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MAJOR ARTICLE

From Start to Finish: Examining Factors Associated With Higher Likelihood of Publication Among Abstracts Presented at an International Infectious Diseases Scientific Meeting

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Background. The landscape of infectious diseases research by interprofessional teams continues to change in both scope and engagement. Limited information exists regarding publication metrics and factors associated with publication of abstracts presented at professional infectious diseases meetings.

Methods. This was a retrospective, observational study evaluating abstracts presented at IDWeek in 2017 and 2018. The primary endpoint was the proportion of abstracts that were subsequently published in peer-reviewed journals. Factors associated with publication were evaluated, and a description of publication metrics was reported.

Results. Of the 887 abstracts analyzed from the IDWeek meetings, 236 (26.6%) were published. Significantly more abstracts were published if they were presented as a platform presentation versus poster presentation (35% vs 21%, $P < .001$). Inclusion of a PhD author significantly increased the likelihood of publication ($P = .0014$). Prospective studies, greater number of authors, and greater number of study subjects were more common among published abstracts. Median time to publication was 10.9 months, and the majority were published in infectious diseases journals, with an overall average impact factor of 7.7 across all journals.

Conclusions. Abstracts from IDWeek presented as oral platforms and those including a PhD author were more likely to be published. Large, diverse authorship teams were common among published abstracts. The high quality of resulting manuscripts is evident by the destination journals and their respective impact factors. These data may be used to inform and motivate clinicians and trainees engaging in infectious diseases–related research.

Keywords. abstracts; academician; IDSA; IDWeek; publications; research.

Evidence-based medicine remains a cornerstone in clinical decision making to optimize patient outcomes. Clinicians and health scientists further expand the body of evidence through dissemination of results through traditional and nontraditional methods. The traditional path for many research endeavors includes an abstract submission followed by presentation at an affiliated conference with final progression to a peer-reviewed manuscript [1]. Most clinicians would agree that not all abstracts are destined for publication as full manuscripts. However, the value of publishing to the authors, institutions, funding agencies, and other clinicians and health scientists is significant. For trainees specifically, the impact on career decisions, postgraduate training, and engagement in scholarship is well documented [2, 3].

The proportion of abstracts submitted to conferences and organized health sciences meetings varies significantly by discipline [4–6]. A Cochrane Review published in 2018 by Scherer and colleagues reported that the average proportion of abstracts published from conferences was 37.3%, ranging from 15.4% to 57.1%. This demonstrated a decline from a 44.5% in the 2007 Scherer Cochrane Review [6]. The publication landscape is dynamic and currently experiencing a surge in number of peer-reviewed journals and thus opportunities for dissemination of results. Several factors that have been observed to influence

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the likelihood of publication include a recognized vigorous study methodology (eg, clinical trial design), studies reporting a positive and statistically significant result, large multicenter studies, studies reporting basic science results, and studies originating from an academic medical center [6]. In addition, the interprofessional contributions and meaningful clinical research among infectious diseases clinicians and scholars may be unique to this discipline [7]. To date, there has not been a robust investigation into the contribution at the author level (eg, terminal degree) nor among infectious diseases–specific professional meetings. Furthermore, there are few data comparing final publications with original abstract data presented at national meetings. Three small studies examined abstracts from infectious diseases professional meetings; however, these are nearly 2 decades old and were significantly limited in number and scope [6]. Thus, the purpose of this study was to determine the proportion of abstracts presented at the Infectious Diseases Society of America's (IDSA) IDWeek 2017 and 2018 conferences that reached publication and to report factors that were predictive of publication.

