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## Publication Status of Unpublished Research Manuscripts on Orthopaedic Surgery Residency Applications After 30 Months

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**Publication Status of Unpublished Research Manuscripts on Orthopaedic Surgery  
Residency Applications After 30 Months**

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Medical Education Research and Curriculum Development Track

Scholarship in Medicine Final Report

**By checking this box, I indicate that my mentor has read and reviewed my draft proposal prior to submission**

**Abstract**

**Objectives:** The orthopaedic surgery residency applicant class of 2016 had a nationwide match rate of 67.8%. This institution received 573 applications for four residency spots. As orthopaedic surgery residency becomes more competitive, so does the drive among applicants to improve their residency applications. Research experience, in particular, is becoming an increasingly common component of applications. Previous research has demonstrated that the requirement for a PubMed Identification number on all published citations on residency applications since 2014 has led to a drastic decrease in misrepresentation of published research. While publication is the ultimate goal of most research projects, not all manuscripts are published at the time of application. The purpose of this study was to determine the ultimate publication rate of the unpublished manuscripts listed as accepted by or submitted to a journal on orthopaedic residency

applications and provide orthopaedic residency selection committees with information they can use to assess the relevance of not-yet-published works listed on applications.

**Methods:** A retrospective analysis was performed on all orthopedic surgery residency applications to a single institution (n=573) 30 months after their submission, focusing on the updated publication status of those manuscripts that applicants had listed as accepted by or submitted to a journal. Manuscripts were assessed by searching PubMed, Google Scholar, and specified journal websites by means of manuscript title, applicant name, lead author name, other author names, journal name, and finally by keywords. Publications found were compared to reported information supplied by the applicants and any not encountered after this search were deemed not found. In addition, the validity of each journal to which manuscripts were accepted or submitted was assessed using *Ulrich's Periodicals Directory*.

**Results:** Among all applications, there were 309 reported “accepted” and 693 “submitted” manuscripts. Of those works listed as accepted by a journal, 73.7% (228/309) went on to publication as reported, whereas 40.4% (280/693) of those listed as submitted to a journal progressed to publication. Of note, there were a high number of manuscripts (45 “accepted”, 82 “submitted”) listed as pending publications that were not submitted for publication at all, but rather were poster or oral presentations incorrectly categorized by applicants. In a total of 23 cases, contrary to their report, the applicant was not listed as an author on a project that did progress to publication.

**Conclusion:** Less than half of research projects listed as submitted to a journal eventually became published, some of which may be due to rejection of the initial research manuscript. Surprisingly, a large percentage of projects listed as accepted for publication also failed to achieve published status. While some of this discrepancy may be attributable to intentional

misrepresentation or other unknown factors, it is likely that a greater percentage is secondary to applicant misunderstanding as to how to complete the research section of their residency applications. Many projects listed as in the process of publication were found to be, in actuality, poster or oral presentations that were incorrectly categorized. Clearer application section distinctions and medical student education on the research publication process may be merited. Orthopaedic residency selection committees should consider this information when assessing the relevance of not-yet-published works listed on applications.

*Key Words:* residency applications, orthopaedic surgery, research, publication

## Introduction/Literature Review

The orthopaedic surgery residency applicant class of 2016 had a nationwide match rate of 67.8%.<sup>1</sup> As competition increases for selection into orthopaedic surgery residency programs, so does the drive among applicants to improve their residency applications. Research experience, in particular, is becoming an increasingly common component of applications, as it is one of only a few submission categories offered by the Electronic Residency Application Service (ERAS) whereby applicants may attempt to distinguish themselves. Between 2007 and 2014, the mean number of research experiences per residency applicant more than doubled, from 3.0 to 6.7.<sup>2</sup> In the orthopaedic surgery applicant class of 2016, specifically, the average number of abstracts, presentations, or publications per matched applicant was 8.2.<sup>1</sup> Furthermore, orthopaedic surgery residency program directors rank research experience as an important factor considered in the selection process.<sup>3</sup>

