










Attitude and knowledge of medical students toward donation after circulatory death

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SUMMARY

OBJECTIVE: A survey among medical students in a Brazilian public university was performed to investigate the acceptance of organ donation in Brazil, particularly donation after circulatory death (DCD).

METHODS: A questionnaire including 26 objectives and Likert scale questions was validated and sent to all medical students of our institution. The answers were analyzed considering the whole set of individuals as well as by dividing the medical students into two groups: less graduated students and more graduated students.

RESULTS: From 1050 students, 103 spontaneous answers (9.8%) were retrieved after 3 weeks. A total of 89.3% agreed totally with deceased donor organ donation and 8.7% agreed partially. However, only 50.5% of the students agreed totally and 31.1% agreed partially to living donation. Students revealed that 82.6% know the concept of brain death. On the other hand, 71.8% of them declared not knowing the concept of planned withdrawal of life-sustaining therapy, mainly cardiorespiratory support. A total of 85.4% of students agreed totally with donation after brain death and 11.7% agreed partially. However, when questioned about donation in awaiting circulatory death after a planned withdrawal of life-sustaining therapy, only 18.4% agreed totally and 32% agreed partially. Both groups of less and more graduated students showed similar results.

CONCLUSIONS: Our study found a clear lack of information and consequently in acceptance of DCD. Education in the field of end-of-life management may improve not only the acceptance of DCD donation but also the whole understanding of planned withdrawal of life-sustaining therapy.

KEYWORDS: Death, sudden, cardiac. Health knowledge, attitudes, practice. Students, medical. Surveys and questionnaires. Organ transplantation.

INTRODUCTION

In the 90s, the Maastricht's group established the four categories for DCD donors, and it had a great impulse¹. Nowadays, this practice is legitimate in the United States, many European countries, Canada, Australia, Japan, China, but still not accepted in Brazil².

The current organ shortage for transplantation and the increased graft demand for patients in waiting list prospect DCD as an effective source of grafts, expanding the potential donor pool. Over the last decades, DCD donors have been responsible for a significant increase in numbers of deceased

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organ donors, while donors after brain death (DBD) has remained broadly stable, particularly in some countries such as the United Kingdom^{3,4}.

In Brazil, despite the advances in last decade, the rate of effective donation was only 17.0 per million population in 2018⁵; therefore, far to supply the needs of those in the waiting list. These data clearly show the importance of discussing the acceptance of DCD in the Brazil.

In general, the Brazilian society is quite conservative, and the lack of appropriate education remains an ordeal especially in the poorer areas of the country. These aspects surely impair the debate about DCD in our context. However, medical students supposedly represent a well-educated part of the society.

The attitude of medical students toward DCD has not been investigated in Brazil so far. To address this issue, we conducted a survey among medical students from our institution in order to better understand the acceptance of DCD along the graduation course in medicine.

METHODS

In an analytical-descriptive study, medical students from the first to the sixth year from the Faculty of Medicine of the University of São Paulo (FMUSP) voluntarily responded to an anonymously questionnaire designed to determine their knowledge and opinion on organ donation, particularly on DCD. This study was approved by the local Ethical Committee (CAPESQ 3.291.655).

The questionnaire was validated by six referees: two senior physicians who worked in a liver transplant program for more than 10 years, two medical students, one statistician, and one chief nurse coordinator from our liver transplantation program. The enquiry included 26 objectives and Likert scale questions, allowing the student to choose from the following alternatives: “agree partially,” “agree totally,” “disagree partially,” “disagree totally,” or to be “indifferent” to the situation proposed by the question. The questionnaire was sent by e-mail to all students from the FMUSP.

The answers to the questionnaire were analyzed considering the whole set of individuals as well as by dividing the medical students into two groups: less graduated students (from first to third graduation year) and more graduated students (from fourth to sixth graduation year), who have been more exposed to clinical practice. The students' sex, self-determined religion, and origin of the state were also evaluated.

