AJNR

Fate of Submitted Manuscripts Rejected from the *American Journal of Neuroradiology*: Outcomes and Commentary

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RESEARCH PERSPECTIVES

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Fate of Submitted Manuscripts Rejected from the *American Journal of Neuroradiology*: Outcomes and Commentary

BACKGROUND AND PURPOSE: The purpose of this study was to determine the publication fate of submissions previously rejected from the *American Journal of Neuroradiology* (*AJNR*) to provide guidance to authors who receive rejection notices.

MATERIALS AND METHODS: A retrospective search by using MEDLINE of all submissions rejected from *AJNR* in 2004 was performed to identify subsequently published manuscripts. The fate of subsequently published manuscripts was analyzed as a function of submission type (major study, technical note, or case report), publication delay, publishing journal type (neuroradiology, general radiology, or clinical neuroscience journal), impact factor, publication volume, and circulation volume.

RESULTS: Of the 554 rejected submissions to *AJNR*, 315 (56%) were subsequently published in 115 different journals, with the journal *Neuroradiology* publishing the greatest number of articles (37 [12%] of 315). The mean publication delay was 15.8 ± 7.5 months. Major studies were more likely than case reports to be subsequently published ($P = .034$), but all 3 subtypes were published at rates greater than 50%. Radiologic journals collectively published approximately 60% of subsequent publications, whereas neurosurgery and neurology journals published 27% of rejected manuscripts. The mean impact factor of journals subsequently publishing rejected manuscripts was 1.8 ± 1.3 (*AJNR* = 2.5), and 24 (7.5%) manuscripts were subsequently published in journals with higher impact factors than *AJNR*.

CONCLUSIONS: These findings should give hope to authors receiving a rejection from *AJNR*, because greater than 50% of articles rejected from *AJNR* are subsequently published within 2–3 years, irrespective of publication type, into high-quality journals.

The *American Journal of Neuroradiology* (*AJNR*) is one of the primary repositories for work presented at the American Society of Neuroradiology and other academic/scientific endeavors in the field of neuroradiology.[1,2] For these reasons, authors of neuroradiology research often initially submit manuscripts for publication in *AJNR*. Unfortunately, due to an overwhelming number of submissions, a limited number of publications per year, and overspecialization of some manuscript submissions, many submissions to *AJNR* are rejected.

In an effort to better identify the outcomes of rejected submissions to *AJNR*, we retrospectively tracked the publication fate of all rejected submissions in 2004. It is our intention that the results from this analysis will facilitate the redirection of rejected submissions to *AJNR* to alternative journals and thus reduce the anxiety associated with rejection and streamline the publication process in the field of neuroradiology.

Methods

All 554 rejected manuscripts received by the *AJNR* Editorial Office in the 2004 calendar year were used for this retrospective study. Of the 554 rejected submissions, 251 manuscripts were submitted as major scientific studies, 272 as case reports, and 29 as technical notes and/or reviews. For each rejected submission, the author's name, corresponding title, and date of receipt were obtained from the *AJNR* office. Institutional affiliations and coauthors' names were not included for this study. In addition, submission bias was eliminated by avoiding subjective assessment of quality (eg, review of referee comments from the *AJNR* submission) and/or topicality.

Search Strategy

A comprehensive search strategy was used to determine the publication outcome (publication journal, date) for *AJNR* rejected submissions in 2004. Initially, all 554 rejected submission titles were searched en mass by using a custom search application, yielding all published rejected submissions with unchanged titles. This step captured ~20% of all subsequently published submissions. All remaining published submissions with modified titles subsequent to *ANJR* rejection were identified via the MEDLINE PubMed data base,[3] by using the following search algorithm: an initial search by author name followed by a combination of author-name search with selected keywords from the original manuscript title. Conflicts in search results in which partial or complete positive title matches were not concordant with the corresponding author (eg, positive title match but negative author match) were treated as a negative search result. Although this scenario was quite rare (3 events, <1%), these search results were treated as negatives due to the uncertainty in origin of authorship (eg, publication by competing group versus dismissal of the corresponding author).

