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Publishing a Research Article in a Major Radiology Journal: Time Investment From Conception to Proofreading After Acceptance

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DESCRIPTION OF THE PROBLEM

Allocated or protected research time may help academic radiologists structurally perform scientific research and may increase publication productivity and quality [1,2]. Allocated research time is precious and should be justifiable. In this regard, it is useful to know how much time it takes to publish a research article. There is a scarcity of studies about this topic, and to our knowledge, no prior study has investigated how much time it takes to publish an article in the field of radiology. Therefore, we conducted a survey to explore how much time it takes to publish a research article in the radiology literature.

WHAT WE DID

Corresponding authors who published original research articles in 1 of the top 10 general radiology journals (Table 1) according to Journal Citation Reports Impact Factor (https://jcr.clarivate.com) between January and September 2022 were requested by email to complete an online questionnaire (Supplemental file) regarding the time it took to publish their article. Four reminder emails were sent.

Analyses were performed using SPSS version 26 and MedCalc version 17.2. If respondents gave a range with regard to the number of hours spent on the publication, we used the mean value for analysis. If respondents reported only a minimum number of hours spent on the publication, we used that value for analysis. If the estimated number of hours spent on the publication was either not provided or could not reliably be extracted, these data were excluded from analysis. Tukey's method was used for the detection of extreme outliers, defined as values smaller than the lower quartile minus three times the interquartile range or values larger than the upper quartile plus three times the interquartile range. The Kruskal-Wallis H test was used to explore the association between characteristics of the corresponding authors and their publications versus the estimated number of hours the corresponding author spent on the article. Pairwise comparisons were used for post hoc testing. P values $< .05$ were considered to indicate statistical significance. Bonferroni correction was used to correct for multiple comparisons.

OUTCOMES AND LIMITATIONS

Responses from 184 of 1,522 corresponding authors were received (response rate 12.1%) (Table 1). The respondents mostly had a first author position (58.2%) and were the ones who reportedly spent the most time on the work (45.7%).

On the basis of useful data provided by 148 respondents, it takes a median of 80 hours (interquartile range, 170 hours) for a corresponding author to publish an original research article in 1 of the top 10 general radiology journals (Fig. 1). Respondents who indicated that they devoted the most time to the work compared with their coauthors on the article spent significantly more hours compared with respondents who indicated that they left most of the work to one of the coauthors (median, 100 versus 30 hours; $P = .030$). However, this association lost significance after Bonferroni correction for multiple comparisons. Age, sex, continent of origin, academic degree, academic position, research experience, English-language proficiency, study design, single-center or multicenter, journal, and author position were all not significantly associated with the number of hours spent on the publication (Table 1).

Some components of conducting research reportedly were more time consuming, in particular analysis and interpretation of data (reported by 54%), acquisition of data (reported by 50%), and drafting the work (reported by 50%). Our overview of the time investment in the various components

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Table 1. Characteristics of 184 respondents and their publications

Characteristic	n (%)	Median Estimated Number of Hours Spent on the Publication by the Corresponding Author	Kruskal-Wallis *H* Test*
Age distribution			$P = .055$
18-24 y	1 (0.5)	NA	
25-34 y	44 (23.9)	150	
35-44 y	72 (39.1)	100	
45-54 y	38 (20.7)	50	
55-64 y	22 (12.0)	45	
>65 y	7 (3.8)	200	
Sex			$P = .551$
Male	126 (68.5)	80	
Female	58 (31.5)	80	
Continent			$P = .283$
Europe	74 (40.2)	100	
North America	43 (23.4)	59	
Asia	64 (34.8)	55	
Other	3 (1.6)	80	
Academic degree			$P = .967$
MD, with or without other degree	138 (75.0)	76	
Other degree	46 (25.0)	100	
Academic position			$P = .216$
Full professor	44 (23.9)	50	
Associate professor	37 (20.1)	80	
Assistant professor	35 (19.0)	40	
Fellow or resident	22 (12.0)	100	
Other	18 (9.8)	150	
None	16 (8.7)	135	
Instructor/lecturer	12 (6.5)	55	
Research experience			$P = .587$
<5 y	37 (20.1)	100	
5-10 y	55 (29.9)	100	
>10 y	92 (50.0)	50	
English-language proficiency			$P = .623$
Elementary proficiency	5 (2.7)	100	
Limited working proficiency	20 (10.9)	150	
Professional working proficiency	66 (35.0)	100	
Full professional proficiency	57 (31.0)	50	
Native/bilingual proficiency	36 (19.6)	65	
Study design			$P = .953$
Retrospective	90 (48.9)	100	
Prospective	63 (34.2)	100	
Systematic review/meta-analysis	13 (7.1)	50	
Other	18 (9.8)	68	