Table 1. Comparison of Variables Among Published and Nonpublished Abstracts From IDWeek 2017 and 2018 Scientific Meetings

Variable	Published (n = 236), No. (%)	Not Published (n = 651), No. (%)	*P* Value
Year abstract presented			
2017	154 (65)	279 (43)	<.0001[a]
2018	82 (35)	372 (57)	<.0001[a]
Type of presentation			
Poster presentation	104 (44)	401 (62)	<.0001[a]
Oral/platform presentation	132 (56)	250 (38)	<.0001[a]
Degree of authors			
MD/DO included	208 (88)	583 (90)	.54
PharmD included	57 (24)	179 (27)	.34
PhD included	166 (70)	381 (59)	.001[a]
MPH included	104 (44)	281 (43)	.82
Primary affiliation of first author			
College of pharmacy	13 (6)	25 (4)	.27
School of medicine	107 (45)	252 (39)	.09
Nonuniversity setting/not available	116 (49)	374 (57)	.01[a]
Type of study			
Case report	3 (1)	12 (2)	.77
Case series	7 (3)	43 (7)	.04[a]
Original research	209 (89)	564 (87)	.49
Systematic review	11 (5)	19 (3)	.21
Other	6 (3)	13 (2)	.61
Study design			
Prospective	99 (42)	169 (26)	<.0001[a]
Retrospective	70 (30)	216 (33)	.33
Not applicable	45 (19)	184 (28)	.006[a]
Other/not listed	6 (3)	28 (4)	.32
No. of patients/participants, median (IQR)	417 (120–2016)	253.5 (87.5–1530.5)	.06
No. of authors, median (IQR)	8 (5–10)	6 (4–9)	<.0001[a]

Abbreviations: DO, Doctor of Osteopathic Medicine; IQR, interquartile range; MD, Medical Doctor; MPH, Master of Public Health; PharmD, Doctor of Pharmacy; PhD, Doctor of Philosophy.
[a]Statistically significant finding.

METHODS

This was a retrospective, observational study reviewing abstracts presented at IDWeek in 2017 and 2018. All abstracts were obtained from lists accessible through the IDWeek portal (n = 4355 total). Senior investigators (P. B. B. and C. M. B.) are active IDSA members. Abstracts were numbered, and a random sample was created using Microsoft Excel among all accepted abstracts listed in the portal. The authors hypothesized the proportion of published abstracts to be 25%. Data were collected and assessed by 4 investigators using the REDCap data tool [8]. Study investigators used a standardized search strategy of PubMed, International Pharmaceutical Abstracts, and Google Scholar databases to determine if presented abstracts were published. Respective strategies relative to each database are detailed in a previous publication using these validated search methods [4]. Any discrepancies were brought to senior investigators (P. B. B. and C. M. B.) for adjudication. The 2017 abstracts were followed for 3 years following the conference date to determine publication, and 2018 abstracts were followed for 2 years from the conference. This timeline was based on prior results of infectious diseases abstracts published a median of 12–16 months after presentation and the impact of the coronavirus disease 2019 (COVID-19) pandemic on publication of 2018 abstracts beyond the 2-year timeline [9–12]. All published articles were downloaded and assessed.

The primary endpoint of the study was the proportion of abstracts presented at IDWeek meetings in 2017 and 2018 that were subsequently published as peer-reviewed articles. The publication date used was the published date in the print journal or final online version, if online only. Categorical variables were compared using Fisher exact or χ^2 tests. Continuous variables were assessed using the Wilcoxon rank-sum test. Univariate and multivariate regression analyses were performed. For univariate statistical tests, P values $\leq .05$ were statistically significant, and all tests were 2-tailed. Factors associated with successful publication were determined using a multivariate regression model. The final list of covariates included year (2017 vs 2018), any author PharmD (yes vs no), any author PhD (yes vs no), oral/platform presentation versus poster, and the number of authors. Adjusted odds ratios (aORs) and 95% confidence intervals (CIs) were calculated. A description of published papers was also conducted, and variables (eg, authorship, sample sizes) were compared to original abstracts.

RESULTS

A total of 887 abstracts were randomly selected for study analysis. Among these, 236 (26.6%) abstracts were published in peer-reviewed journals. The majority of abstracts reviewed

were original research (n = 773/887 [87.1%]). From 2017, 433 abstracts were reviewed, and 154 (35.6%) were subsequently published. Of the sample of 454 abstracts selected from 2018, 82 (18.1%) were subsequently published. The proportion of published abstracts was significantly higher in 2017 compared to 2018 ($P < .0001$). Among the 887 abstracts analyzed, 505 (56.9%) were poster presentations, and 382 (43.1%) were platform presentations. A greater percentage of platform presentations were published as compared to poster presentations (34.6% vs 20.6%, $P < .0001$) (Table 1).

