiras direcionadas à aquisição de conhecimento e habilidades quanto à condução de casos de morte encefálica e atuação perante os potenciais doadores.

Palavras-chave: Transplante de órgãos; Estudantes; Conhecimento; Atitude.

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INTRODUCTION

Organ transplantation is the only possible therapeutic measure for a large number of patients suffering from terminal diseases¹. Despite the growing trend in the number of donors in recent years², they are still unable to meet the demand of the waiting lists. In 2019, the United States showed the highest growth rate in the number of organ donors worldwide, from 33.32 to 36.88 per million individuals, followed by France from 29.74 to 33,25³. In Brazil, in 2020 there was a 6.5% drop in the donor rate compared to the first half of 2019, reaching the mark of 15.8 donors per million⁴. Factors such as the population's lack of knowledge and the failure to use donated organs contribute to a decrease in the number of transplants⁵. Education is essential to inform the population about the training of professionals qualified to effectively deal with issues related to organ transplantation.

Medical students are the target of studies to assess the knowledge and attitude of a certain population regarding organ donation⁶. Healthcare area students are opinion makers and means of information transmission, both in their family environment and to students in other areas. In addition to being future donors, by becoming doctors and nurses they will be able to promote organ donation in their future care activities⁷. Recent studies show a generally positive attitude among medical students towards organ donation; however, they show insufficient knowledge about topics that are necessary to optimize the transplant process^{8,9}. The lack of uniformity in university education is a global reality and countries such as Brazil do not have standardized curricula that instruct universities in the construction of educational resources for their students¹⁰. It is necessary to build current curricula that encompass criteria for diagnosing death, capacity to identify potential donors, requirements for donation, preservation protocols, techniques for family approach and information on transplants with living and with cadaveric donors¹¹. Carrying out a regional study contributed to understanding the needs that must be met by the assessed health schools.

METHOD

Study design: Analytical cross-sectional study, of a scientific nature, of the Knowledge and Attitude type, carried out through the application of a questionnaire.

Inclusion criteria: Medical students who are attending internship semesters (9th - 12th semesters) in 2022 at a public university in Pernambuco; Nursing students who are completing the mandatory internship period (8th - 10th semesters) in 2022 at a public university in Pernambuco.

Exclusion criteria: Refusal to participate in the study; Incomplete filling-out of the questionnaire.

Knowledge and Attitude Questionnaire: The students answered a questionnaire containing 21 questions and divided into three sections: demographic data, knowledge about organ donation, assessment of students' willingness and attitude regarding organ donation. The section related to demographic data consists of 7 questions, the assessment of knowledge consists of 6 questions and the analysis of attitude and willingness consists of 8 questions. Some space was reserved in the questionnaire for any comments from the respondents. To prepare the questionnaire, specialist professionals who work directly with organ transplantation were consulted, and the model sent to the students was the result of modifications and improvements. The assessment of understanding about organ transplantation was made through statements about aspects of the validation of possible donors, brain death protocol guidelines and patient referral. To assess the students' attitude and willingness, multiple-choice questions were asked about motivations and personal options regarding organ donation.

Application of the questionnaire: Before applying it to the research subjects, a pilot study was carried out to validate the questionnaire, which was pre-tested in 10 students, to detect any ambiguity and confusion errors in the questions. After analyzing the responses from the pilot study, necessary changes were made.

The questionnaires were administered to students without prior information or announcements to minimize response bias and were answered anonymously. Medicine and nursing students were invited to answer the handwritten questionnaire during their practice in internship services, and the collection points included the General Surgery sector of Hospital Universitário Oswaldo Cruz and the Ophthalmology sector of Hospital das Clínicas, with prior consent from the heads of the sectors. The questionnaires were answered for a period of 10 to 15 minutes, individually and without consultation. The number of questionnaires applied varied according to the number of students present at the service on different collection days. Only students enrolled in a mandatory internship in the medical course, attending the 5th and 6th years of medical school, and Nursing students, attending the 8th, 9th and 10th semesters, were included in the study.

