

# Educational and Career Outcomes of an Internal Medicine Preceptorship for First-Year Medical Students

*D. Michael Elnicki, MD, Kevin A. Halbritter, MD, Mary Ann Antonelli, MD, Barry Linger, EdD*

**OBJECTIVE:** Medical educators have attempted in recent years to provide quality clinical experiences for medical students early in their medical training. We questioned whether participating in a preceptorship in internal medicine (PIM) resulted in better performances on subsequent clinical rotations and increased interest in internal medicine.

**PARTICIPANTS:** Fifty-four students have participated in the PIM to date, with control groups consisting of students who applied for it but were not selected ( $n = 36$ ), students participating in a preceptorship in family medicine ( $n = 168$ ), and the remaining students ( $n = 330$ ).

**DESIGN:** Prospective cohort study.

**SETTING:** University medical center and community practices.

**INTERVENTION:** A 2-month, clinical preceptorship following the first year of medical school.

**MEASUREMENTS AND MAIN RESULTS:** The following outcomes were assessed: scores in the introduction to clinical medicine course; grades in the medical ethics course; scores from the internal medicine clerkship; and choosing a career in internal medicine. In their second year, PIM students scored higher in both semesters of the introduction to clinical medicine course (87% and 86% vs 84% and 84%,  $p$ 's < .01) and were more likely to receive honors in ethics (50% vs 29%,  $p$  < .01) than non-PIM students. During the internal medicine clerkship, PIM students' scores were significantly higher on an objective structured clinical examination (79% vs 76%,  $p = .05$ ), ambulatory clinical evaluations (80% vs 76%,  $p$  < .01), and overall clerkship scores (78% vs 75%,  $p = .03$ ) but not on inpatient clinical evaluations or on the National Board of Medical Examiners Subject Examination. Preceptorship students were more likely to receive honors grades in the medicine clerkship (33% vs 10%,  $p$  < .01), and they were more likely to match into internal medicine residencies than control students (54% vs 27%,  $p$  < .01).

**CONCLUSIONS:** The PIM course is an intervention, early in students' careers, which appears to benefit them academically and increase their interest in internal medicine as a career.

**KEY WORDS:** medical students; clinical competence; curriculum.

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dissatisfaction among housestaff and attending physicians, stressful lifestyles, the nature of the patients encountered, unfavorable clerkship experiences, and less financial reward than other specialties.<sup>3,4</sup> Several studies have demonstrated that early clinical experiences, role models, and favorable learning environments during clerkships increase student interest in internal medicine.<sup>5-8</sup> Departments of medicine have responded and sought to create better impressions of internal medicine by increasing the amount of time spent in ambulatory settings and emphasizing student-centered learning strategies, such as problem-based learning.<sup>1,9</sup>

Medical schools have been criticized for excessively relying on passive learning techniques and demanding the memorization of trivial facts in students' first years.<sup>10</sup> Students become frustrated with a tedious learning process that lacks relevance to the actual practice of medicine.<sup>11</sup> Educators, therefore, have been encouraged to provide quality experiences for preclinical medical students. Methods that have been suggested include interest groups, research projects, and clinical preceptorships.<sup>12,13</sup> A growing consensus has become apparent among medical educators regarding the need for early clinical exposures to make basic science more relevant.

In 1992 the Department of Medicine at West Virginia University developed a summer preceptorship for students who successfully completed their first year of medical school. It was developed concurrently with similar programs at two other institutions, and some structural elements of these programs have already been reported.<sup>14</sup> The goals of the West Virginia University Preceptorship in Internal Medicine are (1) to give students an early clinical exposure in internal medicine, (2) to provide clinical role models, (3) to increase appreciation of ethical and psychosocial issues in medicine, (4) to integrate basic sciences into a clinical discipline, and (5) to stimulate interest in internal medicine.

This study was undertaken to determine whether students derived demonstrable benefits from their experiences. In acknowledgment of the goals of the preceptorship, we

Since the mid 1980s, internal medicine residency programs have struggled to attract students graduating from U.S. medical schools.<sup>1</sup> In spite of small increases in the past few years, less than 60% of the internal medicine residency positions offered in 1996 were filled by U.S. medical school graduates.<sup>2</sup> Various reasons for this lack of interest in internal medicine have been cited, such as

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*Address correspondence and reprint requests to Dr. Elnicki: Department of Medicine, Robert C. Byrd Health Sciences Center, Morgantown, WV 26506.*

chose the following outcomes to assess medical students who participated in the preceptorship: first, their grades in the second-year medical ethics course, which is clinically oriented and case based; second, their scores in the introduction to clinical medicine (ICM) course, which consists of both physical diagnosis and a didactic introduction to diseases (all specialties) and is also taught in the second year; and third, several scores in the internal medicine third-year clerkship. Finally, we wanted to assess the likelihood of the students' matching into an internal medicine residency as a measure of our ability to stimulate interest in internal medicine. Our hypotheses were that students who were exposed to an early preceptorship in internal medicine would score higher in the areas we examined and would be more likely to choose internal medicine as a career than their peers.