Authorship teams most frequently included a Medical Doctor (MD) or Doctor of Osteopathic Medicine (DO), represented in 791 (89.2%) abstracts. Among these, 208 (26.3%) abstracts were published. An MD or DO was most commonly the presenting author. Another common degree within the authorship team was a Doctor of Pharmacy (PharmD) with 236 of 887 (26.6%) abstracts consisting of at least 1 PharmD author, of which 57 (24.2%) were published. An author with a Master of Public Health (MPH) contributed to 385 of 887 (43.4%) abstracts, and 104 (27.0%) of these were published. Authors with Doctor of Philosophy (PhD) degrees were affiliated with 547 (61.7%) abstracts, and 166 (30.3%) of these resulted in publication. The inclusion of a PhD author was significantly more common among published abstracts ($P = .0014$). The median number of authors in published versus unpublished abstracts was 8 (interquartile range [IQR], 5–10) and 6 (IQR, 4–9), respectively ($P < .0001$). Included abstracts consisted of 268/887 (30.2%) prospective studies and 286/887 (32.2%) retrospective studies, of which 99 (36.9%) and 70 (24.5%), respectively, were published. The proportion of published abstracts was higher among prospective studies than in other types of studies ($P < .0001$). The median of the patients/participants in published studies was 417 (IQR, 120–2016) while the median in unpublished studies was 253.5 (IQR, 87.5–1530.5) ($P = .063$). In the multivariate regression analysis, abstracts presented in 2017 (aOR, 2.76 [95% CI, 2.00–3.81]; $P < .0001$), oral/platform presentations (aOR, 1.96 [95% CI, 1.40–2.73]; $P < .0001$), and the presence of a higher number of authors (aOR, 1.04 [95% CI, 1.01–1.07]; $P = .023$) were associated with higher likelihood of publication.

Table 2. Description of Resultant Publications From IDWeek 2017 and 2018 Abstracts

Variables	No. (%)[a]
Time to publication, mo, median (IQR)	
2017	11.8 (5.5–19.4)
2018	8.6 (4.6–14.7)
Overall	10.9 (5.0–17.7)
Proportion of published abstracts within 1 y of conference	
2017 (n = 154)	79 (51.2)
2018 (n = 82)	50 (61.0)
Proportion of published abstracts within 2 y of conference	
2017 (n = 154)	132 (85.7)
2018 (n = 82)	82 (100)
Impact factor of destination journal	
Mean ± SD (min–max)	7.7 ± 10.8 (0.1–79.0)
Authorship changes (n = 236)	
Authorship consistent with abstract[b]	90 (38.1)
Change in first author	44 (18.6)
Change in number of authors	136 (57.6)
Subject changes (n = 236)	
No. of subjects consistent with abstract[c]	135 (57.2)
No. of subjects increased	73 (30.9)
No. of subjects decreased	28 (11.9)
Degree of first author on manuscript (n = 236)	
MD/DO	150 (63.6)
PhD	49 (20.8)
PharmD	29 (12.3)
MPH	29 (12.3)

Abbreviations: DO, Doctor of Osteopathic Medicine; IQR, interquartile range; MD, Medical Doctor; MPH, Master of Public Health; PharmD, Doctor of Pharmacy; PhD, Doctor of Philosophy; SD, standard deviation.

[a]Data are presented as No. (%) unless otherwise indicated.

[b]All authors remained consistent in number and order with abstract to publication.

[c]All subjects remained consistent in amount with abstract to publication.

As seen in Table 2, the median time to publication (TTP) from IDWeek 2017 was 11.8 months (IQR, 5.5–19.4 months) and from IDWeek 2018 was 8.6 months (IQR, 4.6–14.7 months). A majority of the publications (54.7%) occurred within the first year following their respective IDWeek presentation. IDWeek 2018 follow-up was limited to 2 years due to implications of COVID-19 on research and dissemination. For direct comparison between IDWeek 2017 and 2018, 132, and 82 abstracts were published within the first 2 years following each conference, respectively (Figure 1). Of note, 12 papers were published prior to abstract presentation. When examining the published papers, 61.0% of studies were published in an infectious diseases journal (Figure 2). The next largest contribution (19.5%) was made to general medicine journals. The mean ± standard deviation (min–max) impact factor among destination journals was 7.7 ± 10.8 (0.1–79.0). Additional comparisons between the original abstracts and published papers are found in Table 2.

