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Communication gaps for solid organ transplant-transmitted infections among infectious disease physicians: an Emerging Infections Network survey

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Abstract: Infectious disease (ID) physicians were surveyed concerning knowledge and management of potential transplant-transmitted infections (TTIs). On the basis of cumulative responses to 4 questions that assessed solid organ transplant-related clinical exposures and experience, respondents were divided into 3 groups: most, some, or little transplant experience. Rapid access to donor data was identified as the most important factor when evaluating a potential TTI. Despite varying experience in transplant infections, ID physicians are frequently asked for opinions regarding donor suitability and TTI management. Improved ID physician access to donor information and educational resources will allow more optimal management of potential TTIs.

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Organ donor screening for infections is currently based on donor history and laboratory testing. Serologic testing for deceased donors is mandated for a limited number of pathogens (1, 2). However, because of organ shortages and desire to minimize time delays to optimize allograft function, organs may be transplanted before behavioral risk factors and/or confirmatory testing of initial laboratory screening tests are known. The current screening process results in few transplant-transmitted infections (TTIs); however, residual risks remain if the donor is asymptomatic or in the window period of infection (3, 4). Although additional screening approaches exist for some pathogens (i.e., nucleic acid amplification tests [NAAT]), these have not been uniformly implemented (5).

Donor evaluation data are held and communicated by the 58 organ procurement organizations (OPO), each representing a unique Donation Service Area. Any concern for a potential TTI must be communicated preprocurement by the OPO to the recipient's transplant center per the policy of the Organ Procurement and Transplantation Network (OPTN) (1), which is operated by the United Network for Organ Sharing (UNOS). However, this communication is often incomplete at the time of transplantation, as relevant results may only become available after transplantation. In addition, OPOs and transplant centers are required to report suspected TTIs in recipients to the OPTN.

The OPTN has a Disease Transmission Advisory Committee (DTAC) that confidentially reviews all

reports of potential donor-derived disease to determine whether or not transmission is likely (6). Collective case information is subsequently used to guide OPTN policy and enhance education efforts among organ transplant professionals regarding potential donor-derived events. Through DTAC and other mechanisms, public health authorities may become involved to further investigate these events (7). However, even when potential TTIs are recognized, communication challenges can occur between the OPO and transplant centers. A recent review of potential donor-derived infection events reported to DTAC over an 18-month period demonstrated frequent delays and errors in communication at multiple levels in the communication process, which ultimately contributed to adverse outcomes among affected transplant recipients (8).

Infectious disease (ID) physicians, regardless of their transplant experience, may be asked to provide local expertise regarding interpretation of donor serologies, quantification of donor behavioral risk factors, and management of solid organ transplant (SOT) recipient infections. Thus, we surveyed ID physicians to identify if information gaps exist concerning management of potential TTIs.

Materials and methods

In February 2010, a web-based survey was distributed to 1339 ID physician members of the Emerging Infections Network (EIN). The network is funded by the Centers for Disease Control and Prevention (CDC) and sponsored by the Infectious Diseases Society of America (IDSA) (9). Since its establishment in 1995, the EIN has evolved into a flexible sentinel network comprised of over 1300 infectious disease specialists primarily from North America. The overarching goal of the EIN is to assist the CDC and other public health authorities with surveillance for emerging infectious diseases and facilitate communication between healthcare entities. Membership requirements include physicians who (i) specialize in ID, (ii) see patients on a regular basis, (iii) are willing to complete periodic brief surveys, and (iv) are an IDSA and/or Pediatric Infectious Diseases Society member (10). Participation is voluntary. EIN members comprise approximately 17% of the IDSA's total physician membership and represent all regions of the United States, Puerto Rico, and Canada. Approximately 50% of EIN members practice in a University or teaching hospital setting, 35% in a private or group practice, and the remainder in government hospitals/agencies or the pharmaceutical industry. Clinical ID experience among EIN members ranges from <5 years to >25 years after completing an ID fellowship. EIN members receive approximately 5 surveys per year on various clinical ID topics and also receive and can participate in a moderated listserv.

