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The Impact of Race on Organ Donation Rates in Southern California

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Abstract

Background—The Organ Donation Breakthrough Collaborative began in 2003 to address and alleviate the shortage of organs available for transplantation. This study investigated the patterns of organ donation by race to determine if the Collaborative had an impact on donation rates amongst ethnic minorities.

Study Design—The following data from the Southern California regional organ procurement organization, were reviewed between 2004 and 2008: age, race (White, African American, Asian, Hispanic, and Other), the numbers of eligible referrals for organ donation and actual donors, types of donors, consent rates, conversion rates, organs procured per donor (OPPD), and organs transplanted per donor (OTPD). Logistic regression was utilized to determine independent predictors of ≥ 4 OTPD.

Results—There were 1776 actual donors out of 2760 eligible deaths (conversion rate 64%). Hispanics demonstrated a significantly lower conversion rate than Whites (64% vs. 77%, $p < 0.001$), but a considerably higher rates than African Americans (50%) and Asians (51%, $p < 0.05$ for both). There were no significant changes in conversion rates over time in any race. Age was a negative predictor (OR 0.95), while trauma mechanism (OR 2.1), and standard criteria donor status (OR 2.5) were positive independent predictors of ≥ 4 OTPD. Race did not affect OTPD (all groups $p > 0.05$).

Conclusions—The conversion rates amongst all ethnic minorities were significantly lower than the rates observed in Whites. However, when controlling for other factors, race was not a significant risk factor for the number of organs transplanted per donor. The Collaborative has not had an identifiable effect on race conversion rates during the 5 years since its implementation. Further intervention is necessary to improve the conversion rate in ethnic minorities in Southern California.

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Keywords

transplantation; organ donor; race; conversion rate

INTRODUCTION

As organ transplantation has become the preferred treatment for organ failure, the demand for organs continues to outpace supply. As of April 2010, over 107,000 candidates were listed on the United Network of Organ Sharing waiting list while only 28,465 transplants were performed in 2009.¹ Even as another name is added to the national organ transplant waiting list every 11 minutes, an average of 18 people die each day from a lack of available organs for transplant.¹ This discrepancy continues to be most pronounced among ethnic minorities who accounted for 52% of the waiting list but only 37% of the transplants.¹ In addition, ethnic minorities usually wait much longer than whites for the transplants that they receive; median wait times for kidneys were 573 days for whites, 879 days for Hispanics and 1082 days for African Americans.²

This organ shortage has become a public health crisis and numerous initiatives have been introduced to address the disparity between organ supply and organ demand. The Organ Donation Breakthrough Collaborative was introduced in 2003 to implement “best practices” associated with increases in organ donation and transplantation in high performing organ procurement organizations (OPO’s), hospitals, and transplant centers.³ By spreading known best practices to hospitals with the greatest potential for organ donation and setting benchmarks for organ donation outcomes, the end result would be a significant increase in organ donation. The benchmarks include an overall conversion rate of $\geq 75\%$, 3.75 organs transplanted per donor (OTPD), and a 10% donation after cardiac death (DCD) rate. To date, the Collaborative has been extremely successful, resulting in a 10.8% increase in donors from 2003 to 2004, and a subsequent 9.5% increase in 2005.^{4,5}

Interestingly, no analysis addresses the effect of the collaborative on donation rates by race. The purpose of the current study is to examine racial differences in organ donation outcomes over the time period of the Collaborative. We hypothesized that racial differences in organ donation would continue to persist despite the attention and advances of the Collaborative.

METHODS

This is a retrospective study using an existing database from the Southern California regional OPO, OneLegacy, which covers 14 transplant centers and more than 220 donor hospitals.⁶ This OPO serves over 18.3 million people in Los Angeles, Kern, Orange, Riverside, San Bernardino, Santa Barbara and Ventura counties. The records of patients referred to the OPO for possible organ donation between the years 2004 and 2008 were reviewed. Data regarding the number of referrals for organ donation, eligible deaths, eligible donors, type of donor, organs procured per donor (OPPD), and OTPD were recorded. The mechanism of injury (trauma versus non-trauma), age, race (White, African American, Hispanic, Asian, and other) and gender of all donors were also recorded.

