

Improving Organ Procurement Travel Practices in the United States: Proceedings from the Michigan Donor Travel Forum

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There are significant risks and inefficiencies associated with organ procurement travel. In an effort to identify, quantify, and define opportunities to mitigate these risks and inefficiencies, 25 experts from the transplantation, transportation and insurance fields were convened. The forum concluded that: on procurement travel practices are inadequate, there is wide variation in the quality of aero-medical transportation, current travel practices for organ procurement are inefficient and there is a lack of standards for organ procurement travel liability coverage. The forum concluded that the transplant community should require that air-craft vendors adhere to industry quality standards compatible with the degree of risk in their mission profiles. Within this context, a purchasing collaborative within the transplant community may offer opportunities for improved service and safety with lower costs. In addition, changes in travel practices should be considered with broader sharing of procurement duties across centers. Finally, best practice standards should be instituted for life insurance for transplant personnel and liability insurance for providers. Overall, the aims of these proposals are to raise procurement travel standards and in doing so, to improve the transplantation as a whole.

Key words: Organ recovery, organ procurement, organ procurement systems, public policy, safety

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Since the deaths of six members of the University of Michigan transplant team in 2007, significant efforts have been made to examine organ procurement travel in the United States (1,2). There is a growing concern within the transplant community that current organ procurement travel practices are associated with excess risk due to poor weather conditions, remote locations and the sense of urgency. In the past two decades, there have been 27 reported deaths among transplant professionals worldwide as a result of aircraft accidents while traveling to procure organs (Table 1) (1).

To broaden our understanding of all the variables in procurement travel, we consulted air safety experts and surveyed surgeons, organ procurement organization (OPO) directors, and transplant center administrators (see reference 1 for survey details). It became clear that there are problems with the complexities of medical transportation, including the business models used for regional travel. Through the generosity of the University of Michigan Health System, we were given the opportunity to convene a group of experts from diverse fields to focus on improving the safety and efficiency of travel for organ procurement in the United States (Table 2). The goals of the forum were to identify, quantify and define opportunities to mitigate risks and inefficiencies associated with air travel for organ procurement. In this paper, we summarize the findings of Michigan Donor Travel Forum and introduce policy and practice initiatives designed to better inform those involved in organ procurement travel and to offer suggestions to improve travel for organ procurement in the United States.

Issue 1: The Currently Available Data on Organ Procurement Practices Are Inadequate

There are minimal available data on current organ procurement travel practices in the United States. The only systematic assessment of current procurement travel practices was completed by the forum organizers via (1) a

Table 1: Publicly reported fatal organ procurement accidents (1)

| Transplant center | Year | Mode of travel | Location | Number of fatalities |
|---|------|---------------------|-------------------------|----------------------|
| University of New Mexico | 1990 | Fixed wing aircraft | New Mexico, USA | 2 |
| Ruhr University Bochum | 1994 | Helicopter | Bad Oeynhausen, Germany | 1 |
| Santa Casa de Porto Alegre, Rio Grande do Sul | 1997 | Fixed wing aircraft | Florianopolis, Brazil | 7 |
| California Transplant Donor Network | 2000 | Fixed wing aircraft | California, USA | 1 |
| Brotzu Hospital of Cagliari | 2004 | Fixed wing aircraft | Sardinia, Italy | 6 |
| University Hospital of Besançon | 2006 | Fixed wing aircraft | Besancon, France | 4 |
| University of Michigan | 2007 | Fixed wing aircraft | Wisconsin, USA | 6 |

survey of members of the American Society of Transplant Surgeons (ASTS) and (2) analysis of National Transportation Safety Board (NTSB) data by the Aircraft Owners and Pilots Association–Air Safety Foundation (AOPA-ASF). The AOPA-ASF analyzes aircraft accident data from the NTSB and publishes the annual Joseph T. Nall Report concerning all general aviation in the United States (3). Analyses were done specifically by AOPA-ASF regarding organ procurement-related accidents for the Michigan Donor Travel Forum. Participants in the forum comprehensively reviewed these data. Careful consideration was given to the limitations of this work and specific conclusions were highlighted.

