Profile of the Average Organ Non-donor: Can it be Used Predictively?

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Objective: To describe the profile of the average organ non-donor, compare it to that of the average donor, and identify characteristics that predict the likelihood that a given individual will be a non-donor.

Methods: The charts of 397 consenting potential organ donors of LifeLink of Puerto Rico from 2009 through 2011 were reviewed. Data regarding gender, age, BMI, the presence of diabetes, hypertension and/or kidney injury, death from cerebrovascular accident, and smoking were collected.

Results: Of the 397 charts reviewed, 283 were from donors, 96 were from non-donors, and 18 were excluded from the analysis. When compared to donors, non-donors were found more frequently to be 60 years old or older, diabetic, hypertensive, or obese; to have suffered from kidney injury, to have smoked and to have died of a cerebrovascular accident. On multivariate analysis, age, diabetes, kidney injury and smoking remained significant. However, after adjusting for age, only smoking and death from cerebrovascular accident remained statistically associated to non-donor status.

Conclusion: Although being over 60 years old, having smoked and dying from a cerebrovascular accident were characteristics found significantly more frequently in non-donors, these characteristics were also present in some donors. Therefore, a careful evaluation of each potential donor is still mandatory to avoid the loss of transplantable organs. [*P R Health Sci J 2014;33:129-131*]

Key words: Organ non-donor, Organ donation

Transplantation is the standard of care for end-stage kidneys, heart, liver and lung disease, as well as for type 1 diabetes. The waiting list for a solid organ transplant exceeds 117,000 and continues to grow, while the number of transplants resulting from available donor organs remains stable at below 29,000 per year (1). Most of these transplants are of organs recovered from brain-dead donors. The medical and social histories, clinical condition and viability of organs and tissues of potential donors are assessed. Age, co-morbidities, risk behaviors and other variables impact the outcome of the organ transplant. The constant growth of the transplant waiting list has resulted in an expansion of the donor criteria, culminating in the inclusion of brain-dead donors who are older and sicker than the standard donors and whose deaths are more frequently caused by cerebrovascular accidents (2-9).These potential expanded criteria donors (defined as being 60 years old or older, or being 50-59 years old and having 2 out of 3 of the following: hypertension, a cerebrovascular accident as cause of death or a creatinine level greater than 1.5 mgdL) are less likely to be multi-organ donors, as co-morbidities limit the suitability of organs for transplantation (2,3). Many of these individuals will become non-donors, brain-dead potential donors from whose bodies no organs can be recovered. The management of these potential donors taxes the resources of the organ procurement organization, increasing inefficiency and costs and decreasing the organ yield per donor (10).

LifeLink of Puerto Rico is the organ procurement organization (OPO) serving Puerto Rico and the US Virgin Islands. In 2010 and 2011, organs were recovered from 197 donors, of which 78 were expanded-criteria donors (ECD, 39.6%). While standard-criteria donors yielded 3.65-3.75 organs per donor, ECDs yielded only 1.6-1.79 organs per donor. The rate of stroke as cause of death was 51.5%, compared to less than 40% nationally (11). The number of non-donors has been increasing in recent years, and is now close to 30% (personal communication, LifeLink annual statistics). Failing to recover and transplant organs from a potential consenting donor results in disappointment to the family of the deceased and the OPO staff and taxes scarce resources. Early identification of those

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potential donors that will become non-donors would serve to focus resources in improving management and increasing the organ per donor yield of those that will in the end result in transplanted organs.

The aims of this study were to describe the profile of the average LifeLink non-donor for 2009 through 2011, compare it to that of the average donor, and identify characteristics that can predict the likelihood that any given individual will be a non-donor.

