EXPLORING TRAINING AND CAREER DECISIONS

Changes in U.S. Medical Students' Specialty Interests over the Course of Medical School

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BACKGROUND: Studies have examined factors affecting medical students' specialty choice, but little research exists on stability of these specialty interests.

OBJECTIVE: To describe patterns of change in specialty interests during medical school and examine associations between specialty change patterns and gender, desire for a high-prestige career, and interest in prevention.

DESIGN: Medical students (Class of 2003) at 15 representative US schools were invited to complete surveys during freshman orientation, entry to wards, and senior year.

PARTICIPANTS: This analysis used data from 942 students who completed all 3 surveys.

MEASUREMENTS: In addition to a number of other items, students were asked to choose the 1 specialty they were most interested in pursuing.

RESULTS: The most common specialty choices among freshman students were pediatrics (20%) and surgery (18%); least common choices were psychiatry and preventive medicine (1% each). General internal medicine was the initial specialty choice for 8%. Most students changed their specialty choices, regardless of initial interest. Only 30% of those initially interested in primary care (PC) remained interested at all 3 time points, compared to 68% of those initially interested in non-PC. Female versus male students were more commonly interested in PC at all 3 time points. Senior students interested in non-PC specialties were more likely to desire a high-prestige career (48%) than those interested in PC (31%).

CONCLUSIONS: Medical students may benefit from more intensive introduction to some specialties earlier in pre-medical and medical education. In addition, increasing the prestige of PC fields may shape the physician workforce.

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INTRODUCTION

The distribution of physicians across specialty areas has crucial implications for access and availability of the breadth of medical services, overall costs of the health care system, and optimal health of the nation. Considering the importance of the supply side of this equation—especially in light of recent trends toward a relative lack of primary care (PC) and general internal medicine (GIM) physicians—the topic of medical students' specialty interests is worthy of research.

A number of recent studies have documented determinants of specialty choices of medical students. Putative predictors include: *institutional characteristics*, including private versus public school^{1,2}; *medical school experiences and curricular features*, such as influence of faculty members/mentors/role models^{3–5}; *demographic variables*^{6–8}; *specialty characteristics*, including types of patient problems^{7–9}; *lifestyle factors*, such as workload and prestige^{4,7,8}; and *financial issues*, including income potential and level of indebtedness.^{7,10,11} However, a dearth of research exists on stability of initial specialty interests during medical education.

The primary purpose of this study was to describe patterns of change in medical students' specialty interests. A secondary purpose was to examine the association of specialty selections and change patterns with: (1) gender, (2) desire for a high-prestige career, and (3) interest in prevention. Some prior research has suggested that gender may influence stability of specialty choice; for example, fewer female than male students who are interested in surgery at entry to medical school match in that specialty.¹² Prestige within the medical profession has been studied as a potential factor influencing medical students' specialty choice, especially among students selecting surgical specialties.^{9,10} The third factor was selected because no prior research has examined the potential association between interest in prevention and changes in specialty interest.

METHODS

Sample

All Class of 2003 medical students at 15 US schools were invited to complete 3 questionnaires, at first year orientation (1999), orientation to clinical rotations/wards (typically between the second and third years), and senior year (2002–2003). A nationally representative convenience sample of schools reflected all U.S. medical schools in terms of age,

school size, National Institutes of Health research ranking, private/public school balance, underrepresented minorities, gender, and geographic distribution.¹³⁻¹⁷ The following schools were included: Creighton University School of Medicine, Duke University School of Medicine, Georgetown University School of Medicine, Loma Linda University School of Medicine, Medical College of Georgia School of Medicine, Mercer University School of Medicine, Morehouse School of Medicine, Texas Tech University Health Sciences Center School of Medicine, Tulane University School of Medicine, University of California at Los Angeles School of Medicine/Charles R. Drew University of Medicine and Science, University of Colorado School of Medicine, University of Medicine and Dentistry of New Jersey Robert Wood Johnson Medical School, University of Pennsylvania School of Medicine, University of Rochester School of Medicine and Dentistry, and Wayne State University School of Medicine.