DISCUSSION

Overall, the proportion of abstracts presented at IDWeek 2017 and 2018 published as peer-reviewed articles was nearly 27% during the follow-up period. Few similar studies have been conducted among abstracts presented at infectious diseases conferences, which are summarized in Table 3. Jones and colleagues analyzed 139 abstracts presented at the 2000 International AIDS Conference meeting, of which 47 (34%) were subsequently published [10]. One study that solely investigated platform presentations from British HIV Association meetings between 2002 and 2007 found that 107 of the 201 (53%) abstracts presented were published [11]. In comparison,

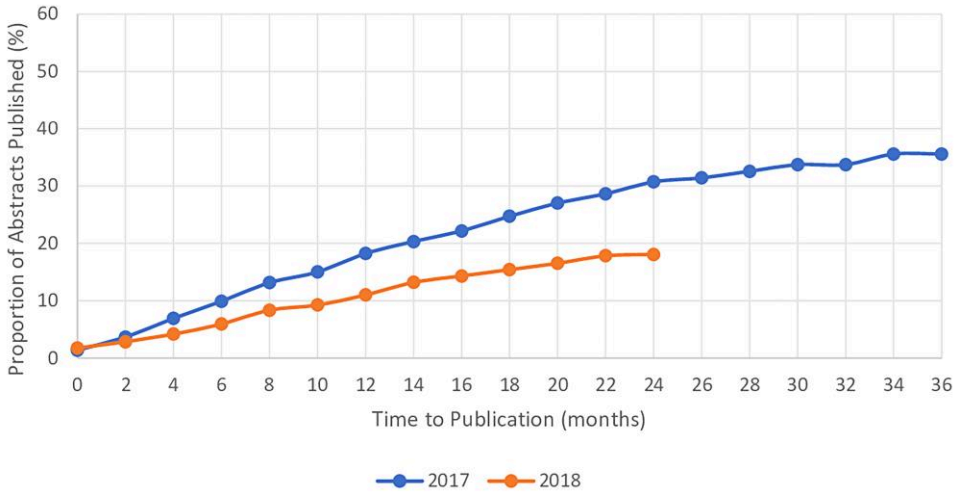

Figure 1. Proportion of abstracts published versus time to publication, IDWeek 2017 and 2018.

the present study found that 35% of abstracts selected as platform presentations were subsequently published, which was significantly higher than those presented as posters. This most likely reflects the high quality of submission and the conference's abstract committee selecting premier abstracts to be showcased as platform presentations. These results confirm those demonstrated in a 2018 systematic review of various professional conferences, which concluded that high-quality abstracts resulting in oral presentations were more likely to be published than poster presentations (Relative Risk [RR], 1.46 [95% CI, 1.40–1.52]) [6]. Rosmarakis and colleagues found that 68 of 190 (36%) abstracts presented at the 1999 and 2000 Interscience Conferences on Antimicrobial Agents and Chemotherapy meetings were later published, comparable to our findings, especially in the 2017 cohort [12]. Notably, only 1 study examined abstracts from an IDSA-affiliated meeting. Hopewell and colleagues analyzed 8 abstracts that were systematic reviews from the 2010 IDSA meeting, reporting that 5 (63%) were subsequently published [9]. These studies discussed above were conducted during a time when the conference and journal landscape was quite different in terms of capacity and audience. The authors of this study acknowledge that some abstracts have an appropriate final deliverable as a scientific professional meeting, and thus, the slightly lower proportion of publications represented in the present study may be due to the larger sample size more accurately representing the proportion of published abstracts. Another consideration is that far more posters were presented in 2017 and 2018 compared to 15–20 years prior. The impact of the COVID-19 pandemic, beginning in early 2020, on infectious diseases clinicians and trainees also cannot be underestimated. This global pandemic led to resource allocation to pandemic response, potentially tabling pending research [13].