Methods

The charts of all consenting potential organ donors from 2009 through 2011 for LifeLink of Puerto Rico were reviewed. Potential donors are defined as those persons with brain death in whom consent for organ donation has been obtained. Donors are those in which one or more organs are recovered and transplanted. Non-donors are those in which no organs are recovered, or recovered organs are not transplanted. For our study, cases in which organs were recovered but not transplanted and those in which organs were recovered only for research were excluded. Cases were classified as non-donors (ND, no organ recovered), or donors (OD, 1 or more organs recovered and transplanted). The data collected included the following variables for each potential donor: age, gender, cause of death, history of diabetes, history of hypertension or heart disease, presence of kidney injury (defined as a creatinine >2 mg/dl at any time), history of smoking, BMI, reason for becoming a non-donor and cause for discarding a recovered organ. In order to describe the sample in terms of donor status, categorical variables were described as frequencies and percentages. For numerical variables, central tendency measures ($\bar{x} \pm SD$) were presented. Pearson's chi-squared test was performed in order to identify differences between groups. Logistic regression analysis was conducted in order to identify factors that influence whether an individual would be an organ donor. For all the tests, a p-value of less than 0.05 was considered statistically significant. All data analysis was conducted using the statistical program Stata (Version 11.2, StataCorp LP, College Station, TX).

The study was approved by the UPR-MSC Institutional Review Board (protocol # 1250211).

Results

Three hundred ninety-seven consenting potential donors from 2009 through 2011 were classified as donors (283, 71.3%) or non-donors (96, 23.9%); 18 (4.5%) were excluded. Mean ages were 42.6 $\pm$ 18.8 years (range: 1.8 months-72 years) for donors and 57.7$\pm$ 17.3 years (range: 22 days-83 years) for non-donors. Males predominated among donors (61.1%, p=0.009). For 15 of the potential donors, reason for becoming a non-donor was having a positive serology for infectious diseases; poor organ quality was the reason for 62 of them, and other reasons were the case in 19. Details for the 62 ND unable to donate because of organ quality are shown in Figure 1.

Table 1 shows the comparisons between donors and non-donors. A statistically significant difference in age, BMI, stroke as cause of death (CVA), having diabetes or hypertension, smoking history and having a creatinine level over 2 mg/dL was found between donors and non-donors. This significance remained present in multiple logistic regression analysis for the variables of age over 60 years, diabetes, smoking and elevated creatinine. However, when adjusted for age, only smoking and death from cerebrovascular accident remained statistically significant.

On counting the number of risk factors per potential donor, we found that fewer than 20% of donors vs 65% of the non-donors had more than 3 risk factors.

Discussion

Our study identified characteristics that were statistically more frequent in the non-donor group, but when adjusting for older age, only smoking and death from cerebrovascular accident remained significant for non-donor status. We hypothesize that diabetes, hypertension and kidney injury are more prevalent with advancing age, and therefore are expected to be more frequent in the non-donor group. However, although smoking

Table 1. Comparison of donors and non-donors

Predictor	Donors N=283	Non-donors N=96	Crude OR	95% CI	*P* value	Adjusted OR*	95% CI	*P* value	Age-adjusted OR	95% CI	*P* value
Age ≥60	73	55	3.86	2.38-6.26	0.0001	3.35	1.75-6.41	0.0001	-	-	-
Diabetes	45	40	3.78	2.25-6.33	0.0001	2.55	1.34-4.86	0.004	0.95	0.33-2.80	0.926
Hypertension	134	70	2.99	1.80-4.97	0.0001	0.63	0.29-1.35	0.234	1.88	0.47-7.47	0.373
Cr>2 mg/dL	41	42	4.59	2.72-7.73	0.0001	3.57	1.90-6.72	0.0001	0.84	0.28-2.52	0.759
CVA	144	77	3.91	2.25-6.80	0.0001	1.54	0.75-3.17	0.243	8.17	2.17-19.92	0.0001
Smoking	35	43	5.75	3.36-9.82	0.0001	5.70	3.06-10.60	0.0001	6.57	2.17-19.92	0.0001
BMI≥30	54	34	2.36	1.41-3.95	0.001	1.63	0.88-3.02	0.123	0.34	0.11-1.06	0.062