## METHODS

### Study Design

To be eligible to participate in the preceptorship in internal medicine (PIM), students must have successfully completed their first year of medical school. They could not be in academic jeopardy or have any remedial assignments that summer. This qualification was certified by the office of the dean. When the number of students applying exceeded the available openings, students were chosen on the basis of a written application and a personal interview with either the course director or the vice chair for educational affairs. Neither interviewer was aware of the students' academic status.

The study has a prospective cohort design, as students were not randomly assigned to the groups. Students who participated in the preceptorship constituted the study cohort. The three groups with whom they were compared consisted of students who applied but were not chosen for or declined the preceptorship (rejected PIM), students who participated in our Department of Family Medicine's preceptorship (PFM), and students who did not apply or participate in either preceptorship. Six of the rejected PIM students subsequently participated in the PFM, but they were considered in the former category during the analysis. The current breakdown of students in each group by year of graduation is shown in Table 1.

### Preceptorship Curriculum

The PIM program has been offered the past 7 summers, and has 6 to 10 (usually 8) participating students each year. The preceptorship lasts 9 weeks and begins the Tuesday after Memorial Day. The timing allows the students 2 to 3 weeks of free time after their final examinations and about the same amount before second-year classes begin. The first week of the preceptorship consists of an accelerated course in history taking and physical examination. Students receive instruction from faculty

**Table 1. Number of Students by Preceptorship Status\***

Graduating Class Year	<i>n</i>	PIM	Not Selected	PFM	None
1995	83	6	0	NA <sup>†</sup>	77
1996	72	6	12	NA	54
1997	79	10	3	30	36
1998	90	8	4	48	30
1999	83	8	10	31	34
2000	94	8	3	32	51
2001	87	8	4	27	48
<b>Total</b>	<b>588</b>	<b>54</b>	<b>36</b>	<b>168</b>	<b>330</b>

\*PIM indicates preceptorship in internal medicine; PFM, preceptorship in family medicine.

<sup>†</sup>PFM began in 1997.

and medical residents during this week. They are given reading materials regarding writing descriptions of histories and physical examinations, progress notes, and prescriptions. They participate in discussions of history taking and physical examination and are given time to practice the skills on each other after presentations.

The next 8 weeks consist of two 4-week blocks during which the students are matched with individual preceptors. Half of their exposure is in general internal medicine and half in medicine subspecialties. Two weeks are spent in community practices outside the university environment. Preceptors are matched with students' requests (by location and specialty), and an effort is made to balance inpatient and ambulatory experiences. For example, a student spending one month on the university nephrology service could spend part of the other month in a community setting with a general internist. When possible, students' community experiences take place in their home towns or within commuting distance of the university, so that housing is not a problem.

Preceptors are asked to allow students as much hands-on experience as possible. The students round in the hospitals with their preceptors and accompany them to outpatient settings. Although they initially function primarily as observers, by the end of rotations the students are seeing patients and presenting them to their preceptors, much like clerkship students. Most PIM students write notes, obtain histories, perform physical examinations, and perform some procedures during their rotations.

Throughout the 8 weeks of clinical rotations, the students who are not at distant community sites participate in daily, 1-hour academic sessions. Three days weekly, students present selected cases which they have encountered with their preceptor. These presentations have been coached by the student's preceptor. A student presents the case and discusses it with his or her peers while a faculty member or resident is present to assist in the discussion. At the two remaining sessions, topics are presented in an interactive discussion format (not as lectures). These topics are chosen in advance and presented by interested faculty members or residents (Table 2). At the

end of each month, students and preceptors evaluate each other and the course. There are no tests, grades, or course credits. However, students receive formative feedback from the course director based on preceptor evaluations and performance in the daily academic sessions. Students also receive a letter in their dean's office files noting their successful completion of the preceptorship.

