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Medical Students Perception about the Donation and Transplantation of Organs and Tissues

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ABSTRACT

Objective: To evaluate medical students' perception about organ and tissue donation and transplantation. **Methods:** This is a cross-sectional study, with quantitative analysis, which evaluated students from the 1st to the 12th semester of the Bahia Medical School of the Bahia Federal University (FMB/UFBA), grouped by year of graduation (1st to 6th year), through a questionnaire. Data were statistically analyzed using R for Windows, considering significant values of $p \leq 0.05$. **Results:** Of the 393 participants, 207 (52.7%) were female, 250 (63.3%) were between 21 to 25 years old, 144 (36.6%) had no religion, and 80 (20.3%) were boarding students. Of all the interviewees, 159 (40.5%) self-assessed their knowledge as regular and 153 (38.8%) as bad and terrible. About the exposure to the subject, 222 (56.6%) had never attended a class and, among those who had, 187 (60.1%) evaluated the information as insufficient. A total of 324 students (82.4%) would have the intention of being a *post-mortem* donor and 42 (61.6%) would accept to participate in a living donor transplantation, although 245 (62.3%) said they did not know the risks. Among the students, 327 (83.2%) said they knew the concept of brain death, 119 (30.3%) the legal terms of donation, and 105 (26.7%) the donor maintenance measures. However, 72 (18.3%) said they had a good knowledge of how to diagnose brain death. A total of 275 (70%) got right what is needed to declare a donor. There were 359 answers that would exclude alcoholics, smokers and users of illicit drugs from the transplant list, and 363 (92.7%) considered that the severity of the problem is the most appropriate criterion for priority on the waiting list. **Conclusion:** Students perceive their level of knowledge as unsatisfactory and understanding about specific issues is still low. No significant influence of sociodemographic aspects was observed regarding the desire to be a donor.

Descriptors: Knowledge; Students; Organ Transplantation; Tissue and Organ Procurement; Hospitals Teaching.

INTRODUCTION

Since the 20th century, medicine has experienced conceptual permutations that touch on the boundaries between life and death. Scientific advances in intensive care have made it feasible to maintain vital organs in *post-mortem* patients when they were diagnosed with absent and irreversible encephalic response. Such advances would come to compose the defining items of brain death, replacing the attestation of death only after cardiac arrest, and opened doors for the transplantation of organs and tissues for therapeutic purposes.[1,2]

The criteria for diagnosing brain death have provided favorable outcomes for patients diagnosed with end-stage diseases who are indicated for organ or tissue

transplantation.[3,4] These conquests are made through the increasingly refined experience of the professionals, the surgical advances, and the advent of effective pharmacotherapy, which has guaranteed the success and safety of the procedures, increased survival, better health conditions, and an important return for society.[5–7]

Although it has the largest public transplantation system and comprehensive assistance to recipients, Brazil has a significant disproportion between the rate of patients on the waiting list and the number of organs available for the procedure.[3,5] This inequality between supply and demand has been understood as a result of the difficulties encountered in the donation and transplantation process and, among those identified, are the insufficient identification of potential donors related to the low knowledge of physicians, difficulties in the donor's maintenance due to physiological changes inherent to the death process itself, medical contraindications, family refusal to donate, among other reasons.[3,8–10]

In this context, the contribution of undergraduate courses in the training of future physicians is emphasized, in order to prepare them for an accurate identification of possible donors, advances in organ harvesting, and maintenance of organ viability.[11,12] Professional ethics education during graduation is defended as an aspect as indispensable as technical education, as it fosters a formation that transcends the strictly scientific power and touches a reflection on the necessary sensitivity and empathy that must exist in this process, whether in the doctor's contact with the ill patient or with a diagnosis of brain death and his family members, or in the social awareness of this act of solidarity that helps countless patients who need a transplant as the only therapeutic alternative.[11,12] Therefore, this research aims to evaluate the perception of the students of the Medical School of Bahia at the Federal University of Bahia (FMB/UFBA) about their knowledge on organ and tissue donation and transplantation, also analyzing which sociodemographic variables can interfere in the desire and/or the agreement to become a possible donor.

METHODS

The study was approved by the Research Ethics Committee of the FMB-UFBA, with opinion number 4,667,685, in accordance with Resolution CNS 466/12.