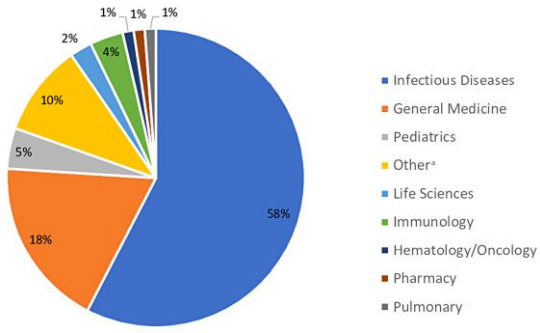

Figure 2. Destination journal for published abstracts originally presented at IDWeek 2017 and 2018. [a]"Other" encompasses education, laboratory, surgery, microbiology, environmental, neurology, obstetrics/gynecology, and travel medicine journals.

The TTP among published abstracts varied between 2017 and 2018. The median TTP from IDWeek 2017 and 2018 was 11.8 months and 8.6 months, respectively. Based on a 2018 systematic review, the average TTP of most studies included was 17 to 20 months. Of note, the review excluded studies that did not follow up for at least 24 months [6]. Among infectious diseases conferences, TTP was reported by only 2 of them and was 12 and 16 months, respectively [9, 10]. In the present study, publication data were collected from 2017 for 3 years and from 2018 for only 2 years due to the changing climate of published infectious diseases work surrounding the COVID-19 pandemic. Infectious diseases clinician and stewardship personnel responsibilities shifted, not only in clinical practice, but also in research, as evidenced by >212 000 articles published on the topics of COVID-19 or severe acute respiratory syndrome coronavirus 2 [13–15]. This may have negatively impacted the results of IDWeek 2018

Table 3. Summary of Comparator Studies Analyzing Abstracts Published From Infectious Disease Meetings

First Author, Year	Meeting	Abstract Selection Criteria	TTP, mo, Median (IQR)	No. Published/No. Presented (%)
Hopewell, 2015 [9]	IDSA	Systematic reviews	12.3 (6.5–22.9)	5/8 (62.5)
Jones, 2008 [10]	IAS	Original research and presenting author with UK address	16 (–2 to 59)	47/139 (33.8)
Waters, 2011 [11]	BHIVA	Oral presentations	Not reported	107/201 (53.2)
Rosmarakis, 2005 [12]	ICAAC	Presented in 7 of 15 thematic areas	Not reported	68/109 (62.4)

Abbreviations: BHIVA, British HIV Association; IAS, International AIDS Society; ICAAC, Interscience Conference on Antimicrobial Agents and Chemotherapy; IDSA, Infectious Diseases Society of America; IQR, interquartile range; TTP, time to publication; UK, United Kingdom.

publications. Extending the follow-up period by an additional year was unlikely to provide any additional benefit for conclusions, as the IDWeek 2017 2-year publication proportion was significantly greater than IDWeek 2018 (30.5% [132] and 18.1% [82], respectively).

Not unexpectedly, physicians (eg, MD and DO degrees) were the most frequent degrees identified for primary authorship (64%) on publications, followed by PhD (20%), PharmD (12%), and MPH (12%). These patterns of authorship are consistent with the nature of abstracts accepted for the IDWeek conference. Studies discussing the correlation between the quantity and/or quality of authors and the likelihood for publication are limited. Stranges and colleagues explored the quality of coauthorship in pharmacy residency research projects and found that the "quality" (ie, university affiliation, degree, and h-index) of coinvestigators positively impacted publication [16]. The present study found that the inclusion of an author with a PhD significantly increased the likelihood of abstract publication. Although the nature of the PhD was unknown, the support from an established research laboratory could provide significant resources, which are often limited to study design, statistical analysis, and manuscript development. Additionally, the motivation for publication may be enhanced if research was generated or supported by a grant-funded laboratory.