Publication Delay

The delay in publication following rejection from *AJNR* was calculated from the date of rejection to the publication date of the journal article as referenced in MEDLINE.[3] In an effort to avoid inconsistency, journals using both fast-track electronic publication dates (eg, E-pub ahead of print) in addition to formal publications dates were limited to the formal publication date.

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Table 1: Publication of manuscripts, sorted by type, subsequent to rejection by *AJNR*

Manuscript Class[a]	Rejected by *AJNR*	Published Elsewhere (%)	Publication Delay[b] (mo)	Impact Factor[c]
Major studies	251	156 (63)	16.2 ± 7.2	1.81 ± 0.97
Case reports	274	143 (47)	16.6 ± 8.2	1.48 ± 0.45
Technical notes	29	16 (65)	14.2 ± 6.8	2.07 ± 1.26
Total	554	315 (57)	15.8 ± 7.5	

[a] Manuscript class was determined on the basis of original submission.
[b] Publication delay, in months (±SD), was determined as described in "Methods."
[c] Average impact factor (±SD) was determined on the basis of the 2005 ISI.[6]

Table 2: Breakdown of publication type and publication delay based on journal classification volume

Journal Category[a]	No. of Publications[b]	Major Studies	Case Reports	Technical Notes	Publication Delay[c]
Neuroradiology (6)	64	31	28	5	15.1 ± 7.1
General radiology (14)	64	35	22	4	16.3 ± 8.0
Specialty radiology (12)	62	30	30	2	14.7 ± 7.6
Neurosurgery (8)	31	13	15	1	17.6 ± 6.2
Neurology (32)	54	28	20	3	16.3 ± 6.8
Uncategorized (35)	41	18	28	1	16.1 ± 8.7
Total	315	156	143	16	

[a] Subcategory of journal with number of journals indicated in brackets.
[b] Number of publications within a given journal category.
[c] Publication delay is the time difference between formal rejection from *AJNR* and publication in a subsequent journal in months (mean ± SD).

Statistical Methods

Continuous and ordinal data are presented as a range, whereas nominal data are presented as a percentage. Baseline analysis of continuous data was compared between groups by using the Student *t* test, whereas nominal data were compared by using a χ^2 analysis test. Multivariate analysis between continuous and ordinal datasets was performed to identify correlations in publication delay, impact factor, publication volume, circulation volume, and number of published submissions via use of multiple logistic regressions. A P value $< .05$ was considered statistically significant in all cases. Statistical analyses were performed by using JMP, Version 6.0 software (SAS Institute, Cary, NC).

Study Criteria

We studied 3 characteristics of the *AJNR* rejected-submission publication journals: publication volume, circulation volume, and impact factor. The publication volume (the number of manuscripts published on-line in 2005) was determined both by MEDLINE and information provided at the homepage of the journal. The circulation volume, or the number of electronic and hard-copy subscriptions, for each journal was obtained by using *Ulrich's Periodicals Directory*.[4] The impact factor of the journal, or the mean frequency that published articles within a journal are referenced within 2 years, was determined from the *2005 Science Citation Index*.[5-8]

Results

With the search strategy outlined previously, MEDLINE searches identified 315 of 554 (56.8%) previously rejected *AJNR* submissions as subsequently published manuscripts. In total, 156 of 251 (62%) rejected major study submissions, 143 of 272 (53%) case reports, and 16 of 29 (55%) technical notes/reviews were published elsewhere (Table 1). As a percentage, major studies were more likely to be published subsequent to rejection when compared with case reports (Yates $\chi^2 = 4.51$, $P = .034$). Statistical differences between case reports and technical notes (Yates $\chi^2 = 0.005$, $P = .95$) and between major studies and technical notes (Yates $\chi^2 = 0.28$, $P = .597$) were found to be insignificant.