At freshman orientation, 2,080 students were eligible to complete the survey and 1,846 responded; 1,982 were eligible at entry to wards and 1,630 responded; and 1,901 were eligible during their senior year and 1,469 responded. Therefore, the overall response rate was 83% (4,945 observations out of 5,963 eligible observations). A total of 971 students responded at all 3 time points.

Materials

The survey focused primarily on medical students' health and wellness, and specific sections included: personal characteristics, health status and behaviors, and health care opinions. Prior publications have examined key research questions related to medical student health.¹⁸⁻²⁰

At each of the 3 survey administrations, students were asked, "Choose the one specialty you are now *most* interested in pursuing." Family medicine, GIM, obstetrics/gynecology, pediatrics, and preventive medicine/public health were categorized as PC, which is generally consistent with prior definitions of PC in other studies of medical students' career choice,⁷ although obstetrics/gynecology was classified as PC. Emergency medicine, medicine subspecialties, psychiatry, surgery, urology, anesthesiology/pathology/radiology, and "other" were deemed non-PC. The "undecided" responses formed a separate category. For the second and third survey administrations, the category "pediatric subspecialty" was added and included in the non-PC category.

The survey given to fourth year students included the following item, "Having a high-prestige career is important to me." Likert scale response choices were dichotomized as affirmative ("strongly agree" or "agree") versus the neutral or negative responses. Also during the fourth year, students were asked to respond to the statement "Prevention is less interesting to me than treatment." Response choices were trichotomized as strongly agree/agree, neutral, and disagree/strongly disagree.

Procedures

Using an Institutional Review Board (IRB)-approved protocol, surveys were usually administered after semi-mandatory activities (e.g., orientation lunches), or at the end of a class. When occasioned based on low response rates, Dillman's 5-stage mailing process was used to maximize response rates.²¹

Approximately one quarter of the senior-year questionnaires were filled out in the first half of the school year, whereas over half were completed toward the end of the school year (April to June). Three schools chose to administer the questionnaire in a mandatory rotation, collecting data throughout the year, whereas the remainder primarily collected data on 1 or 2 specific dates.

Analyses

Data from the 942 students who returned all 3 questionnaires and responded to the query on specialty interest were used in all analyses. A number of exploratory analyses were conducted to ensure that bias would not be introduced into the main data analytic plan. First, possible bias because of not including those who responded to only 2 questionnaire administrations was examined. Analyses assessed whether or not the estimate of those reporting interest in PC in both the freshman year and at ward orientation would be different if the 366 students who responded only at those 2 times were included. Similar comparisons were made for those responding only at the first and third administrations and those responding only at the second and third administrations; in no case was it found that the estimates differed by more than 2 percentage points from estimates based on the 942 full responders used in the main analyses. Second, first-year respondents who later completed the other 2 questionnaires were somewhat less likely to report a non-White ethnicity, but equally likely to be female and report interest in prevention compared to those who did not. Third, time-specific prevalences of individual specialties based on all responders did not differ from those based on complete responders. Fourth, to ensure that the 942 respondents had equal representation from the 15 schools (i.e., that the majority did not come from just a few of the schools), numbers of respondents from the various schools were examined. The 4 smallest schools (14% of the full cohort) comprised 13% of the subset analyzed here, and the 4 largest schools (39% of the full cohort) comprised 40%.

For the main analyses, associations between specialty choice patterns and key variables of interest (gender, desire for a high-prestige career, and interest in prevention) were examined using chi-square tests of association. These tests took into account the non-independence between observations (because of clustering of students within schools); variance estimates were adjusted using the SUDAAN statistical software for correlated data,²² which uses the Taylor linearization method. Although students were assessed at 3 times, for the purposes of this paper each student was assigned a code that indicated their choice pattern over time; therefore each student appears only once in these analysis.

