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Incentives and Physician Specialty Choice: A Case Study of Florida's Program in Medical Sciences (PIMS)

The growing shortage of primary care physicians in medically underserved areas of the nation led medical schools and policymakers years ago to design and fund numerous innovative medical education programs to foster the development of a more balanced physician workforce. Florida's Program in Medical Sciences (PIMS) was an example of one such initiative that was established in fall 1971 at Florida State University (FSU). A precursor of the present-day FSU College of Medicine, this program was created specifically to address the growing need for primary care physicians in rural areas of northwest Florida. The results of empirical tests on the career choices of PIMS graduates in the first 20 years provide weak evidence that the program was more effective than the existing channels of medical education in producing additional primary care physicians to rural Florida counties.

The persistent shortage of primary care physicians in medically underserved areas of the nation has become one of the most challenging health care policy issues facing medical educators and health care policymakers. Medically underserved areas are defined, among other characteristics, by a perceived shortage of physicians and other medical care providers. Most such areas are rural, but some also are found in parts of cities and urban districts. Both financial and personal incentives combine to create a modern-day physician workforce oversupplied with specialists and too concentrated in metropolitan and suburban markets (Schroeder 1985; Isaacs, Sandy, and Schroeder 1996). The other side of this skewed distribution of physician location and services is a real shortage of basic health care services for certain groups of the U.S. population, particularly in rural areas (COGME 1998; Goodman 2004).

Initially, medical schools accepted little responsibility for the growing "surplus of specialists." To be sure, there were a few innovative medical programs, such as the Rochester Medical School, that addressed the need for more generalists, but their impact was not enough to reverse the imbalances (Colwill 2004). More serious reforms were undertaken only after the shortage of primary care specialists was deemed critical in several key states. Faced with legislative mandates for change, medical schools began to experiment with curriculum design and admission policies to favor, preferentially, applicants with promise of commitment to primary care (Verby et al. 1991). Grants from foundations such as the Robert Wood Johnson Foundation sought to enact major

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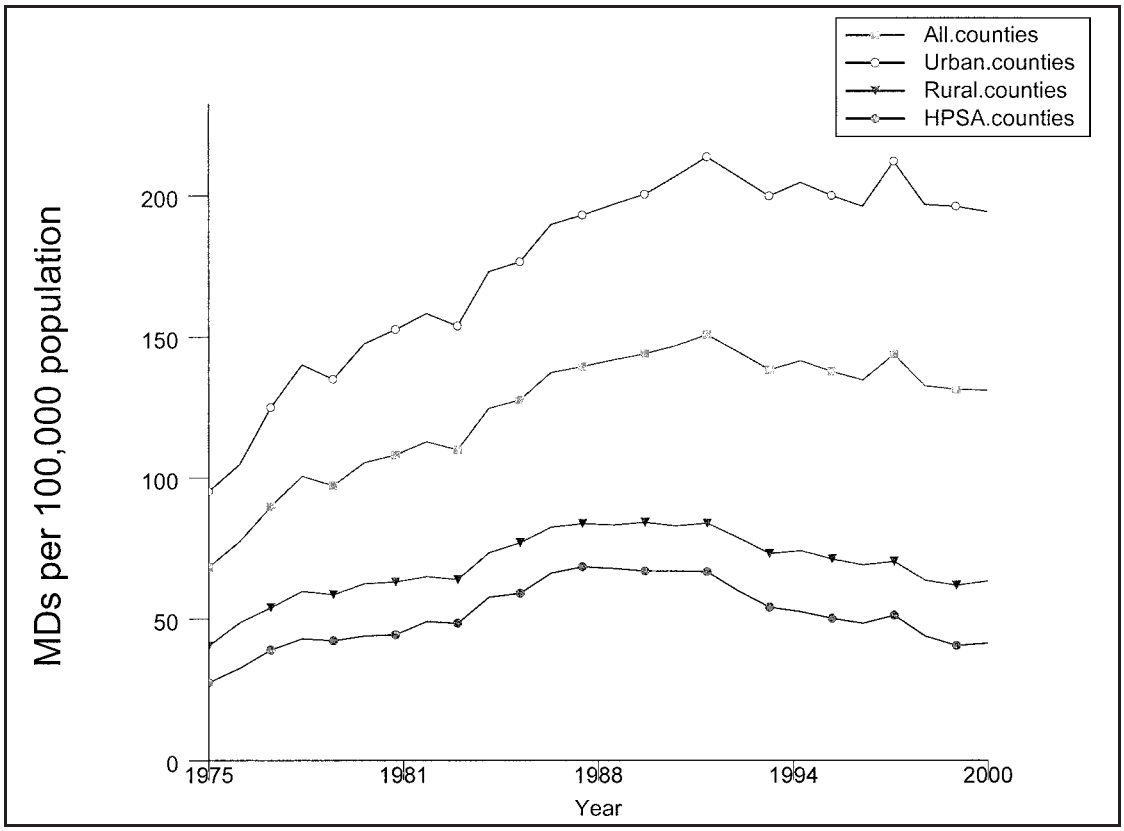

