Changes in Medical Students’ Views of Internal Medicine Careers From 1990 to 2007
Mark D. Schwartz, MD; Steven Durning, MD; Mark Linzer, MD; Karen E. Hauer, MD

Background: The United States faces a shortage of primary care physicians and declining number of medical students choosing primary care careers.

Methods: We conducted a secondary analysis of 2 similar national surveys of senior medical students from 1990 and 2007 that addressed student characteristics, specialties chosen, clerkship experiences, perceptions of internal medicine (IM) compared with other specialties, and influential aspects of IM. We compared responses from 1990 and 2007 by analyzing a merged data set of identical items from the 2 surveys (65% of the items).

Results: The total sample of 2421 students comprised 1244 at 16 schools in 1990 (response rate, 75%) and 1177 at 11 schools in 2007 (82%). In 2007, there were more women (52% vs 37%, \( P < .001 \)) and more educational debt (mean, $101 000 vs $63 000, \( P < .001 \)). Similar proportions of students planned IM careers (23% vs 24%), although plans to practice general IM dropped from 9% to 2% (\( P < .001 \)). The appeal of primary care as an influence toward IM declined from 57% to 33% (\( P < .001 \)). More 2007 students reported high satisfaction with the IM clerkship (78% vs 38%, \( P < .001 \)). Both cohorts thought that workload and stress are greater in IM than in other fields. Students in 2007 felt that opportunities for meaningful work in IM were greater than did students in 1990 (58% vs 42%, \( P < .001 \)).

Conclusions: More students in 2007 than in 1990 viewed IM as a potentially meaningful career. However, the 2007 students had higher debt, more negative perceptions of workload and stress in IM, and less career interest in general IM. To rebuild the generalist physician workforce, improving students’ experience of IM in medical school is no longer sufficient. Bolder reform will be required to improve the educational pipeline, practice, and payment of generalist IM physicians.

Arch Intern Med. 2011;171(8):744-749

The United States faces a troubling shortage in its primary care medical workforce.1,2 This pending crisis results from a convergence of increasing demand (aging, chronically ill baby boomers [born between 1946 and 1964], and an obesity epidemic) with decreasing supply (retiring physicians, fewer clinical work hours among younger physicians, and fewer students choosing primary care careers).3

According to the Institute of Medicine,4 the United States is not prepared to meet the health care needs of the growing number of older adults. One recent model5 predicts that workload will increase by 28% for interns and family physicians by 2025, but the supply of primary care physicians for adults will increase by only 2% to 7% by that time, resulting in a deficit of 35 000 to 44 000 adult care generalists. In 2006, the Association of American Medical Colleges6 anticipated a shortage of 200 000 physicians throughout the next 20 years and recommended that medical schools increase their enrollment by 30% from the 2002 level during the next decade.7 These projections do not account for the impending demand of 30 million to 40 million more Americans who will soon be able to obtain health insurance through reforms in the Affordable Care Act if it is implemented as intended.

Despite the need for more primary care physicians in the United States, the number of medical students matching into internal medicine (IM) residency positions declined 32%, from 3884 in 1985 to 2660 in 2008.8 The number of US students choosing residency training in primary care IM declined even more dramatically, by 54%, from 575 in 1999 to 264 in 2008. Furthermore, the proportion of IM residents choosing to practice general IM after their residency declined from 54% in 1999 to 20% in 2008, suggesting that cur-
rent workforce projections\(^8\) may underestimate the future shortage of primary care physicians. A similarly dramatic shift in career choices among graduates of osteopathic medical schools, which were once a significant source of primary care physicians, further exacerbates these trends.\(^10\)

