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Research Letter

Trends in Publication Speed of Radiation Oncology Research from 2010 to 2019

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Abstract

Purpose: In this investigation, we aimed to describe trends in time to acceptance (TTA) and time to online publication (TTOP) of research published in leading radiation oncology journals from 2010 to 2019. We further sought to identify journal characteristics that might influence TTA and TTOP.

Methods and Materials: We searched the publication history of 5 leading international radiation oncology journals. For all research articles accepted from January 1, 2010, to December 31, 2019, we tabulated the date of article receipt, the date of acceptance, and the date of online publication when available. The TTA was calculated as the number of elapsed days from article receipt to acceptance, and the TTOP was calculated as the number of elapsed days from article acceptance to online publication. Using the Mann-Kendall test, we assessed for monotonic trends over time and used the post hoc Theil-Sen method to estimate rates of change. We created a multiple regression model to identify journal characteristics associated with TTA and TTOP.

Results: In total, 10,132 articles were included. Both the TTA and the TTOP decreased significantly from 2010 to 2019 ($P = .005$ and $P < .001$, respectively), with an estimated decrease of 1.5 days per year for the TTA and 7.0 days per year for the TTOP. Multiple regression modeling revealed that a higher journal impact factor was independently associated with an increased TTA ($P < .001$) and a decreased TTOP ($P < .001$). A higher number of accepted journal articles per year was associated with a decreased TTA ($P < .001$) and an increased TTOP ($P < .001$).

Conclusions: Radiation oncology research has been accepted and published online at increasingly faster rates during the past decade. The TTA may be longer in higher-impact, more selective journals, possibly suggesting a need for comprehensive peer review and complex editorial decisions. However, these articles are also published online faster after article acceptance. Future work examining patterns of acceptance and publication speed is needed to encourage rapid dissemination of practice-guiding data.

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Research data are stored in an institutional repository and will be shared upon request to the corresponding author.

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Introduction

Timely data dissemination via oncologic academic journals is important for relaying potentially practice-changing information and iterative research advancement.[1-3] However, variation in publication practice exists across multiple scientific and medical journals, which may affect how quickly data are made available for readership.[4,5] In this study, we aimed to describe trends in publication patterns and peer-review time of 5 leading radiation oncology journals during the past decade. We hypothesized that there would be a trend toward decreased review and publication time. Furthermore, we expected that certain journal characteristics, including impact factor (IF) and number of accepted articles per year, would correlate with acceptance and publication speed. Data from this investigation may serve as a benchmark against which progress in this regard may be measured moving forward.

Methods and Materials

Data collection

We searched the publication history of 5 leading international radiation oncology journals: *Advances in Radiation Oncology* (*ARO*); *Brachytherapy; Radiotherapy and Oncology* (*Green Journal*); *Practical Radiation Oncology* (*PRO*); and the *International Journal of Radiation Oncology • Biology • Physics* (*Red Journal*). All articles accepted for publication from January 1, 2010, to December 31, 2019, were identified. For each article, we extracted the date of article receipt by the journal, the date of acceptance, and the date of online publication when available. Articles without at least 2 of these dates listed and those that were not full research articles (eg, letters to the editor, comments, errata, etc) were excluded. We subsequently calculated the elapsed days from article receipt to acceptance (time to acceptance [TTA]) and the elapsed days from acceptance to online publication (time to online publication [TTOP]), using Excel (Microsoft Corporation, Redmond, WA). Additionally, we tabulated each journal's IF according to the Journal Citation Reports (Clarivate Analytics, Philadelphia, PA).

Statistical analysis

We used the Shapiro-Wilk test and graphical methods including quantile-quantile plots to determine normality of data distributions. To evaluate for monotonic trends in TTA and TTOP over time, we used the Mann-Kendall test based on monthly medians for all articles throughout the study period. For significant results, we generated estimates for the rate of change over time using Theil-Sen regression. To further evaluate the association of certain journal characteristics with TTA and TTOP, we created a multiple regression model accounting for the year of article acceptance, yearly journal IF, and yearly number of accepted articles per journal. Journal identity was not included in this model owing to multicollinearity. Statistical analysis and figure generation were performed with R, version 4.0.0 (The R Foundation for Statistical Computing, Vienna, Austria). Results were considered significant at $P < .05$.