RESULTS

Data on gender and race/ethnicity for the sample of 942 students are shown in Table 1. The prevalence of specialty intentions at freshman orientation, ward orientation, and during the senior year are displayed in Figure 1. Pediatrics and surgery were the most popular initial choices, followed by family medicine. By ward orientation, the numbers choosing pediatrics had declined sharply, and it remained a less popular choice during senior year. Among the other PC specialties, the

Table 1. Description of the Sample of 942 U.S. Medical Students (Senior Year, 2003)

Characteristic	Number (n)*	Percent (%)
Gender		
Female	441	46.8
Male	501	53.2
Race/Ethnicity		
Asian American/Pacific Islander	173	18.4
Black/African American	65	6.9
Hispanic	26	2.8
Other	38	5.0
White	633	67.3
"Having a high-prestige career is important to me"		
Strongly agree	56	6.2
Agree	325	36.2
Neutral	250	27.9
Disagree	219	24.4
Strongly disagree	47	5.2
"Prevention is less interesting to me than treatment"		
Strongly agree	51	5.7
Agree	207	23.2
Neutral	205	23.0
Disagree	335	37.6
Strongly disagree	94	10.5

*May not total to 942 because of item non-response

general pattern was one of slight change. In contrast, nearly all non-PC specialty choices were more common with time. One fifth of students were undecided on a specialty choice until senior year, when the number then dropped to 1%, and urology was chosen by 1% or fewer at all times points (not displayed).

Table 2 displays the patterns of specialty choice over the course of medical school. As mentioned previously, the most common specialty choices among freshman students were pediatrics (185, 20%) and surgery (165, 18%). A similar proportion reported being undecided on a specialty choice (176, 19%). The majority of students changed their specialty choices, either by ward orientation or senior year. For example, only 15% initially interested in pediatrics were interested consistently in that field across all 3 surveys, 11% switched to another choice at ward orientation and reverted to pediatrics during senior year, 10% later chose a pediatric subspecialty, 44% switched to a non-pediatric, non-PC choice, and the remaining 20% switched to another PC specialty. The specialties in which students were most likely to maintain their initial interest included emergency medicine (37%), psychiatry (33%), obstetrics/gynecology (25%), surgery (24%), and family medicine (23%). Regardless of the initial specialty interest, when changing to another specialty by senior year, a non-PC specialty was the most likely new choice. Among the 176 students who were "undecided" when starting medical school, 71% were interested in pursuing a non-PC specialty by senior year. Whereas Figure 1 refers to overall numbers with interest in the noted specialties, not the pattern for individuals, Table 2 indicates that relatively few *individuals* starting with an interest in GIM remained interested, but other individuals became interested in PC over the course of medical school.

Table 3 shows patterns of specialty choice when specialties were categorized in the more general terms of PC (including GIM), non-PC, and undecided based on specialty interest in freshman year. The most common patterns over the 3 time points were those consistent in choice (i.e., PC at all 3 time

points or non-PC at all 3 time points) and those switching from PC to non-PC. Only 30% of those initially interested in PC remained interested at all 3 time points, and an additional 17% chose a non-PC specialty or were undecided at ward orientation but reverted to a PC specialty by senior year. In contrast, 68% of those initially interested in non-PC remained in a non-PC specialty across all 3 surveys, and an additional 16% settled by senior year on a non-PC specialty. Of those initially undecided, 40% remained undecided at ward orientation, and <1% remained undecided by senior year. At freshman orientation, 418 students (44%) were interested in pursuing PC, compared to 298 (32%) by senior year. About half of those changing from an initial choice of PC had done so by ward orientation (107/220).

Because the reputation of some schools for concentrating on either PC or specialties may attract students wanting to go into those respective areas, school-specific patterns were examined. The basic pattern of choice (changing from PC to specialties being much greater than the opposite) was roughly similar for all the schools in the sample: PC being an initial choice for roughly half (school range, 43–72%, median 57%), with large proportions making non-PC choices by senior year (school range, 31–82%, median 53%). Conversely, little movement out of non-PC specialty choices was observed in any school (school range for change to PC, 0–38%, median 14%).

Among females starting in a non-PC specialty, 73% remained in that category as seniors, compared to 90% of males ($p=.008$). (Note that this is slightly different from the 68% of all students initially interested in non-PC who remained in a non-PC specialty across all 3 surveys mentioned above.) The percentages of females interested in PC at each of the 3 time points were 57%, 41%, and 44%, respectively, compared to 34%, 17%, and 21%, respectively, for males. The differences between genders were significant at all time points (all $p<.001$).

