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Transplantid.net: A Pilot Crowdsourced, Living, Online Library of Resources for the Teaching and Practice of Transplant Infectious Diseases

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The field of transplant infectious diseases is rapidly evolving, presenting a challenge for clinical practice and trainee education. Here we describe the construction of *transplantid.net*, a free online library, crowdsourced and continuously updated for the dual purpose of point-of-care evidence-based management and teaching.

Keywords. bibliography; education; library; solid organ transplantation; stem cell transplantation.

The field of transplant infectious diseases (TID) is a well-recognized subset of infectious diseases characterized by a specialized knowledge base, rapidly evolving literature, and

dedicated journals of interest. TID usually includes infectious issues pertinent to solid organ transplantation, mechanical circulatory support, stem cell transplantation, and hematological malignancies.

In the United States, TID is often a focus of rotations in general infectious diseases training programs, as well as dedicated TID subspecialty fellowships. However, keeping up with medical and scientific advances is labor-intensive for practitioners and educators. For the year 2022 alone, a PubMed search of MeSH (Medical Subject Headings) major topics “transplant” and “infection” yields >1800 articles [1].

The difficulty in staying current in the field hinders evidence-based clinical care and education. Individuals and training programs commonly develop local libraries of TID resources, resulting in duplication of effort. Here we describe the inception of *transplantid.net*, a continuously updated online TID library designed to aid teaching and patient care, using free resources. The target audience encompasses trainees, clinical practitioners, and leadership in infectious diseases education, such as program directors and transplant medical directors. Although useful in its current form, this pilot project is intended to serve as the basis for future iterations that allow for the collection of metrics for library improvement and educational scholarship.

METHODS

Needs Assessment

In 2017, a needs assessment survey (approved by the Institutional Review Board of the Albert Einstein College of Medicine) was distributed on the American Society of Transplantation (AST) Infectious Diseases Community of Practice (IDCOP) e-mail list. Data were collected and analyzed using SurveyMonkey [2]. A 5-point Likert scale was employed as appropriate, for example, “On a scale of 1 (completely unimportant) to 5 (very important)” or “On a scale of 1–5, 1 = strongly disagree, 5 = strongly agree.”

Criteria for Selection of Articles

Articles relevant to solid organ and stem cell transplantation, hematologic malignancies, and mechanical circulatory support are considered for inclusion. The guiding principle for selection is whether the article would be helpful in answering a clinical question pertinent to the daily practice of TID, particularly for trainees during rounds.

These include but are not limited to guidelines (especially from AST and the Infectious Diseases Society of America [IDSA]), review articles on common clinical syndromes, primary research articles of clinical or educational value, and

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case series or reports of importance relevant to the practice of TID. When possible, preference is given to open access articles. Papers of epidemiological or historical interest may be considered for teaching purposes.

Mechanics of Library Maintenance

Members of the IDCOP volunteered to join the TID Online Library Working Group (chaired by Y. A. P.). Contributors are each assigned 1–3 journals to monitor (Supplementary Table 1), which are reevaluated and redistributed on an ongoing basis. Several major journals are followed by >1 contributor to capture varied opinions and to have built-in redundancy when a reviewer is unavailable.

Contributors receive a monthly automated e-mail reminder to review their journals and submit articles that meet criteria. Additional articles from any source may be recommended by contributors ad libitum. Consensus is reached on whether to add the article to the library, with the chair of the Working Group as the final arbiter.

The bibliography is maintained through Zotero [3], a free, open-source reference management software platform, which is searchable and allows cross-referencing under multiple topics (Figure 1). The library is freely accessible and requires no login or password.

New additions to <http://transplantid.net> (also at <http://txpid.net>) are posted on the social media platforms Twitter (<https://twitter.com/TransplantIDNet>) and Mastodon (<https://med-mastodon.com/@TransplantIDNet>). Article links posted to these platforms are accompanied by brief editorial comments by the selecting contributor that describe the article's clinical relevance or educational value. Periodic meetings are held to address library maintenance issues and cull outdated or redundant references.