Figure 1. Florida's ratio of physicians per 100,000 population, 1975–2001 (Source: Florida Statistical Abstract, 1975–2001 editions)

changes in programs at the Dartmouth Medical School and others (Brooks, Orgen, and Wallace 1999). In some instances, these policy-driven changes appeared to alleviate successfully some shortages of primary care physicians at the local level; in many others, they did little to solve a growing problem (Schroeder 1992). A recent publication shows very mixed policy results and suggests that the issues underlying the supply of primary care physicians are more complex than previously thought (Isaacs and Knickman 2004).

This paper examines the results achieved by the Program in Medical Sciences (PIMS), established in Florida in the early 1970s to address the physician manpower needs in medically underserved areas of the state. The discussion begins by addressing the trends in Florida regarding population demographics and physician manpower over the past 30 years and describes PIMS. The sections that follow present an empirical analysis of 20 years of graduating cohorts and test whether the program in Florida has significantly affected these medical school graduates' choices of specialty or location. Results from our PIMS analysis are compared to three other similar community-based programs established in other states during to same time period. Finally, we conclude with a discussion of the possible economic and non-economic reasons for the disappointing results of this program.

Trends in Florida

Policy studies concerning physician workforce issues typically begin with an analysis of changes over time in physician supply and the corresponding population served (Salsberg and Forte 2002; Colwill and Cultice 2003). Aggregate changes in physicians per capita will reflect the impact of changes in other policies and demand (Weiner 2002). These changes in Florida, from 1975 to 2000, are summarized in Figure 1; they