Basic descriptive data on importance of having a high-prestige career and interest in prevention are shown in Table 1. There was no significant association between consistency of specialty category (i.e., the same category choice at all 3 times versus some change) and prevention interest ($p>.05$). Male students were more likely than female students (48% versus 36%, $p=.005$) to report prestige as being important to them. Students indicating interest in a non-PC specialty were more likely to state a desire to have a high-prestige career than those interested in a PC specialty (48% versus 31%, $p=.002$). Specifically, $\geq 50\%$ of students intending to specialize in a medical subspecialty, surgery, or anesthesiology/pathology/radiology reported that having a high-prestige career was important to them. Fewer of those pursuing family medicine (18%), general pediatrics (30%), or GIM (40%) stated that prestige was important.

DISCUSSION

Several interesting findings emerged. First, the most common specialty choices among freshman students were pediatrics (20%) and surgery (18%), and the 2 specialties least likely to be chosen were psychiatry (1%) and preventive medicine/public health (1%). Surgery has been reported previously to be one of the most popular specialty areas among medical students at matriculation.^{5,8,23} Students may enter medical school rela-

Figure 1. Medical students' (n=942) intended specialty choices over the course of medical school, percentages shown (time point 1 = freshman orientation, 2 = ward orientation, 3 = senior year). Pediatric subspecialty was not queried at freshman orientation

tively familiar with some disciplines, such as pediatrics and surgery (and thus having a high level of interest in these areas), but may be less familiar with other disciplines, like psychiatry and preventive medicine. In addition, stigma, perceived lack of prestige, and inadequate inclusion in the premedical undergraduate curriculum could account for this initial low level of interest. Given both the well-recognized burden of psychiatric disorders and the established importance of prevention, medical students may benefit from more intensive introduction to these specialties earlier in premedical and medical education.

Second, while there was some stability in specialty choice, most students changed their specialty choices, either by the time of ward orientation or by senior year, regardless of the initial

specialty interest. When changing to another specialty, a non-PC specialty was the most likely new choice. Furthermore, among students starting medical school undecided on a specialty interest, the majority (71%) were planning to pursue a non-PC specialty by senior year. Less than one third of those initially interested in PC remained interested at all 3 time points, compared to more than two thirds of those initially interested in non-PC. Consistent with earlier reports, only 20–45% of medical students ultimately choose the specialty that they had been initially most interested in.^{8,23–25} Others have noted that most students do not ultimately choose the specialty they originally prefer, and that the direction of change is typically away from PC.^{26,27} Also noteworthy was the finding that at all 3 time points, female medical students were more likely to choose PC fields.

Table 2. Changes in US Medical Students' Choice of Specialty, from Freshman Orientation to Senior Year, 1999–2003 (n=942)*

Specialty Interest During Freshman Orientation	Row <i>n</i>	Choosing same specialty on all 3 questionnaires, <i>n</i> (%)	Choosing same specialty in senior year, with an intermediate change at ward entry, <i>n</i> (%)	Choosing another specialty in senior year, <i>n</i> (%)	
				Non-PC in senior choice	PC in senior choice
Initial choice: PC Specialties (<i>n</i> =418)					
Pediatrics	185	28 (15)	21 (11)	99 (54)†	36 (20)
Family Medicine	110	25 (23)	9 (8)	50 (46)	26 (24)
General Internal Medicine	72	12 (17)	5 (7)	44 (61)	10 (14)
Obstetrics/Gynecology	40	10 (25)	4 (10)	21 (53)	5 (13)
Preventive Medicine/Public Health	11	0 (0)	1 (9)	6 (55)	4 (36)
Initial choice: Non-PC Specialties (<i>n</i> =348‡)					
Surgery	165	39(24)	21 (13)	81 (49)	23 (14)
Emergency Medicine	57	21(37)	6 (11)	25 (44)	4 (7)
Medicine Subspecialty	46	4 (9)	3 (7)	25 (54)	14 (30)
Unspecified/“Other”	42	3 (7)	6 (14)	24 (57)	7 (17)
Anesthesiology/ Pathology/Radiology	25	4 (16)	3 (12)	6 (64)	2 (8)
Psychiatry	12	4 (33)	0(0)	6 (50)	2 (17)
Initial choice: Undecided (<i>n</i> =176)					
	176	0 (0)	1 (<1)	125 (71)	50 (28)

*Percentages may not add to 100% because of those responding "undecided" in the senior year (1 initially interested in emergency medicine, 1 in surgery, 2 in "other," 1 in general internal medicine, and 1 in pediatrics), or, in the remaining cases, because of rounding