Results were further sorted on the basis of the journal subtype (neuroradiology, general radiology, specialty radiology, neurology, neurosurgery, and other uncategorized biomedical journals) that eventually published the rejected submissions (Table 2). Pairwise comparison of journal subtype publications demonstrated that neuroradiology journals published significantly more rejected submissions than uncategorized biomedical journals (Student *t* test; $P < .0009$ or less in all cases). Pairwise comparison of all other journal types (eg, general radiology versus neurosurgical) did not demonstrate statistically significant differences in publication of rejected submissions (Student *t* test; *P* value range, .058–.668). Publication ratios (major studies:case reports:technical notes) were relatively consistent across the 6 journal subtypes (Table 2).

The publication delay between *AJNR* rejection and subsequent publication ranged between 1 and 37.3 months with a mean of 15.8 months (median = 14.5 months, SD = 7.5 months) (Fig 1). The isolated case of a 1-month publication delay suggests that these authors did not follow accepted protocols whereby a manuscript submission must be rejected from 1 journal before submission to another. The publication delay curve (Fig 1 inset) suggests that most of the rejected submission publications took place after a delay of 5–20 months and subsequently leveled off with few expected publications beyond 30 months. When sorted on the basis of manuscript type, no statically significant differences in publication delay were noted (Student *t* test; *P* value range, .084–.705) between major studies, case reports, and technical notes. Similarly, there was no statistically significant difference in publication delay between the 6 journal subclasses (Student *t* test; *P* value range, .093–.974).

Three hundred fifteen manuscripts rejected from *AJNR* were eventually published in 116 different journals (Table 3). Of these 315 published submissions, 11 (3%) represented revised resubmissions to *AJNR* due to prior agreement between the editor and authors. Sixty-five of these journals published only 1 rejected submission to *AJNR*, whereas 17 journals, accounting for 164 of 315 (52.1%) published manuscripts, published 5 or more rejected *AJNR* submissions. Of the journals

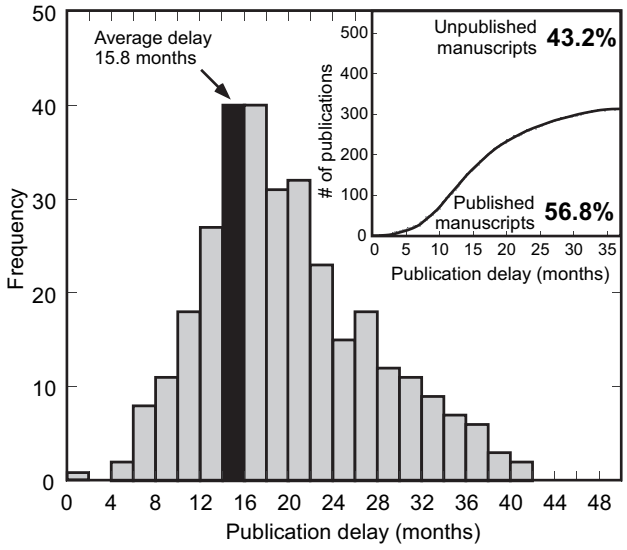

Fig 1. Publication Delay. Publication delay of submissions previously rejected from *AJNR* is shown as a function of frequency histogram with each bin representing a 2-month period. Inset: cumulative publication of rejected *AJNR* submissions shown with time.

publishing a significant (≥5) number of rejected submissions, the journal *Neuroradiology* published the greatest number (37) of manuscripts, followed by *AJR American Journal of Roentgenology* (18); *Journal of Computer Assisted Tomography* (15); *AJNR American Journal of Neuroradiology* (11); *European Journal of Radiology* (10); *Acta Radiologica* (8); *British Journal of Radiology*, *European Journal of Radiology*, *Journal of Neuroimaging*, *Journal of Neurosurgery* (7); *Neurologia Medico-Chirurgica* (Tokyo) and *Surgical Neurology* (6); and *Cardiovascular and Interventional Radiology*; *Journal of Magnetic Resonance Imaging*; *Neurosurgery*; *Journal of Neurology, Neurosurgery and Psychiatry; Journal of Sonography in Medicine* (5). Of this subset of journals, 128 of the 164 manuscripts were published in radiologic journals, representing 11 of the 17 journals. As a composite, the 41 radiologic journals published 190 (60.3%) of the 315 rejected submissions, whereas the 75 nonradiologic journals published the remaining 126 (39.7%) articles.

