



Resident scholarly activity is correlated with in-training exam scores

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ABSTRACT

Objective: To evaluate the correlation between medical resident scholarly activity (SA) and in-training exam scores (ITEs).

Methods: We conducted a 5-year (2013–14 through 2017–18) retrospective comparison of resident ITE scores and their cumulative SA. Each resident's final ITE score was compared to their cumulative SA. Residents who began and ended their residency within this period were also evaluated with a comparison of their cumulative SA to their post-graduate year 1 (PGY1) ITE score and their change in ITE score.

Results: Forty-nine of fifty-one residents (96%) were evaluated. Twenty six of these were tracked from PGY1 through graduation. Spearman rank correlation shows a moderate positive correlation between SA and PGY1 ITE score ($r = 0.43$, $p = 0.029$), a weak positive correlation between SA and senior ITE score ($r = 0.29$, $p = 0.046$), and no correlation between SA and change in ITE score ($r = -0.09$, $p = 0.660$).

Conclusion: Our results provide evidence that higher scoring students tend to perform more SA. This finding warrants further study to determine the nature of this correlation—in particular the extent to which effort to increase one may also increase the other.

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Introduction

Scholarly activity (SA) is an important component of residency programs accredited by the Accreditation Council of Graduate Medical Education [1]. Board passage is a core goal of residency and is predicted annually with American Board of Family Medicine in-training exam scores (ITEs) [2,3]. A correlation between SA and ITEs would indicate the possibility of synergistic benefits to increasing either. For example, those who pursue SA might, through enhanced critical thinking skills or increased knowledge, improve their ITE scores. Those with high ITE scores might more readily undertake SA pursuits. If such a relationship exists, programs desiring to improve ITE performance might benefit from a culture of SA; similarly, programs desiring to boost SA might seek high-ITE performers. However, to our knowledge, no correlation between ITE and SA during medical residency has been evaluated or reported.

We successfully implemented a series of curricular changes over 2 years (faculty and peer research coordinators, a point system, a case report workshop and a guidebook to scholarly activity (SA) to improve SA at Naval Hospital Jacksonville Family Medicine Residency (NHJFMR), detailed elsewhere [4–6]. Over time we perceived a concurrent upward trend in our residents' ITE scores, and sought to formally evaluate this observation.

Methods

This project was determined exempt by the Naval Medical Center Portsmouth Institutional Review Board. We conducted a 5-year (academic Years 2013–14 through 2017–18) retrospective comparison of resident ITE scores and their cumulative SA. NHJFMR is a full scope military family medicine program in the United States. Fifty one residents graduated within this period. Two residents whose

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SA files were lost were excluded. The remaining 49 (96%) residents were evaluated. Each resident's final ITE score was compared to their cumulative SA. A subset of 26 of these residents was also evaluated with a comparison of their cumulative SA to their post-graduate Year 1 (PGY1) ITE score and their change in ITE score. NHJFMR tracks scholarly output on a continuous numerical scale based on the scientific rigor of each project based on the point system developed by Lennon et al. [4], Seales et al. [5], and Seehusen et al. [7] (Table 1).

Results

Spearman rank correlation shows a moderate positive correlation between SA and PGY1 ITE score ($r_s = 0.43$, $n = 26$, $p = 0.029$), a weak positive correlation between SA and senior ITE score ($r_s = 0.29$, $n = 49$, $p = 0.046$), and no correlation between SA and change in ITE score ($r_s = -0.09$, $n = 26$, $p = 0.660$).

Discussion

It is interesting that correlation degraded over the time. The absence of correlation between SA and change in ITE score over time may indicate that residents who perform poorly on the PGY1 ITE exam put their efforts purely into ITE study and not into

SA (beyond the minimum graduation requirement). Given the correlation between PGY1 ITE and SA, it may be that pursuit of SA is an effective adjunct to more focused study. Scholarly pursuits in any area should improve critical thinking skills, allowing a learner to be a more efficient student of core material and also a better test taker. Perhaps a student's internal drive to learn leads to both higher ITE scores and pursuit of SA. To this extent, programs seeking students who score higher on the ITE (and hence, have a greater chance of passing the board exam) may identify them by their SA prior to residency, and entice them by increasing the SA support at their program. Our study is limited by its small size, with only one program evaluated over 5 years. We had a few resident outliers in SA. To minimize outlier skew, we chose the Spearman correlation to assess significance.

