

Home-Field Advantage: The Role of Selection Bias in the General Surgery National Residency Matching Program

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BACKGROUND: For academic general surgery residency programs, graduation from the affiliated allopathic medical school is one criterion used in resident selection. The magnitude of this criterion is unknown. The aim of this study is to describe the nature of this phenomenon, with the hypothesis that states with fewer medical schools would accept more home program graduates than states with more medical schools.

METHODS: In this cross-sectional study from 2012, each allopathic medical school that participates in the American Medical College Application Service was geographically matched to its academic general surgery program that participates in the Electronic Residency Application Service. Program websites were evaluated for categorical resident rosters with medical school matriculation data. The percentage of categorical home program residents was described for each program. A 1-tailed 2-sample t-test was performed between programs in states with fewer ($n \leq 2$) medical schools and programs in states with more ($n > 2$) medical schools, using an $\alpha = 0.05$.

RESULTS: Of the 127 residency programs that met inclusion criteria, there were 64/127 (50.4%) programs with online categorical resident rosters and medical school graduation data. There was a mean of 26.4 ± 12.3 included residents per residency training program. The mean program percentage of home program categorical general surgery residents was $24.6\% \pm 15.2\%$. The median number of medical schools per state was 2 (Interquartile Range [1-4]). A 1-tailed 2-sample t-test showed that the home program percentage rate in states with ≤ 2 medical schools [$n = 17$] ($30.1\% \pm 18.4\%$) was greater than the home program percentage rate in states with > 2 medical schools [$n = 47$] ($22.6\% \pm 13.5\%$) ($p = 0.04$).

CONCLUSIONS: Approximately, one-quarter of categorical general surgery slots are filled with home program graduates. States with fewer medical schools are more likely to fill general surgery slots with home program graduates than states with more medical schools. These selection criteria are important to general surgery programs and future applicants. (J Surg 70:461-465. © 2013 Association of Program Directors in Surgery. Published by Elsevier Inc. All rights reserved.)

KEY WORDS: general surgery, geographic factors, medical school, selection bias

COMPETENCIES: Professionalism, Medical Knowledge, Interpersonal and Communication Skills

INTRODUCTION

There are numerous selection criteria used in the ranking of medical student applicants to surgical residency programs.¹⁻⁶ In general surgery, one specific metric that is used in the consideration of applicants is whether the applicant is a graduate of the affiliated medical school of the academic general surgery residency program.¹ The level of importance given to this metric is 2.46 on a 5-point Likert scale, between “somewhat important (2/5)” and “important (3/5)”. This is the only known study in the published literature where graduation from the home program is an explicit criterion important for applicants. In a related fashion, residency program directors use personal knowledge of an applicant and rotation within the department 65% and 59% of the time, respectively, when considering applicants for the interview process.²

At the University of Pittsburgh Medical Center, there is evidence that graduation from the affiliated medical school is important in the selection criteria for residents. There appears to be an observed bias where there are more categorical general surgery residents that are graduates from the affiliated University of Pittsburgh School of Medicine than categorical general surgery residents that are graduates

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from nonaffiliated medical schools. There are 9/44 (20.5%) categorical residents that have graduated from the University of Pittsburgh School of Medicine.⁷ Although there appears to be a literal selection bias at the University of Pittsburgh Medical Center, the magnitude of this criterion's effect is unknown nationally. There are no other medical schools in Pittsburgh, Pennsylvania, and the nearest allopathic medical school in Pennsylvania is >170 miles away.

As graduation from the affiliated medical school is one criterion used in the selection of residents, the purposes of this study are 2-fold. The first aim is to describe the composition of academic general surgery residency programs based on allopathic home program medical school graduates. The second aim of the study involves more of a geographic focus. The hypothesis is that states with fewer medical schools would accept a higher percentage of home program applicants than states with more medical schools as a result of supply and demand as it relates to proximity of general surgery applicants.

METHODS

This was a cross-sectional study performed in 2012. First, all the allopathic medical schools that participate in the American Medical College Application Service (AMCAS) were identified.⁸ These medical schools were compared with the academic general surgery residency training programs that participate in the Electronic Residency Application Service (ERAS).⁹ Medical schools and residency programs were geographically matched by city and state to determine the home program of each academic general surgery training program. Branch campuses were excluded from the analysis.

Academic general surgery residency program websites were evaluated for categorical resident rosters. A 2-tier search method was used. First, websites listed on the ERAS website were evaluated.⁸ If no information was found, the Internet search engine available at <http://www.google.com> was used using the residency program name as the search string. The top relevant websites were then evaluated for resident rosters. This search process was performed independently a second time to ensure a more consistent and thorough electronic search. Independent double data entry was performed to ensure the accurate extrapolation of electronic data. This process occurred in September 2012. This month was chosen for this cross-sectional study because it was felt that residency program websites were most likely to be updated and current with the start of the ERAS residency match process for 2013.

Residency programs were included if the residency program had a website that included the current resident roster that listed medical school graduation data. Residency programs were subcategorized by having complete and incomplete data. Programs with resident rosters that

included categorical labels for all residents through all years were considered to have complete data. Programs with resident rosters that did not include categorical labels for all residents through all years were considered to have incomplete data. With incomplete programs, the first- and second-year data were omitted so as to not include preliminary first- and second-year residents and residents in other surgical specialties. Residents designated as research residents were also included. Alumni of the residency program were not included. The percentage of categorical home program residents was described for each academic general surgery residency program. Comparisons were made between programs with complete data and incomplete data.

To determine if states with fewer medical schools had a higher composition of home program residents, the number of medical schools per state was determined through the AMCAS website.⁸ All states with at least 1 medical school were included. The median number of medical schools per state was 2 (Interquartile Range (IQR) [1-4], Range [1-13]). With this distribution, the cutoff chosen for states was 2 medical schools per state. A 1-tailed 2-sample t-test was performed between programs in states with fewer ($n \leq 2$) medical schools and programs in states with more ($n > 2$) medical schools.

To see if program size was related to the percentage of home program graduates, simple linear regression was performed using the number of residents per program as the independent variable and the percentage of home program graduates as the dependent variable. A Pearson correlation coefficient was also determined. The residency programs with complete data were used.

A representative sample analysis was performed to see if the study sample was similar to the population of academic general surgery residency programs. A geographic-based Chi-square test was performed using the sample and the population of academic general surgery programs based on the United States Census Bureau Regions.¹⁰ All statistical tests were performed with Stata 11.1 statistical software (StataCorp, College Station, TX), using an $\alpha = 0.05$.

RESULTS

In September 2012, there were 127 academic general surgery training programs that were geographically matched to a specific medical school in the same city comparing AMCAS participants and ERAS participants. There were 127/127 (100%) programs that had departmental/residency websites. There were 64/127 (50.4%) programs with categorical resident rosters and medical school graduation data that satisfied inclusion criteria for this study.

There were 37/64 (58.8%) of programs that had complete data, meaning that categorical general surgery resident medical school graduation data was available for all

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