Eligible deaths include brain dead patients who are less than 70 years old and do not have any medical contraindications to organ donation. Eligible donors are eligible deaths who go on to donate at least one organ. The conversion rate was defined as the number of eligible donors divided by the number of eligible deaths. Types of donors include “standard criteria” (SCD) and “extended criteria” (ECD); there were not any DCDs included in the database. SCDs were declared legally brain dead by hospital criteria and were either < 50 years old or 50–59 years

old with less than two of the following: chronic hypertension, stroke as the cause of death, or serum creatinine >1.5 mg/dL. ECDs were declared legally brain dead and were either > 59 years old or 50–59 years old with two of the previously mentioned comorbidities.

Comparisons of organ donor demographics and outcomes were made across all ethnic groups. The change in the conversion rate over time was determined to examine the effect of the Collaborative. Statistical analysis was performed using the Student's t-test or analysis of variance (ANOVA) for continuous variables, when appropriate, and the Pearson's chi-square was used for categorical variables. Potential risk factors for a donor having a high number of organs transplanted (≥ 4 OTPD) were also identified. The same univariate analyses were performed and significant variables were then included in a multivariate analyses using binary logistic regression to determine independent predictors of ≥ 4 OTPD. Differences were considered statistically significant if the p value was less than 0.05. All statistical analyses were done with SPSS 12.0 for Windows (SPSS Inc., Chicago, Illinois). This study was determined to be exempt from institutional review board approval by the Institutional Review Board of the Cedars-Sinai Medical Center.

RESULTS

During the 5-year study period, there were 1776 eligible donors, out of 2760 eligible deaths for an overall conversion rate of 64%. The majority of eligible deaths were Hispanic (42%), followed by Whites (31%), African Americans (14%) and Asians (10%). Table 1 describes the organ donor demographics by race. Asians were older than the other groups, which probably accounted for their higher percentage of extended criteria donors (28%) and their lower rates for OPPD (3.29 ± 1.3) and OTPD (2.74 ± 1.7). Table 2 compares the conversion rates by race, using whites as the reference point. All other groups had significantly lower conversion rates. Interestingly, Hispanics, although significantly lower than Whites (64% vs. 77%, $p < 0.001$), demonstrated a considerably higher conversion rate than African Americans (50%) and Asians (51%).

When examining the trends of conversion rate over time (Table 3), there was no difference across all ethnic groups during the 5-year study period. Finally, in an effort to determine independent predictors for high organ yield (≥ 4 OTPD), race, age, a trauma mechanism, and SCD status all had p values < 0.05 on univariate analysis (Table 4). The following remained significant after binary logistic regression: age (OR 0.95, 95% CI: 0.94–0.96, $p < 0.001$), a trauma mechanism (OR 2.1, 95% CI: 1.7–2.7, $P < 0.001$) and SCD status (OR 2.5, 95% CI: 1.47–4.35, $p = 0.001$). Race was not an independent predictor of organ yield after controlling for other factors (Table 5).

DISCUSSION

Today's technological advancements in transplantation have led to organ donation being a common and culturally accepted practice. However, with the shortage of organs and inexhaustible waiting lists, many people are still dying from a lack of life-saving transplants. This problem is especially severe in minority ethnic groups, who presently account for approximately 52% of waiting list registrants but only 31% of all donors.¹ The analysis of the in the current study demonstrates that racial disparities also exist with respect to organ donor demographics and outcomes. The conversion rates for African Americans (50%), Asians (51%), and Hispanics (64%) were significantly lower than that observed in Whites (77%). In addition, our region did not witness a significant change in conversion rates over time, irrespective of the race of the donor. This is especially concerning as this time period coincides with the Organ Donation Breakthrough Collaborative and its associated efforts to increase donation rates across the country.

Racial and ethnic differences with respect to organ donation are well described. Racial minorities (African Americans, Hispanics, Asians) are much less likely to sign a donor card or consent for organ donation than their Caucasian counterparts.^{7,8} In fact Caucasians are two times more likely to donate than African Americans and Hispanics, and three times more likely to donate than Asians.⁹ Explanations for this occurrence are plentiful and include: mistrust in the donation system and hospitals, religion/spirituality, lack of knowledge and misconceptions regarding organ donation, and family influence.^{9–13}