In this descriptive-quantitative, cross-sectional study, students from the 1st to the 6th year of the FMB-UFBA were asked to voluntarily answer a self-administered questionnaire adapted from Galvão et al.,[13] Dutra et al.,[14] and Sampaio, Fernandes and Kirsztajn,[15] which assesses the perception about the knowledge about organ and tissue donation and transplantation and their related opinions.

The following inclusion criteria were considered: being a student at FMB-UFBA, being regularly enrolled in the first semester of 2021, and attending from the 1st to the 12th semester. The exclusion criterion was being a student from another course at the university, even if enrolled in any discipline of the medical course.

For data collection and measurement an online questionnaire was used via the Google Forms platform, consisting of objective questions. The instrument was applied between March and April 2021. The questionnaire was organized in two sessions: the first one included sociodemographic (gender, age, religion, race, monthly family income) and academic (semester in course) questions; the second one grouped 19 questions to evaluate the knowledge and perception about the subject.

For the sample calculation, the number of active students in the semester, namely 1,041 undergraduate students regularly enrolled in the first semester of 2021, was sought from the course collegiate. The questionnaire link was sent to the e-mails of all active undergraduate classes, as well as to the addresses of each student (e-mail and WhatsApp). Five attempts at administering the questionnaire were made. The collected data were coded and stored in Microsoft Excel program.

The volunteers were categorized according to year of graduation (1st year – 1st and 2nd semesters, 2nd year – 3rd and 4th semesters, and so on). The sample was determined from the convenience type.

The data were integrated into R for Windows software for descriptive and inferential analysis. Categorical variables were described by absolute and relative frequency, and the normality of the variables was tested by the Shapiro–Wilk test. For comparison between groups, Pearson's chi-square test and Fisher's exact test were performed for nonparametric variables, and the Student t-test for parametric ones. A p value of < 0.05 was adopted to consider statistical significance.

The research participants were clarified as to the research objectives, justifications, risks and benefits, as well as data confidentiality and assured the right to refuse participation. The process proceeded after reading the Free and Informed Consent Form.

RESULTS

In the first semester of 2021, the FMB-UFBA had 1,041 regularly enrolled undergraduates. The e-mail addresses of 888 (85.3%) students were identified and they were invited to participate in the study. In total, 393 (37.8%) answered

the questionnaire. Of the responses obtained, 207 (52.7%) participants were female, 250 (63.6%) were between 21 and 25 years old, and among those who said they were religious, 130 (52.2%) were Catholic. As for race/ethnicity, 189 (48.1%) declared themselves to be brown and 108 (27.5%) declared a monthly family income between 3 and 7 minimum wages. There was no statistically significant association ($p = 0.85$) of these variables with the desire to be a donor. The other results are shown in Tables 1 and 2.

Table 1. Sociodemographic data of the survey (n = 393).

Variable	N (%)
Sex	
Female	207 (52.7%)
Male	185 (47.1%)
Not declared	1 (0.2%)
Age group	
16-20 years	43 (10.9%)
21-25 years	250 (63.3%)
26-30 years	61 (15.5%)
31-35 years	26 (6.6%)
36 years or older	13 (3.3%)
Religion	
Catholic	130 (33.1%)
Protestant	63 (16.0%)
Spiritist	33 (8.4%)
African matrix	5 (1.3)
None	144 (36.6%)
Others	18 (4.6%)
Race/ethnicity	
White	145 (36.9%)
Brown	189 (48.1%)
Black	56 (14.2)
Yellow	1 (0.3%)
Indigenous	2 (0.5%)
Monthly family income	
Up to 1 minimum wage	20 (5.1%)
Between 1 and 2 minimum wages	47 (12.0%)
Between 2 and 3 minimum wages	67 (17.0%)
Between 3 and 7 minimum wages	108 (27.5%)
Between 7 and 10 minimum wages	67 (17.0%)
More than 10 minimum wages	79 (20.1%)
No income	5 (1.3%)

Of those interviewed, 235 (59.8%) were between the 1st and 3rd year of medical school, and 222 (56.6%) students responded that they had never attended classes, lectures, or courses on transplantation. Among those exposed to the theme, 136 (79.5%) and 92 (53.8%) said it was on the surgical axis and the ethical-humanistic axis, respectively. About the information transmitted, 187 (60.1%) evaluated it as insufficient, while 47 (12%) considered it satisfactory.