The preceptors are chosen from the Department of Medicine faculty and from community practitioners with clinical appointments. The latter are not paid, but are given certificates for their offices and teaching credit that counts toward their continuing medical education requirements. Because of the small number of students in the program, we have been able to select as preceptors only those, from either group, who are enthusiastic about the program and those who are felt to be good teachers of beginning students.

The direct costs of the program are as follows. Each student is given a stipend of \$1,500 and is provided with a textbook of internal medicine and one of physical diagnosis. Students are also given notebooks that include syllabi and introductory materials. Two lunches are provided during which course evaluation and feedback are conducted. The total cost is about \$1,700 per student. The necessary financial resources are provided by several sources. The West Virginia Chapter of the American College of Physicians provides three student stipends yearly. Pfizer Pharmaceuticals and Appleton and Lange Publishers have provided textbooks. Our Department of Medicine provides five stipends yearly and covers incidental costs. The costs of preceptors' time, secretarial time, and the course director's time involved with the program have not been calculated.

Students participating in a similar preceptorship in family medicine have been used as comparisons for the PIM students. Both preceptorships run during the summer after the students' first academic year. The PFM also begins with a week of physical diagnosis and is followed by 7 weeks of clinical experience. The PFM students receive the same stipend as the PIM students. However, PFM students spend their entire preceptorship in a single community practice and do not have a specific conference

series. The PFM program has been in existence for 4 years and generally enrolls about 30 students yearly.

## Statistical Analysis

Dichotomous comparisons were made using  $\chi^2$  and Fisher's Exact Test. Comparisons across multiple groups were made by analysis of variance and Tukey-Kramer tests. Comparisons of mean values were made by Student's *t* tests. Because most variables were not normally distributed, nonparametric tests (Wilcoxon/Kruskal-Wallis) were also run, as well as the Welch test, which does not assume equal variances. The results were not affected. All analyses were made on EPI info or JMP software. Student baseline data are presented as means and standard deviations.

The outcomes we selected were grades in the second-year medical ethics course, scores in the second-year ICM course, and scores in the internal medicine clerkship. Ethics grades, reported as pass, fail, or honors, are based on written examinations and participation in small group sessions. The ICM scores are based on written (multiple choice question) examinations, standardized patient interactions, and descriptive evaluations of clinical performance. Scores from the third-year internal medicine clerkship come from the National Board of Medical Examiners Subject Examination, an objective structured clinical examination (OSCE), as well as descriptive (Likert-type) clinical evaluations from the inpatient and outpatient services. The minimum passing grade is 65%, and honors grades usually begin around 80%. Honors grades are limited to the top 15% of each class. We defined an internal medicine residency as matching to categorical or primary care internal medicine, combined programs (i.e., medicine-pediatrics or medicine-psychiatry), or dermatology. Preliminary or transitional years were not considered to be in internal medicine. Complete match lists for each graduating class were obtained from the dean's office.

## RESULTS

The relevant data were examined for all students in the School of Medicine during the study period. A review of students' records at matriculation showed no differences between the PIM students and the other groups. A comparison of PIM students with all non-PIM students showed (mean  $\pm$  SE) undergraduate GPA ( $3.5 \pm 0.05$  vs  $3.5 \pm 0.01$ ), undergraduate science GPA ( $3.5 \pm 0.06$  vs  $3.4 \pm 0.02$ ), MCAT verbal ( $8.8 \pm 0.28$  vs  $8.6 \pm 0.09$ ), MCAT science ( $8.6 \pm 0.24$  vs  $8.6 \pm 0.08$ ). When the non-PIM students are separated into PFM students, those not selected for PIM, and the remaining students, there are still no differences in the above measurements of academic performance prior to participating in the preceptorships (all *p*'s  $> .10$ ).

In the two outcomes measured during students' second academic year, the PIM students performed better

**Table 2. Topics for Preceptorship in Internal Medicine Discussion Sessions**

June	July
Introduction to drugs	Health screening
MEDLINE searches	Substance abuse
Anemia	Decision-making capacity
Dyspnea	Delirium
Jaundice	Abdominal pain
Fever	Withholding and withdrawing
Preventing heart disease	life-sustaining treatment
Rashes	

than students in the other groups. PIM students were more likely to receive honors in ethics than were the non-PIM students (50% vs 29%,  $p < .01$ ). The non-PIM groups had the following percentages of honors grades (and  $p$  values) when compared with PIM students: PFM, 27% ( $<.01$ ); rejected PIM, 35% (.20); and no preceptorship, 29% ( $<.01$ ).