The majority of organ procurement travel in the United States is arranged by OPOs (about 75%), whereas many large transplant centers arrange their own travel. A detailed documentation of organ procurement travel would require an extensive audit of both OPO and transplant center records. In addition, there is a significant amount of travel involved in the procurement of tissues, and this travel had not previously been considered. Overall, the group concluded that reliable detailed data on organ procurement travel are not systematically gathered or reported, which imposes limitations on our ability to improve safety, efficiency and cost.

Table 2: Participants in the Michigan Donor Travel Forum

| Name | Organization | Area of expertise |
|-------------------------|--|--------------------------|
| David Kenny | AOPA Air Safety Foundation Frederick, MD | Air Safety |
| David Wright | AOPA Air Safety Foundation Frederick, MD | Air Safety |
| Dawn Mancuso | Association of Air Medical Services Alexandria, VA | Air Safety |
| Denise Landis | University of Michigan Ann Arbor, MI | Air Safety |
| Hank Miller | University of Michigan Ann Arbor, MI | Air Safety |
| Jeff Guzzetti | National Transportation Safety Board Washington, DC | Air Safety |
| Larry Pietropaulo | Sundance Helicopters, Inc. Las Vegas, NV | Air Safety |
| Mike Seely | Pacific Northwest Transplant Bank Portland, OR | Air Safety |
| Peter Forster | University of Michigan Ann Arbor, MI | Air Safety |
| Randy Africano | AAM Consulting Peoria, IL | Air Safety |
| Dale Berry | Huron Valley Ambulance Ann Arbor, MI | Ground transportation |
| Mike Sweeney | United States Aviation Underwriters, Inc. New York, New York | Insurance |
| Barbara Nikolychick | Huntleigh McGehee Insurance Agency Clayton, MO | Liability/insurance |
| Bruce Wilson | Association of Organ Procurement Associations McLean, VA | Organ procurement/policy |
| Cassandra Smith- Fields | University of Nebraska Omaha, NE | Organ procurement/policy |
| Elaine Berg | New York Organ Donor Network New York, New York | Organ procurement/policy |
| Jim Bowman | Health Resources and Services Administration Rockville, MD | Organ procurement/policy |
| Jim Cutler | Southwest Transplant Alliance Dallas, TX | Organ procurement/policy |
| Kim Nicholl | Duke University Durham, NC | Organ procurement/policy |
| Richard Hasz | Gift of Life Donor Program Philadelphia, PA | Organ procurement/policy |
| Sue Dunn | Donor Alliance Denver, CO | Organ procurement/policy |
| Alan Langnas | University of Nebraska Omaha, NE | Transplant surgery |
| Bob Higgins | Rush University Chicago, IL | Transplant surgery |
| Jeff Punch | University of Michigan Ann Arbor, MI | Transplant surgery |
| John Roberts | University of California–San Francisco San Francisco, CA | Transplant surgery |
| Mark Barr | University of Southern California Los Angeles, CA | Transplant surgery |
| Michael Englesbe | University of Michigan Ann Arbor, MI | Transplant surgery |
| Robert Merion | University of Michigan Ann Arbor, MI | Transplant surgery |
| Shimul Shah | University of Massachusetts Worcester, MA | Transplant surgery |

Recommendation on Issue 1: Document Current Organ Procurement Travel Practices and Costs in More Detail

Within OPOs that arrange travel themselves, there is likely to be existing high quality, granular data regarding travel practices. It was thought that a systematic effort to collect these data from the OPOs would provide insight into both travel practices and costs. In collaboration with the Association of Organ Procurement Organizations (AOPO), we plan to participate in a detailed survey of OPO directors regarding current travel practices and costs. Previous surveys by the AOPO have garnered responses from almost 100% of OPO directors. Our group is optimistic that these survey data will provide the first national assessment of current practices and costs for organ procurement travel. As we develop a better understanding of current practices and costs, consideration of specific performance benchmarks and standards of practice can be considered.

