

Organ donation: a population-based study

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Abstract: Objective: Through a population-based study, it was identified the prevalence of people's willingness to donate their own organs and from their relatives, evaluating associated factors in an adult population. It was also identified their understanding of cerebral death.

Methodology: Cross-sectional study, with people aged 20 yr or older in the urban area of Pelotas, State of Rio Grande do Sul, Brazil. The instrument used was a structured questionnaire, filled out in individual interviews. Chi-squared and linear trend test were used in the bivariate analysis.

Multivariate analysis was conducted according to a hierarchical classification model using Poisson regression. It was considered meaningful the value for $p \leq 0.05$ two-sided.

Results: Amid 3159 participants, the prevalence to donate organs was 52%, amongst which 58% had expressed such willingness to a relative. Most respondents (80.1%) would authorize the donation of relative's organs who had previously declared their willingness to do so. When the subject had not been discussed, only a third of the total number of people interviewed would authorize the donation of a relative's organ. After adjustment to confounding factors, higher willingness was characterized among the youngest, the higher educated and those belonging to families with income over 10 minimum wages. The Evangelical and Jehovah's Witnesses practitioners showed to be less prone to donate.

Conclusion: According to the study, when the peoples had not enough information regarding family member's donation wishes the rate of willingness to donate organs is lower. Sociodemographic characteristics influence the rate of public willingness to donate organs and campaigns educational should be directed to improve rates of donation the organs.

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Advances in immunology and surgical techniques are transforming organ transplants in an important therapeutical option. It has increased dramatically the number of patients waiting for organ donation, up to 70% during the last decade (1). About 20% of the patients in waiting lists, mainly for liver and heart donation, die every year, before being able to undergo an organ transplant (2). This fact happens due to the peculiarity of organ transplant that, in most of the cases, can only occur after the donor's brain death.

Demographic, socioeconomic and cultural characteristics have been related with different prevalence of willingness to organ donation among population (3). Individuals with higher education background, younger and white, often are more willing to donate than those non-White (4), older

(5) and less educated individuals (6). Higher rates of refusal to organ donation have been related to individuals with strong religious beliefs, although none religion forbids organ donation (7). Another reason for refusal to organ donation (8) can be the disregard to the concept of brain death, as criteria for determining death.

One of the main limiting factors for organ donation is the low amount of families that consent to donation (9). When the individual willingness to donate organs is previously communicated to the family, they become more inclined to permit the donation (10). Communication becomes more important in countries where the consent to donation is the family responsibility, as it happens in Brazil (11). The rate of willingness to organ donation in developed countries is around 50–75%

(6, 12, 13), but in developing countries it is little known.

The present population-based study, among adult population, intended to identify the prevalence of individuals' intention in donating their own organs and of their relatives. This study was aimed to describe and evaluate demographic, socioeconomic and religious factors associated to individuals' will of donating their organs and of relatives after death, besides verifying the understanding of the adult population on the concept of brain death.

Methodology

The study was delineated as population-based cross-sectional and included individuals over the age of 20 yr, residents in the urban area of Pelotas, a southern Brazilian city, with an urban population of approximately 320 000 inhabitants (14). The sampling process was in multiple stages. Random sampling of sections were systematically carried out, proportionally to the size of the stratum. Responders were asked if they intended to donate their organs and if they had already communicated such desire to their relatives. Information was gathered on independent variables such as gender, skin color, age, educational level, household income social level [according to the 'Criterion of Economical Classification Brazil' (15)], marital status and type of religious belief. Answers were analyzed in the dichotomic form: individuals that answered negatively and the undecided ones were analyzed jointly, as no donors.

The fieldwork had been conducted by 33 interviewers, all with educational background equivalent to secondary level, who ignored completely the objectives of the study. The interviewers had worked in the pilot study, being previously trained for filing in and coding the questionnaire. Interviews were conducted individually, requesting verbal consent of

the responder. It was also informed to responders about the secrecy of individual data as well as the right of not answering the questionnaires.

Data were inputted in the software EPI Info 6.04 (16) with double typing and automatic checking for consistence and amplitude. Univariate and bivariate analyses were performed using the software Stata 7.0 (17), using as effect measure the proportion between prevalence rate and its confidence interval. In order to evaluate the association among the intention of donating organs and the studied variables, chi-square tests were used for comparison of proportions and trend tests were used for linear association. The compound effect of the independent variables on the outcome was evaluated by Poisson Regression (18), based on the conceptual model of analysis, considering variables according to hierarchical levels (19). Statistical significance of 0.05 was chosen to exclude or maintain the variables in the model. The prevalence ratio was used as effect measuring. The effect of sampling design (DEF = 3.0) for the outcome was considered in all analyses. The study was approved by the commission of Ethics and Research of the Federal University of Pelotas and the individual data secrecy was maintained.