Results

Search results identified 15,079 publications, of which 4947 were excluded owing to either insufficient publication data or status as a nonresearch report (Figure E1). The remaining 10,132 were included in this analysis. The included articles are summarized by journal and year of acceptance in Table 1. The *Green Journal* and *Red Journal* accounted for the majority of the articles (31.8% and 44.5%, respectively). The Mann-Kendall test revealed significant monotonic trends in TTA and TTOP for all

Table 1 Included articles by journal and year of acceptance

	Number of articles by year of acceptance										
Journal	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**Total**
ARO	NA	NA	NA	NA	NA	8	51	94	110	90	353
Brachytherapy	51	75	71	79	100	106	141	156	107	105	991
Green Journal	285	360	212	343	278	355	337	358	351	338	3217
PRO	20	71	90	89	112	148	123	146	117	140	1056
Red Journal	601	447	398	423	459	449	410	459	473	396	4515
Total	957	953	771	934	949	1066	1062	1213	1158	1069	10132

Abbreviations: ARO = *Advances in Radiation Oncology;* Green Journal = *Radiotherapy and Oncology;* PRO = *Practical Radiation Oncology;* Red Journal = *International Journal of Radiation Oncology • Biology • Physics.*

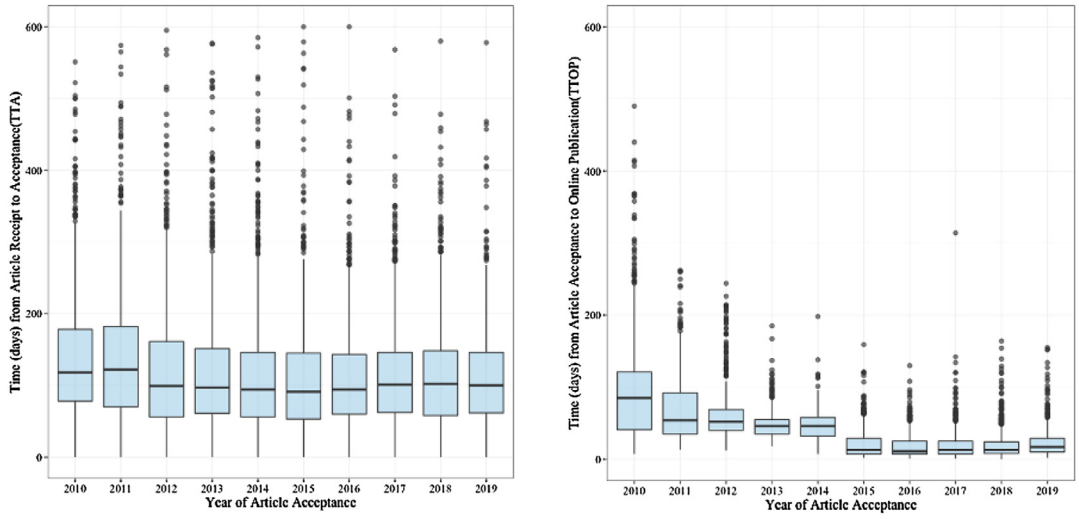

Fig. 1 **(A)** Time to acceptance, and **(B)** time from acceptance to online publication for all articles accepted from 2010 to 2019.

articles from 2010 to 2019 ($P = .005$ and $P < .001$, respectively). The Thiel-Sen method yielded an estimated decrease of 1.5 days per year in TTA and 7.0 days per year in TTOP over this period. Figure 1 describes TTA and TTOP for all articles in aggregate and Figure 2 displays trends individually by journal.