The students had to answer the entire questionnaire. These questionnaires were identified through coding to avoid duplicate responses. The coding was carried out using the participants' initials, which were replaced by numbers, plus the date and month of birth, which together constituted a registration number for each questionnaire. This coding was included in the last part of the questionnaire. Personal data were not collected, so researchers were blind to the respondents' identity. The participants were informed about

the researchers' identity, the estimated response time, and the objectives of the study.

Analysis of the collected data: The collected data were tabulated using Microsoft Excel software, expressed as a percentage or as mean \pm standard deviation or median + max-min values for non-parametric data.

Bioethical aspects: The current study, using secondary data, was registered on Plataforma Brasil, under the responsibility of the Ethics Committee of the Faculty of Medical Sciences of Universidade de Pernambuco, under number 5,103,563.

RESULTS

During the period from February to December 2022, 218 medicine and nursing students from the University of Pernambuco (UPE) and the Federal University of Pernambuco (UFPE), attending their last or penultimate year of college, manually answered the questionnaires during academic internship activities. After excluding 10 questionnaires due to incomplete responses, 208 questionnaires were included in the sample.

Demographic characteristics of the study population

Among the students, 119 were male, representing 57.2% of the sample. The mean age was 24 ± 2.7 years, with 19 being the minimum age and 37 the maximum. In the analyzed sample, 202 (97.1%) students were single, 37.5% declared having a family income of 10 to 15 minimum wages. 130 (62.5%) students studied at UPE and 78 (37.5%) at UFPE, 177 (85.1%) studied medicine and 31 (14.9%) nursing. Forty-one (19.7%) students were in their last year of college and 167 (80.2%) were in their penultimate year. When asked which religion they belonged to, 30.7% said they were Catholics (64), 15.4% evangelical Christians (32), 3.8% spiritualists (8), 8.6% atheists (18), 40.9% did not have a religion (85) and 1 student practiced an African-based religion (0.4%). The demographic data are described in table 1.

Knowledge about organ donation and brain death

Six questions were asked related to the diagnosis of brain death and the organ donation process, and the response rate was 100%. Only 49% of the students knew that a neurologist was not needed to diagnose brain death. The need for the apnea test to diagnose brain death was understood by 60.6% of students. The obligation of compulsory notification to the Organ Notification, Procurement and Distribution Center (CNCDO, *Central de Notificação, Captação e Distribuição de Órgãos*) in cases of suspected brain death was known to only 31.7% of students. Sixty-three percent of students did not know

who is responsible for approaching the potential donor's family and conducting the family interview. Only 27.9% understood that there was no age limit for becoming an organ donor. The vast majority of students (89.9%) knew about the need for consent from the donor's family for the donation to occur.

Students' willingness and attitude

Most students have already considered the possibility of being an organ donor, representing 92.3% of the total number of assessed students. Regarding the donation of tissues and binary organs, the vast majority had a positive attitude, and only 1.9% would not be a donor at all; the attitude differs in relation to the degree of kinship with the possible recipient, as 42.7% of students would donate only to close relatives, 12.5%

Table 1. Demographic characteristics.

Characteristics	Statistics
Number of assessed students	208 students
Sex:	
Male	119(57.2%)
Age	
Mean \pm sd	24.0 \pm 2.7 years
Marital status	
Single	202 (97.1%)
Not single	6 (2.9%)
HEI	
UPE	130(62.5%)
UFPE	78 (37.5%)
Course	
Medicine	177(85.1%)
Nursing	31 (14.9%)
Year of the course	
Last year	41(19.7%)
Penultimate year	167(80.2%)
Family income	
Up to 3 minimum wages	48 (23.1%)
>4-5 minimum wages	39 (18.7%)
> 6-9 minimum wages	43 (20.6%)
10-15 minimum wages	78 (37.5%)
Religion	
Catholic	64 (30.7%)
Evangelical Christian	32 (15.4%)
Spiritualist	8 (3.8%)
Atheist	18 (8.6%)
No religion	85 (40.9%)
African-based religion	1 (0.4%)