The PIM students' mean (SE) score for the first (fall) semester of ICM was 87.2% (0.8%) vs 84.2% (0.2%) for all non-PIM students ( $p < .01$ ). Preceptorship in internal medicine students scored significantly higher in the first semester of the ICM course than the PFM and no-preceptorship groups (Table 3). In the second semester, the differences narrowed, but scores for the PIM students remained higher (86.1%; 0.8%, SE) than the combined non-PIM students (83.7%; 0.3%, SE;  $p < .01$ ).

During the students' third academic year, the PIM students again performed better on several outcomes we assessed. To date, 38 of them have completed their junior clerkship in internal medicine. Of these, 10 performed the clerkship at another clinical campus, (their scores are not available), and another student withdrew, leaving the scores of 27 PIM students for analysis at this academic level. Similarly, only the scores of the non-PIM students who have completed their clerkships at our main campus ( $n = 246$ ) are available. The PIM students were more likely to receive an honors grade in their medicine clerkship than the combined non-PIM students (33% vs 10%,  $p < .01$ ), the PFM students (10%,  $p = .01$ ), and students not participating in a preceptorship (10%,  $p < .01$ ), but not the rejected PIM students (14%,  $p = .18$ ). Compared with the combined non-PIM students, the PIM students' scores were significantly higher on our OSCE, descriptive evaluations during ambulatory rotations, and the overall clerkship grade (Table 4). However, the scores of PIM and non-PIM students did not differ significantly on the descriptive evaluations from the inpatient services or on the National Board of Medical Examiners Subject Examination. The comparisons of PIM students' clerkship scores with each group, by preceptorship status, are shown in Table 4. Although the PIM scores were generally higher, the only difference that was statistically significant was between the ambulatory descriptive evaluations of the PIM and no-preceptorship students.

The final outcome that we assessed was the students' choice of residencies. The PIM students were significantly

more likely to choose an internal medicine residency than non-PIM students. Of the 28 PIM students who have graduated from our medical school to date, 15 (54%) have chosen residencies in internal medicine. Of the 296 students who did not participate in PIM and graduated over the same interval, 80 (27%) chose internal medicine residencies ( $p = .003$ ). For the PIM students who chose internal medicine residencies, the distribution by program type was seven in categorical internal medicine, six in medicine-pediatrics, and two in dermatology.

## DISCUSSION

We were able to identify favorable educational outcomes for students who had participated in PIM in each course we examined. The effect was most pronounced in the percentages of students receiving honors grades in ethics and the internal medicine clerkship. The differences in examination and evaluation scores appear more modest (2%–5%), but they need to be seen in the context of the grading system. A difference of 15% (65%–80%) takes a student from a minimal pass to honors. Analysis of the separate evaluation measures demonstrated that the higher PIM scores came both in objective (OSCE) and subjective (ambulatory descriptive) measures.

Whereas the three non-PIM groups performed in a similar fashion in their ICM course, the PIM students scored higher. This result was expected, as the course stressed pathophysiology and physical diagnosis. One student wrote on her evaluation form, "I've learned more in the past 2 months than in my entire first year of medical school—at least in terms of things I'll remember." We were pleased that the effect of PIM appeared to last through the junior year, as evidenced by scores in the internal medicine clerkship. It is unclear why outpatient, but not inpatient, clinical evaluations were higher for PIM students. An attempt was made to balance the PIM curriculum between the two settings. The School of Medicine's curriculum remains largely inpatient; however, the PIM curriculum may have favored outpatient performance in some way of which we are not aware. The OSCE emphasizes clinical skills, and the PIM students' earlier clinical exposures may explain their higher scores. The knowledge base assessed by the National Board of Medical Examiners Subject Examination appeared to be less affected by PIM.

**Table 3. Introduction to Clinical Medicine Scores by Student Groups\***

Group	n	Fall ICM, (SE) %	p (vs PIM)	Spring ICM, (SE) %	p (vs PIM)
PIM students	46	87.2 (0.8)	—	86.1 (0.8)	—
All non-PIM	470	84.2 (0.2)	<.01	83.7 (0.3)	<.01
PFM	135	84.5 (0.4)	<.05	84.9 (0.5)	NS
Rejected PIM	31	84.5 (0.9)	NS	85.1 (1.0)	NS
No preceptorship	304	84.1 (0.3)	<.05	83.0 (0.3)	<.05

\*ICM indicates introduction to clinical medicine; PIM, preceptorship in internal medicine; PFM, preceptorship in family medicine.

