

Misrepresentation of Research Publications Among Orthopedic Surgery Fellowship Applicants

A Comparison With Documented Misrepresentations in Other Fields

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Study Design. A retrospective study was used to review fellowship applications over 3 years.

Objectives. To assess the prevalence of research misrepresentation in orthopedic fellowship applications, and to compare such activity between subspecialties (*e.g.*, spine, sports, hand).

Summary of Background Data. Competition for orthopedic surgery fellowships is intense. The applicant pool includes orthopedic, plastic, and general surgeons, as well as neurosurgeons. Residency and fellowship training programs in other disciplines have documented shocking levels of misrepresentation in the curriculum vitae of prospective applicants. However, no study has looked at orthopedic residents applying for subspecialty fellowship programs.

Methods. A retrospective analysis investigated 280 applications for fellowship positions in the department of orthopedic surgery at the authors' academic institution from 1996 to 1998 inclusively. To allow for press and publication delays, a minimum 24-month follow-up period was instituted. The listings of applicants' research publications were analyzed for evidence of misrepresentation through an exhaustive literature search. Only the most obvious confirmable discrepancies were labeled as misrepresentations. The results then were compared with those found in studies conducted in other fields: gastroenterology fellowship, emergency medicine residency, pediatric residency, dermatology residency, orthopedic residency, and medical faculty applications.

Results. Among 280 (54%) applicants for orthopedic surgery fellowships, 151 claimed journal publications. It was found that 16 (10.6%) of these 151 applicants had misrepresented their citations. This rate was highest in spine fellowship applicants (20%). However, considering the numbers available, this was not significantly different among the various subspecialty fellowship applicants ($P > 0.1$). In addition, various demographic data did not correlate with the rate of misrepresentation ($P > 0.1$). These results are comparable with those reported in other medical fields ($P > 0.1$).

Conclusions. Misrepresentation occurs in orthopedic fellowship applications at a rate comparable with that

observed in other fields. This rate is not different among the various subspecialties in orthopedics. Policies that may lessen the incidence of falsification on curriculum vitae should be instituted in an attempt to curb such activity. [Key words: fellowship application, misrepresentation, research fraud] **Spine 2003;28:632–636**

According to the statistics published by the National Residency Matching Program every year,¹ orthopedic surgery is one of the most competitive and sought after residency training programs. With decreased funding and the push for fewer specialists, many training programs are being forced to reduce their available training positions. As confirmed by the findings of this study, the applicant pool for orthopedic residency and fellowship positions includes many doctors who were at the top of their medical school class. Early in their career, many trainees express their commitment to orthopedics by performing scientific research and publishing their work in peer-reviewed journals. Because of the excellent field of applicants, many trainees may feel that the cliché “publish or perish” applies to their residency and fellowship, and that their application must include research accomplishments and publications.

A recent study² from the University of Pittsburgh Gastroenterology Department reviewed the claimed research publications in 236 fellowship applications. Of the applicants who reported publications, 30% (16 of 53) unequivocally misrepresented their work. Misrepresentation came in the form of nonexistent articles, nonexistent journals, or articles noted as “in press” that had not appeared in print after an 18-month follow-up period. One applicant cited 24 articles in nonexistent journals.

Similar results have been reported for residency applications. A study³ performed at the University of California, Los Angeles (UCLA), looked at 350 emergency medicine residency applications. Of 113 applicants, 23 (20%) cited publications misrepresented the facts. A statistically significant positive correlation was noted between the number of citations and the incidence of misrepresentation. Markedly less misrepresentation was found in the curriculum vitae of 138 dermatology residency applicants during a recent year at the Vanderbilt University School of Medicine.⁴ Of the 52 applicants citing publications, 3 (6%) had falsified their publications. Most recently, a study⁵ of curriculum vitae submitted by applicants to the orthopedic residency program at the University of Tennessee School of Medicine

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found a 17% (11 of 64) misrepresentation rate. A scrutiny of residency applicants to the pediatrics program at the University of Washington⁶ found that up to 29 (19.7%) of 147 the applicants had misrepresented their publications.

Even medical faculty is not immune to this problem of seemingly epidemic proportions. A recent study⁷ showed that 39 (15.6%) of 250 applicants to faculty positions at various medical schools had discrepancies in their publication citations. These studies are compared in Figure 1.

The amount of erroneous reporting on the curricula vitae of surgery residents that apply for fellowship positions is unknown. The claimed publications in the applications to the UCLA Department of Orthopedic Surgery for consecutive fellowship matches from 1996 to 1998 were analyzed.