The mean publication volume of journals that published rejected *AJNR* submissions was 252.2 manuscripts per year (median = 192.5, SD = 240.4) (Table 4), as compared with the volume of *AJNR* of 490 manuscripts per year. Fifteen (12.7%) journals that published *AJNR*-rejected submissions had a larger circulation volume than *AJNR*. Of these 15 journals, 1 was classified as a neuroradiology journal (*Neuroimage*), 4 were classified as general radiology journals (*AJR American Journal of Roentgenology*, *Radiology*, *Acta Radiologica*, and *European Journal of Radiology*), and the remaining 10 journals were distributed as follows: 2 neurology (*European Journal of Neuroscience, Spine*), 3 neuroradiology (*Journal of Neurosurgery*; *Neurosurgery*; *Journal of Neurology, Neurosurgery and Psychiatry*), and 5 uncategorized (*British Medical Journal, Stroke, Journal of the Medical Association of Thailand, American Journal of Ophthalmology, Journal of Trauma*) medical journals. When sorted on the basis of journal subtype, mean publication volumes were observed to be highest in the neurosurgical and uncategorized journals, followed closely by general radiologic and neuroradiologic journals. Pairwise comparison of journal type to publication volume failed to demonstrate statistically significant differences by using the Student *t* test.

Circulation volume of 85 of the 118 journals were available by using Ulrich's on-line catalog as described in "Methods." This subset of journals had a mean circulation volume of 4446 copies per issue (median = 2500, SD = 12 033), and published 242 (76.6%) of the rejected submissions (Table 1). Seventeen manuscripts, representing 44 (13.6%) of the rejected submissions to *AJNR*, were eventually published in journals with a higher circulation volume than *AJNR*, a journal that garners 6500 subscriptions per year. Of these 17 journals, 5 journals were classified as general radiology journals (*Radiology, Journal of the American College of Radiologists, Radiographics, AJR American Journal of Roentgenology*, *Radiologia Medica (Torino)*), 2 were classified as specialty radiology journals (*Journal of Nuclear Medicine*, *Journal of Sonography in Medicine*), and the remaining 10 comprised 2 neurosurgical (*Journal of Neurosurgery Spine, Neurosurgery*), 1 neurology (*Spine*), and 7 uncategorized (*British Medical Journal, Southern Medical Journal, Ear Nose and Throat Journal*, *American Journal of Ophthalmology*, *Archives of Otolaryngology—Head and Neck Surgery*, *Journal of Trauma, Connecticut Medicine*) medical journals. When sorted on the basis of journal subtype, pairwise analysis suggested that observed differences between circulation volumes in most cases were statistically insignificant with few exceptions (general radiology versus neurologic journals [$P = .017$], general radiology versus specialty radiologic journals [$P = .041$], and uncategorized versus neurologic journals [$P = .034$]). Similarly, no significant differences in circulation volume were observed when publications were sorted on the basis of submission type.

Impact factors were identified for 109 of the 118 publication journals as described in "Methods."[5,6] This subset of journals published 307 (97%) of all submissions rejected from *AJNR*. The impact factors of these journals ranged from 9.052 to 0.43 (Fig 2) with a mean of 1.83, (median = 1.45, SD = 1.33). As can be seen in Fig 2*A*, when compared with *AJNR* (impact factor = 2.525), the average impact factor of journals publishing rejected submissions was slightly lower (mean impact factor = 1.78, SD = 0.72), whereas the average impact factor of all medical journals was lower still (mean impact factor = 1.51, SD = 1.41), and differences were found to be significant (*AJNR* versus average impact factor of rejected journals, $P < .001$; average impact factor of rejected journals versus average impact factor of all biomedical journals, $P < .003$). When impact factors of journals are correlated with publication frequency, most journals publishing more than 1–2 journal articles have impact factors falling within the SD window as shown in Fig 2*B*.

