Brain death and organ transplantation: ethical issues among undergraduate medical students

Alejandro Weber Sánchez¹, Pablo Weber Alvarez²

¹Department of General Surgery, Hospital Ángeles Lomas, México
²General Physician, Hospital Ángeles Lomas, México

Received: 02 October 2019 / Accepted: 07 November 2019

Abstract

Background: An important limitation to increase organ transplants is the number of organ donors. Education about cadaveric organ donation and its ethical implications to medical undergraduates is probably a key factor to increase organ donation.

Methods: Prospective study among undergraduate medical students in a Mexican university to evaluate ethical attitudes regarding organ donation, particularly related to brain death and some ethical issues regarding the allocation of organs to receptors.

Results: To the question: "Harvest organs for transplantation from patients in a coma", 43.42% answered strongly disagree, 21.87% moderately disagree, 21.39% moderately agree and 13.31% strongly disagree. To the question: "Harvest organs for transplant in patients with irreversible cessation of all brain activity", 23.89% answered strongly disagree, 21.36% moderately disagree, 24.68% moderately agree and 30.06% strongly disagree. To the question "Choose the transplant recipient based on their socio-economic status", 79.43% answered strongly disagree, 7.37% moderately disagree, 7.69% moderately agree and 5.49% strongly agree. Finally, to the question: "Promote organ transplants, through economic incentives", 71.74% strongly disagree, 12.38% moderately disagree, 10.36% moderately agree and 5.23% strongly agree.

Conclusions: Sometimes medical students, particularly during their basic training, don't have clear important factors regarding organ transplant such as profound coma, brain death and organ allocation process, which makes difficult their correct attitude to promote organ donation.

Keywords: ethics, medical education, organ donation, transplant

Introduction

Organ transplant is undoubtedly one of the most important advances for the cure of many diseases and effective treatment for the end-stage failure of multiple organs [1]. One of the most important limitations to increase organ transplants is the number of organ donors. There is a wide variation among countries in rates of organ donation. The cause is still not well understood but may be multifactorial [2].
It should be remembered that organ donation covers only 10% of global needs and the principal source in almost all countries are cadaveric donors. The basic scientific knowledge and awareness of the general population and medical students, in particular, is very important. A high level of awareness and consciousness is usually associated with a higher rate of organ donation [2]. Ethical considerations are probably a key factor to increase them. This was a prospective study among undergraduate medical students in a Mexican university to analyze the results about their attitudes toward brain dead, organ transplantation and organ allocation process.

Methods
A prospective, cross-sectional, observational study was conducted among undergraduate medical students from the first to the eighth semester, during the school year of 2014 at Universidad Anáhuac México Norte. A predesigned questionnaire specifically prepared for this research was applied. The Research Ethics Committee of the university approved the study and the students who agreed to participate signed the informed consent. Exclusion criteria: students who didn’t want to participate or didn’t sign the informed consent. Elimination criteria were surveys inadequate for evaluation.

The total population of undergraduate pre-internship medical students in June 2014 was 1627 students. The sample was calculated as a randomized, non-systematically stratified type from the total population of students, for each academic semester from first to eighth, using the basic formula for finite populations from the original reported by Anderson and Burstein, modified by Daniel [3,4] with a level of confidence of 95%, sampling error of 3% and \( p = 0.5\% \). Ten percent was added considering the non-response rate, which yielded a total of 719 students, stratifying the sample according to the population per semester.

Through several steps, we elaborated a special survey and proved its validity and reliability [5]. From a total of 74 questions to evaluate different ethical attitudes, brain dead and organ transplantation were evaluated with four questions, to answer with a five-point Likert scale indicating how much they agreed with the proposed practices or actions. Refuse to answer was marked as 0, strongly disagree 1, disagree moderately 2, agree moderately 3 and strongly agree 4. The four questions regarding this issue were: "Harvest organs for transplantation from patients in a coma", "Harvest organs for transplant in patients with irreversible cessation of all brain activity", "Choose the transplant recipient based on their socio-economic status", and "Promote organ transplants, through economic incentives".

The validity of the segment had 0.639 Kaiser-Meyer-Olkin (KMO) test for sampling adequacy, the total explained variance of 71.648 and Cronbach alpha of 0.895.

The information was organized and classified using Microsoft Excel, the statistical package for social sciences (SPSS) 20 for the construction of frequency distribution tables, percentage and measures of central tendency: median, mean and standard deviation as dispersion measure. The inferential statistics of the variables studied was carried out by means of contingency tables based on the calculation of the probability of occurrence by means of chi-square test accepting a level of significance \( p < 0.05 \).

Results
We obtained 692 questionnaires suitable for evaluation, 96.24% of the calculated sample. Of these, 407 were female (58.8%) and 285 were male (41.2%). The average age was 20.8 years [Figure 1].

![Figure 1. Students gender.](image-url)
Figure 2. Students per semester.

The distribution of students among the different academic semesters was as follows: first 134 (19.4%), second 114 (16.5%), third 74 (10.7%), fourth 89 (12.9%), fifth 81 (11.7%), sixth 77 (11.1%), seventh 62 (9%) and eighth 61 (8.8%) [Figure 2]. Finally, 575 students answered about religion, being 578 Catholic (83.5%), 19 Jewish (2.7%), 5 Hindu (0.7%), 2 Muslim (0.3%), 2 Buddhist (0.3%), 1 Christian (0.1%), 23 other (3.3%), 55 commented not to profess any religion or to be agnostic (7.9%), and 10 didn’t answer this question (1.4%) [Figure 3].

Figure 3. Students religion.