Staff at the EIN coordinating center (Iowa City, Iowa USA) sent the initial survey with a brief introduction to the topic by e-mail or facsimile, followed by 2 reminders to non-responders. Data were analyzed using SAS version 9.2 (SAS Institute, Cary, North Carolina USA). Chi-square or Fisher's exact test was used to compare proportions between categorical variables, as appropriate. EIN surveys do not meet the regulatory definition of human subject research, as determined by The University of Iowa Human Subjects Office/Institutional Review Board and thus receive an exemption from review.

Multiple content experts assisted with design of the survey, and survey readability and comprehension was tested among a small group of ID physicians before distribution to the EIN membership. The survey assessed ID physician clinical exposure and experience with SOT infections. The first 5 questions focused on their background and experience with transplant ID. The next series of 6 questions asked about local donor screening practices, and how and from whom their institution would obtain access to donor information. Respondents were also asked to rank in order the factors they find most useful in evaluating a possible TTI. The final 2 questions requested information about evaluation of potential donors and the frequency of involvement in potential TTIs.

Respondents were divided into 3 groups based on a numerical score calculated according to their cumulative response to 4 questions: (i) organ transplants performed at their institution (yes = 1, no = 0), (ii) involvement in SOT recipient care (routine = 2, rarely = 1, never = 0), (iii) proportion of SOT ID in their practice ($\geq$ 50% = 2, 1–50% = 1, none = 0), and (iv) transplant ID clinical/research interest (yes = 1, no = 0). Respondents were classified as having little (score 0–1), some (score 2–4), or most (score 5–6) transplant experience. Responses to questions on donor screening and access to donor information were examined for differences based on these categories of respondent experience. The analysis included those respondents who reported that organ transplants were not performed in their institution to be inclusive of providers who treat transplant recipients receiving medical care outside of their transplant center and/or those respondents who have received specific training in transplant-related ID.

Results

In total, 684 (51.1%) EIN members responded to the survey. Not all respondents answered all of the questions. Respondents and non-respondents were similar with respect to geographic location and practice setting (e.g., hospital, academic, private practice, federal government/military). Respondents were significantly more likely than non-respondents to have at least 5 years of ID experience ($P = 0.0004$).

Among respondents, 146 (22%) are routinely involved in SOT infection management, 269 (40%) are rarely involved, and 269 (38%) never manage such infections. On the basis of the aforementioned criteria, 85 (12%) ID physicians were considered to have the most transplant ID experience, of which 20 (3%) devote $\geq 50\%$ of their clinical time to SOT patient care. Of the respondents, 297 (44%) had some transplant ID experience, and 302 (44%) had little experience (Table 1). The majority of the 382 respondents with the most or some experience report their training in transplant infections occurred either through clinical experiences after fellowship completion ($n = 156$, 41%), or training in a fellowship program with transplant ID exposure ($n = 148$, 39%).

Of the 253 ID physicians who work at an institution where organ transplants are performed, 87 (34%) were aware that their institution had a protocol for managing recipients of organs from increased-risk donors (11), 32 (13%) were at institutions without such a protocol, and 118 (47%) were unsure (16 ID physicians did not answer). Among those respondents who answered that their institution had no increased-risk donor protocol, the survey did not further assess for the possibility that these respondents may be unaware of such an institutional protocol. Of the 87 respondents who were aware that their institution had a protocol, 73 (84%) provided additional information regarding their institutional protocol. The most frequent pathogens targeted for recipient screening included human immunodeficiency virus (HIV; serology and NAAT), hepatitis C virus (HCV; serology and NAAT), and hepatitis B virus (HBV; hepatitis B surface antigen and NAAT). Of these, NAAT testing is part of the screening protocol for HIV in 38 (51%), HCV in 36 (41%), and HBV in 25 (34%) centers.

Regardless of ID physician transplant experience, rapid access to donor data was identified as the most important factor when evaluating a potential TTI. ID physicians with some or the most experience endorsed improved communication with OPOs as the most important link to gaining additional donor information, whereas those with the least experience ask a transplant ID colleague. Of respondents with the most transplant experience, 55 (65%) had direct access to the OPO, whereas those with some (77, 26%) or little experience (4, 1%) reported significantly less access ($P < 0.0001$). Of the 357 ID physicians who responded to the question, 157 (43%) have been contacted for opinions regarding donor organ suitability prior to procurement (Fig. 1).