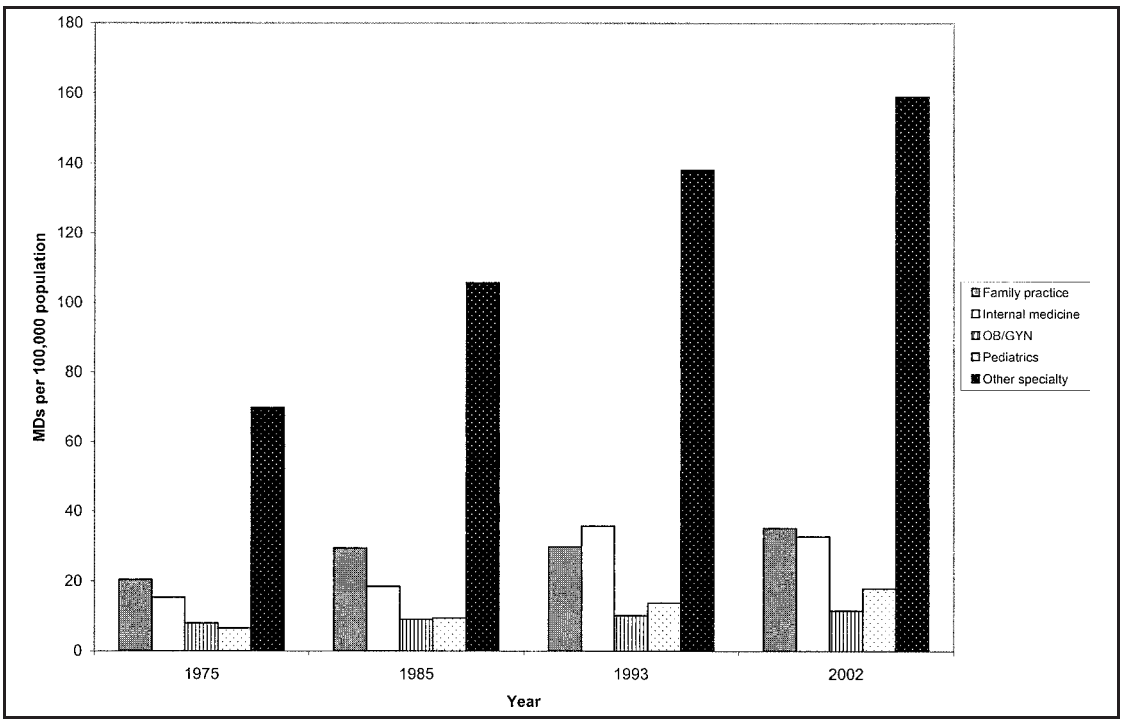

Figure 2. Number of Florida primary care physicians per 100,000 population for selected years (Sources: AHCA 1985–1993; Kaiser Family Foundation 2002)

show that Florida has seen substantial increases in the number of licensed physicians, from 14,900 in 1975 to more than 42,000 in 2002—a 190% change over a 27-year period. During the same period, however, rural counties experienced a 56% increase in the physician-population ratio (to an average of 63 physicians per 100,000 individuals), while urban counties fared much better with a 104.4% increase (to an average of 194 physicians per 100,000 individuals). The lack of improvement in physicians per capita is especially apparent in the Health Professions Shortage Areas (HPSAs) of Florida.[1]

Accompanying this growth in the physician-population ratio in Florida and nationwide has been a gradual decline in the number of licensed physicians choosing one of the "generalist" specialties, namely family practice, internal medicine, pediatrics, obstetrics-gynecology, or emergency medicine. While the number of generalists in Florida's urban counties has grown steadily over the years (to 40% of their total physician population), Florida's rural counties have seen a steady decline in the number of generalists choosing to practice there. In 1987, some 358 generalists practiced in rural counties (72% of their total physician population). By 1993, only 205 generalists practiced in these same rural counties, a 43% decrease in generalist providers over those six years alone. This trend is of particular relevance due to the critical role that specialty choices play in determining ultimate practice locations. While 48% of Florida's licensed physicians chose a generalist specialty in 1975, only 38% of physicians continued to do so in 2002 (AHCA 1985–1993; Kaiser Family Foundation 2002). Figure 2 shows the growth in the number of licensed physicians statewide for both generalists and specialty physicians.

Florida ranks 11th in physicians per capita (AMA 2001c) and currently grants some 494 medical degrees each calendar year from one of five state universities offering graduate medical education programs. Nearly 90% of Florida's newly licensed physicians are "imported" from other states and approximately 38% are international medical graduates (MGT 1999). On average, only 42% of Florida medical school

Table 1. Net change in HMO hospital admissions for urban and rural Florida counties

Years	Urban counties	Rural counties
1989–1993	178,370	2,109
1994–1998	270,975	3,903
1999–2002	53,588	727

graduates continue their residency within the state. In addition, only 12% to 24% of the physicians practicing in one of Florida's metropolitan areas obtained their degree from a Florida medical school. The same can be said of Florida's rural counties, where some 12% to 30% of the physicians practicing in those areas obtained their degree from a Florida medical school (National Conference of State Legislatures 2001).

A further development to consider is the role of managed care. As shown in Table 1, the growth of health maintenance organizations (HMOs) was largely concentrated in urban Florida. We use data on hospital admissions insured by commercial HMOs as a basis for comparison between rural and urban areas.[2] Managed care growth fueled a strong urban demand for generalist physicians, the traditional gatekeepers in HMOs. New generalists appear to prefer locales with a high HMO presence due to the increased demand for their services as well as to the amenities that these areas provide (Escarce 1998). For example, the city of Tallahassee has a large base of government workers and 42% of its population enrolled in HMOs, while the city of Naples, a retirement community, has only .2% (Oliver 1996). These developments highlight the difficulties of recruiting primary care physicians to rural areas where, as the *Miami Herald* (Haney 1994) succinctly put it, there are "poorly equipped hospitals, dried up economies, and nothing much to keep highly educated professionals amused or challenged."