Given the apparent importance of applicant research experience, it is imperative that residency program selection committees be able to accurately interpret the research projects listed on applications. Many studies have looked into the prevalence of publication misrepresentation among residency applicants in orthopaedic surgery<sup>4,5</sup> and various other specialties.<sup>6-15</sup> Results demonstrate misrepresentation rates that vary between 2.9% and 18%, some of the variability attributable to differences in criteria. While these projects are useful in assessing the accuracy of reportedly published works, publications represent only a fraction of the research experiences that students list on residency applications. A much smaller body of research involves the projects that are listed as in the process of publication, specifically those manuscripts that have reportedly been either submitted to or accepted by a journal. Grimm et. al. showed that among radiology residency applicants, 58.9% of “accepted” works and 43.7% of

“submitted” projects progressed to full publication within two years of residency application submission<sup>16</sup>. Another study demonstrated somewhat higher publication rates in the field of urology, where 55.8% of “submitted” manuscripts were published within a year of application<sup>17</sup>. To our knowledge, no study has been performed to evaluate the ultimate publication status of these pending manuscripts among orthopaedic surgery applicants.

The lack of research addressing not-yet-published works on orthopaedic surgery residency applications leaves residency selection committees without evidence-based guidance as to how to assess the relevance of this type of research listed on applications. At the same time, a lack of medical student education as to how to present their research experiences in the ERAS application makes it likely that manuscripts may be misinterpreted. As such, determining the ultimate publication rate of these in-process manuscripts may provide information that residency selection committees can use to help assess the relevance of research listed on applications. This study aims to determine the ultimate publication rate of works listed as either accepted or submitted to a journal thirty months after application to an orthopaedic surgery residency program.

### **Hypothesis/Specific Aims/Research Questions**

The purpose of this study was to determine the ultimate publication rate of not-yet-published manuscripts listed as accepted by or submitted to a journal on orthopaedic surgery residency applications to a single institution.

### **Methods**

A retrospective analysis was performed on 573 orthopaedic surgery residency applications 30 months after their submission, focusing on the updated publication status of those manuscripts

that applicants had listed as accepted by or submitted to a journal. Manuscripts were assessed by searching PubMed, Google Scholar, and specified journal websites. Publications found were compared to reported information supplied by the applicants.

All 573 applications to Wright State's orthopaedic surgery residency program in 2016 were analyzed, with no exclusions. PubMed was used as the initial search for potential publications because the large majority of publications to credible journals can be found on this site. Secondly, Google Scholar and specified journal websites were used to make sure no published works were missed. Specifically, each research project listed by applicants as submitted to or accepted by a journal was examined, and an exhaustive search for the manuscript was performed using the sources above. This search was completed by manually typing the manuscript title, author names, and/or other keywords into the above search engines. Based on the findings, projects were then listed as (1) published, (2) not found, (3) duplicates of another project, (4) published, but with the applicant not listed as an author as indicated, or (5) incorrectly categorized. This last group included those projects listed by applicants as in the process of publication, but based on citations were in fact oral or poster presentations and not submitted to a journal at all.

The research design, sampling methods, and estimated sample size of this project resemble those of previous studies on research misrepresentation in residency applications. PubMed, Google Scholar, and specified journal websites were used to determine ultimate publication rates because these were felt to be sufficient to find all projects that had been published in high quality journals. Similar to previous studies, this project examined the research experiences of a single applicant class at one institution, which was done both for feasibility and the ability to compare the results with the current literature. While looking at data from multiple institutions would

have increased the generalizability of the study, it was decided that this was not a feasible goal for this project. It was felt that 573 applications were a sufficient sample size to make valid conclusions based on the obtained data. Finally, “ultimate” publication rate was determined by searching for projects thirty months following application submission because it was felt that most projects in the process of publication at the time of application should reach publication status by this time. Searching for publications two, five, or ten years later would be unlikely to change the percentage of published works that were found.

## Results

There were a total of 1002 research projects listed by applicants as in the process of publication. 309 of these were indicated to be accepted for publication, while 693 were indicated to be submitted to a journal. Table 1 shows the breakdown of the ultimate publication status of these projects.

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**Table 1: Ultimate publication status of research projects listed as accepted or submitted for publication by applicants to a single orthopaedic surgery residency program, 2016**

	Accepted	Submitted
<b>Found to be published</b>	228	280
<b>Not found</b>	26	300
<b>Duplicate entry</b>	2	16
<b>Article found, author not listed</b>	8	15
<b>Incorrectly categorized*</b>	45	82
<b>Total</b>	309	693

\* The applicant’s research citation indicated these projects were never truly submitted for publication, and therefore did not belong in this section of the application

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Of the research projects listed as accepted for publication, 73.8% (228/309) were found to truly be published thirty months following application submission. Of the remaining projects, 2 were found to be duplicate entries of another project already listed in the applicant’s research.