Source: the authors, based on the data collected for the study.

to anyone known to them and 42.7% to anyone in need, even if they did not know them. Sixty-seven percent of the students said they had already talked to their families about organ donation and that they were aware of their decision. If a family member was diagnosed with brain death, 83.2% of students would consent to the donation. As for living donors, 51.9% believe that organ donation can have some harmful effect. Regarding the possible material or emotional benefits

for the donor's family, 86.1% believe that organ donation can bring some benefit. When asked about access to information on brain death and organ donation, 59.6% stated that they had theoretical classes on this subject during the course, 6.7% stated that they had access through specialty conferences, 10.1% through extracurricular courses and 23.5% said they had not received any information regarding organ donation and diagnosis of brain death.

Table 2. knowledge about organ donation and brain death.

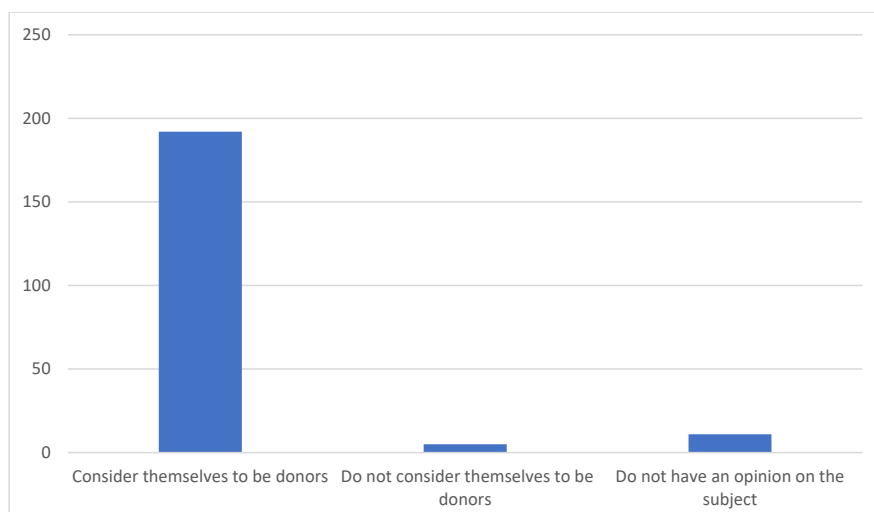
Questions	Correct answer	n (%)
1. The diagnosis of brain death must involve two doctors, including a neurologist. True False I am not sure	False	102(49.0%)
2. Which clinical examination is essential for diagnosing brain death? Anisocoric pupils Absence of patellar reflex Apnea test Presence of hypothermia below 34°C	Apnea test	126 (60.6%)
3. Compulsory notification to the Organ Notification, Procurement and Distribution Center (CNCDO) is mandatory, regardless of the possibility of donating or not organs and/or tissues in the case of: Suspected brain death Diagnosed brain death Cases of deep coma regardless of the cause Notification is not mandatory	Suspected brain death	66 (31.7%)
4. The person responsible for approaching the potential donor's family and conducting the family interview to authorize organ donation or not is: Doctor who diagnosed brain death The patient's attending physician Head or person responsible for the service where the patient is hospitalized Professionals from the State Organ Transplant Center Professionals of the Intra-hospital Organ and Tissue Donation Committee	Professionals of the Intra-hospital Organ and Tissue Donation Committee	77 (37.0%)
5. When analyzing the validation criteria for potential donors, attention should be paid to their age, with 65 years being the upper age limit for donors. True False I am not sure	False	58 (27.9%)
6. Once brain death is confirmed, the removal of organs, tissues, cells and parts of the human body can only be carried out through: Free and informed consent from the family of the deceased Declared consent by the potential donor while living The removal is compulsory by law, requiring no authorization from the family or donor	Free and informed consent from the family of the deceased	187 (89.9%)

Source: the authors, based on the data collected for the study.