Table 2 summarizes the multiple regression model. As described by the Mann-Kendall test, later year of acceptance was associated with decreased TTA ($P < .001$) and decreased TTOP ($P < .001$). Higher journal yearly IF was associated with increased TTA ($P < .001$) and decreased TTOP ($P < .001$). Furthermore, greater number of accepted journal articles per year was associated with decreased TTA ($P < .001$) and increased TTOP ($P < .001$). Coefficients to estimate the per unit effect of each parameter are also provided in Table 2. For example, for every unit increase in IF, there may be an expected increase of 23 days in TTA. However, these estimates should be interpreted carefully as precise causal attribution is not possible with this model.

Discussion

Medicine in general and radiation oncology more specifically rely on timely dissemination of information relevant to clinical practice as well as data important for the advancement of science and knowledge. In recent years, although alternative models such as data repositories and new frameworks have been proposed, the peer-reviewed model using commercial publishers and journals remains the dominant medium.[6] The unprecedented COVID-19

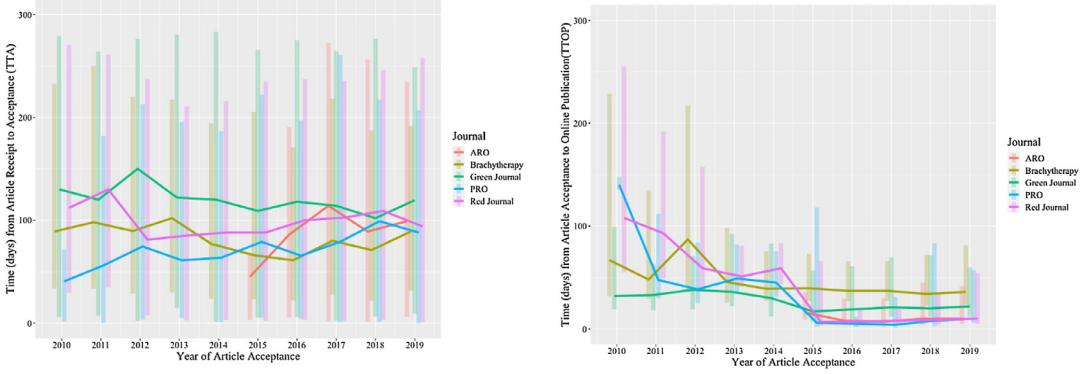

Fig. 2 **(A)** Median time to acceptance in days (TTA), and **(B)** time from acceptance to online publication in days (TTOP) for all articles, with findings stratified by journal. Lines represent the median TTA and TTOP for each journal over time. Bars reflect the interquartile range for the distribution of TTA and TTOP for each journal in a given year. *Abbreviations:* ARO = *Advances in Radiation Oncology*; Green Journal = *Radiotherapy and Oncology*; PRO = *Practical Radiation Oncology*; Red Journal = *International Journal of Radiation Oncology • Biology • Physics*.

Table 2 Multiple regression for TTA and TTOP

	TTA, d			TTOP, d		
Variable	**Coefficient estimate**	**SE**	***P* value**	**Coefficient estimate**	**SE**	***P* value**
Year of acceptance	−7.1	0.4	<.001	−5.2	0.1	<.001
Impact factor*	23	1.4	<.001	−20.6	0.5	<.001
Number of accepted articles*	−0.2	0.01	<.001	0.2	0.004	<.001

Abbreviations: SE = standard error; TTA = time to acceptance (days); TTOP = time from acceptance to online publication (days).
* Reflects yearly journal data.

pandemic of 2020 has highlighted the clear importance of prompt data dissemination. Impressively, the time elapsed from elucidating the infectious agent to published clinical trials for therapeutic management change and vaccine development has likely been briefer than ever before in history.[7,8] That said, concerns have also emerged about the possibility of speed to press compromising the validity and integrity of research findings and potentially the trust of the public in science.[9,10] Furthermore, the growth of nontraditional forums for scientific discourse, such as public social media platforms, which may have no external validation of claims, has complicated communication between the medical community and the public, thereby increasing the need for rapid and accurate sharing of scientific knowledge.