A total of 312 (79.4%) undergraduates self-assessed their knowledge on the subject as regular, poor or very poor. About the terms of the Brazilian legislation for organ donation and transplantation, 274 (69.7%) answered that they did not know the items. On the other hand, 327 (83.2%) said they knew the concept of brain death, and when asked about the diagnosis, 72 (18.3%) reported a good knowledge. Regarding the measures to maintain a potential donor, 288 (73.3%) reported not knowing about the technique. Thirty-five (8.9%) students said they were prepared to approach the family of a potential donor, and, of these, 15 (42.9%) were in residency. The knowledge about the variables brain death concept ($p < 0.001$), diagnosis ($p = 0.03$), and measures for the maintenance of the potential donor ($p < 0.001$) was significantly higher according to the time of the medical graduation course. Figures. 1 and 2 show the answers given by participants about which organs and tissues can be donated *post mortem* and in living-donor transplantation, respectively.

Table 2. Academic data of the survey (n = 393).

Variable	N (%)
Semester by year stratification	
1st year (1st and 2nd semesters)	61 (15.5)
2nd year (3rd and 4th semesters)	77 (19.6)
3rd year (5th and 6th semesters)	78 (19.8)
4th year (7th and 8th semesters)	43 (10.9)
5th year (9th and 10th semesters)	37 (9.4)
6th year (11th and 12th semesters)	97 (24.7)
Attended classes, lectures or course during graduation	
Yes	171 (43.5)
No	222 (56.5)
In which major area of medicine they attended classes, lectures or course	
Surgery axis	136 (34.6)
Ethical-Humanistic axis	92 (23.4)
Pathology and Forensic Medicine axis	20 (5.1)
Internal Medicine axis	28 (7.1)
Neurosciences and Mental Health axis	6 (1.5)
Public Health and Preventive Medicine axis	21 (5.3)
Evaluation of the transmitted information	
Insufficient	187 (60.1)
Regular	77 (24.8)
Satisfactory	47 (12.0)
Self-assessment about their knowledge on donation and transplantation	
Very poor	31 (7.9)
Poor	122 (31.0)
Regular	159 (40.5)
Good	66 (16.8)
Great	4 (1.0)
Did not know how to answer	11 (2.8)
Whether they know about the legal terms of donation and transplantation	
Yes	119 (30.3)
No	274 (69.7)
Whether they know what is required to declare oneself as a donor	
Only inform third parties	275 (70.0)
Register in some document	80 (20.4)
Did not know how to answer	38 (9.7)
Whether they know the concept of brain death	
Yes	327 (83.2)
No	66 (16.8)
Evaluation of knowledge on brain death diagnosis	
Have no knowledge	77 (19.6)
Have some knowledge	244 (62.1)
Have a good knowledge	72 (18.3)
Whether they know the maintenance measures for a potential donor	
Yes	105 (26.7)
No	288 (73.3)
Whether they have been prepared to approach a potential donor's family in the course	
Yes	35 (8.9)
No	358 (91.1)
Whether they intend to be a donor after their death	
Yes	324 (82.4)
No	6 (1.5)
Had never thought about the possibility	63 (16.0)
If not, what is the main justification	
Fear	2 (33.3)
Just do not have the will	2 (33.3)
Others	2 (33.3)

Continue...

Table 2. Continution.

Variable	N (%)
Whether they would accept to be a living donor of an organ or part of an organ	
Yes	242 (61.6)
No	18 (4.6)
Never thought about the possibility	133 (33.8)
If you know the risks of a living transplant	
Yes	148 (37.7)
No	245 (62.3)
Whether they would accept to receive an organ from a deceased	
Yes	392 (99.7)
No	1 (0.3)
Who should be excluded from the transplant list	
Criminals	13 (3.3)
Alcoholics	87 (22.1)
Smokers	84 (21.4)
Elderly	18 (4.6)
Foreigners	4 (1.0)
Illicit drug users	101 (25.7)
Declared nondonors	59 (15.0)
No one should be excluded	182 (46.3)
Criteria they consider most appropriate for organ distribution	
Severity of the health problem	363 (92.7)
Time on the waiting list	11 (2.8)
Did not know how to answer	19 (4.8)