(continued)

Table 1. Continued

Characteristic	n (%)	Median Estimated Number of Hours Spent on the Publication by the Corresponding Author	Kruskal-Wallis *H* Test*
Center(s)			$P = .897$
Single-center	138 (75.0)	80	
Multicenter	46 (25.0)	90	
Journal in which the study was published			$P = .820$
Academic Radiology	26 (14.1)	59	
American Journal of Roentgenology	12 (6.5)	100	
British Journal of Radiology	21 (11.4)	55	
Diagnostic and Interventional Imaging	6 (3.3)	86	
European Journal of Radiology	16 (8.7)	100	
European Radiology	62 (33.7)	55	
Investigative Radiology	9 (4.9)	150	
Journal of the American College of Radiology	5 (2.7)	40	
Korean Journal of Radiology	2 (1.1)	58	
Radiology	25 (13.6)	55	
Position of the corresponding author in the author list			$P = .061$
First	107 (58.2)	100	
Second	12 (6.5)	100	
Last	58 (31.5)	50	
Other	7 (3.8)	12	
Contribution of the corresponding author to the study			$P = .036$ (post hoc test corresponding author vs one of the coauthors: $P = .030$)
The corresponding author spent the most time on the work	84 (45.7)	100	
The corresponding author and one of the coauthors equally spent the most time on the work	83 (45.1)	80	
One of the coauthors spent more time on the work	17 (9.2)	30	

*Twelve extreme outliers were excluded. The data displayed have not been corrected for multiple comparisons.

of research (Fig. 2) may be useful as a roadmap for (beginning) researchers who want to draw up a time schedule, and it may also be useful for those who determine to whom allocated research time is granted.

It is striking that the great majority of corresponding authors (93.6%) spent research time outside of normal office hours. This could mean that that they have a lack of allocated research time, or it could indicate a high devotion to their research work.

There is a scarcity of previous research related to the topic of the present study. Mezrich and Nagy [3] developed an academic relative value unit system for radiology that assigned weight to research-related activities, including publishing a research article. They assumed that it took, on average, a cumulative week's work to complete a peer-reviewed article. Similarly, Rakhra et al [2] reported that faculty members of their radiology department were compensated with five vacation days if they were the first author of an original research article. However, Mezrich and Nagy's and Rakhra et al's estimates were based on assumptions. To our knowledge, our study is the first to provide survey-based estimated data about the time it takes for an author to publish an

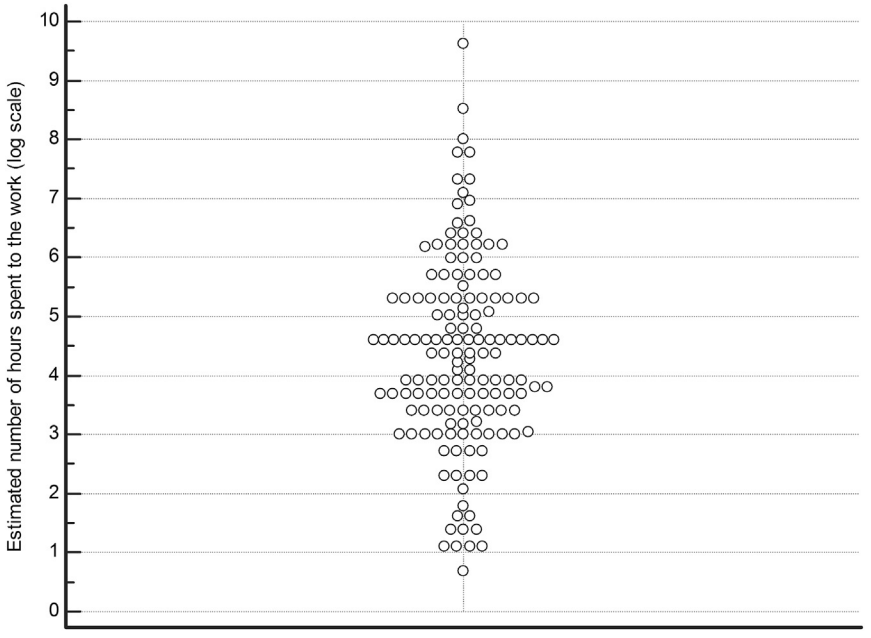

Fig. 1. Estimated number of hours spent on the work by the corresponding author on logarithmic scale.

original research article in the radiology literature. A survey investigating author contributions to publications in leading biomedical research journals showed that just more than half of first authors devoted more than 500 hours to the research [4]. However, data from that survey are already 30 years old. A more recent survey among surgeons that was published 10 years ago suggested that it takes a median of 177 hours to take a study from conception to publication [5]. However, that survey was limited to only 16 surgical researchers and concerned only retrospective studies.

