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RESEARCH PAPER

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Attitudes Toward Vascularized Composite Allotransplantation of the Hands and Face in an Urban Population

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Keywords: face transplant, hand transplant, plastic surgery, survey study, vascularized composite allotransplantation

Abbreviations: VCA, vascularized composite allotransplantation; ED, emergency department; VAS, visual analog scales.

Background: Almost 100 hand and face transplants have been performed worldwide. Their success has generated enthusiasm within the medical community, however, little is known about public attitudes toward vascularized composite allotransplantation (VCA) of the hands and face as compared to solid organ transplantation. The objective of this survey study was to assess these attitudes and the acceptability and potential barriers to the further growth of these procedures.

Methods: Cooper University Hospital Emergency Department (Camden, New Jersey) patients, accompanying family members and friends ≥18 years of age were surveyed about knowledge of and attitudes toward organ, hand, and face transplants as well as preferences as a potential VCA donor or recipient. The socioeconomic aspects of VCA also were assessed.

Results: A total of 1,027 individuals participated. Approximately 70% (69.7%) of respondents indicated that they would want to be organ donors, although only 37.1% reported donor registrations on their driver's license. Respondents demonstrated greatest willingness to donate solid organs upon death: kidneys (77.5%), liver (77.1%), and heart (76.4%). Willingness to donate was less for hands (54.6%) and face (44.0%). Similarly, respondents were more willing to receive a kidney (85.2%) than a hand (60.0%) or face (49.4%).

Conclusions: Respondents were more willing to be donors or recipients of solid organs than of hands or face. However, substantial percentages of individuals indicated a willingness to donate or receive hands or a face. As VCA continues to evolve, knowledge of public attitudes toward VCA will be critical for organ procurement organizations, health system engagement, and funding for relevant research.

Introduction

Vascularized composite allotransplantation (VCA) is the term currently used to describe the transplantation of heterogenous tissues, such as a human hand, which contains bone, muscle, vessels, nerves, and skin.[1] It is now possible to transplant the human hand, leg, uterus, abdominal wall, and face from a deceased donor to a patient in need. To date, more than 65 hand transplants[1] and 27 face transplants[2] have been performed worldwide. The primary reason for such transplants is devastating trauma or infection that compromises the patient's ability to perform activities of daily living. In cases of facial disfigurement, VCA can greatly mitigate an individual's ability to interact with others without social stigma often experienced by those with severe facial disfigurement. The number of hand and face transplant procedures is expected to rise in the coming years as further advances are made in the surgical treatment of these patients and build upon the encouraging early results.

Over the past decade, a body of literature has been dedicated to the psychological and ethical issues involved in VCA.[3-10] Despite this rich and ongoing academic discussion, public attitudes toward face and hand transplants remain unknown.[11,12] While a number of studies have addressed perceptions of face transplant,[13-22] most have surveyed specific groups and focused on immunosuppressant therapy and rejection risk. To our knowledge, there has been no

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evaluation of public attitudes toward issues related to VCA. Attitudes toward financial responsibility and interpretation of publicity related to VCA are also unknown. This survey study was designed to explore how demographic factors and general understanding of the organ donation process relate to interest in and willingness to participate in organ donation.

Materials and Methods

Setting

Participants were recruited from the Cooper University Hospital Emergency Department (ED) located in Camden, New Jersey from October 2012 through April 2013. Camden is an inner city with a population of approximately 77,300 and an ethnicity/race distribution that is 47% Hispanic, and 44% black.[23] Camden is considered one of the poorest cities in the nation, with a median household income of $26,347 and 38% of the population living below the poverty level (2007–2011).[23] Camden also has the highest city crime ranking in the country.[24] These demographics lend themselves to a population that is familiar with traumatic injuries. Given that nearly 20% of the ED patient population is comprised of Camden residents, we anticipated a diverse study population.

Participants

An ED population was intentionally selected for this survey. The majority of ED patients present with an acute medical problem that needs immediate medical attention. This acuity, combined with the preponderance of traumatic injuries, makes this a suitable cohort for an investigation of VCA. Patients and family members in the ED are often willing to participate in longer surveys while waiting for results of ancillary testing and dispositions from the treating physician.[25,26] Patients and their accompanying family and friends were eligible for inclusion if they were over 18 y of age and able to read and understand English. All study procedures were approved by the University of Pennsylvania and Cooper University Hospital Institutional Review Boards. All participants provided verbal informed consent.