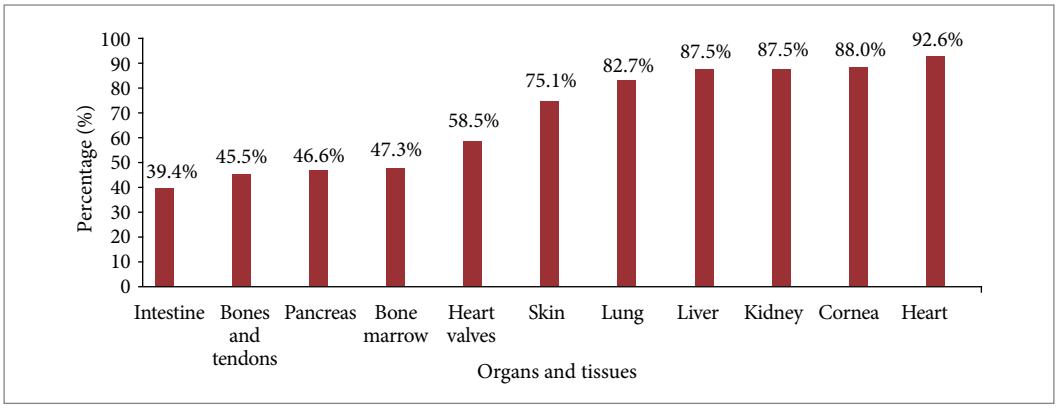

Figure 1. Students' perceptions regarding organs and tissues that can be donated after diagnosis of brain death.

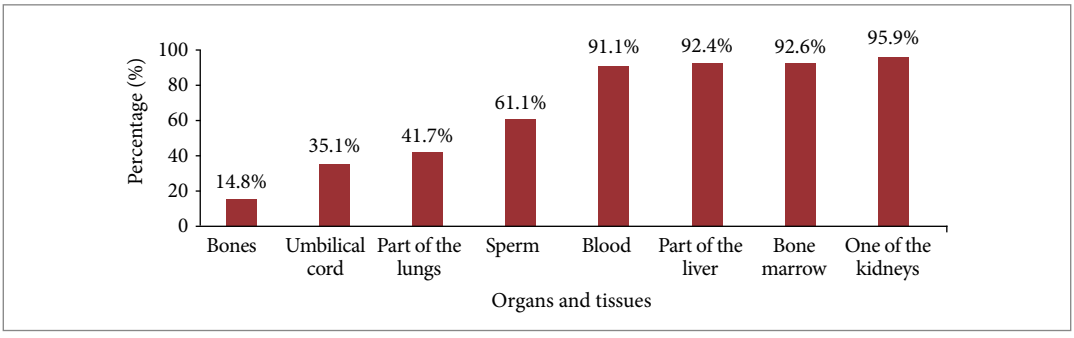

Figure 2. Students' perceptions regarding which organs and tissues can be transplanted in life.

Of the options regarding what is needed to declare oneself as a donor, 275 (70%) students agreed that they only need to inform family members. However, 80 (20.4%) believed that a record in some document is required for this. There was a statistically significant difference (p = 0.03) between the age groups regarding knowledge about what is needed to declare oneself a donor, with a lower number of correct answers found in the 16- to 20-year-old age group.

A total of 324 (82.4%) students declared themselves as *post-mortem* donors, and, among those who do not wish to, the main justifications answered were that they were unwilling and/or afraid. About receiving an organ from a deceased donor, only 1 (0.3%) would not accept to be the recipient. About being a living donor, 242 (61.6%) answered yes, but of these 145 (59.9%) did not know the risks. Length of course was an important factor for knowledge about the risks of living-donor transplantation ($p < 0.001$). However, no significant difference ($p = 0.41$) was observed between the results of wanting to be a living donor and knowing the risks of this during graduation.

As for the exclusion criteria in the transplant queue, 182 (46.3%) students answered that no one should be excluded from the list, 101 (25.7%) excluded users of illicit drugs, and 87 (22.1%), alcoholics. About the criteria they consider most appropriate for organ distribution, 363 (92.7%) considered the severity of the health problem, 11 (2.8%) pointed to the time on the waiting list, and 19 (4.8%) could not answer.