Of Florida's 67 counties, 34 are classified as urban markets for health care. These markets attract specialists due to complementarities in demands for adequate technology, referral practitioners, and an adequate population base for requisite patient volume. Generalist practices, especially family practices, are distinctive in that they require less complementary inputs and can, in principle, distribute themselves evenly throughout the population. Hence, many programs designed to address access to physician care in underserved areas have focused on efforts to recruit, educate, and retain family practitioners (COGME 1998).

Florida's Program in Medical Sciences

The focus of the current study is on the Program in Medical Sciences. Funded by the state from 1971 to 2000, PIMS had the sole mission of enhancing the provision of physician services in rural, underserved areas of northwest Florida. PIMS was one of a handful of programs established amid mounting concerns over the growing shortage of health care providers willing to relocate and practice in rural, underserved areas throughout the nation. This program utilized a community-based model for training medical providers. It was affiliated with the University of Florida's College of Medicine in Gainesville and designed to admit 30 students each calendar year.

The applicant pool of students consisted of individuals committed to rural or primary care medicine but who may have faced obstacles to admission to medical school through the normal channels. These students began their medical education at the Florida State University (FSU) campus in Tallahassee then transferred into the second year class at the University of Florida, and went on to complete their medical studies and earn their medical degrees. The admissions committee favored students deemed to be "nontraditional, from financial and/or educationally disadvantaged backgrounds, or were a member of a minority group not currently well represented in the physician workforce." The term "nontraditional" applied to those students over age 25 who normally would find admission to traditional medical schools difficult due to their age and the presence of established careers and/or families. Other special features of this program included a 12-month curriculum (in contrast to the nine month first year program of traditional medical schools), as well as an early focus on clinical experiences in a community environment (i.e., physician's offices, rural health clinics, etc.).[3]

Data

For this study, the names of PIMS graduates were obtained for the calendar years 1972–1992 from the Florida State University database provided by the FSU Foundation. Similarly, names of University of Florida (UF) medical school graduates were obtained for the calendar years 1975–1995

so that comparisons could be made between the two respective groups: those who went through PIMS their first year (the treatment group) versus those who obtained their medical education solely at the University of Florida campus (the control group). The PIMS students, on average, represented approximately one-fourth of the total pool of graduates from UF for any given year.

Relevant information on physicians practicing in state was obtained primarily from public access databases such as the one run by the Florida Department of Health. The department's website and database, via its physician profiling search form, provided key data concerning the specialty choices, postgraduate training, and practicing locations of currently licensed Florida physicians.[4] Although this data provided limited biographical data (i.e., sex of provider and date of birth), additional sources, such as the American Medical Association (AMA) website were used to fill in the gaps on the in-state providers.[5]

Data on physicians who chose to practice out of state were obtained from several sources. Directories of physicians published by AMA (2001a and 2001b) were used in determining the current location of these Florida-educated providers. Once their practice location was determined, *The Official ABMS Directory of Board Certified Medical Specialists 2001* and the AMA website provided relevant data concerning the date of birth, dates and locations of postgraduate education, and board certifications obtained by these out-of-state practicing physicians.

Originally, data for 2,314 individuals were obtained from the University of Florida Foundation for people identified as medical school graduates from the time period 1975–1995. Following the construction of the completed data set, 207 individuals were excluded (30 from PIMS) for which no data could be found regarding their specialty, postgraduate training, or current practice locale. Thus, 2,107 graduates from the University of Florida's College of Medicine were evaluated—406 of these were from PIMS (the treatment group) and 1,701 completed their medical studies entirely at the UF campus (the control group).

Empirical Analysis

In this section, statistical analyses utilizing *t*-tests are presented to determine whether any differences exist between UF graduates who were in PIMS and UF graduates who were not in PIMS (from the 1975 to 1995 graduating classes). These *t*-tests are based on the characteristics of the graduates themselves and on their ultimate specialty/practice location choices.