Results

During data collection, it was possible to interview 3159 individuals, with the age of 20 yr or more, corresponding to 93.7% of the initial sample. Approximately half (52%) answered having willingness to organ donation and, amid those, 960 (58%) had had informed some close relative about such will. Referring to organ donation of relatives, the majority (80.1%) would authorize it, after the death of the relative that had stated previously his/her willingness to donate. However, when was utilized the words 'cerebral death' as death, only

Table 1. Classification of individuals according to the willingness to donate their own organs and of their relatives

Investigated situation	Yes [n (%)]	No [n (%)]	Undecided [n (%)]
1. A close relative informed about his/her will of donating organs. The doctor informed that the person died. Would you authorize the donation? (n = 3160)	2531 (80.1)	511 (16.1)	118 (3.8)
2. A close relative informed about his/her will of donating organs. The doctor informed that the person is in brain death. Would you authorize the donation? (n = 3159)	1987 (62.9)	920 (29.1)	252 (8.0)
3. The doctor informed that a relative of yours is in brain death but you ignore his/her intention of being a donor. Would you authorize the donation? (n = 3147)	1004 (31.8)	1890 (59.8)	266 (8.4)
4. Do you intent to donate your organs? (n = 3159)	1634 (51.8)	1135 (35.9)	390 (12.3)
5. Did you already inform some close relative about your willingness to organ donation? (n = 1634)	960 (58.0)	674 (42.0)	-

63% would authorize the donation of relative that had informed his wishes. If they had not discussed the subject previously, only one-third of the individuals had answered that they would authorize organ donation of relatives with brain death diagnosed (Table 1).

In the adjusted analysis (Table 2), the age remained associated to willingness to organ donation, even after adjustment for gender and color.

On the second level, education and income remained associated to the outcome, when controlled to age. Subgroups of demographic and socioeconomic variables that presented higher prevalence of willingness to organ donation, in the multivariate analysis, were the younger, those of higher education and monthly household income superior to 10 minimum wages. The group of Evangelical practitioners and Jehovah's Witness

Table 2. Individuals' characteristics associated to willingness to organ donation

Variable	Willingness to donate (%)	Raw prevalence rate (IC ^{95%}) ^a	Adjusted prevalence rate (IC ^{95%}) ^a
<i>Level 1</i>			
Age (yr) ^{b,c} (n = 3159)			
20-29	60.9	1.45 (1.24; 1.70)	1.45 (1.24; 1.70)
30-39	54.7	1.31 (1.10; 1.55)	1.31 (1.10; 1.55)
40-49	51.4	1.23 (1.04; 1.45)	1.23 (1.04; 1.45)
50-59	46.1	1.10 (0.92; 1.32)	1.10 (0.92; 1.32)
60-69	42.4	1.01 (0.84; 1.22)	1.01 (0.84; 1.22)
≥70	41.8	1.0	1.0
Gender ^a (n = 3159)			
Female	51.4	0.98 (0.92; 1.05)	1.0 (0.94; 1.07)
Male	52.2	1.0	1.0
Color ^a (n = 3159)			
Non-White	50.3	0.97 (0.85; 1.10).	0.97 (0.85; 1.10).
White	52.0	1.0	1.0
<i>Level 2</i>			
Social Level ^{b,c} (n = 3147)			
A Level	76.0	2.10 (1.64; 2.70)	1.09 (0.82; 1.45)
B Level	60.2	1.66 (1.33; 2.08)	1.02 (0.80; 1.30)
C Level	52.1	1.44 (1.15; 1.80).	1.05 (0.82; 1.33)
D Level	44.9	1.24 (0.99; 1.55)	1.04 (0.83; 1.30)
E Level	36.2	1.0	1.0
Education (schooling) in years ^{b,c} (n = 3156)			
12 or more	68.8	2.53 (2.07; 3.11)	2.09 (1.69; 2.60)
9-11	61.2	2.14 (1.76; 2.60)	1.84 (1.50; 2.26)
5-8	57.9	1.80 (1.52; 2.15)	1.65 (1.38; 1.98)
1-4	47.7	1.41 (1.16; 1.73)	1.35 (1.11; 1.64)
Illiterate	36.6	1.0	1.0
Household income in MW ^{b,c} (n = 2918)			
>10	69.8	1.69 (1.45; 1.97)	1.31 (1.16; 1.49)
6.01-10	54.5	1.29 (1.10; 1.52)	1.10 (0.95; 1.28)
3.01-6	51.2	1.26 (1.06; 1.50)	1.14 (0.97; 1.33)
1.01-3.0	47.9	1.16 (0.98; 1.38)	1.12 (0.96; 1.30)
<1.01	41.2	1.0	1.0
<i>Level 3</i>			
Marital situation ^b (n = 3159)			
Married or common law married	50.5	1.32 (1.12; 1.55)	1.03 (0.86; 1.24)
Single or without companion	59.2	1.55 (1.33; 1.80)	1.08 (0.89; 1.31)
Separated	55.8	1.46 (1.19; 1.76)	1.10 (0.88; 1.37)
Widowed	38.3	1.0	1.0
What is your religion (n = 3159)			
Catholicism	53.4	1.0 (0.92; 1.09)	1.06 (0.99; 1.15)
Protestantism	34.9	0.66 (0.41; 1.06)	0.70 (0.43; 1.13)
Evangelical	39.0	0.73 (0.63; 0.85)	0.83 (0.71; 0.96)
Spiritualistic	62.8	1.18 (1.06; 1.31)	1.19 (1.09; 1.31)
Afro-Brazilian	48.7	0.91 (0.64; 1.31)	0.98 (0.66; 1.44)
Jehovah's Witness	16.1	0.30 (0.11; 0.84)	0.21 (0.05; 0.88)
Others	55.3	1.04 (0.84; 1.28)	1.03 (0.83; 1.26)
No practitioner	53.3	1.0	1.0