8 projects were found to be published, but without the applicant listed as an author as indicated. 45 projects (representing 55.6% of the non-published works) were incorrectly categorized as pending publications whereas they were in fact oral/poster presentations or other non-published works. The remaining 26 projects were simply not found.

Of the research projects listed by applicants as submitted to a journal for publication, 40.4% (280/693) went on to be published. Of the remaining 413 projects, 16 were found to be duplicates of another research entry, 15 were found without the applicant listed as an author, and 82 (representing 19.9% of the non-published works) were found to have been incorrectly categorized. There were 300 additional projects that could not be found in any form. The distribution of this data can be visualized using the pie charts below for both the “accepted” and “submitted” categories.

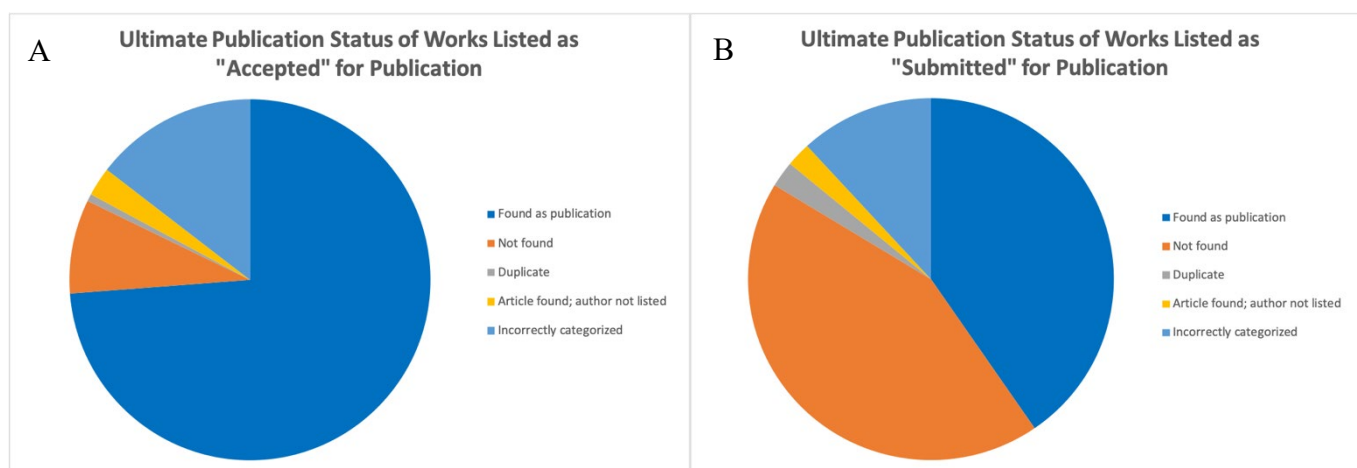


Figure 1: Pie charts demonstrating the proportion of research projects categorized within each “ultimate publication status” category. *A* includes the data for projects indicated to be accepted for publication. *B* includes data for the projects listed as submitted for publication.

## Discussion

From the 573 applications to a single orthopaedic surgery program during the 2016 application cycle, there were a total of 1002 research projects that applicants documented in

ERAS as being in the process of publication, either accepted by or submitted to a journal. Our goal with this study was to provide information to residency directors as to how likely such projects are to achieve publication status. Our data shows that 40.4% (280/693) of projects listed as submitted to a journal at the time of application ultimately went on to publication. This is similar to the rates of publication found in a comparable study in the field of radiology, which demonstrated a 43.7% publication rate for reportedly submitted works,<sup>16</sup> and is slightly lower than the 55.8% publication rate in a study of urology residency applications.<sup>17</sup> Conversely, our study shows that 73.7% (228/309) of projects that were listed as accepted to journal were ultimately published, higher than the 58.9% rate of publication for similar research in the field of radiology.<sup>16</sup>

Although it is somewhat surprising that less than half of projects listed as submitted to a journal eventually became published, there are potential explanations for this discrepancy. Not all works submitted to a journal meet the standards for publication, and many projects are rejected upon initial submission. One would expect that most rejected manuscripts would be edited and resubmitted at a later date. However, applicants who had already been accepted to a residency program by the time their journal submission was rejected may not have had the motivation nor the time to prepare their project for resubmission.