A total of 71 (20%) respondents had been previously involved with an unexpected potential TTI. These infections included 28 unique pathogens, of which *Mycobacterium tuberculosis*, West Nile virus, and *Histoplasma* were the most commonly noted. Of these 71 respondents, 20 (28%) reported difficulty obtaining relevant case information from the OPO, specifically donor culture results and pertinent recipient information from transplant centers utilizing other organs from the common donor.

Transplant infectious disease (ID) experience among 684 ID physician respondents based on self-reported characterizations of practice patterns[1]

	Reported organ transplant experience:		
Respondent answers to survey questions	Little to no experience	Some experience	Most experience
Are organ transplants performed in your institution?			
Yes	17 (7%)	152 (60%)	84 (33%)
No	285 (66%)	145 (34%)	1 (0.2%)
Are you ever involved in transplant ID?			
Yes, routinely	0	61 (42%)	85 (58%)
Yes, rarely	37 (14%)	232 (86%)	0
Never	265 (99%)	4 (1%)	0
Transplant ID constitutes what portion of your practice?			
Significant ($\geq 50\%$)	0	1 (5%)	20 (95%)
Some (1–50%)	0	277 (81%)	65 (19%)
None	302 (94%)	19 (6%)	0
Do you have a clinical or research interest in transplant infections?			
Yes	5 (3%)	57 (39%)	85 (58%)
No	297 (55%)	240 (45%)	0
Totals	302 (44%)	297 (44%)	85 (12%)

[1]Row percentages shown.

Table 1

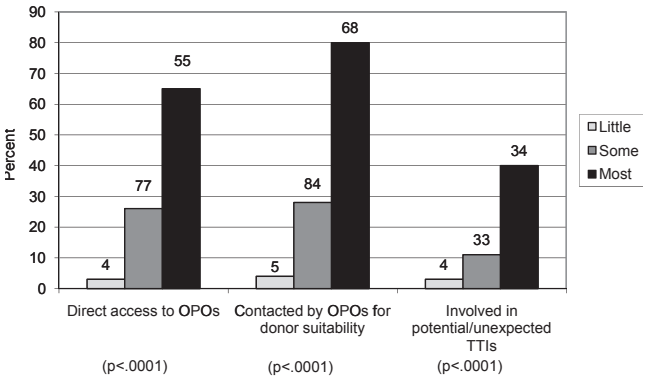

Fig. 1. Organ procurement organizations (OPOs) accessibility, donor suitability inquiries, and involvement with transplant-transmitted infections (TTIs) among infectious disease physician survey respondents. Percentage (number) of survey respondents who indicate having direct access to OPOs to obtain relevant donor/recipient information, receiving inquiries regarding donor suitability, and involvement in potential unexpected TTIs. The number of respondents per category varies, as not all respondents answered all of the questions. When classified by level of transplant experience, the differences by percentage of respondents in all categories are statistically significant ($P < 0.0001$).

Many respondents provided additional suggestions to assist ID physicians in the management of TTIs, most focusing on educational efforts and practice guideline development. Many respondents proposed the promotion of improved understanding of communication channels between ID physicians managing transplant recipients with suspected TTIs, OPOs, the CDC, and centers managing transplant recipients of common-donor organs.

Discussion

We demonstrate that despite varying transplant experience, ID physicians are frequently asked for their opinion regarding potential donor organ suitability prior to organ procurement, and sometimes asked to consult on recipient management of possible TTIs. Of concern, although most respondents (78%) rarely or never manage SOT patients, they still may be asked by other transplant professionals to consult on urgent questions regarding these issues. Further decision-making by ID physicians is complicated by their unfamiliarity with institutional increased-risk donor screening protocols, uncertainties about whom to contact, and limited access to relevant clinical information.

The limited capacity to quantify preprocurement donor infection risk further compounds communication gaps. Of the survey respondents, 20% were previously involved with management of suspected TTIs, and 28% of these had difficulty obtaining pertinent information from the OPO regarding the donor and the other common-donor organ recipients.