The Mann-Whitney *U* test was used to compare the answers between the two groups, and the chi-square test was used to analyze the answers among the different religious beliefs. The

statistical significance was set at 0.05. All statistical analyses were performed using the R software with packages “stats” and “rstatix” (<https://www.r-project.org/>).

RESULTS

We retrieved 103 spontaneous answers after 3 weeks. Considering that the total number of students of the school is 1050, we observed a 9.8% of spontaneous answers to the questionnaire. The higher number of responses was in the third year (27.2%), followed by the second (22.3%), first (19.4%), fourth (13.6%), fifth (9.7%) and only 7.8% from the sixth year of the medical school.

A total of 50.5% of the enquire was answered by women and 49.5% by men. The majority of the responses were from students from São Paulo state (82.5%). Regarding religion, 31.1% of the students classified themselves as agnostic, 23.3% as atheist, 19.4% as catholic, 7.8% as Kardecist spiritists, 4.9% as having no religion, 3.9% as protestant, and 8.7% as others.

Concerning student's statement regarding organ donation and transplantation, 78.6% answered that it would be an issue for medical graduation program and 81.6% for postgraduation course. Moreover, 36.9% have evaluated their knowledge about this issue as regular, 35% as inadequate, and only 18.4% as adequate. In fact, only 44.7% declared to have studied this subject during medical school.

The collected results showed that students are steadily aware about donor/recipient imbalance in organ transplantation waiting list, as 88.4% agreed completely or partially with the affirmation of not having enough donors for transplantation in Brazil. At the same time, 95.2% of the students seem to trust in transplantation as a life-saving procedure, as when they agreed in undergoing this treatment if necessary. In fact, 89.3% agreed totally with deceased donor organ recovery and 8.7% agreed partially. When confronted to a living donation, 50.5% of the students agreed totally and 31.1% agreed partially. Despite this decrease in agreement, 73.8% of the students agreed totally to donate part of their livers for a loved one and 19.4% agreed partially.

On the one hand, students revealed that 82.6% have some knowledge on the concept of brain death; however, only 31.1% answered, and they completely comprehended this issue. On the other hand, 71.8% of them declared not knowing the concept of planned withdrawal of life-sustaining therapy, mainly cardiorespiratory support. When asked about the concept of unsuccessful resuscitation after cardiac arrest, 68.9% responded to fully or partially comprehend.

When the enquire targeted the acceptance of donation after brain death, 85.4% of the students agreed totally and 11.7% agreed partially. However, when questioned about donation in awaiting cardiac or circulatory death after a planned withdrawal of life-sustaining therapy, only 18.4% agreed totally and 32% agreed partially (Table 1). When the question was about acceptance of donation in case of unsuccessful resuscitation after cardiac arrest, 39.8% agreed totally and 27.2% agreed partially (Table 1), even though 95.1% agreed in being an organ donor in case of this type of death.

Concerning the best donation criteria, 57.3% of the students preferred presumed donation and 23.3% chose consented donation. A total of 76.7% agreed totally for donation in case of a family member having a brain death diagnosis and 16.5% agreed partially. However, when asked about authorization for donation in case of a family member having an unsuccessful resuscitation after cardiac arrest, 50.5% students agreed totally and 27.2% agreed partially.

Table 1. Students demonstrated greater acceptance of organ donation after brain death but less acceptance of donation after circulatory death.