RESULTS

Needs Assessment

The initial needs assessment received 77 responses, of which 62 (80.5%) were from attending physicians in infectious diseases and 7 (9.1%) from fellows in infectious diseases (Supplementary Table 2). Most respondents (68 [88.3%]) served as infectious diseases consultants (Supplementary Table 3). The majority of the respondents rounded with trainees and gave lectures (Supplementary Table 4). Program leadership was well-represented, including 16 (20.8%) in infectious diseases fellowship leadership roles, 9 (11.7%) in TID fellowship leadership, and 4 (5.2%) in other leadership roles.

The most common online resources employed for clinical care and education were PubMed, IDSA guidelines, AST guidelines, and UpToDate (Supplementary Tables 5 and 6). Respondents placed a high priority on their online TID

resources having computer access, regular updates, searchability, and cross-referencing (Supplementary Table 7). There was a modest preference for a larger, more comprehensive resource over a smaller, curated one (Supplementary Table 7).

Agreement with the statement “I am satisfied with my available reference options for patient care” averaged 3.23 on a Likert scale from 1 to 5, and agreement with “I am satisfied with my available reference options for education” was 3.36 (Table 1). Interest in a dedicated online TID library was strong, with an average of 4.55 agreement with the statement “I would be interested in a dedicated online transplant infectious diseases library” (Table 1).

Online Presence of the Library

Currently, <http://transplantid.net> (Figure 1) consists of >1200 links to articles and other online resources, filed under >80 topic headings. A dedicated folder entitled “BASICS” contains articles for trainees beginning their first TID experience. Articles are cross-referenced; for example, the IDSA guidelines for Aspergillosis are filed under “Aspergillus” as well as “IDSA Guidelines.”

The Twitter feed has more than 2000 followers, with >250 tweets and >200 000 impressions in 2022. The Mastodon feed currently serves as an automated mirror of the Twitter feed.

DISCUSSION

The optimal practice and teaching of TID requires ready access to high-yield and up-to-date data. Yet a centralized unrestricted compendium of relevant studies has previously been unavailable. A needs assessment survey that queried TID members of the AST IDCOP, including a significant proportion of attending physicians in educational leadership positions, indicated that available reference options for patient care and education did not address existing needs. Thus, a dedicated, dynamic online TID library was in demand.

The resulting pilot project to create a centralized and open-access online TID library has anecdotally been well-received. The compendium is constructed through a crowdsourcing model that relies upon volunteer contributors and automated e-mail reminders to screen journals and solicit articles. Notably, this approach can be applied to any moderate-sized body of literature, including other infectious diseases subspecialties (eg, human immunodeficiency virus, mycology, orthopedic infections).

There are, however, several limitations to the TID library in its current form. First, for copyright reasons, full-text articles are not available unless they are already open access. Traditional publishing still requires payment to gain online access to articles, and the availability of journal subscriptions varies widely between institutions. This limitation has resulted in a