Interestingly, the overall publication rate of projects listed as accepted to a journal was lower than might be expected as well. One would assume that the overwhelming majority, if not all, of projects accepted to a journal would be published within a 30-month timeframe. While it is true that some projects may have been provisionally accepted and undergoing revisions, 30 months is more than enough time for revisions to be made and projects to become published. Regardless, this would not account for the 26.3% of projects that were not ultimately published. It is possible

some of this discrepancy may be attributable to intentional misrepresentation on the part of the applicant; however, we believe that a greater percentage is due to applicant misunderstanding as to how to complete the research section of their residency applications.

The ERAS residency application contains distinct and separate sections for applicants to list poster presentations, oral presentations, book chapters, published journal articles, and journal articles that have not been published. Despite this, our data indicates that many applicants incorrectly categorized their research. There were a total of 81 projects listed by applicants as accepted to a journal that did not ultimately become published. However, over half of these projects (55.6%) should not have been listed as accepted for publication in the first place. Most were abstracts accepted for presentation at a conference, while others were book chapters or articles from university newsletters. Had these projects been appropriately categorized in their corresponding sections of the ERAS application, the percentage of reportedly accepted works to become published would increase to 86.3% (228/264) in place of 73.7%.

A similar, though less profound, number of research projects listed by applicants as submitted to a journal were found to be incorrectly categorized. Of the 413 “submitted” projects that were not ultimately published, 82 works (19.9%) should not have been listed as submitted to a journal. As before, the majority of these projects were manuscripts submitted for presentation at a conference. Had these projects been appropriately placed on the ERAS application, the percentage of reportedly submitted works to become published would increase to 45.8% (280/611) instead of 40.4%.

Given the number of conference abstracts that were inappropriately listed in the “peer reviewed journals” section of the ERAS application, this portion of the system requires particular attention. Currently, research that is in the process of publication should be listed in a category

labeled as “Peer reviewed journal articles/abstracts (other than published).” However, this description leaves room for interpretation as to whether “peer-reviewed” applies to only journal articles or to abstracts as well. Our data suggests that many applicants included non-peer-reviewed abstracts, specifically conference abstracts, in this portion of the application. Changing the wording of this section to specify what should and should not be included may be beneficial to both applicants and residency programs.

Two other factors account for a small percentage of the remaining projects that did not become published. First, there were a number of projects that were listed multiple times by applicants. Even after excluding abstracts accepted or submitted to multiple conferences, there were 2 reportedly accepted projects and 16 reportedly submitted projects that were exact duplicates of another work listed by the applicant. Second, some projects were found to be published, but without the applicant listed as an author as indicated on their applications. There were 8 such “accepted” and 15 such “submitted” works. Of note, in four of these cases, the applicants were mentioned in the acknowledgements section of the published manuscript. We decided to exclude all of these projects from the “found” category in our data analysis given that these works were not novel publications in the same form as listed on the ERAS application.

There are several limitations to this study. Our data comes from a single applicant class to a single institution, and as such may not be applicable to all residency programs. This study also includes only orthopaedic surgery applicants, and so the results cannot be generalized to applicants of different specialties. Furthermore, despite our strict search criteria, it is possible that some published manuscripts were missed during our search and incorrectly labeled as “not found.” Using multiple search strategies minimized, but did not eliminate, this risk.

## Conclusion

Our study of 573 applications to a single orthopaedic surgery residency program demonstrated that 40.4% of projects listed as submitted to a journal and 73.7% of projects listed as accepted to journal were ultimately published 30 months after application submission. With this information, residency program directors will be better equipped to evaluate the importance of applicant research that has not yet been published. Of note, out of those research projects that were not ultimately published, a large proportion were not submitted for publication at all, and simply were incorrectly categorized by the applicant in the research section of their applications. Although the ERAS application recently underwent revisions to better delineate how research should be listed, this data indicates that the system may benefit from further modifications. This could include more precise wording of each research category “title” or more formal education for applicants and school administrators on how this section should be completed. If such changes were to be made in the future, it would be interesting for subsequent studies to evaluate whether this intervention results in higher publication rates for these not-yet-published projects. At present, it is important to note that a significant number of research projects in the process of publication at the time of residency applications do not ultimately become published. Orthopaedic residency selection committees should consider this information when assessing the relevance of not-yet-published works listed on applications.