Issue 2: Operators Currently Contracted for Transplant Travel Vary Dramatically in Terms of Aircraft, Pilot Qualifications and Safety Certifications

The aviation experts offered new perspectives on variations in safety culture, safety management systems and overall quality across carriers. At present, it appears that most OPOs and transplant centers procure aircraft charter services for transport with limited knowledge of the qualifications and safety certifications of the charter operators under consideration. Furthermore, few surgeons and OPO directors possess the requisite knowledge needed to properly evaluate the qualifications of these operators and make an informed decision as to an operator's suitability for such flights. In most cases, requisitioning parties appear to select charter operators based upon criteria that are both intuitive and readily accessible to nonaviation personnel, such as price, aircraft availability and proximity to the departure destination. Although some OPOs utilize the services of charter brokers, concern for the air carrier's safety certifications, liability insurance limits, prior FAA violations and safe operating practices might play too little a role in the process of selecting an air charter operator. Overall, to quote an invited expert in air safety, 'You are hailing a cab when you need to travel; your people deserve better'.

Recommendation on Issue 2: Assure High-Quality Aero-Medical Operators for All Transplant Professionals

The group discussed issues critical to assuring that all charter operations are conducted by highly qualified and certified vendors detailed herein.

Certifications and affiliations with national benchmarking groups

Among aviation experts, charter carriers exhibiting the highest operational and safety standards are clearly identifiable based upon third party audits and certifications. Although several charter operator safety certification programs and operating standards exist, the most recognized and coveted are: the platinum level certification award provided by the Aviation Research Group U.S. (ARG/US), the Wyvern Standard and the International Standard for Business Aircraft Operations (IS-BAO) developed by the International Business Aviation Council. Charter operators with these certifications have undergone audits verifying adherence to the very highest standards. These certifications include an assessment of overall operations, initial and recurrent pilot training standards and qualifications, safety management systems, ongoing safety training and culture, quality assurance systems, aircraft dispatch, aircraft maintenance and maintenance personnel qualifications and continuing education standards. Certification by one from these groups should be strongly considered by OPOs and transplant centers as a criterion for selecting a charter operator for medical transport.

In the event that it is not possible to utilize an air charter operator possessing one of the certifications listed earlier, it is recommended that the OPO or transplant center perform due diligence by means of either the National Business Aircraft Association's (NBAA) Aircraft Charter Pre-Screening Questionnaire (available at nbaa.org/prodsvcs/store/accg/) or by requesting a Charter Evaluation and Qualification Report (CHEQ Report) from ARG/US. Both the NBAA questionnaire and CHEQ report address safety concerns of subcontracting/outsourcing air transport services in the event of aircraft nonavailability. It should be noted that while both the ARG/US CHEQ report and the NBAA questionnaire will provide information for due diligence, proper evaluation of the information is required to determine operator suitability. With this in mind, a decision matrix based upon the NBAA questionnaire should be developed and deployed to all OPOs and transplant centers.

Pilot safety and training

Part of assuring a company commitment to a culture of safety includes employing high-quality pilots and giving them the opportunity for safety training and improvement. A charter carrier should facilitate annual or semiannual safety training for their pilots. A company should have a safety officer with an in-depth understanding of aviation safety and broad authority to assure a culture of safety within the company. The charter carrier should have policies to avoid 'green on green' situations, which refer to the pairing of an inexperienced captain with an inexperienced first officer.

Maintenance training and aircraft safety record

High-quality charter operators employ high-quality aviation technicians. The company must facilitate continuous maintenance training and quality assurance.

Operational control and aircraft availability

The demands that a transplant center or OPO place on charter operators are quite high, due primarily to a relatively small volume of flights, intermittent and unpredictable demand for flights and short lead times prior to flights. Our group voiced broad concern about how charter carriers manage situations when demand for aircraft is high or aircraft are off-line due to maintenance issues. Common practice in these situations is that a charter operator that cannot service a given procurement trip will coordinate a flight through a back-up vendor. Although the purchaser may have assurances as to the quality of their primary vendor, explicit contractual arrangements must be made to assure that any subcontracted backup vendor also meets purchaser-defined quality criteria.