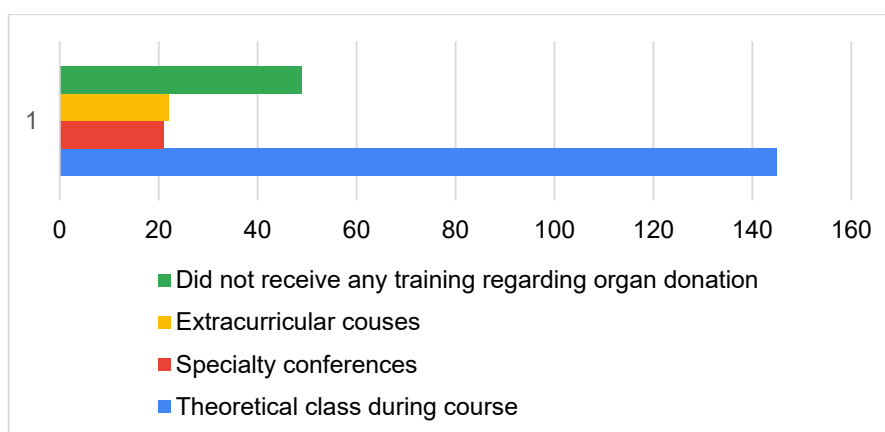
Table 3. Students' willingness and attitude.

Questions	n (%)
1. Have you ever considered the possibility of being an organ donor in the event of brain death?	
Yes	192 (92.3%)
No	5 (2.4%)
I don't have an opinion on the subject	11 (5.2%)
2. What do you think about donating tissues or binary organs during your lifetime?	
I would not be a donor under any circumstances	4 (1.9%)
I would donate only to a close relative such as parents, children or siblings	89 (42.7%)
I would be a donor to anyone I knew who needed the organ	26 (12.5%)
I would be a donor to anyone who needed the organ, even if I didn't know them.	89 (42.7%)
3. Have you talked to your family about your attitude towards organ donation?	
Yes	141 (67.8%)
No	65 (31.2%)
I do not want to be a donor	2 (0.9%)
4. Does your family know about your decision?	
Yes	140 (67.3%)
No	53 (25.5%)
It does not apply	15 (7.2%)
5. If one of your family members were diagnosed with brain death, would you consent to organ donation?	
Yes	173 (83.2%)
No	7 (3.3%)
I don't have an opinion on the subject	28 (13.4%)
6. Do you think that organ donation can cause any harmful effects/complications in living donors?	
Yes	108 (51.9%)
No	73 (35.1%)
I don't have an opinion on the subject	27 (13.0%)
7. Do you think that organ donation can bring any material or emotional benefit to the donor's family?	
Yes	179 (86.1%)
No	29 (13.9%)
8. Access to information about the organ donation process during university education.	
Theoretical class during the course	124 (59.6%)
Specialty conferences	14 (6.7%)
Extracurricular courses	21 (10.1%)
I did not receive any training regarding organ donation	49 (23.5%)

Source: the authors, based on the data collected for the study.

Graph 1. Students' attitude in case of brain death.

Graph 1: representing the absolute number of students regarding their attitude towards organ donation, of which 192 (92.3%) consider themselves to be organ donors, 5 (2.4%) do not consider themselves to be donors and 11 (5.2%) do not have an opinion on the subject. Source: the authors, based on the data collected for the study.

Graph 2. Source of information about organ donation.

Graph 2: represents the students' main source of information regarding their knowledge related to organ donation. Thus, 124 (59.6%) stated that they had theoretical classes on this subject during the course, 21 (6.7%) stated that they had access through specialty conferences, 14 (10.1%) through extracurricular courses and 49 (23.5%) stated that they had not received any information regarding organ donation and diagnosis of brain death.