DISCUSSION

After Mollart and Goulon[16] published the article *The depassed coma* in 1959, which discussed unconscious patients with absent brain response, there was a redefinition to the diagnosis of biological death that allowed for better analyses on this topic. From the perspective that brain death is the most current criterion for declaring death, several countries have developed or followed their own criteria for this diagnosis, associated or not with the existence of a law for this.[17]

In Brazil, the initiation of the brain death protocol occurs in a systematized way and with well-defined criteria by the Federal Medical Council Resolution No. 2173/2017, where it is explicit the necessary knowledge about clinical and neurological tests that the doctor must have, so that the confirmation of nonperceptive coma and absence of brain and brainstem function is accurate.[4]

Although this resolution recommends specific training for the diagnosis of brain death, offering greater security in the identification of potential donors, it does not exclude the importance that physicians, regardless of specialty, understand this process. This fact is reinforced by the new resolution, which extends the possibility of diagnosis to any medical professional, since the clarification to the family about a possible opening of the brain death protocol, its meaning and stages are the responsibility of the attending physician.[4]

Despite the importance of the topic, this study found a low understanding, in general, among the students. A significant part perceived that they did not have adequate knowledge, possibly because some of them have not had contact with this theme through classes, courses or lectures, or maybe they had contact on the subject, but the explanation was not very clear. This hypothesis is strengthened by observing a dissatisfaction about the information transmitted by those who have already had contact with the subject. Galvão et al.[13] and Batista and Kusterer[18] pointed out a similar trend by revealing that medical students, although they recognize the importance of studying the subject during undergraduate study, feel dissatisfied with their level of knowledge, evaluating it as regular, poor, or very poor. These data translate a concern about a deficit in teaching, evidenced when other national studies denounce a vicious cycle of neglecting these discussions in undergraduate education, which would enable them to at least have a good understanding of the basics of brain death diagnosis, the legal terms for donation, and the measures for maintaining the potential donor.[14,15,18,19] In São Paulo, Reis et al.[20] revealed a similar trend of there being knowledge considered undesirable, which strengthens the hypothesis that this subject is not treated uniformly in medical schools.

Despite these findings, in all years of the course, the participants correctly pointed out which organs can be donated, both for transplantation after brain death diagnosis and for living donors, with a progressive trend of correct answers as the course progressed. The rates of correct answers as to which organs can be donated during life or after death were also lower than observed in other surveys, with the organs with the lowest percentages being liver, lung, pancreas, intestine, heart valves, and bone marrow.[14,15,20]

When comparing these results with a previous study[14] performed in the same institution, which evaluated 779 students, an apparent improvement in the students' level of knowledge about the concept of brain death and the current legislation is noted, although it is still considered insufficient in view of the relevance of having this basic knowledge. These findings may suggest that, in the last 19 years, there has been an advance in the training of these students, which would be a positive point in the evolution of medical education at the institution.

Furthermore, exemplifying the central role of the professional in the capitation process, the literature points to important criteria that influence family members not to sign the informed consent form.[3,8,9,22] The most diverse reasons go beyond the influence of religion and the fear of mutilation itself, extending to the professional's unpreparedness to adequately inform about what the diagnosis of brain death is, to the approach to the family of the deceased, inappropriate choice of time and place to request the donation, such as those performed in corridors and service receptions.[8,22] Certainly, education for procurement is a

preventive measure for these negative predictors of organ donation, and it is up to medical schools to train professionals who are better prepared in technical, ethical, humanistic, and legal aspects.

One must recognize, then, the indispensable character of a continued preparation of these students in relation to the legal, ethical, and technical aspects of transplantation. One suggestion would be disciplinary planning that provides more exposure to the processes of notification, uptake, and the progress of transplantation. This ignorance is a reality that extends beyond graduation. Amaral and collaborators,[10] when interviewing medical faculty from various specialties, pointed out that 44% did not know how to make the diagnosis of brain death, 53% did not know how to take the measures to maintain the patient with brain death, and 31% did not know the legal terms. This probably contributes to the less technical training of the students today, since the students in the last years of the course declared that they did not feel prepared to approach the family of a possible donor.