## References

1. National Resident Matching Program. Charting Outcomes in the Match for U.S. Allopathic Seniors. Retrieved from <https://www.nrmp.org/wp-content/uploads/2016/09/Charting-Outcomes-US-Allopathic-Seniors-2016.pdf>
2. DePasse JM, Palumbo MA, Ebersson CP, Daniels AH. Academic Characteristics of Orthopaedic Surgery Residency Applicants from 2007 to 2014. *J Bone Joint Surg Am.* 2016;98(9):788-795. doi:10.2106/JBJS.15.00222
3. Green M, Jones P, Thomas J. Selection criteria for residency: Results of a national program directors survey. *Acad Med.* 2009 Mar; 84(3):362-367. doi: 10.1097/ACM.0b013e3181970c6b.
4. Dale JA, Schmitt CM, Crosby LA. Misrepresentation of research criteria by orthopaedic residency applicants. *J Bone Joint Surg Am.* 1999;81(12):1679-1681
5. Konstantakos EK, Laughlin RT, Markert RJ, Crosby LA. Follow-up on misrepresentation of research activity by orthopaedic residency applicants: has anything changed? *J Bone Joint Surg Am.* 2007;89(9):2084-2088. doi:10.2106/JBJS.G.00567
6. Baker DR, Jackson VP. Misrepresentation of publications by radiology residency applicants. *Acad Radiol.* 2000;7(9):727-729
7. Beswick DM, Man L-X, Johnston BA, Johnson JT, Schaitkin BM. Publication misrepresentation among otolaryngology residency applicants. *Otolaryngol--Head Neck Surg Off J Am Acad Otolaryngol-Head Neck Surg.* 2010;143(6):815-819. doi:10.1016/j.otohns.2010.08.054
8. Eisenberg RL, Cunningham M, Kung JW, Slanetz PJ. Misrepresentation of publications by radiology residency applicants: is it really a problem? *J Am Coll Radiol JACR.* 2013;10(3):195-197. doi:10.1016/j.jacr.2012.12.013
9. Kaley JR, Bornhorst J, Wiggins M, Yared M. Prevalence and types of misrepresentation of publication record by pathology residency applicants. *Arch Pathol Lab Med.* 2013;137(7):979-982. doi:10.5858/arpa.2012-0253-OA
10. Neuman SA, Long TR, Rose SH. Publication misrepresentation among anesthesiology residency applicants. *Anesth Analg.* 2011;112(3):674-677. doi:10.1213/ANE.0b013e3182042d4d
11. Phillips JP, Sugg KB, Murphy MA, Kasten SJ. Misrepresentation of scholarly works by integrated plastic surgery applicants. *Plast Reconstr Surg.* 2012;130(3):731-735. doi:10.1097/PRS.0b013e31825dc3f2
12. Roellig MS, Katz ED. Inaccuracies on applications for emergency medicine residency training. *Acad Emerg Med Off J Soc Acad Emerg Med.* 2004;11(9):992-994. doi:10.1197/j.aem.2004.04.010
13. Sater L, Schwartz JS, Coupland S, Young M, Nguyen LHP. Nationwide study of publication misrepresentation in applicants to residency. *Med Educ.* 2015;49(6):601-611. doi:10.1111/medu.12729
14. Wiggins MN. A meta-analysis of studies of publication misrepresentation by applicants to residency and fellowship programs. *Acad Med J Assoc Am Med Coll.* 2010;85(9):1470-1474. doi:10.1097/ACM.0b013e3181e2cf2b

15. Wiggins MN. Misrepresentation by ophthalmology residency applicants. *Arch Ophthalmol Chic Ill 1960*. 2010;128(7):906-910. doi:10.1001/archophthalmol.2010.123
16. Grimm LJ, Maxfield CM. Ultimate publication rate of unpublished manuscripts listed on radiology residency applications at one institution. *Acad Med*. 2013 Nov;88(11):1719-22. doi: 10.1097/ACM.0b013e3182a7f903
17. Pak JS, Pagano MJ, Cooper KL, McKiernan JM, Badalato GM. Prevalence of Research Publication Misrepresentation Among Urology Residency Applicants and Its Effect on Match Success. *Urology*. 2017;99:5-9. doi:10.1016/j.urology.2016.08.055