■ Methods

A retrospective study was conducted to review all applications for fellowship positions in the Department of Orthopedic Surgery at the UCLA Medical Center for the 1996 through 1998 matches. To allow for publication delays of articles listed as “in press” or “in print,” a minimum 24-month follow-up period was allowed. The listing of research publications was analyzed for evidence of misrepresentation. Confirmation of a publication included citation in the MEDLINE database, a copy of the publication in the application file, or review of the actual journal. Database searches used the author’s name, coauthors’ names, title, periodical, and subject. If database searches and actual review of the journal failed to yield the cited publication, existence of the journal was determined with the use of *Ulrich’s International Periodicals Directory*⁸ (containing information on 140,000 serials published throughout the world and considered the definitive reference on the existence of journals), *The EBSCO Serials Directory*⁹ (containing 160,000 bibliographic entries on all subjects from 70,000 publishers worldwide), and *The National Library of Medicine List of Serials Indexed in the Index Medicus*¹⁰ (containing all the citations to the biomedical journal literature catalogued by the National Library of Medicine).

“Unequivocal misrepresentation” was defined as the citation of an article that proved to be nonexistent, or the incorrect listing or listing order of self as an author of a published article. This had to be a definite discrepancy in a cited journal that could be physically obtained and reviewed. If an exhaustive search for the journal using the aforementioned databases proved fruitless, the article was classified as “unverifiable” but not considered an unequivocal misrepresentation because of the possibility that the journal was a local production with very limited circulation. Articles reported as “accepted,” “in press,” “submitted,” or “in progress” also were reviewed to see which of these materialized into published works after the minimum 24-month follow-up period. In addition, the following demographic data were collected from the application forms and curricula vitae: gender, affiliation with academic honor societies, undergraduate degree fields, presence of other postgraduate degrees, type of residency training program (orthopedic, plastics, general), and the location of the residency training programs. Applications then were compared between the subspecialties that drew the largest number of applicants: spine surgery, hand surgery, and sports surgery. Statistical compar-

isons were performed using the χ^2 test. A *P* value less than 0.01 was considered statistically significant.

■ Results

Demographics

The applications and curricula vitae of 280 applicants were studied. Of these applicants, 253 (90%) were men and 27 were women. Hand surgery had the highest number of applicants (*n* = 123), followed by sports (*n* = 73), spine (*n* = 68), pediatrics (*n* = 8), oncology (*n* = 7), and joint replacement (*n* = 1). Of the applicants, 107 (38%) were members of one or more honor societies (AOA, PBK, or TBP). In terms of undergraduate training, 176 (63%) of the applicants held science degrees, whereas 104 (37%) held nonscience (arts) degrees. Of the 29 applicants (10%) with advanced postgraduate degrees, 23 had a master’s degree, 3 had a PhD, 2 had a JD, and 1 had a DVM. Four applicants (1%) had received their residency training outside the United States.

Research

All 280 applicants reported research activity. This study looked specifically at published journal articles, which are the most straightforward to verify. Of the 280 applicants, 151 (54%) had cited journal publications. By comparison, 70 applicants (25%) claimed research papers that were “accepted” or “in press,” and 204 applicants (73%) claimed research papers that were “in progress” or “submitted.” Moreover, 81 applicants (27%) claimed published abstracts, and 155 applicants (55%) cited presentations at a regional or national level.

Journal Publications

Overall, the rate of unequivocal misrepresentation for all reviewed orthopedic fellowship applications was 16 of 280 (5.7%). Of the candidates claiming published works, misrepresentation was found on 16 (10.6%) of the 151 applications.

Publications in the form of journal articles were cited in 76 (62%) hand surgery applications. Of the 212 research publications cited, 191 (90%) were conclusively verified. Seven (9%) of the applicants who claimed publications were classified as unequivocal misrepresenters. Six of these claimed nonexistent articles in existing journals, and the seventh listed self as the first author when in fact he or she was the third author. Three applicants had multiple misrepresentations: One claimed two nonexistent articles and named self as the first author in a third article when in fact he or she was second, and the other two claimed two nonexistent articles in existing journals. Six applicants cited journal articles that could not be conclusively verified and were classified as unverifiable: Four cited existing but obscure journals, which the authors were unable to review, and two cited journals whose existence could not be verified.