Bivariate analysis demonstrated no significant correlation between any of the following parameters: publication delay, impact factor, publication volume, and number of published submissions. In contrast, bivariate fits did show moderate positive correlation between circulation volume and impact factor as well as between circulation volume and publication volume.

Discussion

We undertook this analysis to better understand the process and outcome of neuroradiologic manuscript submission, re-

Table 3: Summary of journals publishing rejected *AJNR* submissions

No. of Published Submissions	Journal Name
37	*Neuroradiology*
18	*AJR American Journal of Roentgenology*
15	*Journal of Computer Assisted Tomography*
11	*AJNR American Journal of Neuroradiology*
10	*European Journal of Radiology*
8	*Acta Radiologica*
7	*British Journal of Radiology, European Journal of Radiology, Journal of Neuroimaging, Journal of Neurosurgery,*
6	*Neurologia Medico-Chirurgica* (Tokyo), *Surgical Neurology*
5	*Cardiovascular and Interventional Radiology, Journal of Magnetic Resonance Imaging, Neurosurgery, Journal of Neurology, Neurosurgery and Psychiatry, Journal of Ultrasound in Medicine*
4	*Cerebrovascular Diseases, Emergency Radiology, Journal of Clinical Neuroscience, Neuroimage, Radiation Medicine*
3	*Head & Neck, Korean Journal of Radiology, Journal of Magnetic Resonance Imaging, Pediatric Radiology, Neurosurgical Review, Neuroimaging Clinics of North America, Ultrasound in Medicine and Biology*
2	*Academic Radiology, Acta Neurochirurgica (Wien), Acta Neurologica Scandinavia, Arquivos de Neuro-Psiquiatria, Clinical Imaging, Clinical Neurology and Neurosurgery, Clinical Radiology, Connecticut Medicine, Journal of Neurology, Journal of Neuro-Oncology, Journal of Neuroradiology, Journal of Trauma, Journal of Vascular and Interventional Radiology, Neurocritical Care, Neurological Research, Neuropediatrics, Neuroscience Research, Otology & Neurotology, Pediatric Blood & Cancer, Pediatric Neurosurgery, Spinal Cord*
1	*Acta Oto-Laryngologica; The American Journal of Emergency Medicine; American Journal of Ophthalmology; The American Surgeon; Annals of Academic Medicine Singapore; Annals of Biomedical Engineering; The Annals of Otology, Rhinology, and Laryngology; Archives of Otolaryngology—Head & Neck Surgery; Archives of Pharmacal Research; British Medical Journal; British Journal of Haematology; Brain Injury; The Canadian Journal of Neurological Sciences; Child's Nervous System; Clinical Nuclear Medicine; Cortex; Current Problems in Diagnostic Radiology; Dementia and Geriatric Cognitive Disorders; Dento Maxillo Facial Radiology; Ear, Nose, & Throat Journal; European Journal of Cancer; European Journal of Medical Research; European Journal of Neurology; The European Journal of Neuroscience; European Journal of Paediatric Neurology; Indian Journal of Pathology & Microbiology; International Journal of Gynecological Cancer; International Journal of Legal Medicine; Journal of the American College of Radiology; Journal of Cardiovascular Magnetic Resonance; Journal of Cerebral Blood Flow and Metabolism; The Journal of Craniofacial Surgery; Journal of Digital Imaging; Journal of Endovascular Therapy; The Journal of Infection; Journal of the International Neuropsychological Society; Journal of the Medical Association of Thailand; Journal of Medical and Dental Sciences; Journal of the Neurological Sciences; Journal of Neurosurgery: Spine; Journal of Nuclear Medicine; Journal of Pediatric Hematology/Oncology; The Journal of Spinal Cord Medicine; Journal of Neurology, Medical Physics; Methods of Information in Medicine; Multiple Sclerosis; Neurology India; Neurological Sciences; Nuclear Medicine Communications; Journal for Oto-Rhino-Laryngology and Its Related Specialties; Psychiatry and Clinical Neurosciences; Radiographics; La Radiologia Medica; Radiology; Rheumatology International; Sichuan Da Xue Xue Bao Yi Xue Ban; The Southern Medical Journal; Spine; Stroke; Surgical and Radiologic Anatomy; Topics in Magnetic Resonance Imaging; Tumori; Vnitřní lékarštví; Beijing Da Xue Xue Bao Yi Xue Ban; Zhonghua Bing Li Xue Za Zhi*