Survey design

The authors developed the survey for this study (Appendix A). Content validity was assessed by coauthors with expertise in solid organ transplantation, VCA, bioethics, psychological aspects of appearance and disfigurement, emergency department survey administration, and survey development for ease-of-understanding within a population with lower levels of educational attainment. The survey required approximately 15 minutes to complete and contained 31 questions in which participants were asked to rate their familiarity and comfort with the process of solid organ donation. Specifically, questions addressed attitudes toward becoming a donor and attitudes toward discussing organ donation with family members; willingness to donate particular body parts after death; understanding of the organ donation process; agreement or disagreement with statements about immunosuppressant therapy, financial responsibility, and identity concerns related to VCA; and willingness to be a public figure after face or hand transplantation.

Participants responded using visual analog scales (VAS) for various questions (e.g., 0 = strong no; 100 = strong yes). To simplify the analysis, each VAS was collapsed into 3 categories: "no" for responses scoring 0–30, "maybe" for 31–69, and "yes" for 70–100.

Demographic data also were collected, including age, gender, marital status, religious affiliation, level of education, race/ethnicity, employment status, income and whether or not they had undergone any cosmetic or transplant surgical procedures. No identifying information was collected.

Survey administration

Eligible patients were identified at the Cooper University Hospital ED by trained research associates who approached patients and their accompanying family and friends once the initial physician encounter was completed and patients were considered medically stable for participation. Enrollment was conducted 7 d a week, from 8:30 a.m. to 10:30 p.m., ensuring a representative ED sample. Once informed consent was obtained, the questionnaire was administered using a laptop computer, with questions read aloud for patients with vision limitations. Survey responses were entered into and managed by the secure, web-based Research Electronic Data Capture (REDCap) survey tool hosted at the University of Pennsylvania.[27]

Statistical analysis

Summary statistics for all variables were examined to assess integrity of survey responses. Frequencies and proportions were reported for categorical variables. Means and standard deviations or medians and interquartile ranges were analyzed for continuous variables, as appropriate. For all analyses, an α (α) level of $P < 0.05$ was considered statistically significant. Chi-squared or Fisher's exact tests were used to determine statistical differences in responses by age, gender, race (white / non-white), religion (Christian / non-Christian), employment status (unemployed / healthcare / non-healthcare), income ($<$\$25,000 / $\geq$\$25,000 per year), and education ($<$12th grade, 12th grade, $>$12th grade). Statistical tests were conducted using IBM SPSS Statistics (version 21.0, Armonk, NY).

Results

Cohort characteristics

One thousand twenty-seven individuals completed the survey over the 7-month study period. **Table 1** summarizes the demographic characteristics of the respondents. The

Table 1. Demographic characteristics of the study population (N = 1,027)

Characteristics	Answer	N	(%)
Person Seeking Care in ED (N = 1,027)	Self	905	(88.5)
	Family member or friend	112	(10.9)
	Other	6	(0.6)
Reason for Visit to ED (N = 1,015)	Illness	697	(68.7)
	Injury	154	(15.2)
	Other	164	(16.2)
Age (N = 1,022)	18–29 years	287	(28.1)
	30–39	193	(18.9)
	40–49	190	(18.6)
	50–59	190	(18.6)
	60–69	99	(9.7)
	70–79	44	(4.3)
	80–89	17	(1.7)
	90+	2	(0.2)
Gender (N = 1,022)	Female	636	(62.2)
	Male	386	(37.8)
Race (N = 1,022)	White	592	(57.9)
	Black	410	(40.1)
	Asian	7	(0.7)
	Other	13	(1.3)
Ethnicity (N = 1,002)	Non-Hispanic	756	(74.0)
	Hispanic	246	(24.1)
Religious Affiliation (N = 1,004)	Christianity	705	(70.2)
	No religion	145	(14.4)
	Islam	25	(2.5)
	Judiaism	19	(1.9)
	Other	110	(11.0)
Employment Status (N = 1,023)	Unemployed	601	(58.7)
	Non-healthcare profession	297	(29.0)
	Healthcare profession	125	(12.2)
Estimated Annual Income (N = 868)	<$25,000	470	(54.1)
	$25,000-$50,000	225	(25.9)
	$50,000 - $75,000	64	(7.4)
	$75,000 - $100,000	55	(6.3)
	$100,000 - $150,000	33	(3.8)
	>$150,000 per year	21	(2.4)
Highest Education Completed (N = 1,022)	8th Grade or less	32	(3.1)
	9th Grade	29	(2.8)
	10th Grade	39	(3.8)
	11th Grade	69	(6.8)
	12th Grade	400	(39.1)
	1–2 y of college	249	(24.4)
	3–4 y of college	153	(15.0)
	Graduate degree	51	(5.0)
Prior Cosmetic Surgery (N = 1,021)	Yes	45	(4.4)
Transplant History (N = 1,023)	No transplant history	852	(83.3)
	Family member with transplant or listed	108	(10.6)
	Not sure	44	(4.3)
	Transplant recipient or listed	19	(1.9)
Kidney Disease (N = 1,024)	No kidney disease	693	(67.7)
	Not sure	54	(5.3)
	Family member has kidney disease	195	(19.0)
	Yes has kidney disease	82	(8.0)
Dialysis History (N = 277)[1]	No dialysis	124	(44.8)
	Family member on dialysis	118	(42.6)
	Self on dialysis	20	(7.2)
	Not sure	15	(5.4)