Reporting of a suspected TTI depends on reporting by physicians at the transplant recipient's facility and/or the participating OPO. Although reporting is mandated by OPTN policy (1), significant underreporting likely occurs (12). Our results demonstrate that ID physicians across all levels of experience have incomplete access to the OPO, the agency to whom the concern should first be reported. Interruptions in communication between ID physicians, OPOs, and others managing common-donor organ recipients, may result in delays in reporting potential TTIs to the OPTN through DTAC. Likewise, there is potential for delayed involvement of public health authorities to further investigate events (13). Communication complexities and challenges likely lead to management delays of suspected TTIs, if they are even reported. The Council of State and Territorial Epidemiologists approved a position statement recognizing the need for health departments to develop transplant-related expertise to improve TTI investigation (14).

Our results show that ID physicians with the most experience in managing transplant infections have more contacts with their OPO. Respondents' comments reflected a need for better communication and educational resources to aid management of TTI issues. Specific suggestions included education about the role of OPOs and how to better access relevant donor information, development of a "1-800" help line to assist in real-time management of transplant infections, guideline development specific to TTI issues, and accessibility to other online resources. Information regarding the role of the various agencies in the detection, communication, and investigation of TTIs is accessible via their websites (Table 2). American Society of Transplantation pathogen-specific transplant ID guidelines are also available (15).

Efforts to more formally address these communication and educational deficiencies are underway. The NOTIFY Project is being coordinated by the World Health Organization and the Italian National Transplant Centre, and involved the gathering of information worldwide on adverse outcomes in transplantation, emphasizing the need for standardized methods for detection and investigation globally. In the future, a website is planned that will host a database of information collected by the NOTIFY Project, which is intended as a communication hub for institutions worldwide to allow access to Biovigilance information (16). In addition, with the assistance of the DTAC,

Various organizations involved in the detection, communication, and investigation of donor-derived infections

Name	Website	Role
United Network for Organ Sharing (UNOS)	http://www.unos.org/	Private, non-profit organization managing the US organ transplant system under contract with Human Resources and Services Administration, a federal government agency
Organ Procurement and Transplant Network (OPTN) • US Transplant Centers • OPTN Reporting Line • Disease Transmission Advisory Committee (DTAC)	http://optn.transplant.hrsa.gov/ http://optn.transplant.hrsa.gov/members/search.asp http://optn.transplant.hrsa.gov/resources/professionalResources.asp?index=61-866-787-4909 http://optn.transplant.hrsa.gov/members/committeesDetail.asp?ID=95	UNOS-operated organization regulating organ allocation and placement Phone listing of all US transplant centers Reporting mechanism for potential patient safety issues and OPTN policy violations OPTN committee that compiles all potential TTI cases reported to UNOS
Council of State and Territorial Epidemiologists (CSTE); Centers for Disease Control and Prevention (CDC)	Report to state and local health department; http://www.cste.org CDC provides assistance to health depts.; http://www.cdc.gov	Public health reporting and investigation of notifiable diseases and suspected illness clusters
Organ Procurement Organizations (OPOs)	http://organdonor.gov/organizations/organ_procurement.htm http://www.aopo.org/click-state-find-opo-a6	Contact and background information for US OPOs

TTI, transplant-transmitted infection.

Table 2

there was recent implementation of OPTN policy changes to facilitate communication (1). These changes focused on standardizing OPO and transplant center procedures in reporting and sharing information in cases of potential donor-derived transmission events. Periodic reevaluation of the DTAC experience guides the need for any future OPTN policy changes and identifies areas of educational opportunity for those involved in transmission events.

Our study has several limitations. ID physicians from the EIN may not be representative of all ID physicians in the United States. Also, respondents may have had a greater interest in transplant infections, been more aware of institutional screening protocols, and been more informed on how to access relevant clinical information than the non-respondents. The converse may also be true, in that respondents may have taken the survey because they find this a problematic issue, necessitating additional educational resources. Finally, respondents tended to have more experience than non-respondents; hence, our results may suggest that EIN members have more transplant experience than they actually do.

The recognition and management of TTIs is challenging owing to suboptimal screening methods prior to organ procurement. Management is further complicated by communication gaps between reporting physicians and the various agencies responsible for investigating potential donor-derived events. Because ID physicians are frequently asked for guidance, improved access to transplant infection related resources and educational opportunities are needed.

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