The African American community has been addressing this problem since the late 1970's and ultimately helped achieve some improvements in organ donation rates.^{14–19} However, organ procurement has not been adequately addressed in Hispanic and Asian communities. Hispanic Americans pose a unique challenge mostly for demographic reasons. Over the past decade, the number of Hispanic Americans added to this waiting list has increased by over 260%, while the list involving non-Hispanics has grown 146%.²⁰ This growth in the Hispanic American transplant waiting list parallels the growth of the Hispanic American population as a whole. It is anticipated that Hispanics will represent 24% of the total U.S. population in 2050, a doubling of their current proportion.²¹ This tremendous growth is most evident in California, where it is anticipated that Hispanic Americans will become the state's largest single ethnic group by 2025, and will account for 41% – 47% of the population.²² In 2008, Hispanics accounted for 32% of eligible deaths in our region, whereas nationally, they accounted for 15%.¹ Despite this need, Hispanic Americans remain 60% less likely to donate their organs compared to non-Hispanic Whites.²⁰ The true nature of the lack of willingness to become organ donors in this minority group is unexplained. Many studies have extrapolated from the successful approach used to increase organ procurement in African Americans.^{18,19,23} Similarities, such as distrust of the medical system and misconceptions concerning religion exist in both minority groups; however, there are other critical problems specific to the Hispanic American community. These problems include language barriers and misinformation concerning organ donation.

It is also well known that Asian Americans are significantly less likely to consent for organ donation compared with their Caucasian counterparts.^{7,8} In fact, Caucasians are more than three times as likely to donate compared to Asian Americans.⁹ The reason for this disparity remains ill-defined due to the vast diversity of this ethnic group. Asian Americans are defined by 20 countries and 60 different ethnic groups, each with widely varying customs and beliefs.⁹ With this in mind, the current evidence suggests that a mistrust in the donation system, misconceptions regarding organ donation, a preference to maintain body integrity after death and family influences all contribute to the mostly negative attitudes towards organ donation among Asian Americans.^{7–9} Religion/spiritual/cultural beliefs also play a significant role in influencing Asian Americans' willingness to become organ donors; and it has been suggested that greater involvement between the medical community and religious leaders is imperative to improve organ donation rates within the Asian American community.²⁴

The Organ Donation Breakthrough Collaborative was initiated by the Department of Health and Human Services to help address the growing organ shortage crisis. The main purpose of the Collaborative was to facilitate changes in the performance of organ donation activities by the adoption of proven "best practices" from the nation's top performing hospitals and OPOs.^{4,5} By spreading these practices to hospitals with the greatest potential for organ donation, the end result would be a significant increase in organ donation. The Collaborative set a goal to increase the average conversion rate to 75%, up from an average of 43%.^{4,5,25} As mentioned earlier, the Collaborative has enjoyed marked success, with more than 33% of participating hospitals achieving the goal of a 75% conversion rate.^{5,25} Its success even led to an offshoot, the Transplantation Growth and Management Collaborative, whose goal was to share best practices from high performing transplant centers. Of note, these collaboratives did not take into account the racial and ethnic differences seen at major hospitals across the country.

As seen with our data, during the 5-year study period, Whites had a consistently elevated conversion rate. In fact, in only one year (2008), did the conversion rate fall below 75%. However, African Americans, Asians, and to a lesser extent, Hispanics, all had consistently low conversion rates during the same time period. Evaluating for changes in our region during the collaborative could be misleading. Whites were already at an optimal level, so little improvement could be achieved. Specific programs targeting minorities would have been beneficial, as these ethnic minorities comprise two-thirds of the eligible deaths in our region. The Collaborative may not have initially accounted for these differences, but it is taking strides for factoring in donor characteristics when predicting donation outcomes for each OPO. Greater education and outreach will be necessary to improve these donation rates among minorities in our region and there is much room for improvement in our region.

We also examined independent predictors of high organ yield. Considering 3.75 OTPD is the national benchmark for optimal organ retrieval, we chose ≥ 4 OTPD as our outcome measure for each individual donor. The age of the donor, a traumatic mechanism for injury, and categorization as an SCD were independent factors for organ yield. Whereas race is associated with poor clinical outcomes for a variety of conditions, it was not a significant risk factor for the number of organs transplanted per donor when other variables were taken into consideration. Consequently, it appears that a key issue for the shortage of organs available from minority donors is the lack of consent for donation. Directing more resources towards interventions that focus on increasing consent rates in these populations is warranted.