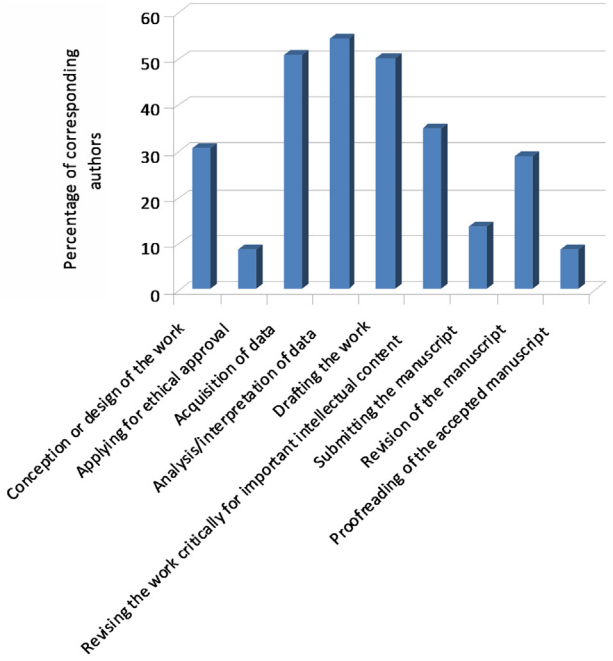

Fig. 2. Components related to the work that were considered most time consuming according to corresponding authors. Note that multiple components could be selected per respondent.

It remains under discussion if and how scientific output should be compensated [6]. Compensation could be done by allocating research time [2]. In a retrospective study, Rakhra et al [2] analyzed the scientific output of their radiology department before and after the introduction of a metrics-based award system of allocated research time. They observed a significant increase in the number of publications and median Impact Factor after introduction of the system [2]. However, the retrospective design limited their study in determining causation [2]. Compensation for research activities could also be done by a awarding a financial bonus or by granting academic promotion. To our knowledge, there has been no research yet on which compensation method works better in terms of satisfaction among researchers and improving scientific output.

Our study had some limitations. First, the survey response rate was relatively low (12.1%), limiting the generalizability of the results. Second, our study was based on a retrospective estimate of the number of hours corresponding authors have spent on publishing a research article. Retrospective judgments tend to underestimate the duration of tasks more and are subject to greater intersubject variability compared with prospective judgments [7]. However, a prospective study would be difficult if not impossible to execute, as the time lapse to publication typically takes years, and many studies never even make it to publication.

Third, we did not investigate the total amount of time consumed per research article (ie, the sum of time spent by all authors who were involved). Fourth, we did not investigate how much time it takes to apply for a grant, which can also be considered a component of conducting research. However, grant application does not apply to all studies.

Fifth, the wording of some survey questions could have been better for a better understanding, and we could have given extra granularity to some questions. Sixth, our study was limited to the top 10 general radiology journals.

REFERENCES

1. Alderson PO, Bresolin LB, Becker GJ, et al. Enhancing research in academic radiology departments: recommendations of the 2003 consensus conference. Radiology 2004;232:405-8.
2. Rakhra KS, Chepelev L, McInnes MDF, Schieda N, Rybicki FJ. A metrics-based research salary award system and its 9-year impact on publication productivity. Acad Radiol 2022;29:728-35.
3. Mezrich R, Nagy PG. The academic RVU: a system for measuring academic productivity. J Am Coll Radiol 2007;4:471-8.
4. Shapiro DW, Wenger NS, Shapiro MF. The contributions of authors to multiauthored biomedical research papers. JAMA 1994;271:438-42.
5. Song D, Abedi N, Macadam S, Arneja JS. How many work hours are requisite to publish a manuscript? Plast Reconstr Surg Glob Open 2013;1:e9-10.
6. LeMaire SA, Trautner BW, Ramamurthy U, et al. An academic relative value unit system for incentivizing the academic productivity of surgery faculty members. Ann Surg 2018;268:526-33.
7. Block RA, Zakay D. Prospective and retrospective duration judgments: a meta-analytic review. Psychon Bull Rev 1997;4:184-97.

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