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THE RELATIONSHIP BETWEEN VERIFIED ORGAN DONOR DESIGNATION AND PATIENT DEMOGRAPHIC AND MEDICAL CHARACTERISTICS

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Abstract

Previous studies on the correlates of organ donation consent have focused on self-reported willingness to donate and on self-reported medical suitability to donate. However, these may be subject to social desirability bias and inaccurate assessments of medical suitability. We sought to overcome these limitations by directly verifying donor designation on driver's licenses and by abstracting comorbid conditions from electronic health records. Using a cross-sectional study design, we reviewed the health records of 2070 randomly selected primary care patients at a large urban safety-net medical system to obtain demographic and medical characteristics. We also examined driver's licenses that were scanned into electronic health records as part of the patient registration process for donor designation. Overall, 943 (46%) patients were designated as donors on their driver's licenses. On multivariate analysis, donor designation was positively associated with age 35–54 years, female gender, non-black race, speaking English or Spanish, being employed, having private insurance, having an income above $45,000, and having fewer comorbid conditions. These demographic and medical characteristics resulted in patient subgroups with donor designation rates ranging from 21% to 75%. In conclusion, patient characteristics are strongly related to verified donor designation. Further work should tailor organ donation efforts to specific subgroups.

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DISCLOSURE

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INTRODUCTION

The demographic factors that affect a person's willingness to consent to organ donation have been extensively studied. For example, several studies have found that willingness to donate is associated with female gender, white race, and younger age (1–7). However, these studies relied on asking respondents if they were willing to donate or were designated as organ donors on driver's licenses. By not directly checking respondents' licenses to verify donation designation, these studies may be susceptible to social desirability bias, or the tendency of individuals to answer questions in a manner that will be viewed favorably by others. Social desirability bias may confound research results by creating false relationships or obscuring relationships among variables (8). Moreover, little is known about the role of medical suitability in donor designation. A survey of 385 subjects found no relationship between the self-reported comorbid conditions and driver's license donor designation. However, neither the comorbid conditions nor the donor designation were directly verified (2).

We sought to overcome these limitations by examining driver's licenses and state identification cards, which record actual donation designations. We were able to examine these because they are scanned into patients' electronic health records at each clinical encounter with a large urban safety-net medical system. We also obtained information on medical conditions directly from patients' health records, rather than relying on self-report. Knowing more accurately the demographic and medical correlates of donor designation may help inform future efforts to increase organ donation.

METHODS

This study was conducted at an urban safety-net medical system in northeast Ohio that includes a large tertiary care hospital and over a dozen community centers located in both poor and wealthy communities. We randomly selected 2500 active patients from the electronic health record on March 5, 2014. Active patients were defined as those who saw their primary care physician at least twice in the preceding two years. Only patients over the age of 18 years were eligible for this study.

From electronic health records, we obtained patient demographic characteristics including age, gender, race, ethnicity, language, marital status, employment status, health insurance, and zip code. We also determined the presence of specific common comorbid conditions based on relevant ICD-9 codes, including hypertension, chronic obstructive pulmonary disease, diabetes, cancer, cerebrovascular accident, chronic kidney disease, congestive heart failure, connective tissue disease, peripheral vascular disease, myocardial infarction, peptic ulcer disease, AIDS, and liver disease. Because we did not have data on individual income, we used census data to obtain the median household income of each patient's zip code.

Two researchers independently examined scanned driver's licenses, state identification cards, or learner's permits to determine each patient's organ donor designation. A third researcher resolved any discrepancies between the two researchers. This study was approved

by the Institutional Review Board of MetroHealth Medical Center, Cleveland, Ohio (approval number 685, protocol number 13-00548).

We used descriptive statistics (percentages, means, and standard deviations) to describe the characteristics of the patients. We used the chi-square test to determine the univariate relationship between organ donation status and patient characteristics. We used logistic regression to determine the multivariate relationship between organ donation status and patient characteristics. P values less than .05 or 95% confidence intervals that excluded 1.00 were considered statistically significant. All statistical analyses were performed using JMP Pro 11.0 (SAS Institute, Cary, North Carolina).