Of 73 sports surgery applicants, 34 (47%) claimed publications. Of the 77 journal articles cited, 71 (92%) were verified conclusively. Two applicants (6% of those who claimed publications) were classified as unequivocal

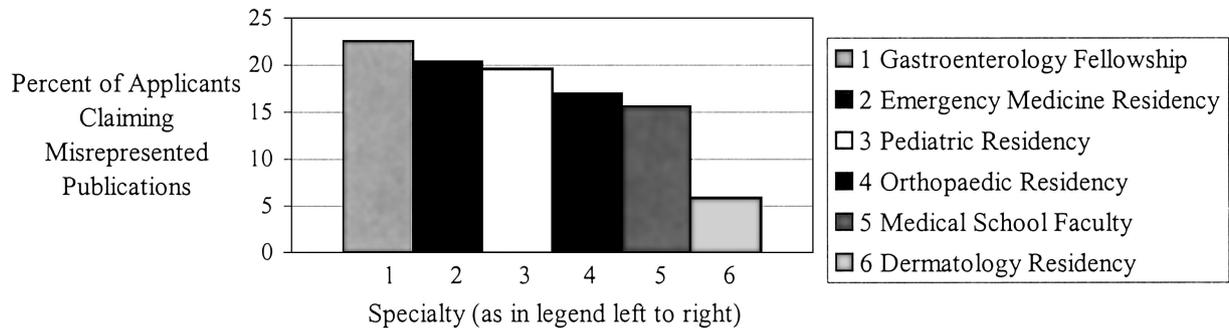


Figure 1. Percentage of applicants found to have misrepresented their publication citations in the different fields as described ($P > 0.1$). Four subjects were excluded from the Sekas and Hutson study because they were not unequivocal misrepresenters according to the definitions used in this study.

misrepresenters. One applicant claimed self to be the second author whereas he or she was in fact the fifth, and the other left out the names of four other authors. Three applicants fell into the unverifiable category: Two of these cited articles in existing but obscure journals that the authors could not review, and one cited an article in a journal whose existence could not be verified.

Of 68 spine surgery applicants, 35 (52%) claimed publications. Of the 76 journal articles listed, 68 (89.5%) were verified conclusively. Seven applicants (20% of those who claimed publications) were classified as unequivocal misrepresenters. Four of these applicants claimed nonexistent articles in existing journals; two incorrectly listed themselves as the first authors; and the seventh cited self as the second author whereas he or she in fact was the fifth. There was one unverifiable applicant, who cited an article in an existing but obscure journal that could not be obtained.

The proportion of applicants who misrepresented their research publications, according to a comparison of hand, sports, and spine applicants, was not significantly different considering the numbers available ($P > 0.1$). These data are graphically represented in Figure 2.

By far the most popular category in all the curricula vitae was the “in progress/submitted” category (532 citations), as compared with the “publications” category (380 citations) and the “accepted/in press” category (97 citations). However, the follow-up investigations

showed that the “in progress/submitted” category had the lowest rate of actual publication (4%), in contrast to the 90% verification rate for the “publications” category and the 32% rate for the “accepted/in press” category. Considering the available numbers, statistical analysis showed that no significant difference existed among the various orthopedic subspecialties with regard to the “in progress/submitted” category and the “accepted/in press” category ($P > 0.1$ in both cases). These data are summarized in Tables 1 and 2.

Gender, undergraduate training, medical school location, academic honor society membership, and the presence of advanced postgraduate degrees all were examined, but no statistical correlation with the rate of misrepresentation could be found. Unlike some of the other studies mentioned, the rate of misrepresentation did not appear to increase with the number of claimed articles ($P > 0.1$) (Figure 3).

■ Discussion

The falsification and erroneous representation of physicians' credentials is not a new phenomenon. Reade and Ratzan¹¹ found that 12% (113/946) of the “specialists” listed in the 1983 Hartford, CT Yellow Pages were not board certified in a specialty according to the American Medical Association directory or the Marquis *Directory of Medical Specialists*. Schaffer *et al*¹² found that 5%