There are a number of limitations to this study that should be considered. The retrospective design of the database limits the conclusions that can be made. In addition, the demographics of the region examined might differ from other regions across the nation. Despite these issues, the present study represents one of the largest studies to date that examines the racial differences with respect to organ donation demographics on a regional basis.

In conclusion, the current study suggests that the conversion rates amongst all ethnic minorities are significantly lower than the rates observed in Whites. However, when controlling for other factors, race was not a significant risk factor for the number of organs transplanted per donor. The Collaborative has not had an identifiable effect on conversion rates in racial minorities during the 5 years after its implementation. Further intervention is necessary to improve the conversion rate in the diverse population of Southern California.

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Table 1

Analysis of Organ Donor Demographics and Outcomes by Race

	White (n=653)	AA (n=187)	Asian (n=137)	Hispanic (n=751)	Other (n=48)	p Value	Total (n=1776)
Age, y [*]	41 ± 17	40 ± 17	47 ± 16	36 ± 17	43 ± 16	<0.001	40 ± 17
Trauma [†]	39%	34%	27%	46%	33%	<0.001	40
SCD [†]	83%	87%	72%	88%	86%	<0.001	85%
OPPD [*]	3.74 ± 1.6	3.52 ± 1.7	3.29 ± 1.3	3.93 ± 1.7	3.45 ± 1.4	<0.001	3.76 ± 1.6
OTPD [*]	3.16 ± 1.8	2.92 ± 1.9	2.74 ± 1.7	3.5 ± 1.8	3.02 ± 1.8	<0.001	3.24 ± 1.8

^{*} Analysis of Variance used for analysis.[†] Pearson's Chi-square used for analysis.

AA, African American; OPPD, organs procured per donor; OTPD, organs transplanted per donor; SCD, standard criteria donors.

Table 2

Comparison of Conversion Rates by Race

	Eligible Deaths	Eligible Donors	Conversion Rate	p Value
White	853	653	77%	Reference
African American	377	187	50%	<0.001
Asian	271	137	51%	<0.001
Hispanic	1169	751	64%	<0.001
Other	90	48	53%	<0.001
Total	2760	1776	64%	

The Pearson's Chi-square was used for the analyses.

Table 3

Change in Conversion Rate over time by race

	2004 (n=530)	2005 (n=560)	2006 (n=627)	2007 (n=557)	2008 (n=486)	p Value (overall)	p Value (2008 versus 2004)
White	76% (124/164)	79% (134/170)	76% (135/177)	81% (129/161)	71% (129/181)	0.242	0.362
AA	49% (38/78)	37% (27/74)	52% (46/88)	52% (36/69)	59% (40/68)	0.097	0.222
Asian	53% (33/62)	48% (24/50)	50% (32/64)	45% (21/47)	56% (27/48)	0.811	0.752
Hispanic	62% (131/213)	63% (157/251)	67% (190/285)	64% (169/266)	68% (104/154)	0.641	0.235
Other	46% (6/13)	53% (8/15)	39% (5/13)	57% (8/14)	60% (21/35)	0.712	0.392

The Pearson's Chi-square was used for the analyses.

AA, African American.

Table 4 Univariate Analyses of Risk Factors for ≥ 4 Organs Transplanted per Donor

Variable	< 4 OTPD (n=1047)	≥ 4 OTPD (n=732)	p Value
Age, y	44 $\pm$ 16	28 $\pm$ 13	<0.001
Trauma	29%	64%	<0.001
SCD	78%	95%	<0.001
Race			<0.001
White (reference)	39%	34%	
African American	12%	9%	
Asian	9%	5%	
Hispanic	37%	49%	

Data are expressed as mean $\pm$ SD for the t test and as % for Pearson's Chi square.

OTPD, organs transplanted per donor; SCD, standard criteria donors.

Table 5 Binary Logistic Regression for Predictors of ≥ 4 Organs Transplanted per Donor

Variable	OR	95% CI	p Value
Age, y	0.95	0.94–0.96	<0.001
Trauma	2.1	1.7–2.7	<0.001
SCD	2.5	1.47–4.35	0.001
Race			
White (reference)	1		
African American	0.787	0.53–1.2	0.24
Asian	0.799	0.49–1.3	0.362
Hispanic	1.1	0.83–1.4	0.607
Other	0.834	0.41–1.7	0.62

SCD, standard criteria donor.