Source: the authors, based on the data collected for the study.

DISCUSSION

The present study was carried out as part of an undergraduate research project promoted by *Fundação de Amparo à Ciência e Tecnologia do Estado de Pernambuco* (FACEPE); it was decided to interview students attending the last semesters of the course, during the curricular internship, to evaluate the entire academic training of the medicine and nursing courses at universities in Pernambuco. Pernambuco is a large transplant center in Brazil, and in 2022, it was responsible for 315 of the 5,306 transplants carried out in the country¹², while Brazil, in 2021, was the third country in absolute numbers of liver transplants and the fourth in absolute numbers of kidney transplants among 35 countries

worldwide¹². Despite the country's great importance in the worldwide organ transplant scenario, most Brazilian universities do not have a specific module or curricular subject regarding organ donation, as is the case in the two assessed universities, and some of the concepts are taught in other disciplines, such as Forensic Medicine and Abdominal Surgery. The study revealed insufficient knowledge of nursing and medical students in relation to brain death diagnoses and procedures necessary for organ donation to occur. The results are similar to data present in the literature^{13,6,14}. In a sectional study conducted in Canada, in which medical students from all years of the course were questioned, there was no evidence of an increase in knowledge over the school years,

reaffirming the need to formalize curricular courses aimed at the acquisition of such concepts.

Compulsory notification of brain death is the initial step to start the organ donation process, which was unknown to 69.3% of the interviewed students. The moment of the diagnosis of brain death is crucial to continue the necessary care for the potential donor, and the lack of understanding regarding the conducts delays the entire thorough donation process. It was also evident that 63% of students did not know who was responsible for approaching the potential donor's family and conducting the family interview. The lack of preparation for the diagnosis of brain death leads to negative consequences both in technical procedures and in approaching family members. The professionals' lack of knowledge and skill negatively influences family decisions regarding organ donation. The language, posture and attitude of nursing and medical professionals are decisive in embracing and guiding families and the consequent decision on whether or not to donate the organs¹⁵; despite its importance, the lack of preparation of professionals in clinical practice is notorious. In Brazil, in 2022, refusal by family members to donate the potential donors organs accounted for 46% of unrealized donations.

The vast majority of interviewees (92.3%) consider the possibility of being an organ donor, demonstrating the positive attitude of these students. Such findings demonstrate an attitude above the average observed in previous studies. In 2005, a study carried out in Turkey with 426 medical, nursing, dentistry and health technician students showed that 65.9% wanted to be donors¹⁶, another Turkish study carried out in 2015 only with medical students showed that 50% wanted to donate organs¹⁷, whereas in Nepal 400 medical and nursing students were interviewed and 43.5% wanted to donate their organs¹⁸. These findings may be related to the general characteristics of the population, such as religious reasons; in the study carried out in Nepal, 91.5% of the students were Hinduists, whereas in studies with a majority of Christian population, similar to Brazilians, students generally showed a positive attitude, such as in a study carried out in Ethiopia⁷ in which 49.9% of students were orthodox Catholics and 34.1% Protestants; of these, 67.5% wished to donate their organs. However, this fact may also be related to the academic period during which these students were interviewed, as students from more advanced periods tend to have a more positive attitude towards organ donation¹⁹.