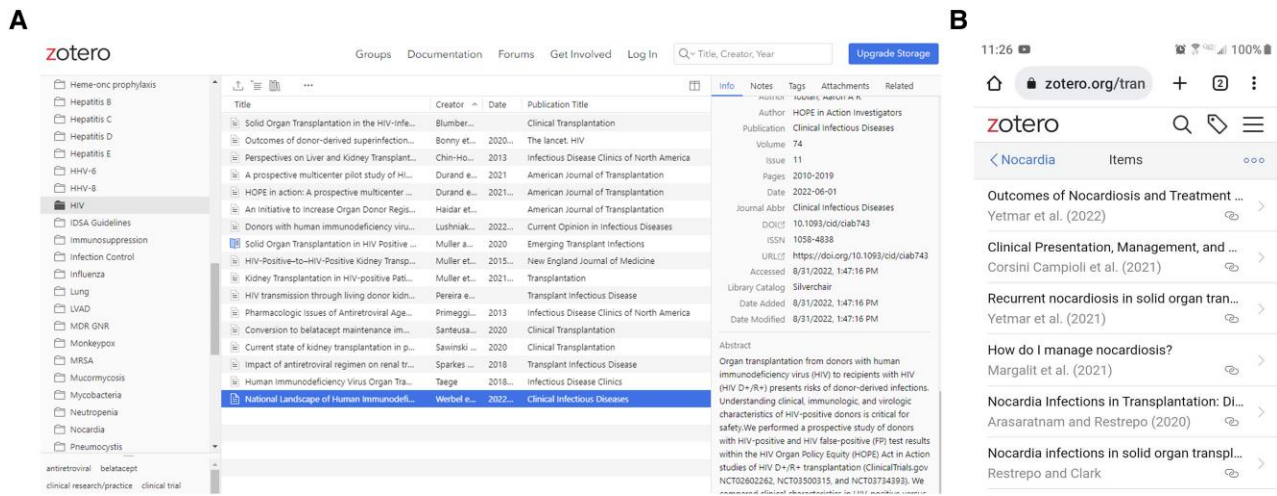


Figure 1. Screen capture of transplantid.net on a desktop computer (A) and mobile phone (B).

Table 1. Responses to the Question “Regarding Your Own Transplan Infectious Diseases Resources ... (on a Scale of 1–5, 1 = Strongly Disagree, 5 = Strongly Agree)”

Statement About Resource	No. of Respondents	Average
I rely on my own library of transplant infectious diseases articles for reference	77	3.47
I rely on a local/institutional library of transplant infectious diseases articles for reference	77	3.22
I rely on the American Society of Transplantation library	77	3.16
I pull articles as I need them	77	4.44
I rely on textbooks or review journals	76	3.57
I am satisfied with my available reference options for patient care	77	3.23
I am satisfied with my available reference options for education	77	3.36
I would be interested in a dedicated online transplant infectious diseases library	77	4.55

preference for open access articles, which constitutes selection bias.

In addition, decisions regarding which journals and articles to include are idiosyncratic to the working group members. All contributors are engaged in research in TID and are aware of biases involved in the choice of article (eg, their field of interest, journals in which they hold an editorial position, work authored by contributors or their colleagues). However, since many major journals are followed by >1 contributor, if 2 contributors independently choose the same article for inclusion, internal consistency is achieved. In our experience, there have been no significant issues in reaching a consensus within the working group regarding inclusion or exclusion.

Although previously there were pediatric infectious diseases specialists in the working group, there are none at the moment, and no pediatric journals are being monitored. We continue to solicit pediatric TID specialists to remedy this.

Social media engagement has been modest. Improving online social media presence through recognized strategies [4, 5] may increase the online footprint of this resource.

The current free, open-source tools do not allow for quantification of any metrics regarding the use of <http://transplantid.net> or any means to explore any relationship between social media presence and utilization of the library. However, funding has recently been obtained to upgrade the interface and allow for collection of data, including anonymized user locations to measure the geographic range of impact, and access to statistics for individual folders and articles. This more granular data will provide the basis for educational scholarship regarding value and engagement [6], as well as serve for a guide for self-improvement.

In summary, after demonstrating a need for enhanced access to high-yield TID references for clinical and educational purposes, a dedicated online TID library was constructed and has generated engagement anecdotally and on social media, suggesting utility for TID practitioners and trainees. Notably, this model is generalizable. By collecting website traffic and user engagement metrics, future iterations of transplantid.net will evolve to better address the educational and clinical needs of the TID community.

Supplementary Data

Supplementary materials are available at *Open Forum Infectious Diseases* online. Consisting of data provided by the authors to benefit the reader, the posted materials are not copyedited and are the sole responsibility of the authors, so questions or comments should be addressed to the corresponding author.

Notes

Author contributions. Conceptualization, construction, data collection, and analysis of needs assessment survey: Y. A. P. Conceptualization, construction, and maintenance of online resources: Y. A. P. Selection of articles for the library: all authors. Manuscript: Y. A. P., with editing by M. M. A., H. T., C. E. H., P. V., and S. A., and additional comments and approval from all authors.

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