| | n | % | 95%CI | |
|--|----|------|-------|-------|
| | | | Lower | Upper |
| Do you agree with organ donation in cases of brain death? | | | | |
| Indifferent | 3 | 2.9 | 0.0 | 9.5 |
| Partially agree | 12 | 11.7 | 5.8 | 18.3 |
| Totally agree | 88 | 85.4 | 79.6 | 92.0 |
| Do you agree with organ donation after cardiac arrest, when the patient has an unfavorable neurological prognosis, but is not yet diagnosed with brain death? | | | | |
| Totally disagree | 8 | 7.8 | 0.0 | 17.6 |
| Partially disagree | 15 | 14.6 | 4.9 | 24.4 |
| Indifferent | 28 | 27.2 | 17.5 | 37.0 |
| Partially agree | 33 | 32.0 | 22.3 | 41.9 |
| Totally agree | 19 | 18.4 | 8.7 | 28.3 |
| Do you agree with organ donation in cases of cardiac arrest in emergency care which did not respond to resuscitation maneuvers? | | | | |
| Totally disagree | 5 | 4.9 | 0.0 | 15.1 |
| Partially disagree | 8 | 7.8 | 0.0 | 18.0 |
| Indifferent | 21 | 20.4 | 10.7 | 30.6 |
| Partially agree | 28 | 27.2 | 17.5 | 37.4 |
| Totally agree | 41 | 39.8 | 30.1 | 50.0 |

CI: confidence interval.

We also investigated whether self-determined religion could influence the students' answers regarding acceptance of donation after brain death, in DCD Maastricht's groups II and III. In none of these situations, religion had no impact on their answers ($p=0.343$, $p=0.741$, and $p=0.695$, respectively).

Finally, we investigated if the acceptance of organ donation was different between the two groups of students according to their graduation year. We could not find any influence of the students' training process in the acceptance of organ donation, particularly regarding DCD donation (Table 2).

DISCUSSION

In order to understand the view and the acceptance of organ donation in Brazil, particularly DCD donation, this survey was conducted in a selected portion of our society: students from a medical school. Even though we have retrieved only 9.8% of the enquiries sent to the students, we obtained enough answers to study their view. Despite the use of social media, the current adherence index was lower than a previous survey investigating the attitude about organ transplantation of medical students from this same faculty (33.04%)⁶.

Our results have showed that medical students are steadily aware about the insufficient rate of donors for patients on waiting lists for organ transplantation in their countries, and they clearly responded in favor to donation after brain death. However, we could observe some reluctance toward living donation. Chen et al., in an investigation with university students in China, observed higher willingness to donate a living kidney to a relative (94%) than to donate after death (61.3%)⁷. In contrast, 89.3% of our students totally agreed with deceased donor organ donation and only 50.5% with living donation. However, 73.8% of the students totally agreed to donate part of their livers for someone next to them. Comparing these two different results, we can clearly observe the cultural differences of these two societies. Despite the well-educated individuals investigated in both enquires, these conflicting results suggest that East countries have difficult in accepting deceased donation, while West countries struggle to proceed with living donation.

The perspectives of medical students and nurses toward transplantation and donation have been investigated earlier⁷⁻¹⁰. Ríos et al., studying the acceptance of living liver donation among medical students in Spain, could not find any influence of the religion of the students⁹, similar to the results of this study. On the other hand, Dutra et al. found a higher willing to donate organs among spiritual students than in Catholics and Protestants⁸. Xie et al. found an unfavorable view of nurses in China regarding this issue and advocated for a better training for this important group of professionals¹⁰. The view of patients

Table 2. Students were divided between the first 3 and the last 3 years of medical course.