Figure 4, 5. Attitudes regarding the question: "Extract organs for transplant in a person in coma".
The average percentage of students who chose not to answer this segment of brain death and organ transplantation was 8.03%, \( p = 0.58 \). Regarding the first question: “Harvest organs for transplantation from patients in a coma”, 43.42% answered strongly disagree, 21.87% moderately disagree, 21.39% moderately agree and 13.31% strongly disagree [Figure 4, 5].
To the second question: "Harvest organs for transplant in patients with irreversible cessation of all brain activity"; 23.89% answered strongly disagree, 21.36% moderately disagree, 24.68% moderately agree and 30.06% strongly disagree [Figure 6, 7].

To the question "Choose the transplant recipient based on their socio-economic status", 79.43% answered strongly disagree, 7.37% moderately disagree, 7.69% moderately agree and 5.49% strongly agree [Figure 8, 9].

Finally, to the question: "Promote organ transplants, through economic incentives", 71.74% strongly disagree, 12.38% moderately disagree, 10.36% moderately agree and 5.23% strongly agree [Figure 10, 11].

**Discussion**

Organ transplantation is a worldwide practice, being the donors one of the most important limitations. Undoubtedly there is an increasing need of cadaveric donors. The wide variation among countries in rates of organ transplantation is not only due to the economic factor. The process of organ donation is a complex one, involving organizational, ethical, medical, legal, cultural, social and emotional factors [6]. Spain has the world leadership in transplants for more than 25 years due to its prevailing culture about organ transplantation [7].

Awareness of the general population is important, but scientific knowledge and ethical principles seem to be necessary and could be a key factor to increase confidence between medical students to promote this practice. Certain concepts as profound coma, brain death, and organ assignation, which are now well defined, need to be completely understood for them to accept and promote this practice. So, medical students have to be sensitized even since their primary years in medical school to increase organ donation culture as was demonstrated by Figueroa in Deutschland and other authors [8,9].

Mexico has an advanced legislation about organ transplantation and a special institution CENATRA (Centro Nacional de Trasplantes), to establish programs and campaigns that must be met in the provision of organs, tissues and cells for transplant purposes, and to promote, in coordination with the dependencies of the Public Federal Administration organ donation from both life and cadaveric donors, but these actions are not always known by medical students [10].

It is evident that the purpose of the ethical training among medical students is that knowledge doesn't remain a theory, but results in actions to contribute to the full realization of man and to the good of society, especially when delicate issues as medical practice, human dignity and end-of-life itself may be considered to be in conflict [11,12]. Scientific knowledge, as well as knowledge about the legislation which is clear in many countries as in Mexico and favors this practice, is necessary since the beginning of medical education. It is not possible to conceive the techno-scientific training of the physician, separated from the ethical-philosophical-humanist knowledge; even more so in the current time in which advances in medicine and the problems that arise in relation to the care of patients are now much more complex than those that occurred in the past.

With this part of the survey, we wanted to explore the attitude towards possible donors in regard of the respect for their life, which requires students to be certain of donor's death and on the other hand the principle of total gratuity, and fair allocation of the organ respecting the dignity of both the recipient and the donor.

The first two questions regarding organ extraction were designed antagonistic to verify knowledge and attitude of the students, since the first raises the extraction of organs in patients in a coma which is clearly unethical and a conduct against the law because they are living people; [13] and the second, extraction of organs in subjects with complete absence of all brain activity (encephalic death), indicates the irreversible loss of the functional unit of the organism as a whole, confirming the donor's death, allowing therefore with ethics and legitimacy to extract organs still functional from a person who has died.

According to these principles, the students were more in disagreement with the extraction of organs for transplantation from people in coma 65.29% and more according to the extraction in people without detectable brain activity 54.74% as it should be, these two questions correspond one to each other, but these answers manifest possible confusion and lack of exact knowledge of what each situation means. It must be pointed out that 8.03% of students chose not to answer this segment of the survey about organ donation, reflecting they require more knowledge in this regard [Figure 12]. When we analyzed these answers per semester, we found that 70% of students in the 8th semester strongly disagree to extract organs from a patient in coma, probably due to their more advanced knowledge, different from what we observed in students coursing basic semesters, p < 0.05.

Lotto et al suggest that the conviction of the inviolability of human life and not only the knowledge of what constitutes brain death influences these decisions. It is, therefore, necessary to make perfectly clear these principles, so that the attitudes of medical students aim to promote donor organ transplantation with confidence [14].
Figure 12. Answer per semester.

Figure 13. Attitudes regarding: “Promote organ transplants through economic incentives”.

Figure 14. Attitudes regarding: “Choose the organ transplant recipient based on their socio-economic status”.
On the other hand, the other two propositions posed unethical suppositions to identify students’ attitudes, one being to promote organ transplants through economic incentives, and the other, to choose the recipient based on the socio-economic status, obtained 84.12% and 86.8% of disagreement among the students, respectively [Figure 13,14]. These results show an attitude against materialistic unethical positions as proposed by some authors [12], but there was a difference between students of clinical semesters which disagree more than students of basic semesters, p < 0.05 and p < 0.001 respectively, probably due to the knowledge and sensibility acquired during their medical formation.

Although in general there is an agreement that the students must receive ethical and humanistic contents during their training, the moment in which they are taught, are still a matter of debate. Similarly, there is no agreement about the evaluation of ethical attitudes, which is a difficult and very complex task. It is relatively easier to evaluate the learning of other medical issues, but it is also an important matter to evaluate scientific-ethical concepts as well [15,16].

Conclusion

Medical schools have to promote organ donation respecting legality and ethics among the students, since the very beginning of medical training. Respect for life regarding organ donation requires the students to acquire a precise knowledge concerning brain death and total gratuity, non-commercialization and fair assignation of the organs, respecting the human dignity to motivate them to promote organ donation.

Conflict of interest

The authors involved in this investigation declare that there is no conflict of interest.

Funding

The authors declare no funding for this research.

References