[1]Posed to those who answered that they or a family member have kidney disease.

majority were ED patients (88.5%) seeking treatment for an acute medical condition (68.7%). Respondents ranged in age from 18–90+ years, with the majority being between 18–29 y of age (28.1%). Most were female (62.2%), white (57.9%), and non-Hispanic (74.0%). A total of 127 (12.4%) participants had experience with organ transplant: 10.5% had a family member listed for recipient of an organ and 1.9% had themselves listed for recipient of an organ.

General knowledge of organ donation

As summarized in **Table 2**, the vast majority (93.0%) of respondents had heard of organ donation. Respondents were most familiar with solid organ transplants involving kidneys (97.6%), heart (96.2%), and liver (94.3%) and were less familiar with transplants of the hands (67.1%), ovaries (63.3%), face (57.2%), stomach (54.7%), and uterus (53.1%). Respondents were most familiar with biological or tissue type match as being a required step for organ donation.

Preferences and rationale for organ donation

Table 3 summarizes respondent preferences and rationale for organ donation. Despite most respondents (69.7%) reporting that they would want to be an organ donor, only 52.8% of these individuals (37.1% in total) were listed as organ donors on their driver's licenses, and 42.0% (34.0% in total) reported ever having discussed organ donation with their families. The most common reason for wanting to be an organ donor was to save a life.

Respondents were most willing to donate solid organs upon death, with the majority of respondents indicating "yes" (i.e., 70–100 on VAS ranging from 0–100) for kidneys (77.5%), liver (77.1%), and heart (76.4%). Fewer respondents indicated "yes" for uterus (60.0%, women only) and hands (54.6%). The fewest respondents indicated "yes" to willingness to donate their face (44.0%).

Most respondents (55.4%) indicated no reason for not wanting to donate an organ. Of those willing to donate a solid organ (i.e., heart, kidney, or liver) but not a face, the most common reasons were: wanting one's face to remain intact (13.8%), not wanting one's family to see one's face on another person (10.4%), and not wanting another person to look like oneself (9.0%).

Table 2. Knowledge of organ donation

Question	n	(%)
Heard of organ donation (N = 1,020) [1,2,3]	949	(93.0)
Sees organ donation as [4]		
Saving a life	776	(75.6)
Better quality of life	554	(53.9)
Donation after death	515	(50.1)
Service to mankind	379	(36.9)
Do not know	44	(4.3)
Believes required steps for organ donation include [4]		
Biological/tissue type match	776	(75.6)
Immunology match	757	(73.7)
Advance directive / statement in will	713	(69.4)
Registration at DMV	704	(68.5)
Approval of donor's family	661	(64.4)
Discussion w/ family, friends, physician	629	(61.2)
Time / distance between donor and recipient	570	(55.5)
Registration with state of regional donor registry	528	(51.4)
Believes it is possible to donate		
Kidneys (N = 1,021)	996	(97.6)
Heart (N = 1,021)	982	(96.2)
Liver (N = 1,018)	960	(94.3)
Corneas (N = 1,013)	806	(79.6)
Hands (N = 1,015)	681	(67.1)
Ovaries (N = 1,003)	635	(63.3)
Face (N = 1,015)	581	(57.2)
Stomach (N = 1,011)	553	(54.7)
Uterus (N = 1,004)	533	(53.1)

Chi-squared or Fisher's exact tests determined statistically significant ($p < 0.05$) differences between
[1]race (white / non-white),
[2]income (<$25,000 / ≥$25,000 per year),
[3]education (<12th grade, 12th grade, >12th grade).
[4]Items that allowed more than one response are reported as% of total survey respondents.

