

# Textual Analysis of General Surgery Residency Personal Statements: Topics and Gender Differences

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**PURPOSE:** Applicants to US general surgery residency training programs submit standardized applications. Applicants use the personal statement to express their individual rationale for a career in surgery. Our research explores common topics and gender differences within the personal statements of general surgery applicants.

**METHODS:** We analyzed the electronic residency application service personal statements of 578 applicants (containing 3,82,405 words) from Liaison Committee on Medical Education-accredited medical schools to a single ACGME-accredited general surgery program using an automated textual analysis program to identify common topics and gender differences. Using a recursive algorithm, the program identified common words and clusters, grouping them into topic classes, which are internally validated.

**RESULTS:** We identified and labeled 8 statistically significant topic classes through independent review: “my story,” “the art of surgery,” “clinical vignettes,” “why I love surgery,” “residency program characteristics,” “working as a team,” “academics and research,” and “global health and policy.” Although some classes were common to all applications, we also identified gender-specific differences. Notably, women were significantly more likely than men to be represented within the class of “working as a team.” ( $p < 0.01$ ) Furthermore, men were significantly more likely than women to be represented within the class of “clinical vignettes” ( $p < 0.01$ ).

**CONCLUSIONS:** Applying textual analysis to a national cohort, we identified common narrative topics in the personal statements of aspiring general surgeons, noting differences between the statements of men and women.

Women were more likely to discuss surgery as a team endeavor while men were more likely to focus on the details of their surgical experiences. Our work mirrors what has been found in social psychology research on gender-based differences in how men and women communicate their career goals and aspirations in other competitive professional situations. (J Surg Ed ■■■■-■■■. © 2017 Association of Program Directors in Surgery. Published by Elsevier Inc. All rights reserved.)

**KEY WORDS:** medical student, surgery residency, personal statement, textual analysis

**COMPETENCIES:** Interpersonal skills and communication

## INTRODUCTION

In the United States (US), medical students embark on the path from medical school to residency by submitting a standardized application to selected residency programs through the Association of American Medical Colleges electronic residency application service (ERAS). The application consists of transcripts, letters of recommendation, a “Dean’s letter” or medical student performance evaluation (MSPE), extracurricular activity descriptions, a curriculum vitae, and a personal statement.<sup>1</sup>

The composition of personal statements is not standardized. The ERAS application provides no official guidelines on writing a personal statement.<sup>2</sup> However, advice abounds. University sites, academic office websites, and online personal statement warehouses offer advice, counseling, and fee-for-service editing.<sup>3</sup> The Association of American Medical Colleges Careers in Medicine website advises applicants to write personal statements that meet 3 broad goals: communicate enthusiasm for and dedication to your specialty, address potential reviewer concerns, and provide topics for discussion during interviews.<sup>4</sup>

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Just as the writing of personal statements is not standardized, there is no coordinated or standardized use of personal statements by residency programs. Surveys of residency program directors demonstrate wide variation in the use of personal statements in the resident selection process.<sup>5-8</sup> One reason for this wide variation may be that characteristics of a high-quality personal statement are unclear. Research has shown that there is low inter-rater reliability when assessing personal statement quality.<sup>6</sup>

The lack of standardization in the writing and use of personal statements gives personal statements a uniquely *personal* status within the ERAS application. Personal statements allow applicants to choose how best to communicate their rationale and aspirations for their career to their chosen professional community. The necessity of *choice* makes personal statements a rich data source.

Previous studies examining the role of personal statements in the application process have used human readers to identify a few specialty-specific topics within personal statements, specifically in anesthesiology.<sup>5</sup> Recently, we showed that large-scale textual analysis allows an exhaustive characterization of the significant topics within large cohorts of specialty-specific personal statements. Furthermore, we identified subtle differences between male and female cohorts in the topics they employed to communicate their aspirations and career goals.<sup>9</sup>

Based on our previous work, we hypothesized that a large-scale textual analysis could identify significant topics in the personal statements of applicants to general surgery residency programs. We further hypothesized that such an analysis would allow us to identify significant differences between men and women in the topics each employed to communicate their aspirations and career goals. In this article, we describe a large-scale textual analysis of the personal statements of general surgery applicants, noting both the common topics and the gender differences.

## METHODS

### Study Population

We collected the personal statements submitted to ERAS in the applications for postgraduate training at Brigham and Women's Hospital for academic year 2013 to 2014. We included all applicants from Liaison Committee on Medical Education (LCME)-accredited US or Canadian medical schools applying to postgraduate training programs at the Brigham and Women's Hospital in General Surgery during the academic year 2013 to 2014 in the analysis. This study was approved by the Partners Health Care Institutional Review Board.

### Data Collection and Analysis

We performed textual analysis of the corpus using Alceste® (ALCESTE VERSION 2012 ENTERPRISE, Image-Zafar.

com, Toulouse, France) an independent contextual analysis software program previously described.<sup>9</sup> Our method was dictated in part by the algorithms of Alceste.

To prepare the personal statements for analysis, we identified, numbered, and collated all the personal statements in a single document, termed a "corpus." We then standardized certain words within the corpus for the sake of consistency and efficiency. For example, we replaced words "brother" and "sister" with the word "sibling," and standardized personal nouns such as "Mr. Smith." We then analyzed this corpus using Alceste.

Alceste categorizes text into segments called "elementary contextual units" (ECUs). Each ECU is a sentence or a chunk of sentences that represents an individual unit of meaning. ECUs are both identified and grouped into classes based on statistical word co-occurrence. For example, in our corpus, "competition" is often found in close proximity to "sport." Furthermore, "sport" is often found in close proximity to "athlete." These branching relationships between words allow Alceste to identify and group ECUs into classes. These word co-occurrences and the relationships that they suggest can be visualized with a tree diagram (or dendrogram). Tree diagrams for 2 of the classes are provided in the [Appendix](#). Alceste uses word co-occurrence to generate classes that are both as internally homogenous and as externally distinct from the other classes as possible.

The end product of this analysis for the corpus as a whole is 3-fold. First, Alceste produces a hierarchy of classes or dendrogram. Within each class, Alceste also ranks the ECUs and the words that make up that class according to statistical significance, each ranked in order by  $\phi$  coefficient and  $\chi^2$  statistical significance, with the minimum  $\chi^2$  for a classified word equaling 18.25, with one degree of freedom. Finally, Alceste provides a tree diagram that displays the relationship between words within each class.

We independently and blindly reviewed the completed statistical output. We reviewed all ECUs and characteristic words for each of the topic classes, and provided a blinded interpretation of the topic of each class. We then conferred and agreed upon descriptive labels for each class. The descriptive label for each class is based on both ECUs and on the most characteristic words for that class.

We also conducted a separate ("cross-data") gender analysis by tagging the personal statements written by men and women. Within the corpus, Alceste is able to use the tags to divide the *aggregate* personal statements written by women from the *aggregate* personal statements written by men. Looking at each group of aggregate personal statements, Alceste identifies statistically significant differences in the frequency and weight of class occurrences in one group compared to another group. Alceste reports whether a statistically significant difference in class occurrences is present. We then quantified the difference between men and women for each of the classes by counting the number of significant ECUs within each class for each

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