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# Are self-identified “disadvantaged” students less likely to enter surgical residencies? A single-institution study



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## ABSTRACT

**Background:** Given more emphasis on training primary care physicians for underserved areas, we hypothesized that students self-identifying as “disadvantaged” would be less likely to pursue surgical training.

**Methods:** We retrospectively reviewed medical school data on students graduating 2005–2014. Students were stratified into “disadvantaged” and “nondisadvantaged”. Data were recorded on age, grade point average, Medical College Admission Test (MCAT), gender, surgery grade, United States Medical Licensing Examination step 1 score, and residency match into a surgical field. A comparison of the proportion of students matching into a surgical field was assessed with chi-square test. Multivariate logistic regression was performed to assess the factors that predict the choice of general surgery *versus* another surgical field.

**Results:** Of the 1140 students who graduated during the study period, 219 (19.2%) students self-identified as “disadvantaged”. Of all students, 158 (13.9%) chose a surgical field. The disadvantaged group was older at entry and had lower grade point average and total MCAT scores. Twenty-seven (12.3%) disadvantaged students chose a surgical residency *versus* 130 (14.1%) nondisadvantaged students ( $P = 0.56$ ). On multivariate logistic regression, female gender (odds ratio [OR] = 3.9; 95% confidence interval = [1.9–8.3],  $P < 0.01$ ), disadvantaged status (OR = 2.8 [1.1–7.1],  $P = 0.03$ ), and United States Medical Licensing Examination step 1 score  $\geq 227$  (OR = 0.43 [0.21–0.88],  $P = 0.02$ ) were significantly associated with matching into general surgery *versus* another surgical specialty.

**Discussion:** Although the disadvantaged cohort was older and had lower undergraduate GPAs and MCAT scores, the proportion of disadvantaged students matching into a surgical residency was not statistically different. To address the future shortage of general surgeons in underserved areas, increasing enrollment of “disadvantaged” students may alleviate the “surgical desert”.

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## Introduction

Prior studies have demonstrated that physicians from underserved backgrounds are more likely to practice in an underserved area.<sup>1-3</sup> Most of the work done regarding improving physician participation in underserved areas has involved primary care, most notably the disciplines of family medicine, pediatrics, and internal medicine. To date, there has been minimal attention to addressing the shortage of surgeons needed to partner in the treatment of these same communities. Numerous reports predict a significant future shortage of general surgeons, primarily constituted by a lack of service in smaller communities and rural areas.<sup>4-12</sup> Surgeons serving these areas typically have an extended scope of practice and in many ways function as a primary care surgeon.

On the American Medical College Application Services (AMCAS) application, there is a specific section for applicants to designate whether they self-identify as “disadvantaged”. The application webpage offers guidelines for what might constitute being disadvantaged, including growing up in a medically underserved area, parental educational and/or occupational background, and/or enrollment in state or federal assistance programs.<sup>13</sup> Additionally, the applicant is given space to describe the extent of their circumstances. This designation is intended to identify those individuals who may not have had the same educational advantages as other applicants and who have demonstrated perseverance and resilience in pursuit of a career in medicine. This designation may also be a marker to identify those students more likely to devote themselves to ameliorating health care disparities.

Given the tendency for students who come from disadvantaged backgrounds to be more likely to return to practice in these areas, we sought to investigate the relationship between AMCAS “disadvantaged” status and choice of surgical careers. Owing to the emphasis on training more primary care physicians for underserved areas, we hypothesized that students who indicate themselves as “disadvantaged” on their AMCAS application are less likely to pursue surgical training.

## Methods

After institutional review board approval, we performed a retrospective review of a University of California, San Diego School of Medicine Admissions database of students matriculating from 2001-2010 and graduating between 2005-2014. Data were extracted on age at entry, undergraduate science (biology, chemistry, physics, and mathematics) grade point average (GPA), total Medical College Admission Test (MCAT) score, gender, and residency match into a surgical field at graduation. A surgical residency, requiring a minimum of 5 clinical training years, included one of the following residencies: general surgery, orthopedic surgery, neurosurgery, otolaryngology (ENT), urology, plastic surgery, cardiothoracic surgery, and vascular surgery. We categorized the residencies into three groups: academic program (main medical school program), program affiliated with a medical school, and free-standing program without a medical school affiliation. Categorical and preliminary students were grouped together. If a

student initially matched into a preliminary general surgery program and then pursued a different nonsurgical field, they were not included in the surgery group. If they initially matched into a preliminary general surgery program followed by continuation in a categorical general surgery program, they were included in the general surgery group. If they initially matched into a preliminary general surgery program and then continued in an alternative surgical specialty, they were classified as “other surgical specialty”.

## Disadvantaged

An applicant’s self-assessment as “disadvantaged” is routinely compared to AMCAS and the school’s criteria, and only those students whose self-description matches those descriptors are considered as “disadvantaged.” Students may be classified as disadvantaged either because they come from an educationally and/or environmentally or economically disadvantaged background (or both.) Because our school allocates Health Resources and Services Administration scholarships for disadvantaged students, we abide by their definitions of economic disadvantage. In terms of educational and/or environmental disadvantage, we look at parental education levels, characteristics of the student’s high school (low SAT scores, low percent of graduating seniors, low percentage of graduates attending 4 year college after graduation) and support to the family from public assistance programs. The approximate breakdown for the disadvantaged designations is as follows: about 40% of the population is educationally and/or environmentally disadvantaged, about 40% is economically disadvantaged, and about 20% qualify as both educationally and/or environmentally disadvantaged and economically disadvantaged. When we use these criteria, about 90% of those students who are admitted and who self-designated as “disadvantaged” on their AMCAS application are confirmed.

## Race

Race and ethnicity reporting was not required on the application. Additionally, the method of tracking race and ethnicity at our institution changed during the cohort period and is therefore difficult to pool. As result, data were not available on all subjects and therefore, excluded from our analysis.

## Statistical analysis

For our initial analysis, students were stratified into “disadvantaged” and “nondisadvantaged” groups. Admissions data were assessed with analysis of variance for continuous variables or chi-square or Fisher exact test for categorical data. The proportion of students from “disadvantaged” backgrounds matching into surgery versus nondisadvantaged was assessed with a chi-square test. Multivariate logistic regression modeling was used to assess “disadvantaged” status and other admissions data on the odds of matching into a surgical residency.

Our secondary analysis focused on the students who matched into a surgical field. The outcome of interest was choice of general surgery versus another surgical residency.

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