Preferences for receiving an organ transplant

As shown in **Table 4**, respondents demonstrated greater willingness to receive a kidney (85.2%) than a hand (60.0%, $P < 0.001$) or face (49.4%, $P < 0.001$) transplant, as indicated by a "yes" (i.e., 70–100 on VAS ranging from 0–100). Of these, most were willing to accept a lifetime of immunosuppressant therapy for hand (80.7%) or face (81.3%).

Attitudes toward social aspects of VCA

Table 5 shows respondents' attitudes toward social aspects of VCA. While attitudes toward payment for solid organ transplants and face transplants did not differ in general, more respondents felt patients and their families should pay for face and hand transplants (13.4%) compared with solid organ transplants (4.6%) ($P < 0.001$). More respondents indicated they would desire to meet the recipient of a loved one's kidney transplant compared with a hand or face transplant. Of those who would wait longer for a hand or face transplant that matched their skin color, most were not sure how much longer.

Presented with 3 potential face transplant recipients, respondents preferred a face transplant going to an injured soldier over a healthy person injured from an animal attack or a smoker burned from a house fire caused by a lit cigarette. This preference did not vary with respect to demographic variables (i.e., age, gender, race, religion, employment status, income, and education). Respondents were more willing to be interviewed on television after receiving a kidney transplant than a hand or face transplant. Most would prefer an open casket burial or cremation after donating an internal body part (62.8%). In contrast, cremation and closed casket burial were preferred after donating a visible body part (59.2%).

Table 3. Preferences and rationale for organ donation

Question					n	(%)
	Wants to be an organ donor (N = 989) [1-3]				689	(69.7)
	Listed as an organ donor on driver's license (N = 1,013) [1-4]				376	(37.1)
Discussed organ donation with family (N = 1,019)[1-3,5,6,]						
	Yes, several times [8]				183	(18.0)
	Yes, once [8]				163	(16.0)
	No, never				673	(66.0)
Would want family to donate if incapacitated (N = 334)[8]						
	Yes				269	(80.5)
	No				33	(9.9)
	Not sure				32	(9.6)
Reasons for wanting to donate organs[9]						
	[1,3,7] Save a life				792	(77.1)
	[1,3] Effectively use remains				353	(34.4)
	[1,3,] Contribute to education				287	(27.9)
	[1,2,3,4] Contribute to science				284	(27.7)
	[3,7] No reason				163	(15.9)
	[6] Other				36	(3.5)
Reasons for not wanting to donate organs[9]						
	No reason				569	(55.4)
	Wants body to remain intact				105	(10.2)
	Thinks donation could affect medical care				80	(7.8)
	Does not like the idea				71	(6.9)
	Religious / spiritual preferences				64	(6.2)
	Concerned about dispensation of remains				59	(5.7)
	Only wants to donate certain organs				51	(5.0)
	Does not think donation can help others				50	(4.9)
	Other				98	(9.5)
Would donate upon death[10]	No		Maybe		Yes	
Kidneys (N = 995)	160	(16.1)	64	(6.4)	771	(77.5)
Liver (N = 989)	170	(17.2)	56	(5.7)	763	(77.1)
Heart (N = 989)	177	(17.9)	56	(5.7)	756	(76.4)
Corneas (N = 999)	257	(25.7)	93	(9.3)	649	(65.0)
Stomach (N = 989)	277	(28.0)	78	(7.9)	634	(64.1)
Hands (N = 994)	358	(36.0)	93	(9.4)	543	(54.6)
Face (N = 996)	486	(48.8)	72	(7.2)	438	(44.0)
Ovaries (women only) (N = 608)	189	(31.1)	46	(7.6)	373	(61.3)
Uterus (women only) (N = 610)	196	(32.1)	48	(7.9)	366	(60.0)
Reasons for wanting to donate internal organs but not face [9,11]						
	Wants face to remain intact				142	(13.8)
	Does not want family to see another who looks like self				107	(10.4)
	Does not want another to look like self				92	(9.0)
	Believes organ donation helps others more than face donation				60	(5.8)
	Other				25	(2.4)
	Not applicable				4	(0.4)

Chi-squared or Fisher's exact tests determined statistically significant ($P < 0.05$) differences between
[1]race (white / non-white),
[2]income ($<$ \$25,000 / $\geq$ \$25,000 per year),
[3]education ($<$ 12th grade, 12th grade, $>$ 12th grade),
[4]employment (unemployed / healthcare / non-healthcare),
[5]gender (male / female),
[6]religion (Christian / non-Christian),
[7]age.
[8]Question posed only to "Yes" responses to previous question.
[9]Items that allowed more than one response are reported as% of total survey respondents.
[10]VAS (0 = strong no, 100 = strong yes) were collapsed into 3 categories: "no" for responses scoring 0-30, "maybe" for 31-69, and "yes" for 70-100.
[11]Participants only received this question if their willingness to donate heart, kidney or liver was $\geq$60 and willingness to donate face was $\leq$40.