Crude OR - crude odds ratio; Adjusted OR - adjusted odds ratio; Age-adjusted OR - age-adjusted odds ratio; 95% confidence interval.
Crude OR was determined using simple logistic regression analysis based on each individual predictor in the table and being an organ non-donor as the outcome.
*Logistic regression analysis adjusted for all predictors in this table.
A *p* value of <0.05 was considered statistically significant.

and death from stroke were significantly more frequent in non-donors, they were also present in some donors. Therefore, the individual evaluation of each potential donor is still mandatory to avoid the loss of transplantable organs.

Since the data analyzed in this study are limited to those collected in a standard fashion and that appear in the donor record, other characteristics that could influence donor status cannot be identified. The comparison of non-donors with single organ donors may yield additional results, as might a detailed analysis of the number of risk factors present in a potential donor versus outcome. The need for organs mandates that any exclusion of a potential donor be thoroughly justified, particularly in the absence of a clear contraindication for donation (5-8). Local transplant center policies and practices, considerations of geography and cold ischemia time, and the application of prior experience with marginal donors, in addition to donor characteristics, should be part of the decisional process involved in excluding any given donor. The recent opening of a liver transplant center in our service area is associated with a decrease in cold ischemia time for organs transplanted here and may result in a higher utilization of single organ (liver only) donors. This requires that any change in current potential donor evaluation be carefully considered before implementation.

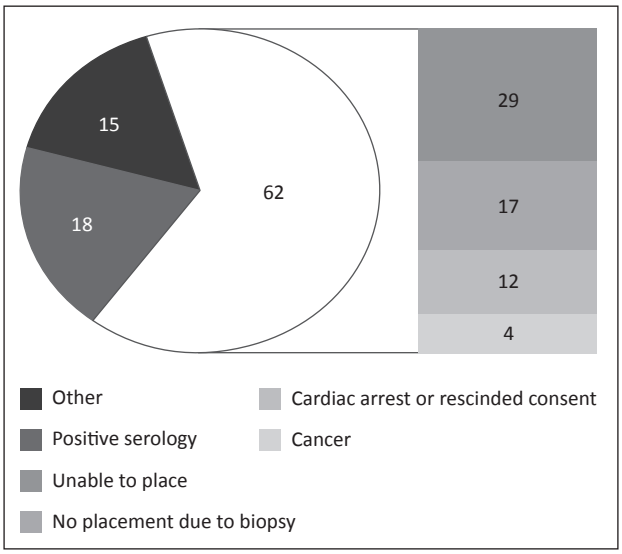

Figure 1. Reasons for becoming a non-donor

Resumen

Objetivo: Describir el perfil del no-donante de órganos, compararlo con el de donante, e identificar características que puedan predecir el no-donante. Métodos: Se revisaron los expedientes de 397 donantes potenciales de LifeLink de Puerto Rico entre 2009 y 2011. Los datos recogidos incluyeron edad, género, índice de masa corporal, historial de diabetes, hipertensión, daño renal, fumar, y muerte por accidente cerebrovascular. Resultados: De los 397 expedientes revisados, 283 fueron de donantes, 96 de no-donantes y 18 se excluyeron del análisis. Los no donantes eran más frecuentemente de 60 años o más, fumadores, tenían diabetes, hipertensión, obesidad o fallo renal, y habían muerto de accidente cerebrovascular. La edad, diabetes, fumar y fallo renal mantuvieron significancia en el análisis multivariado. . Sin embargo, al ajustar los resultados por edad, sólo fumar y muerte por accidente cerebrovascular se mantuvieron significantes. Conclusión: A pesar de que edad sobre 60, fumar y muerte por accidente cerebrovascular fueron estadísticamente más frecuentes en no-donantes, estas características también se encontraron entre los donantes. Por lo tanto, cada donante potencial debe ser evaluado detalladamente para evitar la pérdida de órganos trasplantables.

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