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Organ donation from burn-injured patients—a national perspective

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ABSTRACT

Background: There is a discrepancy between publically available data from the United Network for Organ Sharing (UNOS) database and perception of the incidence of mortally burn-injured patients serving as organ donors. In the last 5 y, a single burn center referred several patients who went on to successfully donate multiple organs. However, UNOS data indicate very few referrals of patients with burn injuries nationwide. This discrepancy in UNOS-reported occurrences *versus* institutional experience prompted this work.

Methods: UNOS data from 1988–2012 was examined for causes of death related to thermal injury, electrical injury, inhalation injury, or carbon monoxide poisoning. The National Burn Repository was examined for burn center death rates and patient characteristics of those with reported nonsurvivable burn injuries. Finally, a national survey queried the clinical experiences and educated opinions of burn center directors, transplant surgeons, and organ procurement organization (OPO) representatives regarding organ donation in the burn-injured population.

Results: Between 42% and 52% of those surveyed responded. Survey data indicate that at least 61 patients with burn-related injuries have served as organ donors in the past 5 y alone, *versus* 23 identified in 24 y of UNOS data. Survey data also indicate that inhalation injuries were the most common burn-related injuries seen before successful organ procurement. Kidneys were the most commonly donated organs, but all major organs and tissues were represented in the experiences of surgeon and organ procurement organization respondents. Up to 10% surgeon respondents believe that patients with burn injuries should not be referred for possible organ donation.

Conclusions: There are more organs donated by patients with mortal burn injuries than currently available UNOS data would suggest. Survey data suggest that these patients should be able to contribute successfully to the supply of organs needed by those on transplant waiting lists, but remain inconsistently recognized as such a resource. Knowledge about long-term organ and tissue viability from burn-injured patients is lacking, and should be the focus of future research.

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1. Introduction

1.1. Case report

A 16-y-old male was involved in a house fire reportedly caused by a television explosion. The patient was found to be asystolic in the field by first responders, who estimated 15 min of down time before the initiation of Advanced Cardiac Life Support. Cardiopulmonary resuscitation continued *en route* to a local emergency room, and minutes after arrival, vital signs were regained. Shortly thereafter, a laryngeal mask airway was placed, and request was made for transfer to the nearest burn center, approximately 23 miles away.

The patient presented to the burn center with approximately 50% total body surface area burns to the back, buttocks, bilateral upper and lower extremities, and carbonaceous debris around the nose and mouth with bronchoscopic evidence of inhalation injury. Chest x-ray showed bilateral lung infiltrates. The patient was endotracheally intubated and massive fluid resuscitation with vasopressive support was initiated. The patient had a carboxyhemoglobin level of 21.3% on initial laboratory tests at the burn center, with an estimated level of 50%–60% near the time of injury.

The patient's Glasgow Coma Score was 3T without the need for sedatives or paralytics, and he showed no evidence of brainstem activity. He lacked gag reflex, cough reflex, rectal tone, and both pupils were fixed and dilated. Referral was made to the local organ procurement organization (OPO) for evaluation of appropriateness for organ donation approximately 9 h after presentation to the burn center. An estimated 36 h after injury, brain death was confirmed by clinical examination and apnea test. The patient's family wished to proceed with organ donation and the patient was able to donate bilateral lungs and kidneys. As of December 2012, the involved OPO reported that the patients' bilateral lungs were donated to a single recipient who was still alive at 1-y posttransplantation. The statuses of donated kidneys were unavailable.

1.2. Background and literature review

The gap between the number of patients awaiting organ transplant and the number of available organs has been problematic for over half a century [1]. As of February 20, 2014, there are 121,290 patients on the waiting list for an organ transplant, with 77,325 of them in active waiting status [2]. Since 1988, the largest number of United States transplants performed in a given year occurred in 2006, with 28,940 transplants from 14,750 donors (8017 deceased and 6733 living). Although this is a large increase in transplants from those documented only 10 y prior in 1996 (19,765 transplants from 9222 donors), the disparity between organ availability and need continues to grow. The United Network for Organ Sharing (UNOS) partners with the Organ Procurement and Transplant Network (OPTN) to maintain a database of statistics that has detailed yearly organ donations and transplants since 1987. Donor causes of death are available, although burn-related injuries are not included as categories of cause. As such, it is unclear how many patients with nonsurvivable burn-related injuries contribute to the donor pool each year.

The National Burn Repository (NBR) is a rolling database cataloging a 10-y record of inpatient burns in North American burn centers. In the 2012 annual report,183,036 cases are represented from 2002–2011, with 6822 of them listing death as the documented outcome [3]. On the basis of known individual burn center experiences, mortally burn-injured patients do go on to donate greatly needed organs, as did the patient described in the previously mentioned case report; however, simply referencing the national data available from OPTN would lead one to believe that it is a very rare occurrence.

The following were the aims of this study: (1) to assess the number of burn-related organ donors evident in OPTN national data reporting, (2) to estimate the number of mortally burn-injured patients represented in the NBR that may have qualified as organ donors, and (3) to nationally survey professionals involved in burn care and organ transplantation in an effort to assess their experiences and opinions regarding organ donation in patients with burn injury. The overall goal was to use these data to identify reasons for discrepancies in reported numbers in databases *versus* actual donor figures, and codify different perspectives on referral of patients with burn injuries for organ donation.

Table 1 – Deaths per age group as reported in 2002–2011 data of the NBR.

Age group (y)	Deaths in NBR	Deaths with no comorbidities	Average hospital length of stay (±SD) (d)	Minimum hospital length of stay (d)	Maximum hospital length of stay (d)
0–19.9	533	180	13.7 ± 25.8	1	168
20–29.9	329	172	22.3 ± 65.2	1	508
30–39.9	412	170	12.6 ± 34.7	1	385
40–49.9	645	180	19.4 ± 38.0	1	232
50–59.9	820	192	14.1 ± 26.6	1	235
Total	2739	894	16.4 ± 40.4	1	508

Deaths without comorbidities are those patients with "True" recorded as a qualifier for the question of "No comorbidities" within the database. Those with "No" or "Null" recorded were not considered. Total lengths of hospital stay were examined for those patients with an outcome of death and no comorbidities. Any portion of the first 24 h of admission counts as 1 d toward hospital length of stay.