Table 4. Preferences for receiving an organ transplant

	No		Maybe		Yes	
Question	**n**	**(%)**	**n**	**(%)**	**n**	**(%)**
Would consider receiving[1]						
Kidney (N = 994)	91	(9.2)	56	(5.6)	847	(85.2)
Hand (N = 990)	280	(28.3)	116	(11.7)	594	(60.0)
Face (N = 989)	367	(37.1)	133	(13.4)	489	(49.4)
Would take immunosuppressants to receive[1]						
Kidney (N = 877)	36	(4.1)	71	(8.1)	770	(87.8)
Hand (N = 680)	55	(8.1)	76	(11.2)	549	(80.7)
Face (N = 573)	33	(5.8)	74	(12.9)	466	(81.3)
	Dangerous	Neutral	Safe			
Perception of immunosuppressant risk (N = 980)[2]	187	(19.1)	506	(51.6)	287	(29.3)

[1]VAS (0 = strong no, 100 = strong yes) were collapsed into 3 categories: "no" for responses scoring 0–30, "maybe" for 31–69, and "yes" for 70-100.
[2]VAS (0 = extremely dangerous, 100 = completely safe) were collapsed into 3 categories: "dangerous" for responses scoring 0-30, "neutral" for 31-69, and "safe" for 70-100.

Table 5. Attitudes toward social aspects of VCA

Question	**Response**	**n**	**(%)**
Believes transplants should be funded by			
Solid organs (N = 1,011)	Insurance	612	(60.5)
	Government	223	(22.1)
	Patients / Families	47	(4.6)
	Other	129	(12.8)
Face and hands (N = 1,006)	Insurance	537	(53.4)
	Government	201	(20.0)
	Patients / Families	135	(13.4)
	Other	133	(13.2)
Wishes to meet recipient of loved ones			
Kidney (N = 1,015)	Yes	576	(56.7)
	No	327	(32.2)
	Not sure	112	(11.0)
Hand(s) (N = 1,012)	Yes	450	(44.5)
	No	451	(44.6)
	Not sure	111	(11.0)
Face (N = 1,010)	Yes	423	(41.9)
	No	473	(46.8)
	Not sure	114	(11.3)
Would wait longer to receive transplant of own skin color			
Hand(s) (N = 987)	No	440	(44.6)
	Not sure	123	(12.5)
	Yes	424	(43.0)
	1 week [1]	20	(3.9)
	1 month [1]	37	(7.2)
	Several months [1]	62	(12.0)
	1 y [1]	49	(9.5)
	2 y or longer [1]	123	(23.9)
	Not sure [1]	224	(43.5)
Face (N = 977)	No	417	(42.7)
	Not sure	119	(12.2)
	Yes	441	(45.1)
	1 week [1]	15	(2.8)
	1 month [1]	37	(7.0)
	Several months [1]	47	(8.9)
	1 y [1]	50	(9.5)
	2 y or longer [1]	152	(28.8)
	Not sure [1]	226	(42.9)

(*continued on next page*)

Table 5. Attitudes toward social aspects of VCA *(Continued)*

Question				Response	n	(%)
Wishes for treatment of bodily remains						
After internal organ donation (N = 1,003)				Closed casket	134	(13.4)
				Cremation	303	(30.2)
				Donation to science	62	(6.2)
				Open casket	327	(32.6)
				Does not wish to donate	101	(10.1)
				Other	76	(7.6)
After visible body part donation (N = 1,000)				Closed casket	276	(27.6)
				Cremation	316	(31.6)
				Donation to science	61	(6.1)
				Open casket	105	(10.5)
				Does not wish to donate	160	(16.0)
				Other	82	(8.2)
Endorses face transplant for [2]				Disagree	Neutral	Agree
Animal attack (N = 988)	41	(4.1)	83	(8.4)	864	(87.4)
Burns from cigarette fire (N = 979)	195	(19.9)	159	(16.2)	625	(63.8)
Injured soldier (N = 988)	24	(2.4)	40	(4.0)	924	(93.5)
Willing to be interviewed on TV after receiving transplant [3]	No	Maybe	Yes			
Kidney (N = 990)	406	(41.0)	96	(9.7)	488	(49.3)
Hand(s) (N = 969)	435	(44.9)	100	(10.3)	434	(44.8)
Face (N = 965)	448	(46.4)	105	(10.9)	412	(42.7)