Table 4: Publication volume, circulation volume, and impact factor of journals publishing rejected *AJNR* submissions

Journal Subset	No. of Publications[a]	Publications[b] per year (Mean ± SD)	Circulation[c] Volume (Mean ± SD)	Impact[d] Factor (Mean ± SD)
Neuroradiology	64	270.5 ± 312.6	1694.7 ± 2432.6	2.100 ± 1.683
General radiology	64	290.1 ± 236.6	10493.5 ± 11862.0	1.806 ± 1.210
Specialty radiology	62	185.1 ± 108.7	3098.6 ± 4100.0	1.717 ± 1.102
Neurosurgery	31	304.4 ± 212.1	2975.4 ± 4916.0	1.819 ± 0.824
Neurology	54	206.3 ± 149.4	1013.5 ± 1477.7	1.822 ± 1.087
General	40	304.1 ± 344.7	7010.2 ± 1945.9	1.905 ± 1.803
Total	315			

[a] Number of rejected *AJNR* submissions published in journal subset.
[b] Number of manuscripts published in 2005 determined using MEDLINE.
[c] Number of journals circulated per issue as determined using *Ulrich's Periodicals Directory* online.[4]
[d] References.[5-8]

jection, and publication. Our analysis of all 554 rejected *AJNR* submissions showed that more than half were eventually published in a subsequent journal. Over 60% of the published rejections were ultimately published in a radiologic journal, whereas the remaining approximately 40% were published in either a neurologic, neurosurgical, or other medical journal. The journal *Neuroradiology* was the most frequent publisher of rejected *AJNR* manuscripts, publishing 12% of all previously rejected submissions. These findings should give hope and guidance to authors whose papers are rejected from *AJNR*, because a core group of radiology journals published more than 50% of the rejected *AJNR* submissions. Although some statistical differences were observed in the data analysis, it was clear that the observed differences in publication rates of major studies, case reports, and technical notes remain small enough to reassure authors that publication does not necessarily depend on submission type. Likewise, the differences in observed publication delays when sorted on the basis of submission type or publication subtype are also small, and thus no specific journal or manuscript class should be viewed as a less favorable submission path.

In 1990, Chew[9] undertook a study similar to our own that focused on the fate of rejected *AJR* submissions. In many respects (publication delay, submission subtype ratios, publica-