Despite the positive attitude, 51.9% of the assessed students believe that organ donation can have some harmful effects. This finding may be related to the gap in knowledge of these students when considering the details of the organ donation process. A logistic regression carried out at the Amsterdam Medical Academy related the increased desire to

be a donor with the increasing level of medical knowledge⁶. Overcoming the barriers of lack of knowledge is essential for improving the training of future opinion-forming professionals. In addition to the lack of knowledge, the refusal to donate organs is related to conflicts between the desire to help and the violation of the body, whether for religious or cultural reasons or lack of trust in health services and professionals. One example of this instance are the scandals related to the sale of positions on the transplant lists and deviation of organs, as happened in the "Fura-Fila" operation carried out by the federal police in Rio de Janeiro in 2008²⁰ or in an organ transplant center in Germany²¹, in which doctors were accused of manipulating the list waiting time for recipients. A study carried out with students in Iraq in 2016 evaluated the reasons related to refusing to donate organs, among which were the fear regarding the hasty diagnosis of brain death, in addition to the lack of confidence in prioritizing socially favored patients over others²².

Even though the students did not demonstrate the necessary knowledge, 59.9% of them stated they had theoretical classes during the course on organ donation, showing that the superficial approach of current curricula can lead to a lack of perception among students regarding the need to improve their skills, since such knowledge has already been theoretically covered during their academic training.

The students' positive attitude, in addition to representing future donors, benefits the population in general, since students in the health area are propagators of knowledge and shapers of opinions²³; thus, investing in the education of future health professionals represents a way to fight the dissatisfied stability in the donor rate in the country. Increasing the technical, scientific and human capacity of professionals allows the greater dissemination of knowledge, fighting the lack of information and distrust among the population regarding the transparency, efficiency and safety of the chain of processes related to organ donation.

This study has methodological limitations. This is a cross-sectional research carried out in only one university center over a short period of time and therefore with a limited sample. Consequently, the knowledge of only a small fraction of students was assessed. The research did not take into account students from other regions of the state or the country, so the conclusions cannot be generalized, and we did not use a rigidly validated questionnaire. On the contrary, validation was carried out through a small pilot study, applying it to students and experts, thus making corrections for small deviations, based on the obtained results. This type of validation, although it demonstrates that there was concern in testing the questionnaire before its application, is known to be more limited. Multiple-choice questions were used, limiting the investigation

of personal motivations and understandings of each student. It was decided to apply the questionnaires in person due to the high number of abstentions related to online questionnaires in our academic environment, significantly increasing the demand for the time dedicated to data collection, as students were approached individually during the internship. When approached, they had to respond amidst other health service activities, possibly not offering sufficient time and conditions for good reflection at the time of the response. The limited number of nursing students was mainly due to the large distribution of these students in the various academic centers of the state, reaching only those who were allocated to the services where the research was carried out. Finally, the study lacks a control group. If applied to a group of students attending the first years of medical school, or to students of the same age and social group from courses other than those in the medical field would allow clearer and more well-founded conclusions. The fact that it is an undergraduate research project is also limiting. With minimal funding and fitted within a curriculum with excessive hours of full-time dedication, there is a clear limitation of time and opportunities for fieldwork.

CONCLUSIONS

Considering the previously discussed methodological design with its limitations, the present study demonstrates the insufficiency of knowledge of future doctors and nurses regarding the diagnosis and management of brain death cases, despite a positive attitude. The results suggest that it is necessary to build curricular solutions capable of meeting the learning needs of these students and, therefore, suggest the improvement of curricula. Subsequent studies, including a greater number of students, involving other regions of the country and considering the involved curricular nuances can confirm the results of this small study and point out necessary solutions.

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AUTHORS' CONTRIBUTION

Luiz Eduardo Correia Miranda: study supervisor, supported the planning of the study, guided the collection of data in the field, data analysis and writing of the manuscript. Maria Vitória Rocha Santos Bezerra Maia: had a grant for the undergraduate research project, which was the basis for the article. She contributed to research planning, field data collection and analysis, as well as the writing of the manuscript. Marina Gabinio de Araújo Pontes

and Inaia Mackert Pascoal: contributed to collecting data in the field as well as writing the manuscript. Matheus Stillner Eufanio: contributed to writing and reviewing the manuscript. Ana Clara Galindo Miranda: contributed to writing and reviewing the manuscript.

CONFLICTS OF INTEREST

The authors declare no conflicts of interest.

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