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Learning style preferences of surgical residency applicants

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ABSTRACT

Background: The learning style preferences of general surgery residents have been previously reported; there is evidence that residents who prefer read/write learning styles perform better on the American Board of Surgery In-Training Examination (ABSITE). However, little is known regarding the learning style preferences of applicants to general surgery residency and their impact on educational outcomes. In this study, the preferred learning styles of surgical residency applicants were determined. We hypothesized that applicant rank data are associated with specific learning style preferences.

Materials and methods: The Fleming VARK learning styles inventory was offered to all general surgery residency applicants that were interviewed at a university hospital-based program. The VARK model categorizes learners as visual (V), aural (A), read/write (R), kinesthetic (K), or multimodal (MM). Responses on the inventory were scored to determine the preferred learning style for each applicant. Applicant data, including United States Medical Licensing Examination (USMLE) scores, class rank, interview score, and overall final applicant ranking, were examined for association with preferred learning styles.

Results: Sixty-seven applicants were interviewed. Five applicants were excluded due to not completing the VARK inventory or having incomplete applicant data. The remaining 62 applicants (92%) were included for analysis. Most applicants (57%) had a multimodal preference. Sixty-nine percent of all applicants had some degree of preference for kinesthetic learning. There were statistically significant differences between applicants of different learning styles in terms of USMLE step 1 scores ($P = 0.001$) and USMLE step 2 clinical knowledge scores ($P = 0.01$), but not for class ranks ($P = 0.27$), interview scores ($P = 0.20$), or final ranks ($P = 0.14$). Multiple comparison analysis demonstrated that applicants with aural preferences had higher USMLE 1 scores (233.2) than those with kinesthetic (211.8, $P = 0.005$) or multimodal (214.5, $P = 0.008$) preferences, whereas applicants with visual preferences had higher USMLE 1 scores (230.0) than those with kinesthetic preferences ($P = 0.047$). Applicants with aural preferences also had higher USMLE 2 scores (249.6) than those with kinesthetic (227.6, $P = 0.006$) or multimodal (230.1, $P = 0.008$) preferences.

Conclusions: Most applicants to general surgery residency have a multimodal learning style preference. Learning style preferences are associated with higher USMLE step 1 and step 2 scores, in particular for applicants with aural preferences. Students who performed well in

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lecture-dominated medical school environments because of their aural preferences could be at a disadvantage in the more independent, reading-focused learning environments of surgical residency.

1. Introduction

The theory of learning styles posits that learners have distinct preferences for how they assimilate new knowledge [1]. These preferences have implications in medical education; there is evidence that tailoring teaching methods to the preferences of a trainee can maximize learning efficiency [2]. Among the various models of learning styles is the Fleming VARK model, in which learners are categorized by their preferred learning styles as expressed by sensory modalities as follows: visual (V), aural (A), read/write (R), and kinesthetic (K) [3]. Learners may also be categorized as multimodal (MM), in which they have a preference for a combination of sensory modality learning styles. Validity evidence for the VARK model has been demonstrated previously across a broad spectrum of populations [4–10].

The learning style preferences of general surgery residents have been previously reported [11]. Previous studies have provided evidence that residents who prefer read and/or write learning styles perform better on the American Board of Surgery In-Training Examination (ABSITE), whereas aural dominant residents tend to have lower scores [12]. However, little is known regarding the learning style preferences of applicants to general surgery residency and their impact on common measures of academic achievement. In this study, the preferred learning styles of surgical residency applicants were determined. We hypothesized that applicants to general surgery have similar distribution of VARK learning style preferences to surgical residents and that learning style preferences are associated with metrics commonly used to rank resident applicants.

2. Materials and methods

The study protocol was reviewed by the institutional review board and determined to be exempt. All applicants to the general surgery residency program at a university hospital during the academic year 2013–2014 who were invited for an interview were offered the opportunity to complete the Fleming VARK learning styles inventory (version 7.2, http://www.vark-learn.com/english/index.asp). Participation in the study was strictly voluntary. Neither applicants' participation nor their responses to the questionnaire were considered in the evaluation of their residency application. To minimize any potential bias, scoring of the VARK inventories was deferred until after all interviews were conducted and the program's final rank list was submitted to National Residency Matching Program (NRMP).

The VARK inventory consists of sixteen multiple-choice questions. Each question has four possible responses (a–d), of which the applicants were instructed to select one, more than one, or none of the possible responses, as per the VARK administration instructions. The VARK inventories were then scored to determine the learning style preferences for each applicant. Applicants were categorized as having a unimodal preference for visual (V), aural (A), read/write (R) or kinesthetic (K) learning styles, or as having a multimodal (MM) preference, which could encompass any combination of 2, 3, or all 4 of the unimodal learning styles.

The United States Medical Licensing Examination (USMLE) step 1 and step 2 clinical knowledge (CK) scores, class rank, total interview scores, and final ranking for each applicant were collected and examined for any association with VARK learning style preference. Class rank was defined as each applicant's rank at their medical school by quartiles. Total interview score was defined as the sum of each applicant's eight individual interviews, each with a possible range from 0–30 points, for a total possible range of 0–240. The final ranking was the applicant's ordinal position on the final rank list submitted to NRMP. Basic demographic information, including gender, was also collected.

Statistical analysis was performed using chi-square analysis, analysis of variance, and multiple comparison analysis (Tukey method). P values <0.05 were considered statistically significant.

3. Results

Sixty-seven residency applicants were interviewed during the 2013–2014 academic year. Five applicants were excluded; four did not complete the VARK inventory and 1 applicant had incomplete application data. The remaining 62 applicants (92%) were included for analysis. Three additional residents were excluded from the analysis of final rank order only; two were excluded because they were not ranked by the program, and one was excluded because of the applicant's withdrawal from the NRMP match.

The distribution of learning style preferences among resident applicants is shown in Figure 1. The majority of applicants had an MM preference (57%), whereas those with K preferences made up the largest proportion of applicants with unimodal preferences (21%). Applicants with V preferences had the smallest representation, at 6%.

Figure 2 shows the prevalence of individual sensory modalities among resident applicant learning style preferences. The sum of the percentages exceeds 100% because applicants with MM preferences are counted more than once. Seventy-one percent of resident applicants had some degree of K learning preference. The differences in prevalence of individual sensory modalities were not statistically significant ($P = 0.11$).

Forty applicants were male, 22 were female. The proportion of male and female applicants with MM preferences was not statistically different: 55% and 59%, respectively ($P = 0.76$).

The mean USMLE step 1 and step 2 CK scores by learning style preference are graphically depicted in Figures 3 and 4,