Construction of the *t*-tests begins by dividing the data into 21 test years and computing for each year the number of graduates from each program satisfying the particular criteria being tested. For each *t*-test, the level of significance α was chosen to be .05 and the hypotheses to be tested were as follows:

$$H_o: \quad X_{PIMS} - X_{UF} = 0$$
$$H_A: \quad X_{PIMS} - X_{UF} \neq 0.$$

One test criterion was the difference in the proportion of graduates classified as "nontraditional." For the specialty choices, three test criteria were given: those choosing generalist specialties, those choosing primary care specialties, and those choosing the penultimate generalist specialty, namely family practice. Finally, for the practice locations, two test criteria were selected: those choosing to practice in state (vs. out of state) and those choosing to practice in rural (vs. urban) areas. The results of these *t*-tests provide evidence on the effectiveness of PIMS over the period, relative to normal channels of medical education, in producing an additional supply of generalist physicians and an additional physician supply to rural Florida counties.

From its inception, PIMS sought "nontraditional" students primarily on the belief in their higher propensity to undertake primary care specialties in their medical training. This selective admissions policy of PIMS was supported by the work of Rosenblatt et al. (1992), who found that successful applicants to rural practice, primary care programs tend to be older, married, and have a family prior to matriculation into medical school. In this context, a "nontraditional" indicator was assigned to students who were at least 25 years of age prior to admission into medical school. Overall, 88 graduates from PIMS and 259 graduates from the UF program were given this nontraditional designation. Testing for differences in the proportions of nontraditional status graduates produced a *t*-statistic of 2.69 with a *p*-value of .0062, and we reject the null hypothesis (no difference in the means) at $\alpha = .05$. Hence, we can conclude that the mean proportion

Table 2. Graduates from PIMS and UF by specialty choice

Specialty choice	PIMS graduates			UF graduates			Test results	
	Number of graduates	Mean PIMS	Variance PIMS	Number of graduates	Mean UF	Variance UF	*T*-statistics	*p*-values
Generalists	184	.469	.027	661	.392	.006	1.947	.0172
Primary care	129	.317	.028	484	.287	.003	.789	.2189
Family practice	67	.169	.015	215	.127	.002	1.503	.1034

Note: Criteria for test calculations: $n = 21$ test periods; $df = n_{PIMS} + n_{UF} - 2 = 40$; $\alpha = 0.05$.
$t = (X_{PIMS} - X_{UF})/S^2_{PIMS}/n_{PIMS} + S^2_{UF}/n_{UF}$.

of nontraditional graduates is higher in PIMS than in the general pool of UF graduates.

Next we examine the specialty choice decisions of graduates in the two groups. The first row in Table 2 reports the number of graduates from each program choosing one of the targeted "generalist" specialties.

The data summarized in Table 2 indicate that 184 generalists emerged from PIMS, while the UF program graduated 661 over the same time period. Testing for differences in the proportions of generalists produces a *t*-statistic of 1.947 with a *p*-value of .0172. Thus, sufficient evidence exists to reject the null hypothesis (no difference in the means) at $\alpha = .05$.

In contrast, testing for differences in the proportions of primary care and family practice specialties produced *p* values of .2189 and .1034, respectively, indicating no statistically significant differences between PIMS graduates and nonparticipant graduates of UF. Overall, the results generated by this section are mixed. PIMS did help to promote physician graduates who were nontraditional, as well as physicians selecting generalist specialties as a career choice. At the same time, the proportion of primary care and family practitioners produced by PIMS was no greater than the results achieved by nonparticipants in the comparison group.

A similar examination of the practice location choices of graduates focused on two test criteria: those choosing in-state (vs. out of state) areas and those choosing rural (vs. urban) areas. These data are summarized in Table 3.