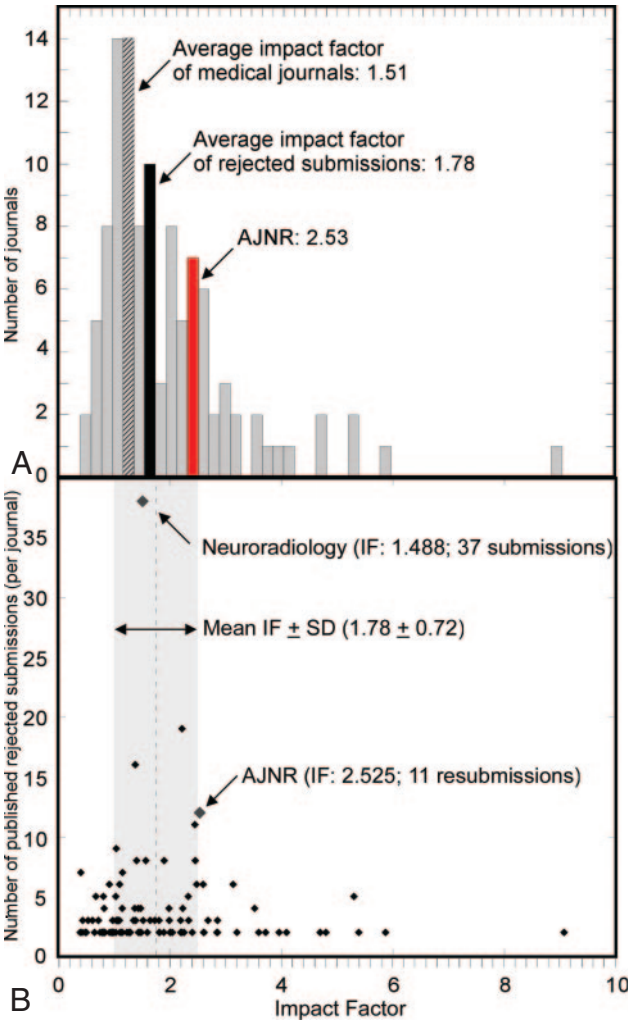

Fig 2. Impact factor distribution of journals publishing rejected *AJNR* submissions. *A,* Impact factor distribution of journals publishing rejected *AJNR* submissions shown as a histogram, with each bin representing an impact factor range of 0.2. The journal *AJNR* is contained within the frequency distribution bin shown in red, whereas the average impact factor of all journals in this study would belong in the black bin and the average impact factor of all biomedical journals would belong in the gray and black bin. *B,* Impact factors of each journal (*diamonds*) shown as a function of the number of published submissions. Mean impact factor of all journals publishing rejected *AJNR* submissions (*dashed vertical line*) and SD (*gray rectangle*) are shown for reference.

tion volume), our study gave very similar results to his, suggesting that the publication process, despite a 17-year difference between his and our studies, is not significantly different now relative to 1990. Of note, subsequent publication outcomes were slightly lower (57% versus 62%) in rejected *AJNR* submissions relative to *AJR* data. Whereas χ^2 analysis suggests these differences are not truly significant ($P = .09$), this difference (reduction) may be a result of an increase in the competitiveness of scientific publication during the past 17 years, or it may simply be a result of the fact that rejected submissions from more generalized radiologic journals (eg, *AJR*) have a higher probability of being published as more potential journals exist (including specialized journals such as *AJNR*) to publish their work. One striking difference when comparing our study and his is the significantly lower mean impact factors reported in 1990 (*AJR*) compared with the current study. However, this difference may simply reflect an overall increase in impact factor across journals with time.

Certain limitations to this retrospective study remain and are largely a function of the limitations of the current search software. First, because searches were limited to MEDLINE, it is possible that the number of unpublished manuscripts was overestimated, because this search engine does not index all international medical journals. Second, case report indexing is not always performed in some journals and thus cannot be indexed by MEDLINE. Third, if the corresponding author changed or was no longer affiliated with the submission after rejection, it is possible that the publication would go undetected using our search criteria. Finally, any manuscript published after the MEDLINE search date (April 1–4, 2007) would yield a falsely negative result, but we anticipate that this would comprise, at most, a very small subset of as-of-yet unpublished submissions.

Conclusions

Our analysis of the fate of rejected *AJNR* submissions should provide both guidance and reassurance with regard to resubmission of a rejected manuscript. Rejected *AJNR* submissions are likely to be published in journals with similar publication and circulation volumes that are just as commonly cited on the basis of impact factor as *AJNR*. Furthermore, publication delay is not significantly different from previous studies and does not seem to correlate strongly with either journal or manuscript type.

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