Contributing Factors to Perceptions of Residents' Statistical Abilities

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To the Editor:

I would like to thank Newsome and colleagues for their article, “Breadth of Statistical Training Among Pharmacy Residency Programs Across the United States,” published in the April 2018 edition of *Hospital Pharmacy*.¹ This article provides great insight on research training programs across American Society of Health-System Pharmacists (ASHP)–accredited postgraduate year 1 (PGY1) pharmacy residency programs. The authors found the majority of programs had limited statistical training for pharmacy residents and in turn, Residency Program Directors (RPDs) had low overall confidence in their residents’ ability to perform statistical analysis. In addition, complex statistical training within residency and publication rates of at least 50% were significant predictors for high RPD confidence in residents’ statistical capabilities. It is of high importance to prepare residents with research training for future responsibilities utilizing statistical knowledge such as the use of evidence-based medicine in clinical practice, potential research obligations at their place of employment, and effective precepting on the use of statistical methods. However, it is important to consider the effects of the publication rate breakpoint chosen in this study, average residency class size found, and learning methodology employed in statistical training on the generalizability of the published results.

Publication of PGY1 pharmacy residency research manuscripts is challenging. Annual publication rates for PGY1 pharmacy residency research projects are reported to range from 4% to 20%.² Low resident publication rates are due to both low submission and low acceptance rates.³ Utilization of a 50% or greater publication breakpoint as a predictor of RPD confidence may be an overzealous point of reference in this study compared with the national standard. Only 8.9% of the cohort had a publication rate of 50% or greater, representing an elite group of residency programs and not consistent with the national average.¹ Results may be more generalizable if a publication rate breakpoint was closer to the national average, such as 15% to 20%. Furthermore, the nearly unattainable publication rate was included in the multivariate analysis performed to control for confounding effects of all the statistically significant predictors. The use of an excessive breakpoint for publication rate may be masking retained statistical significance of other potential predictors.

Publication rate is as much a function of submission as it is of acceptance to research journals.³ Several factors may influence residents’ submission of their research including

the amount of support and encouragement they receive from their RPD, limited time in their residency program, and institutional change post-residency. The relationship of low RPD confidence in residents’ statistical abilities and low publication rates found in this study is not surprising.¹ Low RPD confidence in the residents’ abilities, whether statistical or otherwise, may hinder emphasis on project publication and lead to lower submission rates and thus, lower publication rates. However, submission rates were not reported in this study as a potential confounder.

Residency class sizes range from 1 to upward of 9 residents, with an overall average of about 3 residents per program.^{4,5} Academic medical centers are able to support larger residency class sizes, averaging 5 residents per year.⁶ This article reports an average residency class size of 2 residents within the surveyed cohort.¹ Considering pharmacy resident positions are funded in part by Medicare, larger residency programs would have more financial resources to support statistical training.⁷ Therefore, the limited statistical training found in the analysis may not be descriptive of programs with more residents, including academic medical centers.

Active teaching methods are most effective in learning statistical concepts and harboring positive attitudes toward statistical utilization.⁸ This study notes the time spent, topics covered, and intensity of statistical training provided. Specifically, this article reports 6.9% of the programs incorporated problem-based interactive learning using statistical software.¹ However, it does not report teaching methodology of each statistical topic, particularly active learning, which is known to have beneficial effects and may confound RPDs’ confidence in residents’ statistical abilities.

Statistical training within a PGY1 pharmacy residency programs is paramount for the success of future clinical pharmacists. The authors of this study successfully draw attention to an overall limitation in statistical training among PGY1 pharmacy residency programs and how this may be leading to a low level of confidence of RPDs’ in their residents’ statistical capabilities. It is important to consider the methodology of publication rate selection, cohort residency

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class size, and method of statistical training on these results. Accurately characterizing deficits in statistical training is the first step toward enhancing PGY1 pharmacy residency programs. Improved statistical skills will not only help to increase the efficacy of our future clinicians but also enhance future residency research preceptors.

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