In the 1990s, the Resource-Based Relative Value Scale for Medicare physician reimbursement raised the expectation of decreasing the compensation gap between generalist and subspecialist physicians,\(^11\) and the managed care movement, with its growth of health maintenance organizations, signaled the need for more generalists and fewer subspecialists.\(^12\) These policies resulted in an increase in the proportion of students choosing primary care careers (IM, general pediatrics, and family medicine), from 38% in 1988 to 50% of all US graduates by 1998.\(^6\) However, the impact was short-lived given the expanding compensation gap (median compensation for primary care physicians increased 21.4% from 1995 to 2004 compared with 37.5% for specialist physicians, adjusted for inflation) and the public’s reaction against health maintenance organizations and the generalist’s gatekeeper role (controlled access to specialty services).\(^3,14\) Thus, the current proportion of students expected to practice primary care is only 16% to 18% after accounting for internists and pediatricians choosing subspecialty or hospitalist careers.\(^5\)

A 2007 survey\(^16\) found that medical students valued the teaching during IM clerkships but expressed serious reservations about IM as a career. Students who reported more favorable impressions of the patients cared for by internists, the IM practice environment, and the internists’ lifestyle were more likely to pursue a career in IM. Students were dissuaded from IM by their experiences with elderly and chronically ill patients. While anticipated lifestyle was associated with IM career choice, debt was not an independent predictor, despite the disparity in average compensation among specialties.

In light of this history, how have medical students’ views of IM changed during the past 2 decades? How can such changes inform strategies to attract more students to primary care general IM careers? To answer these questions, we conducted a secondary analysis of 2 similar surveys of senior medical students (1990 and 2007) to compare current perspectives on IM careers with those from 17 years earlier.

### METHODS

Methods used for the 1990 and 2007 surveys have been published.\(^6,17\) Here, we provide a brief summary of the survey methods and details of this secondary analysis.

In 1990, a survey of 1650 senior students at 16 US medical schools was conducted; 1244 students (78%) responded.\(^17\) The 16 schools were chosen randomly within 4 strata defined by public vs private funding and by historical rates above and below the median proportion of graduates choosing IM. Questionnaire items were developed using student focus groups and labeled the underlying constructs by consensus. We shared 24 items about influences on career choice. Factors were retained on the basis of eigenvalues larger than 1.0. Items were assigned to factors according to their largest loading, and simple structure was obtained using factor loadings larger than 0.35 for this assignment. The researchers interpreted the derived factors and labeled the underlying constructs by consensus. We determined scale reliability for each factor with the Cronbach \(\alpha\) coefficient and calculated a mean score for each factor.\(^18\) To aid interpretation, perceptions and influences factor scores were dichotomized at the midpoint of the 5-point scale (below or above 3.0) and reported as proportions as well as means. Responses from 1990 and 2007 were compared using unpaired, 2-tailed \(t\) tests for continuous variables and \(\chi^2\) tests for dichotomous variables. To adjust for multiple comparisons, the \(\alpha\) value for significance was set at <.002 (0.05/25).\(^19\)

The combined data set consisted of 2421 students, 1244 from 16 schools in 1990 and 1177 from 11 schools in 2007. In both surveys, student characteristics were similar to those of all US medical students completing the Association of American Medical Colleges Graduation Questionnaire in the corresponding year.\(^6,20\)

### CAREER PLANS

The proportion of students planning careers in IM (combining all IM types, including general, subspecialty, and medicine-pediatrics) was similar in 1990 (24%) and 2007 (23%). However, the percentage of students planning general IM training declined from 9% in 1990 to 2% in 2007 \((P<.001)\) (Table 1).
Table 1. Comparison of Student Characteristics, Medical School Experience, Appeal of Primary Care, and Career Plans in 1990 vs 2007