There were particular safety concerns regarding the purchasing of flight services on an *ad hoc* basis. Contracts must be established to provide flight services for specified periods of time. There should not be any financial incentive for a charter operator or a pilot to fly a particular flight. In addition, there can be no pressure on a pilot to fly because of the importance of the 'mission'. Such incentives and influences may have deleterious safety implications by forcing utilization of secondary or even tertiary vendors. Decision algorithms regarding 'fly/no fly' should be made in advance and be based only upon the safety of crew and medical teams.

Transplant aviation purchasing group

According to FAA records for 2007, and based on flight hour estimates by participants in the forum, organ procurement activities in the United States require an estimated 12 000 flight hours per year of private air travel, mostly in turbine-powered, fixed-wing aircraft. Based on these numbers and an estimated maximum aircraft annual utilization of 800 flight hours per aircraft, it is conceivable that the transplant community could support a specialized network of 15 strategically located aircraft specifically designed to handle transplant procurement trips. Using this logic, one aviation expert estimated potential net cost savings in the range of 30–40% when compared to estimates of current financial outlays.

A suggestion was made that there may be an opportunity for transplant providers to consolidate the currently fragmented and relatively disorganized travel into an aviation services purchasing group. With collaboration among OPO directors, AOPO, ASTS and transplant centers, high-volume use of aircraft could be leveraged into the creation of a dedicated fleet for consistently safe, reliable and affordable service. Such a purchasing group would assure

ARG/US platinum status for all transplant travel. In addition, consolidation would facilitate auditing and quality assurance of the charter operator. A single charter operator could provide a higher level of service and would provide the transplant community with critically important data on cost and utilization of air travel in transplantation.

Issue 3: Current Organ Procurement Travel Practices are Inefficient

There was general consensus that opportunities exist to improve the efficiency of current organ procurement travel practices. For example, there are frequently multiple abdominal or thoracic teams present at a procurement procedure (1,2). Such redundancy of expertise may be unnecessary. Similarly, organs are generally procured by a team from the institution that will be doing the transplant. Such practices markedly increase the amount of travel and resources needed to procure donor organs (1,2).

Numerous potential opportunities to improve the efficiency of organ procurement were discussed. These included:

1. Increased procurement of organs by local transplant surgeons.
2. Transportation of donors to centralized procurement facilities.
3. Limiting procurement procedures to an appropriately trained single thoracic and single abdominal team.
4. Improved technology such as real-time video and audio links between the procurement operating room, the procurement surgeon and the transplant surgeon.
5. Improving communication and trust between transplant centers and surgeons.

There were differences in opinion among surgeons regarding the viability of these potential efficiency measures. For example, some cardiac and lung transplant surgeons expressed reservations about local procurement of organs, with the organ then being flown to the recipient transplant hospital. Anecdotally, these surgeons stated that they have had relationships with other transplant centers with which they felt comfortable, allowing that center to procure a heart or lung on their behalf, but such relationships are currently rare. There was broader acceptance for local procurement of livers.

Some OPO directors and surgeons voiced the opinion that initiatives to improve the efficiency of organ procurement practices will hinge upon collegiality and trust among surgeons. It was thought that in certain areas this simply did not exist yet and that efforts to improve efficiency by increasing the local procurement and shipping of organs would not be possible. Conversely, in certain regions of the United States there is already the impression that this

is very feasible and is already being done successfully in some areas.

Recommendation on Issue 3: Develop Regional Organ Procurement Collaboratives in Liver Transplantation

The group opined that liver transplantation is a good potential target for such process improvements, as it involves more travel by individual teams than does kidney procurement, yet has less stringency on the part of recipient surgeons for seeing the organ *in situ* than does heart or lung transplantation. Also, there are already successful regional precedents for such an approach. For such process improvements to expand into thoracic transplantation, it was thought that success must first be demonstrated in abdominal transplantation.

Given the current requirements for regional sharing of some livers for transplant, there may be even greater opportunities to increase the efficiency of procurement practices. Clearly, such relationships among transplant centers require excellent communication, technical expertise, and mutual respect. It was suggested that ASTS, AOPO and the OPTN liver committee could take leadership roles in such efforts.