As for the desire to be an organ donor, most participants showed a favorable attitude toward this act of solidarity in the *post-mortem* condition, and somewhat less so when alive. Although there is this positive attitude among medical students in general, there seems to be a divergence of these perceptions in the general population, in which a large part still refuses to declare themselves as organ donors, and that, probably, are associated with the lack of adequate knowledge about the process, by cultural influence, fear of death, and the feeling of insecurity in the health system.[15,18–20] Thus, excluding decisions linked to religiosity, there seems to be an association directly proportional to the degree of knowledge and desire to donate.[20]

It is worth noting that a considerable number of students had not yet thought about the possibility of donating, as Batista and Kusterer[18] and Reis et al.[20] In Brazil, since 2001 Law No. 10,211[21] which defines informed consent for organ donation is not enough for the individual to wish to be a donor, but also to inform others about his or her decision. Furthermore, even if you inform family members and people close to you, the final decision rests with the relatives. Therefore, activities of any kind that promote reflections that touch on the theme, such as this research, can constitute another *campaign*.

The FMB/UFBA has an ethical-humanistic axis composed of eight mandatory curricular components, which was indicated as the second major area of medicine in which students had the most contact with the theme during the course. Yet some students, in all undergraduate years, would still exclude from the waiting list smokers, alcoholics, illicit drug users, undeclared donors, elderly people, criminals, and foreign people. The Ordinance No. 160/2006, which deals with liver transplantation, makes it clear that these groups should not be excluded, and the criterion for choice is the severity of the problem. In fact, most medical students got this criterion right.[24] Other authors found similar results that still reveal an unethical posture of students, pointing to the need to strengthen an education in favor of not violating the bioethical principles of beneficence, justice, and nonmaleficence.[13,14,20,26]

No statistically significant association was observed between the sociodemographic variables including religion and the desire to be a donor, although some authors[18,25] suggest that some religious beliefs are responsible for a considerable part of refusals. The correlation between religion and the desire to donate seems to be contradictory, as most of the most frequent religions in the country are in favor of this act that can save eight lives for each brain death diagnosis.[5] However, although most religions allow and view donation as an altruistic attitude, the senses found in the literature diverge from this understanding by showing that spiritualists are more willing to perform informed consent, while Jehovah's Witnesses seem to donate less.[5,14] It is worth noting that, whatever the decision and religion of the patient or family approached, the healthcare professional must maintain an ethical and empathetic stance in order to respect them in their entirety.

The fact that this study was conducted virtually, due to the new public health conditions facing the pandemic of COVID-19, may have induced biases in the questionnaire filling, making up one of the difficulties of this analysis. Moreover, there was a low adherence of students in the internship, which made it difficult to assess the level of knowledge and preparation of these future professionals, as well as their individual perception of the organ transplantation and donation process. A study of this topic would be essential to evaluate the quality of teaching in preparing the students of this faculty to deal with the diagnosis of brain death, maintenance of the potential donor, and approaching the family for guidance and care.

CONCLUSION

Medical students, despite understanding the importance of declaring themselves as organ donors, still have limited knowledge regarding legal terms, the concept and diagnosis of brain death, measures for maintaining a potential donor, risks of living-donor transplantation, organs that can be donated after diagnosis of brain death or while alive, and criteria for organ distribution. Probably, this deficit stems from low exposure to the topic during undergraduate studies, given the lack of longitudinality of the topic in curricular grids and internships. Therefore, continuous assessments are relevant in determining the degree of medical students' lack of knowledge and unpreparedness. Furthermore, the sociodemographic variables were not shown to be significant in the decision process, where there seems to be a great influence of each participant's experiences and subjectivities in deciding who is or is not worthy of receiving an organ.

AUTHORS' CONTRIBUTION

Substantive scientific and intellectual contributions to the study: Garcia CCM and Batista CB; **Conception and design:** Garcia CCM and Batista CB; **Data analysis and interpretation:** Morbeck CAE and Garcia CCM; **Article writing:** Garcia CCM and Morbeck CAE**; Critical review:** Batista CB, Garcia CCM and Morbeck CAE; **Final approval:** Batista CB.

AVAILABILITY OF RESEARCH DATA

All dataset were generated or analyzed in the current study.

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