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>1990 (n = 1224)</th>
<th>2007 (n = 1177)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Students</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age, mean, y</td>
<td>27</td>
<td>28</td>
</tr>
<tr>
<td>Married</td>
<td>38</td>
<td>35</td>
</tr>
<tr>
<td>Have children</td>
<td>14</td>
<td>13</td>
</tr>
<tr>
<td>Women</td>
<td>37</td>
<td>52</td>
</tr>
<tr>
<td>Debt, mean, 2007 $</td>
<td>63,000</td>
<td>101,000</td>
</tr>
<tr>
<td>Debt &gt; $100,000</td>
<td>5</td>
<td>53</td>
</tr>
<tr>
<td>Medical school experience</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Satisfied with IM clerkship</td>
<td>38</td>
<td>78</td>
</tr>
<tr>
<td>&quot;A&quot; or honors in IM</td>
<td>40</td>
<td>46</td>
</tr>
<tr>
<td>Had outpatient IM rotation</td>
<td>44</td>
<td>94</td>
</tr>
<tr>
<td>Made career choice in fourth year</td>
<td>8</td>
<td>35</td>
</tr>
<tr>
<td>Had sufficient insight into IM career</td>
<td>84</td>
<td>78</td>
</tr>
<tr>
<td>Appeal of primary care</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Appeal of PC attracted them toward IM</td>
<td>57</td>
<td>33</td>
</tr>
<tr>
<td>Appeal of PC pushed them away from IM</td>
<td>21</td>
<td>41</td>
</tr>
<tr>
<td>Outpatient rotation made IM more attractive</td>
<td>35</td>
<td>31</td>
</tr>
<tr>
<td>Outpatient rotation made IM less attractive</td>
<td>25</td>
<td>33</td>
</tr>
<tr>
<td>Career plans</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Planning IM career</td>
<td>24</td>
<td>23</td>
</tr>
<tr>
<td>Planning primary care IM career</td>
<td>9</td>
<td>2</td>
</tr>
</tbody>
</table>

Abbreviations: IM, internal medicine; PC, primary care.

\[ P < .001 \]

\[ P = .003 \]

STUDENT CHARACTERISTICS

The 2 cohorts were of similar age, marital status, and parental status. Compared with 1990, the 2007 cohort had more women (52% vs 37%, \( P < .001 \)) and much greater educational debt (mean, $101,000 vs $63,000 in 2007 dollars, a 60% increase). The proportion owing more than $100,000 increased 10-fold, from 5% to 53% in 2007 (\( P < .001 \)). However, the proportion with zero educational debt also increased, from 18% to 24% in 2007 (\( P < .001 \)).

MEDICAL SCHOOL EXPERIENCES

More 2007 students reported high satisfaction with the IM clerkship (78% vs 38%, \( P < .001 \)), received an “A” grade or honors in the IM clerkship (46% vs 40%, \( P < .001 \), and had an outpatient IM rotation, separately or as part of the IM clerkship (94% vs 44%, \( P < .001 \)) than students from 1990. More students in 2007 had an ambulatory experience as part of their IM clerkship than in 1990 (67% vs 19%, \( P < .001 \)). In 2007, students made their career choice later and felt less informed about IM careers than 1990 students had. In 2007, 35% of students made their career choice in their senior year vs 8% of students in 1990 (\( P < .001 \)). In 2007, 78% of the respondents, vs 84% in 1990, said their medical school experience provided them with sufficient insight into what an internist does to make an informed decision about IM as a career (\( P < .001 \)).

APPEAL OF IM AND PRIMARY CARE

In 1990, 57% of students said the appeal of being a primary care physician attracted them toward IM, but this proportion dropped to 33% in 2007 (\( P < .001 \)). The proportion saying the appeal of being a primary care physician pushed them away from IM increased from 21% in 1990 to 41% in 2007 (\( P < .001 \)). Students in 2007 were less likely to be attracted to IM by their outpatient rotation than were students in 1990 (31% vs 35%, \( P < .001 \)). Of students in 2007, 33% said that the outpatient rotation made a career in IM seem less attractive compared with 25% of students in 1990 (\( P = .003 \)). In 2007, students were less likely than those in 1990 to say the overall IM clerkship made a career in general IM more attractive (19% vs 24%, \( P < .001 \)) but were more likely to say it made a career in subspecialty IM more attractive (49% vs 35%, \( P < .001 \)).