| | First 3 years of medical school | | Last 3 years of medical school | | p-value* |
|--|---------------------------------|---------------------|--------------------------------|--------------------|----------|
| | n | 95%CI | n | 95%CI | |
| Do you agree with organ donation in cases of brain death? | | | | | |
| Indifferent | – | – | 3 | 4.23(0–13.59) | 0.1044 |
| Partially agree | 2 | 6.00(0.00–13.00) | 10 | 14.08(7.04–23.45) | |
| Totally agree | 30 | 94.00(88.00–100.00) | 58 | 81.69(74.65–91.05) | |
| Do you agree with organ donation after cardiac arrest, when the patient has an unfavorable neurological prognosis, but is not yet diagnosed with brain death? | | | | | |
| Totally disagree | 4 | 13.00(0.00–31.00) | 4 | 5.63(0.00–17.89) | 0.5709 |
| Partially disagree | 2 | 6.00(0.00–25.00) | 13 | 18.31(7.04–30.57) | |
| Indifferent | 11 | 34.00(19.00–53.00) | 17 | 23.94(12.68–36.20) | |
| Partially agree | 11 | 34.00(19.00–53.00) | 22 | 30.99(19.72–43.24) | |
| Totally agree | 4 | 13.00(0.00–31.00) | 15 | 21.13(9.86–33.38) | |
| Do you agree with organ donation in cases of cardiac arrest in emergency care which did not respond to resuscitation maneuvers? | | | | | |
| Totally disagree | 2 | 6.00(0.00–25.00) | 3 | 4.23(0.00–17.12) | 0.9344 |
| Partially disagree | 5 | 16.00(0.00–34.00) | 3 | 4.23(0.00–17.12) | |
| Indifferent | 3 | 9.00(0.00–28.00) | 18 | 25.35(14.08–38.25) | |
| Partially agree | 8 | 25.00(9.00–43.00) | 20 | 28.17(16.90–41.07) | |
| Totally agree | 14 | 44.00(28.00–62.00) | 27 | 38.03(26.76–50.93) | |

Both groups presented similar responses, showing no significant influence of the level of medical training at the acceptance of organ donation. CI: confidence interval.

*p-value calculated by the Mann-Whitney *U* method.

has also been investigated¹¹, showing the lack of education as a major problem and advocated for better public information to improve organ donation acceptance. In this study, we found a decent level of knowledge of the concept of brain death among students (82.6%), which translated into a high acceptance of donation with brain death. However, the knowledge and acceptance of DCD donation was lower.

Regarding DCD donation, which is the main goal of this study, we already expected that it would be a difficult discussion in our society. For example, despite still a matter of debate in developed countries, end-of-life interventions are much well accepted in Europe¹². Different from other countries, removing life support in terminal patients in Brazil is not welcome in general. In our results, 71.8% of the students do not know the concept of planned withdrawal of life-sustaining therapy, mainly cardiorespiratory support. They are quite used to not fully invest in patients with critical prognosis; however, planning withdraw of life-sustaining therapy is still highly controversial in Brazil, and this was revealed in this study.

This controversy clearly impacted the student's responses regarding DCD donation. While 85.4% answered to completely agree with brain death donation, only 18.4% agreed totally and 32% agreed partially with DCD Maastricht category III, and 39.8% agreed totally and 27.2% agreed partially with DCD Maastricht category II. Indeed, this was again revealed when the students were asked about consenting donation in case of a loved one's brain death, and 76.7% were totally in agreement; whereas, when consenting donation in case of a family member having an unsuccessful resuscitation after cardiac arrest, only 50.5% of the students agreed totally. Interestingly, these points-of-view do not change during the course of medical school, as both groups of less and more graduated students showed similar responses. It seems therefore that acceptance of DCD donation goes beyond of education in our society. Wu et al. found a higher acceptance rate of DBD donation (69.7%) than DCD donation (30.3%) among students of traditional Chinese Medicine¹³, showing that the organ transplant education for medical students and the public is warranted.

CONCLUSIONS

This study showed that medical students in Brazil are well informed about organ donation, particularly regarding donation after brain death, even though there is still room for improvement. However, there is a clear lack of information and consequently in acceptance of DCD. Education in the field of end-of-life management may improve not only the acceptance of DCD donation, but the whole understanding of planned withdrawal of life-sustaining therapy.

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AUTHORS' CONTRIBUTIONS

RBM: Conceptualization, Funding acquisition, Investigation, Methodology, Project administration, Writing – original draft. **DVG:** Funding acquisition, Investigation, Writing – original draft. **DRW:** Data curation, Methodology, Writing – original draft. **AGS:** Formal analysis, Resources. **AJFC:** Formal analysis, resources. **RMA:** Methodology, Writing – review and editing. **LBH:** Data curation, Investigation. **FHG:** Conceptualization, Writing – review and editing. **LACDA:** Supervision, Writing – review and editing.

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