The data reveal a small numerical difference in the proportion that stays in state; that is, 53% (215 out of 406) of the PIMS graduates remained in state to practice while only 50% (843 out of 1701) of UF graduates chose to do so. The *t*-tests do not support a finding that this difference is significant. Focusing only on graduates who remain in state, we report a *t*-statistic of 1.808 and a *p*-value of .0565, suggesting that at the margin of $\alpha = .05$ there is (weakly) insufficient evidence to reject the null hypothesis (no difference in the means). However, if we test for differences in the proportions of in-state graduates who become generalists, we get a *t*-statistic of 3.131, leading us to conclude that, again at $\alpha = .05$, there is a difference in the mean proportion of generalists who remain in state after graduation from each of these respective programs.

Turning to the question of how frequently those in-state graduates choose rural counties in which to practice, we see that only 4.7% (10 out of 215) of the in-state PIMS graduates and 2.4% (20 out 843) of the in-state UF graduates chose a rural county as their ultimate practice

Table 3. Location choice decisions of PIMS and UF graduates

Location criteria	PIMS graduates			UF graduates			Test results	
	Number of graduates	Mean PIMS	Variance PIMS	Number of graduates	Mean UF	Variance UF	*T*-statistics	*p*-values
In state	215	.545	.016	843	.494	.004	1.808	.0565
In state-generalists	114	.555	.045	339	.403	.004	3.131	.0026
In state-rural	10	.038	.003	20	.025	.00	1.006	.1623

Note: Criteria for Test Calculations: $n = 21$ test periods; $df = n_{PIMS} + n_{UF} - 2 = 40$; $\alpha = 0.05$.
$t = (X_{PIMS} - X_{UF})/S^2_{PIMS}/n_{PIMS} + S^2_{UF}/n_{UF}$.

location. While that may appear to be statistically significant at first glance, the test statistics (t-value of 1.006, p-value of .162) tell otherwise.

At this point it seems relevant to ask the question: Where in state did these graduates choose to practice if they were not going to rural counties? The answer becomes clear if one tabulates the largest counties, where 4% or more of the in-state graduates of either program currently (as of 2000) reside and practice. These results are summarized in Table 4.

It can be seen from Table 4 that 56% of the PIMS graduates who remained in state following graduation are now practicing in one of seven highly populated counties—namely Leon, Duval, Alachua, Orange, Hillsborough, Okaloosa, and Volusia counties. Likewise, 61% of the graduates from the University of Florida program who chose to remain in state are practicing in nine, similarly populated counties—namely Alachua, Orange, Duval, Hillsborough, Pinellas, Miami-Dade, Palm Beach, Brevard, and Leon counties. In short, these patterns confirm that the most attractive urban areas of the state seem to be the favorite location choices of both groups.

Note that our results cannot address the counterfactual question of what would have happened to physician supply in rural counties of Florida in the absence of PIMS. PIMS might have increased physician supply in those areas just by increasing the total numbers of physicians in Florida without changing the distribution across rural/urban areas.[6] This explanation seems doubtful, however, considering that the state of Florida's 11th place ranking among all states in physicians per capita was unchanged from 1980 to 1999 (AMA 2001c). An ideal study might be to compare physician supply developments in other states that did not launch their own initiatives in medical education; however, it is difficult to implement an empirical model to control for relevant supply shifters in practice.

Table 4. Florida counties representing more than 4% of either PIMS/UF in-state graduates

	PIMS graduates		UF graduates	
Florida counties	Number of graduates	% in-state graduates	Number of graduates	% in-state graduates
Alachua	21	9.8	133	15.7
Brevard	0	0	36	4.3
Duval	26	12.1	70	8.3
Hillsborough	10	4.7	45	5.3
Leon	28	13.0	35	4.1
Miami-Dade	0	0	41	4.9
Okaloosa	9	4.2	0	0
Orange	17	7.9	75	8.9
Palm Beach	0	0	41	4.9
Pinellas	0	0	43	5.1
Volusia	9	4.2	0	0
Total	120	55.8	519	61.4

Previous Evidence on Physician Location and Policy Initiatives

Our results can be compared with numerous studies conducted over the past few years showing the undeniable effect of pecuniary and non-pecuniary factors on the specialty choice/location decisions made by medical residents. Rosenthal et al. (1994) determined that about 20% of residents in specialty programs surveyed would consider switching to primary care, some for an adjustment in income and others for a more favorable work week schedule. McKay (1990) found that the number of residents in a given specialty increased when that specialty's relative expected earnings increased, when the relative length of the postgraduate training period decreased and, in particular, when the relative expected work week hours decreased. Finally, Carpenter and Neun (1999) addressed location preferences by noting that young primary care physicians prefer initial practice locations where there is strong demand for their professional services (i.e., places with a strong academic presence, a sufficient number of facilities to accommodate incoming patients, and a moderate to high population growth). This supply response was facilitated by factors such as low crime rates, low unemployment, low poverty rates, and a moderate cost of living.