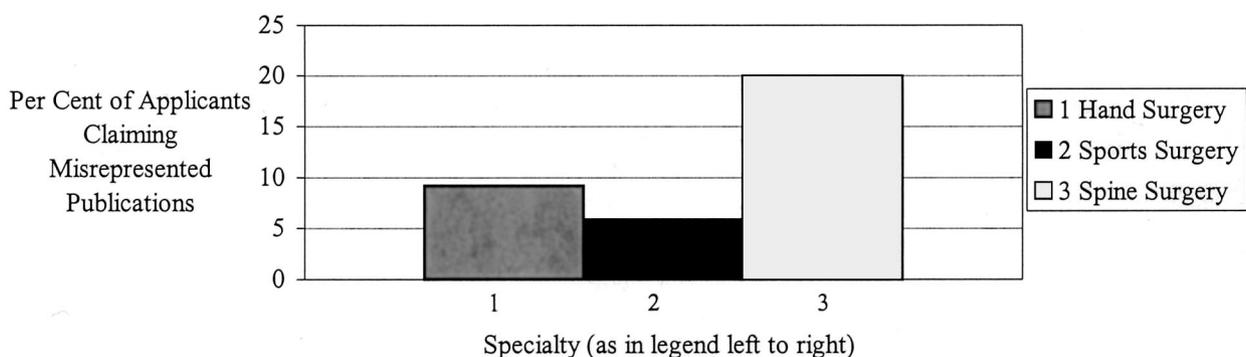


Figure 2. Percentage of orthopedic surgery fellowship applicants found to have misrepresented their publication citations. These values were not statistically different ($P > 0.1$).

Table 1. Publication Rates of Papers Listed as "Accepted" or "in Press" After 24–48 Months Follow-up

Fellowship	No. Applicants	No. Articles	No. Verified	Percent Verified*
Hand surgery	32	50	15	30%
Sports surgery	18	22	7	32%
Spine surgery	16	21	6	29%

* $P > 0.1$.

(39/773) of the applicants for hospital staff privileges at a local hospital included false information in their applications.

The case of a radiology resident at the University of California, San Diego,¹³ demonstrates the ease with which academic dishonesty can evade detection by peer review. The physician claimed 137 published articles in his bibliography, 60 (44%) of which were deemed questionable or fraudulent.

Another study¹⁴ funded by the National Science Foundation surveyed 2000 doctoral candidates in the sciences and 2000 of their respective faculty about their exposure to perceived academic misconduct. They found substantial levels of plagiarism and data falsification as well as a variety of questionable research practices.

The current review of research publications reported by surgery fellowship applicants shows that misrepresentation does exist in their documents, despite their rather impressive curricula vitae. A proper discussion concerning the prevalence of such erroneous reporting and the quest to understand the motivations surrounding this practice must be prefaced with a thorough debate about the true definition of fraud. Engler *et al*¹³ defined fraud as intentional misrepresentation in which "the perpetrator makes statements that are intended to induce others to believe things that he or she knows to be false." This study and others look at the rate of misrepresentation in a literal sense. One obviously cannot infer premeditated fraud in some of these cases of misrepresentation. However, careless reporting and outright deception are culpable acts that deserve attention.

Several hypotheses may explain the finding of erroneous research citations in this study. First, residents who seek fellowship training may feel that stockpiling their

Table 2. Publication Rates of Papers Listed as "Submitted" or "in Progress" After 24–48 Months Follow-up

Fellowship	No. Applicants	No. Articles	No. Verified	Percent Verified*
Hand surgery	96	268	12	4.5%
Sports surgery	49	135	5	3.7%
Spine surgery	46	108	1	1.0%

* $P > 0.1$.

bibliography with published research will give them a competitive edge in the interview process. This, in turn, may lead to academic merit, a more prestigious fellowship, and, subsequently, a more rewarding career. Moreover, applicants may feel that the benefits they can reap greatly outweigh the risks of engaging in such fraudulent activity. Gurudevan and Mower³ showed a statistically significant correlation between the number of citations claimed and the rate of misrepresentation in emergency medicine residency applications. Applicants may think that a voluminous bibliography is less likely to be carefully scrutinized by an admissions committee.

Other proposed explanations for the existence of this problem include universal acceptance of such activities, innocent error, the attempt to prolong a favorable visa status, and mental illness. LaFollette¹⁵ believed that there is no single cause for such behavior, but rather, that it is a multifactorial issue. He argued that environmental conditions harboring competition and overzealous aspiration, fame, and fortune, and more importantly, the laissez faire attitude of the institutions governing basic research contribute to research fraud. He went on to illustrate how "the erosion of the peer review process in the post-World War II organization of basic research has created the bureaucratic nightmare that surrounds any attempt to engage in scientific research today." This trust also is being broken for residency and fellowship applications. Clinical training programs are uncovering heretofore-unnoticed attempts by applicants to gain competitive advantage over their peers by falsifying information regarding their research endeavors.