The present study also found significantly a greater number of authors on published as compared to unpublished abstracts. More authors may represent an interprofessional team and the positive benefits that may arise from such collaborations. While the inclusion of many different professions was maintained at the time of publication, authorship order or makeup had changed 62% of the time. These modifications included a change in first author nearly 20% of the time and in number of authors 57% of the time. This may be due to a number of factors including facilitation of manuscripts by a more senior author, the need to add expertise not anticipated at the time of the original abstract presentation, or failure by some co-authors to meet authorship criteria [17]. Willingness to make authorship changes may be necessary to progress research to manuscript publication.

The study methodologies play a crucial role in likelihood of publication following a major conference. The present study suggests that prospective studies are significantly more likely to be published than retrospective studies. Although not statistically significant, a larger sample size contributed to increased subsequent publication. This was also shown to be true in the 2018 systematic review which concluded that prospective studies were published more frequently than retrospective studies (RR, 1.17 [95% CI, 1.06–1.30]) and that studies with larger sample sizes were more likely to be published if they were randomized trials (RR, 1.25 [95% CI, 1.08–1.46]) [6]. A prospective study avoids the limitations faced with retrospective studies, such as recall bias and inability to avoid confounding factors. Some abstracts analyzed in our study were unclear on their methodology reiterating the importance of expressing clear methodology in a concise abstract.

Abstracts from both the 2017 and 2018 IDWeek conferences were subsequently published in high-impact journals. Unsurprisingly, infectious diseases journals were the destination for the majority (61%) of publications, whereas subspecialty areas (eg, pulmonary, pharmacy, hematology/oncology) represented only a fraction of represented journals. The high overall impact factor likely speaks to the quality of abstracts presented at the conference. It appeared that many of these studies were also not completed, with participants being recruited at the time of abstract presentation, as approximately 31% of publications had more study subjects included in the article compared to the original abstract presentation.

Several limitations exist within this study. The most notable limitation was the follow-up time for publication of presentations from IDWeek 2018 of 2 years, compared to 3 years among the cohort of 2017 IDWeek abstracts. Due to the impact of the pandemic on infectious diseases clinicians, this likely had a significant impact on abstract publications of IDWeek 2018, especially beyond 24 months. It is possible that additional abstracts could have been published in the third year; however, we feel that very little could be concluded from those additional data. Another limitation of our study was the process to determine if an abstract was published. Although the study methodology used was previously published and for a similar study design [4], if an author's name changed or if the publication does not appear in the databases accessed, a published article may be inadvertently excluded. Another limitation of our study is that the direction (ie, positive, negative, or null) of study

results was not analyzed. Previously published data demonstrated a TTP for positive results of approximately 1.7 years compared to 3 years for negative or null results [9]. The present study was also limited by the inability to determine the actual role of each author, including those with a PhD. For example, it is unknown if authors with a PhD were the primary statistician on a study or played another role, such as senior investigator. Although this study did not address the impact of statistician authorship, the addition of a statistician to a research study significantly reduced TTP in a previous study [18]. While diversity of authors in terms of degrees was assessed, we did not directly collect information on the contributions of trainees or underrepresented groups. Knowledge of trainee involvement in and progression to published abstracts would be important to help allocate resources for improved scholarly output. Having a benchmark of contributions by underrepresented groups in infectious diseases research would allow focused efforts in improving valuable diversity. Future studies should focus on these persisting gaps in the evidence.

CONCLUSIONS

These results provide a comprehensive analysis to the progression of research among abstracts presented at an international infectious diseases conference in the immediate prepandemic environment. The results suggest that comprehensive, collaborative authorship teams are common among IDWeek abstracts and contribute to increased likelihood of publication. While the majority of abstracts remain unpublished, a significant proportion were published in high-quality journals, especially among those originally selected as platform presentations. These data will be helpful in training and communicating with prospective researchers early in the process. Our study solely evaluated abstracts presented at IDWeek, representing a fraction of abstracts presented worldwide at other professional conferences. Further studies are needed within other fields of research to thoroughly conclude the factors influencing publication. Additionally, future studies to evaluate the impact of the COVID-19 pandemic on abstract publication rates and TTP should be further investigated [19–21].

Notes

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Potential conflicts of interest. C. M. B. and P. B. B. have served as IDWeek abstract reviewers.

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