The effects of adequate program design on specialty choice/location decisions have been addressed by several researchers who independently evaluated three noteworthy community-based model programs to determine which factors were most relevant to their success. The Rabinowitz et al. (2001) in-house evaluation of the Physician Shortage Area Program (PSAP) in Pennsylvania found that an applicant's rural roots, the incorporation of a mandatory family medicine

clerkship, a required outpatient sub-internship program, and assigning a family practice mentor were all instrumental to the program's success.

Verby et al. (1991) provided a similar assessment of the Rural Physicians Associate Program (RPAP) at the University of Minnesota. This program's success was remarkable: 81% of graduates chose to practice in primary care specialties and 63% in rural practice locations. The design characteristics that, according to Verby, contributed most were its selective admissions component and a core curriculum focused on the development of keen clinical skills in a rural setting.

Ramsey et al. (2001) provided a similar assessment of the multistate, community-based program that began at the University of Washington in 1970 and went on to serve five states: Washington, Wyoming, Alaska, Montana, and Idaho (hence, the acronym, WWAMI). The success of this program was reflected in the relatively high number of family practice graduates it produced (57%) and in its success of bringing 74% of its graduates back to the program states to practice. Ramsey et al. and other proponents of this program ascribe the results to an early focus on primary care and community-based training, a medical leadership committed to its underlying mission, and a strong and vocal rural constituency served by the program (Ramsey et al. 2001).

Discussion

The results of our PIMS study suggest that the program was rather unsuccessful in its mission of making a discernible difference in the specialty choice and location decisions of its graduates. Why were the results of this program so much different from the other highly successful community-based model programs previously considered? Perhaps one of the answers lies in the multifaceted approach employed by these other programs in the admission, education, recruitment, and retention of primary care physicians for their respective states.

As suggested by the advocates of the WWAMI program, features essential to the success of any community-based program include a favorable political economy for legislative support, fostered by a strong medical leadership committed to primary care and an active rural constituency served by the program. In addition to these factors, evidence from PSAP and RPAP suggests that mandatory clerkships in primary care in the third and fourth years combined with a dedicated rural tract program following graduation are essential to success. While PIMS employed the selective admissions criteria and early exposure to clinical experiences in a community setting, it lacked other critical components that have proven instrumental to the success of these model programs.

The federal government has instituted a number of pecuniary-based programs to address this health manpower issue. One of these pecuniary-based programs, supported by the work of Rosenthal et al. (1994), involves a 10% Medicare bonus payment made to a practicing physician for the provision of primary care medical services in a rural setting. A second program, directed specifically at rural health care clinics, entails a cost-based reimbursement from both Medicare and Medicaid for all primary care services provided. Preliminary evidence from both programs suggests that these pecuniary-based economic incentives have been instrumental in alleviating the growing shortage of rural primary care providers by allowing these physicians to run profitable practices in many rural and medically underserved areas of the country (COGME 1999).

In addition to these pecuniary-based incentive programs, the government also has sponsored numerous placement programs, the most notable of which are the Department of State's J-1 Visa program and the National Health Service Corps (NHSC) sponsored by the Department of Health and Human Services. Under the J-1 Visa program, participating doctors are granted a waiver which requires them to relocate and practice in a medically underserved area for a prescribed period of time. The National Health Services Corps complements the effects of the J-1 Visa program by offering scholarships and loan repayment plans to new physicians who are willing to relocate and provide medical care in these underserved areas, once again for a prescribed period of time.[7]

Further support for these various programs has been provided by Brooks, Mardon, and Clawson (2003). They found that rural primary care physicians were more likely than their urban counterparts to have been: 1) raised in a rural locale (26% vs. 13.4%); 2) foreign born with J-1 Visa waivers (48.8% vs. 35%); and 3) a National Health Service Corps member (12.6% vs. 3%).