[1]Question posed only to "Yes" and "Not Sure" responses to previous question.
[2]VAS (0 = strongly disagree, 100 = strongly agree) were collapsed into 3 categories: "disagree" for responses scoring 0-30, "neutral" for 31-69, and "agree" for 70-100.
[3]VAS (0 = strong no, 100 = strong yes) were collapsed into 3 categories: "no" for responses scoring 0-30, "maybe" for 31-69, and "yes" for 70-100.

Discussion

VCA is a growing specialty throughout the world. Several academic medical centers both within and outside of the United States have already performed these procedures and others are preparing to offer them. To date, most VCA-related research has focused on technical aspects of the procedures and issues of immunosuppression, with some discussion of the psychosocial and bioethical issues.[3-10] Less is known about public perception and attitudes toward these procedures, which was the rationale for this study.

Perhaps not surprisingly, awareness of VCA is lower compared to that of solid organ transplants. This likely reflects the recent introduction of VCA relative to solid organ transplantation. Even with the extensive and ongoing media coverage of face and hand transplantation, awareness of these procedures is not as great as that of solid organ transplantation.

While a majority of those surveyed indicated a desire to posthumously donate their organs, only half of these individuals had registered as organ donors. Among those willing to donate organs or body parts, approximately one-third of respondents indicated that they would be willing to donate their face or hands. However, donation preferences tend strongly toward solid organs over the hands and face. The main reasons for reluctance to donate were desire for one's face to remain intact after death and aversion toward another person looking like oneself, which is perhaps representative of the central role of the face in self-identity.[28,29] Because face transplantation most often results in a hybrid appearance of the donor's facial features with the recipient's underlying bone structure,[30] addressing the latter concern may be important for successfully educating VCA donors and recipients as well as the general public.[31]

Respondents were more willing to receive a donated organ than to donate their own organ, as found in other studies.[32,33] This dichotomy is true for kidney transplants as well as for transplants of the hands and face, which suggests that existing problems associated with the solid organ shortage may apply to VCA as it becomes more common. On average, people who would accept a hand or face transplant are almost as willing to accept the risk of lifelong immunosuppressant therapy for VCA as they are for a kidney transplant.

Attitudes toward the societal implications of VCA suggest that the study population views transplant of the hands or face as a partly medical and partly elective procedure. Many of those who would accept a hand or face transplant would prefer a body part that matches their skin tone, which suggests that cosmetics may be an important consideration for VCA. In addition, more survey respondents indicated that VCA costs should be paid out-of-pocket than by insurance or government programs as compared to solid organ transplant. This could represent a threat to the long term growth and sustainability of the specialty, as few individuals would be able to pay for the substantial medical costs presently associated with these procedures.

Perception of personal sacrifice and accountability for facial trauma plays a role in public endorsement of face

transplant. Transplant to ameliorate injury sustained secondary to military service garners nearly universal support. Victims of disfiguring accidents receive substantial support as well, though transplantation is valued more highly for "blameless" accidents than for accidents partly resulting from the victim's own actions.

While our study provides new information on attitudes toward VCA, it has some limitations. Primarily, our sample, while large and diverse, can be seen as non-representative of the more general population. Future studies that include more geographical and socioeconomic representation, but that also use large sample sizes, may provide additional information on attitudes toward VCA or yield important confirmatory findings.

In conclusion, this study suggests that an urban emergency department population is more aware of and comfortable with solid organ transplantation than VCA. While organ transplantation is generally well-received, hand and face transplants are less understood and less accepted. The high willingness to donate organs despite the low rates of donor registration and family member discussion reported in this study could be improved by promoting discussion of organ donation among family members, as suggested by previous studies.[34-36] These observations may serve as potential targets for future public education campaigns that not only emphasize the need for organ donation registration but the specific consideration of VCA procedures as well. Finally, additional research is needed to further elucidate the psychosocial concerns, particularly in the areas of identity and body image, among donors and recipients of VCA.

Disclosure of Potential Conflicts of Interest

No potential conflicts of interest were disclosed.

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