^aIC = confidence interval at 95 %; ^ball variables are controlled to the others of same or superior levels; ^clinear trend.

remained with negative association to willingness to organ donation; likewise, they manifested lower willingness to organ donation, after adjustment to age, education, household income and marital situation. Inversely, Spiritualists individuals presented 19% more willingness to organ donation, relating to those that did not practice any religion, even after adjustment to marital situation and to variables of superior levels.

Discussion

The present study about willingness to organ donation was, according to bibliographical revision carried out, the only population-based study conducted in Brazil about the issue. More than half of the individuals willing to donate organs had already communicated such decision to a relative. This result did not differ from the 52% found by Guadagnoli in the North-American population (10), but it was superior to what was found in the resident population of Hong Kong (33%) (20). This fact was important because only one-third of the individuals answered that they would authorize the donation of organs from a relative's with brain death, if they did not know the relative's will but this percentage rose to 60%, when the willingness to donate was manifested. Siminoff (1), interviewing family members of donor-eligible death, also found that the previous knowledge of willingness to donation was strongly associated to the consent for organ donation. Education and household income were strongly related to willingness to organ donation, even after adjustment to variables of the same and superior levels. Individuals with 12 or more years of formal education presented higher probability to be organ donors, twice as much as illiterates. Others studies (6, 21) had evidenced that lower education and socioeconomic levels have been the main factors associated to lowest frequency willingness to organ donation. When the term 'death' was substituted by the term 'brain death' the willingness to donate fell 20%, suggesting that some individuals do not understand or do not accept the term brain death. According to Kerridge (22) many individuals stopped authorizing donation of relative's organs because they did neither understand, nor accept brain death as death criterion.

Some restrictions of the study must be pointed out. It was conducted a cross-sectional study because of its relatively low cost and fast execution, providing a good representation of the population in a specific period (23). It is also important to consider that other variables, not measured in this study, can also help to explain the variability of willingness to organ donation among the

population. For instance, the existence of relatives or friends that need transplantation, or were submitted to one, can make individuals to have a more positive attitude relating to organ donation.

Sampling representativeness relating to population of the city (14) and low refusal percentage obtained (6.3%) are strong points of this study, allowing to identify demographic differences in willingness to organ donation and to help in the planning of procedures, aiming groups with lower intention of donation. This study allows to conclude that older individuals, with lower educational level and household income have less willingness to donate their organs. This fact suggests that delineation of campaigns should address interventions in these groups, educating them for the importance of organ donation and to inform their willingness to a relative.

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