Their study advises that rural health care can best be fostered by a careful selection of applicants committed to rural health care and by a medical school curriculum designed to engage practitioners in a rural setting. In addition, Brooks, Mardon, and Clawson (2003) find the J-1 Visa program and the NHSC have played a significant role in the provision of primary care in many rural and medically underserved areas of the state.

Conclusion

The growing shortage of primary care physicians in rural and medically underserved areas of the nation remains a critical issue in health care. The recent literature has helped to ascertain what factors are instrumental in producing the desired results, namely an efficient provision of physician services and a more equitable distribution of physicians among specialties and locales. It is useful, in hindsight, to see how well medical education initiatives work to achieve these goals.

PIMS was implemented in 1971 to alleviate the shortage of primary health care providers practicing in rural counties of northwest Florida. The results obtained here suggest that the program was rather unsuccessful in affecting the specialty choice and location decisions of its graduates. While the program employed selective admissions criteria and early exposure to clinical experiences in a community setting, it failed to incorporate some critical components of other, successful community-based model programs.

In Florida, economic incentives have proven instrumental in physician specialty and location preferences. The designers of PIMS may have failed to address the fundamental point that physicians will likely continue to locate and specialize where they can achieve their highest-valued employment, including non-pecuniary benefits. Not every economist agrees that government promotion is the best policy. Newhouse et al. (1982) were highly critical of government-based incentives due to the high cost, the arguable assumptions of market failure, and the lack of consistent criteria for what constitutes medically underserved.

This paper illustrates clearly that addressing the shortage of primary care physicians in rural areas by targeting the "right applicants" may be insufficient to produce effective change. Clearly, it will take coordinated action by health care policymakers and medical educators to ensure that programs are effectively compatible with the incentives and career concerns of physicians.

Notes

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1 To receive a primary care HPSA designation, an area must contain fewer than one primary care physician per 3,500 individuals based on clearly recognizable boundaries such as census tracts or county lines. The lack of access, in this definition, pertains to the presence of physical or cultural barriers impeding easy access to basic health care needs. Currently, 13 counties in Florida qualify as HPSAs according to the Florida Department of Health; nine are in the northwest, which is called the "Big Bend" area of the state, and two are in the southernmost portion of the state (sources: MGT 1999 and http://bhpr.hrsa.gov/shortage/hpsacrit.htm).

2 The most common source of data by county on HMO penetration is from Wholey et al. (1997). These authors caution that the algorithms used to construct year-to-year penetration rates are intended for metropolitan statistical areas (MSAs) or health care shortage areas (HSAs) and may be unreliable at the county level. We report the number of hospital admissions insured by commercial HMOs from the Hospital Financial Reports submitted annually by hospitals in Florida for each of the years 1989–2002. The annual reports to AHCA have long been routine and are well audited. Our measure of hospital admissions is not perfect, but should be a good proxy for HMO penetration growth for the purpose of a rural versus urban county comparison.

3 Florida State University was considered the ideal site for PIMS for two reasons: its large rural student population (in 1971, 40% of FSU students came from rural counties) and its central location to most of Florida's rural counties. From 1975 to 1992, the PIMS applicant pool was limited to graduates from Florida State University, the Universities of West Florida and Florida, and Florida A&M University. This policy was changed to the American Medical College Application Service process in 1993 to allow a broader pool of prospective statewide applicants. More information on the early history of PIMS can be found at the Florida State University School of Medicine website at: http://www.med.fsu.edu.

4 The State of Florida Department of Health Website, http://www.doh.state.fl.us, accessed from August–September 2002, was the source of this information.
5 The official American Medical Association website, http://www.ama-assn.org, via its AMA membership index was a key source of data on physician providers used in this study.
6 This point was raised by an anonymous reviewer.
7 Further information on the Florida Department of State's J-1 Visa waiver program can be found at: http://www.doh.state.fl.us. Likewise, information on the Department of Health and Human Services' National Health Service Corps can be found at: http://www.hhs.gov.

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