Although no correlation could be found between the various demographic variables and the rate of mispre-

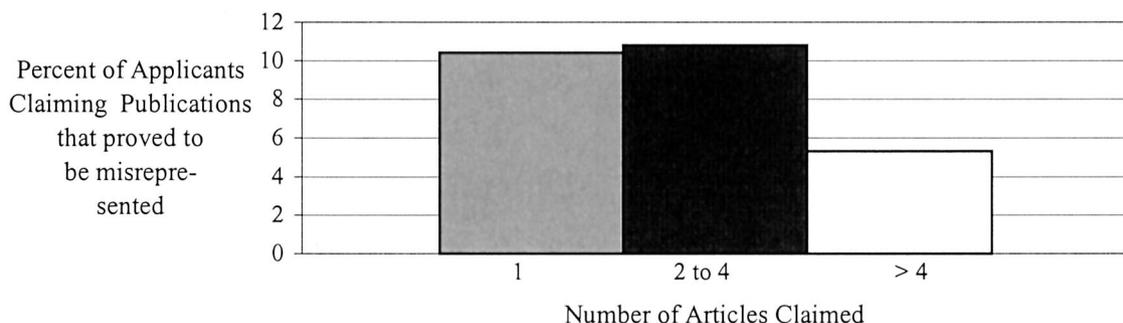


Figure 3. Percentage of applicants found to have misrepresented their publication citations, as compared with the total number of published articles claimed ($P > 0.1$).

sensation, the current sample size most likely did not provide sufficient statistical power. As applicants claimed more publications, the number of misrepresentations increased. These findings are similar to those of Gurudevan and Mower.³ In a comparison of the data from Sekas and Huston,² Gurudevan and Mower,³ Boyd *et al*,⁴ Dale *et al*,⁵ Goe *et al*,⁷ and Bilge *et al*⁶ with the pooled data from all orthopedic fellowship applicants in the current study, statistical analysis demonstrates that these groups are not significantly different from each other ($P > 0.1$). Although not statistically significant, a trend rated gastroenterology fellowship applicants and emergency medicine residency applicants as those with the highest rate of misrepresentation, followed by pediatric and orthopedic surgery residency applicants, and finally by medical school faculty, orthopedic surgery fellowship, and dermatology residency applicants.

The current review of the applications to the UCLA Fellowship Training Programs found that many applicants fail to differentiate properly among peer-reviewed, published articles from abstracts, presentations, and pending publications. This gives the applicants' curricula vitae the appearance of containing more published research than actually is present. The senior author¹⁶ in 1997 found that overall, only 46% (668/1465) of the papers presented at the Annual Meeting of the American Academy of Orthopedic Surgeons eventually are published, and that this rate is lowest for hand surgery (39%, 28/72). This rate is slightly higher (52%, 206/397) when papers presented at the American Society for Surgery of the Hand annual meeting¹⁷ are followed to publication. When interviewed, authors have stated that publication in a peer-reviewed journal is not a high priority after oral presentation.^{18–20} Does this suggest that to some, the rigors of peer review are not worthy of their academic rewards?

Now that the authors have identified a practice that may seriously undermine the academic integrity of our profession, what can be done to curtail this activity? Just as our standards of the medical practice are self-governed, our academic integrity and professional behavior must be self-policed. Sekas and Hutson² have suggested guidelines that define the obligations of those who discover misrepresentation and the responsibilities of faculty to prevent such behavior and enact departmental policies that address these issues. The American Board of Internal Medicine²¹ has developed such a treatise. The key to addressing this issue probably is prevention and education. The Council of Emergency Medicine Residency Directors has developed a guideline statement that must be signed by any prospective applicant. The UCLA Emergency Medicine Program has included such a form in its residency application. Boyd *et al*⁴ proposed policies that may reduce the amount of time and effort that would be necessary to verify every claimed article by all applicants. These policies include accompaniment of cited articles by a photocopy of the articles' cover page, all articles listed as "in press," "accepted," or "in print" by a photocopy

of the letter of acceptance from the journal's editor, and those cited as "in progress/in preparation" by a letter from a coauthor attesting to the works' existence and degree of completion.

■ Key Points

- Competition for orthopedic surgery fellowships is intense, pressuring applicants to pursue any advantage possible in an attempt to obtain the best available spots.
- Misrepresentation of research achievements exists in orthopedic fellowship applications at a rate comparable with that found in other fields.
- The rate of misrepresentation is not significantly different among the various subspecialty fellowships in orthopedic surgery.

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