PERCEPTIONS OF IM

Table 2 describes the 2 perception scales and the 3 influence scales with their constituent items, the scale reliability (Cronbach α coefficient), and the overall mean score for each scale. Of the 11 perception items, 8 clustered reliably into 2 factors: “workload and stress” and “opportunity for meaningful work.” Figure 1 shows that similar majorities of students in both cohorts thought that “workload and stress” is greater in IM compared with other fields they chose or considered. In contrast, the proportion of students who said that IM provides more “opportunities for meaningful work” increased from 42% in 1990 to 58% in 2007 (\( P < .001 \)). This factor includes having a positive influence on patients’ lives, feeling competent, feeling intellectually challenged, and being satisfied with one’s career as a resident or internist. In individual perception items not part of these scales, a similar majority of students in 1990 (63%) and 2007 (66%) felt that the income potential in IM is less than in other fields (\( P = .16 \)). More 2007 students thought it was easier to match into an IM residency than into other fields than in 1990 (59% vs 43%, \( P < .001 \)).

INFLUENCES ON IM CAREER CHOICE

Of the 24 influence items, 14 clustered reliably into 3 factors: “esteem of IM,” “types of patients cared for by internists,” and “time and workload in IM.” Figure 2 illustrates that most students in both cohorts were attracted toward IM careers by the “esteem of IM,” and this proportion increased from 68% in 1990 to 82% in 2007 (\( P < .001 \)). In contrast, most students in both cohorts were pushed away from IM by the “types of patients cared for by internists,” although this proportion decreased from 72% in 1990 to 55% in 2007 (\( P < .001 \)). The proportion of students pushed away from IM by “time and workload in IM” remained relatively high, although it too decreased, from 54% in 1990 to 46% in 2007 (\( P < .001 \)).
In response to an individual influence item not part of these scales, students in 2007 were more likely than those in 1990 to say that the loans they had to repay pushed them away from a career in IM (26% vs 16%, \( P < .001 \)).

In this study of 2 graduating classes of medical students, we found that, compared with 1990, the 2007 cohort was more satisfied with their IM educational experiences and twice as likely to have had ambulatory care training. Nonetheless, students in 2007 were more attracted to subspecialty IM careers and less interested in general IM. Despite greater perceived opportunities for meaningful work and esteem in IM, a similar percentage (24%) of students in 2007 chose IM and a much smaller percentage (2% vs 9% in 1990) chose primary care general IM. Persistent unfavorable perceptions of income disparity, workload, and stress appeared to counter the gains from perceptions of meaningful work. Thus, many of the “next steps” needed to improve the attractiveness of IM and general IM careers may fall outside the purview of medical educators and within the realm of health policy.

DEBT AND INCOME

The influence of student debt and anticipated income on career choice is complex and difficult to separate from desires for controllable lifestyles, for which finances may be a proxy. The class of 2009 graduated with an average total educational debt of $132 000 ($158 000 for the 86% of students with debt). One in 4 students graduated owing more than $200 000. The income gap between generalist and subspecialist physicians has grown to nearly 3-fold, resulting in an income disparity of $3.5 million throughout a 40-year career. Increasing income disparities between primary care and specialty physicians may drive career choice directly and indirectly by sending “market signals” about status, prestige, work life, and lifestyle.

Although these economic facts are not lost on medical students, their effect on career choice is nuanced. A
Robert Graham Center study found that the strongest predictors of primary care career choice were having National Health Services Corps loan repayment or scholarships. These findings suggest that there is a group of students whose career choice is sensitive to debt relief and who are willing to trade debt for service. Unfortunately, while the doubling of National Health Services Corps scholarships and loan repayment in the 2009 Recovery Act was needed and welcome, positions are still available to fewer than 5% of US students.

The strongest negative predictor of primary care career choice in the Robert Graham Center study was expected income in primary care compared with specialty careers, which cut the odds of choosing a primary care career by half. Consistent with this finding was a recent analysis showing a strong correlation between mean salary in a specialty and the percentage of residency positions filled in the match by US graduates. Our finding that students in 2007 were more pushed away from IM careers by their debt than were those in 1990 supports this association. However, financial concerns are only one of several factors influencing career choice. Debt was not independently related to IM specialty choice in both surveys.