A PubMed literature search of papers within the past 5 years relating to resident SA and ITE scores shows that research in SA focuses on identifying and overcoming barriers [4,5,7–10], and in ITE scores focuses on using ITE to predict board passage or to compare curricular innovation [3,11–13]. There are few studies that correlate standardized medical examination scores to research or SA, and each of these evaluates pre-residency exposure to

Table 1. JFMRP Scholarly Point System, adapted from Seehusen et al. [7].

Scholarly activity	Points
Completion of an IRB-approved research project or a publishable well-conducted process improvement project	10
Acceptance of a manuscript describing a case report, clinical review, or research project in a peer-reviewed medical journal	8
Acceptance for publication of an FPIN Clinical Inquiry	7
Submission, acceptance, and presentation of a podium or poster presentation at a regional, national, or international medical conference for a case report or original research	6
Acceptance for publication of an FPIN Help Desk Answer or EMedRef	5
Submission without acceptance of a manuscript describing a case report, clinical review, or research project in a peer-reviewed medical journal	5
Acceptance for publication of a letter to the editor in a peer-reviewed journal	3
Being recognized at a local, regional, national, or international conference	3
Publications for lay public such as newspaper or magazine articles on medical topics	2
Presentation of SA at the JFMRP Annual Academic Scholarship Day	2
Presentation of a Grand Rounds/TIMM conference to the hospital staff	1
Submission without acceptance of a presentation at a regional, national, or international conference	1
Presentation of case at Tumor Board	1
Completion of CITI/IRB training	1

CITI = Collaborative Institutional Training Initiative, IRB = Institutional Review Board, EMedRef = FPIN's electronic Medical Reference, FPIN = Family Practice Inquiries Network, JFMRP = Jacksonville Family Medicine Residency Program, TIMM = Tumor Inquiry/Morbidity and Mortality.

outcomes within residency. Chen et al. [14] found that United States Medical Licensing Examination Step 2 scores correlated with peer-reviewed journal publication and ITE 2 scores during anesthesia residency, but that pre-residency research experience did not correlate with in-residency publication or ITE 2 scores. Sharma et al. [15] similarly found that pre-residency research experience was not predictive of standardized test performance in internal medicine residents. In orthopedic surgery residents, Kreitz et al. [16] found that higher standardized test scores during medical school correlated with higher in-training examination scores during residency, but were negatively correlated with resident research productivity measured by co-authorship and first authorship. We measured correlation between SA and ITE scores within residency, and used a broad definition of SA (vice publication alone), so our outcomes are not directly comparable with these studies. Our results are most consistent with Chen et al.'s [14] score to publication correlation, and inconsistent with Kreitz et al.'s [16] negative score to publication correlation. Further study is needed to determine if these differences are real, and if so, which resident groups fall into the positive or negative correlation, and if the mindset that drives choice of residency influences how test taking relates to scholarship. That neither Chen et al. [14] nor Sharma et al. [15] found a correlation with pre-residency research and scores suggests that perhaps our correlation is unidirectional, and that increasing SA during residency will not help improve ITE scores.

Larger, prospective quantitative studies may confirm or refute the correlations we found, their presence in non-military programs and other specialties, and evaluate how efforts to change one impact the other. Qualitative studies can explore resident preferences to determine if programs with more robust scholarly output attract higher scoring residents.

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Conflicting and competing interests

The authors reference a book, *The Recipe: A practical guide to SA*. Dr. Lennon was an editor and

chapter author, and Dr. Sanchack was a chapter author. The book is available for sale, which may give the appearance of conflict. However, all proceeds from the sale of the book go not to the authors, but to the The Uniformed Services Academy of Family Medicine; the book is also freely available online. For these reasons we believe the authors have no competing interests.

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