Table 4. Medicine Clerkship Scores by Preceptorship Group\*

Group	n	NBME	OSCE	Inpatient	Ambulatory	Overall
PIM	27	522 (15.6)	78.7 (1.3)	78.4 (1.4)	79.9 (1.2)	77.9 (1.2)
All non-PIM	246	501 (5.2)	76.0 (0.4) <sup>†</sup>	77.9 (0.5)	76.2 (0.4) <sup>‡</sup>	75.1 (0.4) <sup>§</sup>
PFM	52	518 (11.1)	74.8 (0.9)	80.2 (1.4)	76.8 (0.9)	75.9 (0.8)
Rejected PIM	14	545 (21.4)	74.9 (1.8)	80.6 (1.9)	75.5 (1.6)	77.4 (1.6)
No preceptorship	180	492 (6.0)	76.4 (0.5)	77.1 (0.5)	76.1 (0.5) <sup>§</sup>	74.7 (0.5)

\*All scores presented as means and standard errors. NBME indicates National Board of Medical Examiners; OSCE, objective structured clinical examination; PIM, preceptorship in internal medicine; PFM, preceptorship in family medicine.

<sup>†</sup>p = .05 compared with PIM.

<sup>‡</sup>p < .01 compared with PIM.

<sup>§</sup>p < .05 compared with PIM.

The PIM students were more likely to enter internal medicine residencies than non-PIM students, although it might be noted that even the non-PIM rate was slightly higher than the approximately 20% seen in the 1990's. This finding may make department chairs and program directors more willing to see the program's costs as recruitment expenses that will eventually yield a return in housestaff. Similar favorable recruitment results have been noted in a family medicine preceptorship.<sup>15</sup>

The PIM accomplished more than academic and recruitment goals. The students have been given an early clinical exposure to positive clinician role models. One student wrote about his community preceptor, "There should be more teachers like Dr. X in the first 2 years of medical school. His excitement about medicine, integrity, and love for people make him the perfect role model for students." Their appreciation of ethical issues was evident during the ethics course. Several faculty members who teach the course commented that the PIM students, having seen examples, integrated theory into actual cases better than their peers. The students made similar comments in their feedback sessions.

This is not the first example of a "preclinical" preceptorship in internal medicine. A primary care internal medicine elective was developed at Wright State University in 1982. It also utilized conferences and clinical experiences with internists. The program was highly evaluated by students and preceptors, but no objective outcomes were reported.<sup>16</sup> The University of Texas Southwestern offers 1 to 2 weeks of community-based instruction during any free blocks of time, and the University of Texas Medical Branch offers a 4-week community preceptorship after the first year of medical school. Both have been highly rated, but no outcome data have been reported.<sup>14</sup> One author described a clinical experience in which senior medical students acted as preceptors for first-year students and cited subjective benefits for both.<sup>10</sup> A recent publication noted that students who had participated in an early clinical preceptorship were generally more positive about their medical education than were those students who had not participated.<sup>17</sup>

Some limitations to this study are apparent. The rejected PIM group was small, which may have obscured

some differences. This project was carried out at a single medical school, and the number of PIM students whom we have been able to follow to residency choices is small. The generalizability of the data may, therefore, be limited. Undergraduate grade point average and MCAT scores have been shown to be good predictors of subsequent performance in medical school.<sup>18</sup> From examining these performance measures, the students in the PIM group appeared to be comparable to the control students prior to experiencing the preceptorship, but there may have been differences that we were unable to measure. As an increased interest in internal medicine would be more likely in the students applying for PIM than in those not volunteering for the program, a self-selection bias is likely. Surveys would indicate, however, that large numbers of medical students are initially interested in internal medicine but are "turned off."<sup>4,8</sup> That being the case, the task for internal medicine recruitment is to maintain interest in those who have it, rather than to create it in those not interested. Because few of the PIM students have completed their residencies, we are unable to comment on their ultimate career choices (e.g., general internal medicine vs subspecialty). We are also unable to comment on the career choices of the students who participated in the family medicine preceptorship.

We have identified a relatively inexpensive method for providing medical students with an early clinical experience, which also cultivates their interest in internal medicine. We have experienced no difficulty in recruiting either qualified students or preceptors. The program has been funded at its current level without support from the School of Medicine, but costs have been the limiting factor on its growth. Other departments of medicine may want to consider a PIM as a means of achieving their own educational and recruitment goals.

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## ANNOUNCEMENT

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