RESULTS

Of the 2500 randomly selected patients, 2070 (83%) had their organ donation status documented on a state driver's license (1518 patients), a state identification card (519 patients), or a learner's permit (33 patients). The remaining 430 (17%) patients had no documentation of their organ donation status.

The demographic and medical characteristics of patients with a donation status are listed in Appendix Table 1. A majority of patients were female, spoke English, and were unemployed. The three most common comorbid conditions documented in the electronic health records were hypertension, chronic obstructive pulmonary disease, and diabetes.

Overall, 943 (46%) patients were designated as organ donors. On univariate analysis, organ donor consent was associated with a number of patient characteristics (Table 1). For example, 50.5% of patients without any comorbid conditions had consented to organ donation, while only 31.7% of patients with two or more comorbid conditions had consented to organ donation. On multivariate analysis (Table 1), organ donor consent was positively associated with age 35–54 years, female gender, non-black race, speaking English or Spanish, being employed, having private insurance, having an income above $45,000, and having fewer comorbid conditions. For example, patients without any comorbid condition had 1.65 (95% confidence interval 1.25, 2.18) times greater odds to consent to organ donation compared with patients with two or more comorbid conditions.

The patient characteristics independently associated with organ donation consent allow the creation of patient subgroups with varying likelihood of donor consent. For example, among the 123 patients who were female, were white or other race, were employed, had private insurance, had an income above $45,000, and had zero or one comorbid conditions, 163 (75%) had consented to organ donation. Similarly, among the 29 patients who were male, black race, not employed, had government or no insurance, had an income below $45,000, and had two or more comorbid conditions, 6 (21%) had consented to organ donation.

DISCUSSION

We found that about half of the patients at a large urban safety-net medical system were designated as donors on their driver's licenses. This is similar to national figures on the percentage of Americans who are designated as donors (9). We also found that several

demographic and medical characteristics were independently associated with organ donor consent, and patient subgroups varied widely in rates of donor designation. The strengths of this study include a large and diverse sample of patients, the direct verification of donor designation rather than relying on self-reported measures of willingness, and objective measures of comorbid conditions.

Our findings on correlates of donation designation are generally consistent with previous studies on willingness to donate with respect to age, gender, and race (1–3,5–7,10–13). However, the proportion of individuals who had verified organ donor designation is somewhat lower than the proportion who self-reported donor designation in a national survey (Appendix Table 2) (14). Moreover, previous studies have been inconsistent on the effect of employment status, insurance, income, and comorbid conditions on willingness to donate (2,10,11,15). By contrast, we found that all four variables were strongly associated with verified donation designation. To our knowledge, language has not previously been examined in relationship to organ donation as we did in this study.

Because organ donation status varies greatly depending on patient demographic and medical characteristics, it may be appropriate to target organ donation efforts more narrowly. Physicians may play a key role in discussing organ donation with their patients. Some research suggests patients are interested in talking with their doctors about organ donation and that having talked with one's physician about organ donation increases one's willingness to donate (13). Motor vehicle clerks may also play a key role in the organ donation decision (16). Previous research suggests that department of motor vehicles based interventions may moderately boost organ donation rates (17,18).

Several limitations must be considered in interpreting the study results. First, some subgroups had relatively few patients. Second, all of the subjects were individuals receiving care from a single health system so the results may not generalize to patients in other health systems or to the general public. Third, we did not have direct measures of certain variables of interest such as income and education. Fourth, the goal of our study was not to prove the presence of social desirability bias. The only way to do so would be to ask subjects about their willingness to donate and then examine their driver's licenses.

In conclusion, the decision donate one's organs is associated with many different demographic and medical characteristics. Further work is needed to tailor organ donation efforts to subgroups who are less likely to become organ donors. In particular, it is important to determine ways to reach the elderly, males, blacks, people speaking other languages, the unemployed, those with government insurance, the poor, and those with multiple comorbid conditions.