Issue 4: Lack of Standards for Organ Procurement Insurance and Travel Liability Coverage

In an informal poll of OPO directors, transplant administrators and transplant surgeons, there was a striking lack of knowledge regarding insurance implications and associated liability. This was particularly true among the transplant surgeons. The issues are complex. For example, if a transplant surgeon is employed by a university and is procuring organs on behalf of that university, presumably the surgeon would be insured by the transplant center. However, the insurance policy held by the transplant center may have a specific exclusion for charter air travel. In contrast, when a transplant surgeon is employed by a transplant center but the surgeon is procuring organs for the OPO as an independent contractor, it is unclear who, if anyone, insures the transplant surgeon. The group felt strongly that insurance coverage is needed for all employees of the OPO and transplant center, including the surgeons. In addition, the OPO and transplant center must be aware of the coverage status of all charter and transportation providers. In the event of a travel accident, both the charter operator and the party contracting are potentially exposed to liability. This is particularly true in the context of an inadequately insured charter operator.

Recommendation on Issue 4: Define Travel Liability Coverage Best Practices

Considering the complexity of the issues surrounding liability and insurance for organ procurement travel, our group decided to attempt to define travel liability coverage best practices. A brief overview of these best practices is detailed later. More explicit and detailed recommendations will be made in collaboration with AOPO and ASTS. At a minimum, an insurance agent with expertise in transplantation and aero-medical transportation is important when purchasing coverage.

It should be clearly defined who insures the transplant professionals who travel to procure organs. For example, who should assure adequate coverage for surgeons, surgical trainees, medical students, organ procurement/preservation professionals who travel to recover organs? A general rule for determining the limits of liability is to set it at 10 times the annual salary of specified decedents. In addition, the policy should include an appropriate aggregate total limit for benefits payable.

For example, a physician or resident participating in organ procurement might be insured with a US\$ 3 million accidental death, dismemberment and paralysis benefit. For transplant perfusionists and medical students, a US\$ 1 million benefit might be reasonable. An aggregate limitation of US\$ 11.5 million payable due to any single accident was suggested. This coverage should include 24-h accident protection while on a business trip, broad commutation coverage and specified aircraft coverage.

Importantly, in the case of a travel-related accident, the party that owns the vehicle is potentially liable as well as the contracting party. For example, if an OPO contracts for a flight, the OPO may be sued for damages in the event of an accident. Moreover, if the plane crashes into a residential area causing loss of life and/or property damage, the potential liability could be large. This liability may fall on the aircraft operator, but also on the party contracting the aircraft. Transplant centers and OPOs should make sure that their charter operator has a minimum of US\$ 25–50 million accident liability coverage, with the OPO or transplant center being listed as an additional insured party.

Although some of the broader-based implications of organ procurement travel may take sometime to implement, best insurance practice and qualifications of charter providers should be addressed as soon as feasible.

Summary

This forum was convened to address an issue central to transplantation: the process of obtaining and transporting an invaluable and perishable resource without undue risk to personnel or cost to the healthcare system. This concept

is at once readily understood and easily overlooked, as the requirements for flexibility and responsiveness in a transport system do not always align with maximizing safety and minimizing cost. Despite the relative dearth of data regarding current organ procurement practices, our group was able to make initial recommendations. The most crucial of these is that transplant centers and OPOs should reexamine aircraft vendors, and require that they adhere to industry quality standards compatible with the degree of risk in their mission profiles. Within this context, a purchasing collaborative within the transplant community may offer opportunities for improved service and safety with lower costs. In addition, fundamental changes in travel practices should be considered with broader sharing of procurement duties across centers. Finally, the group recommended that best practice standards be instituted for life insurance for transplant personnel and liability insurance for providers. The aims of these proposals is to raise procurement travel standards to the same level of quality and efficiency as exist elsewhere in the transplant environment, and in doing so to improve the field as a whole.

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References

1. Englesbe MJ, Merion RM. The riskiest job in medicine: Transplant surgeons and organ procurement travel. *Am J Transplant* 2009; 9: 2406–2415.
2. Lynch RJ, Mathur AK, Hundley JC et al. Improving organ procurement practices in Michigan. *Am J Transplant* 2009; 9: 2416–2423.
3. Aircraft Owners and Pilots Association—The 2007 Nall Report. <http://www.aopa.org/asf/publications/nall.html>. Accessed September 17, 2009.