†This includes 18 students initially reporting interest in pediatrics who later chose a pediatrics subspecialty area

‡Includes 1 student, not presented, who initially chose urology and again selected that specialty in senior year

Third, consistent with prior research,^{8,9} students wanting a high-prestige career were more likely to be interested in a non-PC specialty than a PC specialty at all 3 time points, and almost half of students reported that prestige was important. Earlier regional studies have shown similar relationships.^{28–30} This association has implications for efforts to shape the physician workforce, such as increasing the prestige of GIM and other PC fields, which may be accomplished if greater respect were afforded to PC disciplines by academic medical centers, the medical profession generally, and society at large. Further survey research involving medical students could elucidate the extent to which such strategies (and others, including increased reimbursement for PC services) could impact medical students' specialty choice.

A number of interventions have been suggested, and some have been studied, in efforts aimed at effecting change, especially in terms of producing more PC physicians.³ The current findings appear to support some of these prior suggestions, such as enhanced medical school support of students interested in PC. Efforts to increase the number of US medical students going into PC will be more successful when they are less interested in prestige, or when PC specialties are given more prestige, as reflected in both widespread intra- and extraprofessional attitudes, and compensation.

Several methodological limitations of this analysis should be considered. First, the study focused on patterns of change in specialty interest among medical students, and data on the residency match, final career choices, and future career changes were unavailable. Students may respond differently before and after the match, although this could not be examined. Second, only a few key variables were examined in relation to stability of specialty interest, although a large number of potentially important factors can be enumerat-

ed.^{3,27,31} Third, estimates may not reflect population values because the school sample was non-random and a considerable portion of the sample did not contribute information at all survey points, although sensitivity analyses revealed little

Table 3. Specialty Choice (PC, Non-PC, and Undecided) Patterns Among US Medical Students, 1999–2003 (n=942)

Initial choice of specialty and specialty choice pattern over 3 time points**	n (%)* having this specialty choice pattern	
Initial choice: PC Specialties		
P-P-P	127 (30)	n (%) Stayed in Primary Care: 196 (47)
P-NP-P	41 (10)	
P-U-P	28 (7)	
P-P-NP	76 (18)	n (%) Changed to Non-Primary Care: 200 (53)
P-NP-NP	107 (26)	
P-U-NP	37 (9)	
Initial choice: Non-PC Specialties		
NP-NP-NP	235 (68)	n (%) Stayed in Non-Primary Care: 202 (84)
NP-P-NP	15 (4)	
NP-U-NP	42 (12)	
NP-NP-P	16 (5)	n (%) Changed to Primary Care: 52 (15)
NP-P-P	23 (7)	
NP-U-P	13 (4)	
Initial choice: Undecided		
U-U-P	22 (13)	n (%) Changed to Primary Care: 50 (28)
U-P-P	14 (8)	
U-NP-P	14 (8)	
U-NP-NP	69 (39)	n (%) Changed to Non-Primary Care: 125 (71)
U-P-NP	9 (5)	
U-U-NP	47 (27)	

*Percentages may not add to 100% because of those responding "undecided" in the senior year.

**P primary care, NP non-primary care, U undecided

effect of analyzing only students responding to all 3 surveys. Fourth, despite the fact that a desire to have a high-prestige career was associated with specialty choice, desired prestige is a very complex construct, and its measurement in the present survey was very limited. Fifth, data were not available on students' potential intentions to pursue careers as hospitalists. Given the growth and increasing recognition of this relatively new field,^{32,33} future research should include it in surveys of medical students.

To more fully understand specialty interest decision-making, research should assess changes in specialty choice before medical school matriculation, as well as changes that occur after medical school graduation, in addition to further examining patterns of change in medical students' specialty interests during medical school. Specialty decisions often change during residency,³⁴ and a substantial portion of physicians change specialties after entering practice, caused in part by general dissatisfaction with their choice because of lifestyle incompatibility and negative practice experiences.³⁵ Specialty interest is a complex developmental process, but a greater understanding of the decision-making process may inform efforts to optimize the distribution of physicians across specialty areas; this may, in turn, have implications for access and availability of medical services, overall costs of the health care system, and population health.

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