We sought to consider a similar but broader question in radiation oncology: how has the speed of scholarly dissemination changed during the past decade? Here, we analyzed available publication metrics (TTA and TTOP) for 5 leading academic journals. Our data demonstrate significant decreases in both TTA and TTOP for all research articles from 2010 to 2019. However, greater, more consistent change was observed in TTOP, with an estimated decreased of 7.0 days per year, compared with an estimated decrease of 1.5 days per year in TTA. These trends likely reflect intentional efforts on behalf of publishing groups to more rapidly disseminate scientific information. Furthermore, differences in TTA are likely smaller than those in TTOP because peer review and editorial decisions, which contribute to TTA, are more difficult to systematically expedite without compromising the quality of the published science.

Furthermore, our data suggest that certain journal characteristics, namely IF and the number of articles accepted per year, might correlate with TTA and TTOP for accepted articles. Increased TTA was associated with greater journal IF and a decreased number of accepted articles. This result may indicate that journals publishing scholarship of higher impact might require a more thorough peer review process—for example, in the form of a greater number of reviewers and/or more comprehensive review standards. It is also possible that editorial decisions may be more complex in these situations, requiring relatively greater deliberation before acceptance decisions, or that these journals may receive larger numbers of submissions to consider. Importantly, 3 of the included journals (*Red Journal, PRO*, and *ARO*) are sister journals of the American Society for Radiation Oncology (ASTRO). Some articles may initially be considered at the flagship *Red Journal* and undergo peer review with the ultimate decision of rejection. These articles can then potentially be forwarded, along with peer reviews, to an in-network sister journal for consideration. In such cases, peer review and acceptance decisions may require less time, potentially introducing a bias wherein the flagship journal appears to have relatively slower review and acceptance times. Information regarding article transfer between journals was not available and was not considered in this investigation; however, it nonetheless needs to be considered when interpreting the results.

In contrast, decreased TTOP correlated with higher journal IF and a decreased number of accepted articles. These trends suggest that more selective, higher-impact journals may have effective infrastructure to more rapidly publish accepted articles online. Encouragingly, all included journals had a significantly decreasing TTOP over this study period, indicating that successful field-wide efforts have been made to ensure accepted research is rapidly made available to the scientific community. A particularly drastic decrease in median TTOP was observed in the ASTRO journals from 2014 to 2015, with a decrease from 59 to 7 days and 45 to 6 days for the *Red Journal* and *PRO*, respectively. These changes coincided with the introduction of the open-access journal *ARO*, possibly indicating a conscious effort or policy change from ASTRO journal leadership to publish data in a more rapid and easily accessible fashion.

Although this investigation draws from a large sample and variety of radiation oncology journals, it nonetheless has methodological limitations. First, many endpoints that we would have included in our analysis were not publicly available. For example, information regarding the number of reviewers and rounds of revisions, which both likely influence TTA, is not published on journal websites. Internal efforts on behalf of journals or professional groups might help elucidate the effect these factors have on publication speed metrics. Second, the increasing adoption of other platforms of publication, such as

preprints, also influence the visibility of scholarship before publication in a journal. However, we did not attempt to analyze these relationships in this study. Third, linear regression modeling was used to estimate changes over time; however, this model may not fully represent the nuanced trends in publication kinetics over time. Optimal interpretation of these data should consider this limitation of the modeling approach. Last, the type of scientific article (eg, review article, original research, etc) may have an effect on TTA and TTOP, but these attributes were not always available or consistently described across journals. Therefore, we were unable to perform any analysis investigating the association of article type with publication kinetics.

Conclusion

Radiation oncology research available in leading specialty journals has been accepted and published online at increasingly faster rates during the past decade, allowing for more rapid dissemination of practice-changing data. Time from article receipt to acceptance may be greater in higher impact, more selective journals, possibly reflecting a need for more complex editorial decisions and thorough peer review. However, these articles also benefit from rapid online publication after acceptance (TTOP). Future research to further identify predictors of review and publication speed are needed to encourage effective distribution of the most up-to-date yet also appropriately vetted data. Efforts to improve knowledge dissemination would encourage high-quality, evidence-based practice among the radiation oncology community at large.

Supplementary materials

Supplementary material associated with this article can be found, in the online version, at doi:10.1016/j.adro.2021.100863.

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