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Table 1

Univariate and multivariate relationship between patient characteristics and donor designation on driver's license (n=2070).

	n	Organ donor, %	Univariate p value	Multivariate odds ratio (95% confidence interval)
Age, years			<.001	
18–34	663	48.6		1.24 (0.95, 1.62)
35–54	777	49.7		1.31 (1.03, 1.67)
≥55	630	37.3		1.00
Gender			<.001	
Female	1198	49.5		1.48 (1.23, 1.79)
Male	872	40.2		1.00
Race			<.001	
White	941	55.0		2.19 (1.73, 2.76)
Black	746	34.9		1.00
Other	383	43.0		1.64 (1.20, 2.25)
Ethnicity			0.28	
Hispanic	83	39.8		1.00
Non-Hispanic	1987	45.8		1.22 (0.71, 2.12)
Language			<.001	
English	1879	47.0		2.80 (1.77, 4.53)
Spanish	78	38.5		2.35 (1.17, 4.73)
Other Language	113	26.6		1.00
Marital Status			.20	
Married	573	47.8		0.88 (0.70, 1.11)
Not Married	1497	44.7		1.00
Employment			<.001	
Employed	801	54.8		1.35 (1.11, 1.65)
Not Employed	1269	39.7		1.00
Insurance			<.001	
Private	1035	53.7		1.49 (1.20, 1.84)
Government	839	35.6		1.00
None	196	44.9		1.23 (0.88, 1.74)
Income, $			<.001	
<30,000	632	36.9		1.00
30,000–44,999	717	45.9		1.15 (0.91, 1.46)
≥45,000	721	52.8		1.32 (1.01, 1.71)
Number of medical conditions			<.001	

	n	Organ donor, %	Univariate p value	Multivariate odds ratio (95% confidence interval)
0	1202	50.5		1.65 (1.25, 2.18)
1	464	44.8		1.38 (1.02, 1.86)
≥2	404	31.7		1.00

Appendix Table 1

Demographic and medical characteristics of patients (n=2070).*

Age, years	45.3 (16.5)
Gender	
Female	1198 (58%)
Male	872 (42%)
Race	
White	941 (45%)
Black	746 (36%)
Other	383 (19%)
Ethnicity	
Hispanic	83 (4%)
Non-Hispanic	1987 (96%)
Language	
English	1879 (91%)
Spanish	78 (4%)
Other	113 (5%)
Marital Status	
Married	573 (28%)
Not Married	1497 (72%)
Employment Status	
Employed	801 (39%)
Not Employed	1269 (61%)
Insurance	
Private	1035 (50%)
Government	839 (41%)
None	196 (9%)
Annual household income, 1000$	41.3 (18.2)
Specific medical conditions	
Hypertension	586 (28%)
Chronic obstructive pulmonary disease	292 (14%)
Diabetes	225 (11%)
Cancer	91 (4%)
Cerebrovascular accident	70 (3%)
Chronic kidney disease	64 (3%)
Congestive heart failure	51 (2%)
Connective tissue disease	35 (2%)
Peripheral vascular disease	35 (2%)

Myocardial infarction	30 (1%)
Peptic ulcer disease	28 (1%)
AIDS	21 (1%)
Liver disease	9 (.04%)
Total medical conditions	0.7 (1.1)

* Numbers indicate mean (standard deviation) for continuous variables and n (percentage) for categorical variables.

Appendix Table 2

Study results on verified donor designation on driver's license and corresponding results from 2012 Gallup poll on self-reported donor designation on driver's license.

	Study Results		Gallup Poll	
	n	**Verified donor designation, %**	**n**	**Self-reported donor designation, %**
Age, years				
18–34	663	48.6	724	65.8
35–54	777	49.7	1100	60.7
≥55	630	37.3	1517	55.0
Gender				
Female	1198	49.5	1840	63.1
Male	872	40.2	1529	56.9
Race				
White	941	55.0	1203	64.6
Black	746	34.9	584	39.0
Other	383	43.0	1574	48.7
Ethnicity				
Hispanic	83	39.8	721	44.0
Non-Hispanic	1987	45.8	2648	62.8