**STUDENT EXPERIENCE OF IM**

Ironically, 2007 students reported much more satisfying exposure to IM compared with those in 1990, but the experience appeared to turn them away more from primary care and general IM. What led students to say that they liked the training and saw IM work as meaningful but still felt pushed away by the exposure? Is more exposure to the primary care practice environment and general internists steering students away from the field? Successful efforts by US medical schools during the past 2 decades to move more medical education out of the hospital and into “real-world” practice exposed students to the joys and challenges of office-based work. Although students appreciate their IM experiences, those considering IM careers still have significant hurdles to overcome.

**MEANING IN MEDICINE VS WORK LIFE AND LIFESTYLE**

Students seem to view IM more positively now than students did in 1990, largely driven by the appeal of IM subspecialties. This appeal represents more hopeful news than in 1990, when students expressed serious reservations about any IM career. Students are attracted by the meaningful work in IM: the intellectual challenge, opportunities to positively influence their patients’ lives, and the inner satisfaction of achieving competence and responsibility for patient care. More students might choose IM if we can address their concerns about work life, lifestyle, and income.

**GENERATIONAL CHANGES**

Although not addressed in this study, researchers have identified generational differences between the baby boomers of the late 1980s and the generation Y “millennials” (born between 1980 and 1994) of more recent vintage. Current generations still aspire to excellence but appear less willing to sacrifice quality of life for career growth. This change has also been driven by the growing proportion of women entering medical practice, as they tend to work fewer hours than men, although both women and men increasingly prioritize work-home balance. The increased desire for a controllable lifestyle has disproportionally affected IM; specialties perceived as more flexible (eg, anesthesiology, dermatology, plastic surgery, and radiology) have seen the greatest growth in applicants.

**LIMITATIONS**

The self-report nature of these surveys may have encouraged social desirability bias, but this potential limitation was likely mitigated by ensuring participants’ anonymity. The students sampled in this analysis may not fully represent the national graduating classes from 1990 and 2007, despite their demographic similarities to the Association of American Medical Colleges Graduation Questionnaire responses from these years. Some unknown proportion of the differences found may be attributable to the different schools attended by respondents in the 2 surveys. In addition, although some of the significant differences between groups may have arisen by chance given our large sample size, we used a very conservative measure (Bonferroni correction) to address the use of multiple comparisons. The potential influence of the hospitalist career path on student career choice was not addressed, as this field had not yet emerged in 1990. Because the distinction between general and subspecialty practice is often unclear to medical students, our ability to explore general IM in detail was limited.

**IMPLICATIONS**

The primary care workforce is the foundation of high-performing health care systems around the world; at least half of all physicians practice primary care in most systems. To rebuild and sustain the US generalist physician workforce, improving students’ experience of IM in medical school has occurred; however, it is no longer sufficient. Bolder payment and practice reform will be required to reduce the remuneration gap between primary care and subspecialty physicians and to address the adverse work conditions in general IM that students identify in clerkships. Such policies include expanding scholarships and loan repayment opportunities for those choosing primary care training and practice, addressing physician work-life concerns by carefully designing patient-centered medical home models to reward visits that are not face-to-face and promote a satisfying and sustaining clinician experience, and helping primary care physicians slow the productivity treadmill by shifting away from the fee-for-service system driven by volume incentives to one driven by value incentives. Many of these innovative steps will be piloted through the Affordable Care Act. It is essential to evaluate the impact of such health reform provisions on the primary care workforce. It remains to be seen whether the market signals sent by health care re-
form will be strong enough to influence student career choice and provide an adequate primary care workforce.

Accepted for Publication: January 3, 2011.

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Financial Disclosure: None reported.

Funding/Support: The 1990 study was funded by the American College of Physicians and the American Board of Internal Medicine. The 2007 study was supported by the Shadyside Hospital Foundation of Pittsburgh, Pennsylvania, and the American Board of Internal Medicine Foundation.

Role of the Sponsors: The funding organizations had no role in the design of the present study; the collection, analysis, and interpretation of the data; and the decision to publish the article.

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