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Family Medicine Residency Characteristics Associated With Practice in a Health Professions Shortage Area

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Background and Objectives: While some family medicine residency programs are designed to train residents in community health centers (CHCs) for future careers serving underserved populations, there are few outcome studies on such programs. Our residency program provides three options for ambulatory health center training, but otherwise residents participate in the same curriculum. We analyzed relationships between ambulatory training site and likelihood of practice in health professions shortage areas (HPSAs). **Methods:** We sent a mail survey to all graduates of one family medicine residency about practice locations, types, and populations; influences on practice choice; and sociodemographic characteristics. **Results:** Training in a CHC had a statistically significant association with the likelihood of practice in an HPSA for both initial and current practice. Training in a rural residency site was associated with initial and current rural practice. Logistic regression analysis showed that physicians who completed ambulatory training in the CHC were nearly six times more likely to report having practiced initially and four times more likely to cite current practice in an HPSA. **Conclusions:** Outpatient CHC residency training increases the likelihood of practice in an underserved setting. This finding has policy implications for supporting workforce training in practice settings that care for underserved populations.

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The maldistribution of physicians in the United States has been an important and persistent barrier to health care access nationally, particularly for people who live in rural or poor urban communities.¹ The federal government has attempted to reduce distributional disparities through several Public Health Service Act initiatives, including the National Health Service Corps (NHSC), Health Professions Education Programs, and funding for community and migrant health centers. While community and migrant health center movements have generally been viewed as successful, recent reports question the nation's capacity to provide a sufficient workforce staffing community health centers (CHCs) that serve as safety net providers for uninsured and other vulnerable populations.² Given the high proportion of CHCs staffed by family physicians and

the prior decade's decline in medical students choosing careers in family medicine, this poses a significant policy challenge.

Family medicine traces its origins to reports issued more than 4 decades ago that chronicled shortages of generalist physicians and called on the nation to train physicians who would care for traditionally underserved populations.³ Subsequent recommendations, recently reiterated in the education literature, include that physician training be decentralized so that exposure to underserved urban and rural communities can raise the likelihood that graduates will practice in such locations.⁴

Medical education research has examined the effect of CHC and rural-based medical student and family medicine residency training interventions on the number of family physicians working in health professions shortage areas (HPSAs). Some studies have focused on policy,⁵⁻⁷ program design,⁸ and training costs,⁶⁻⁸ while others have examined career trajectories of physicians trained in underserved settings.⁹⁻¹³ Researchers who have studied the proportion of physicians serving

underserved populations following completion of an underserved track in medical school or residency programs have shown associations between this type of training and subsequent career decisions; these studies have included rural training tracks,^{14,15} education emphasizing underserved populations,⁹ and residency training outcomes in underserved areas.⁹⁻¹³ Most studies assessed the association of future underserved practice within one residency training program of several different practice training sites.

Recently, a survey of graduates of the Washington-Alaska-Montana-Idaho (WAMI) Family Medicine Residency Network reported on recruitment and retention to underserved settings of CHC and non-CHC trained graduates.¹⁶ Their results demonstrated that CHC-trained graduates were almost three times as likely as non-CHC-trained graduates to be practicing in underserved settings.

Our study examines the influence of one residency program's three distinctly different ambulatory training sites on graduates' career trajectories. This university-based residency program developed a single system for inpatient and elective training but included three separate ambulatory training tracks based in three different continuity practice sites: a federally qualified CHC serving a poor, culturally and linguistically diverse urban population; a hospital-owned, rural site 30 miles west of the city; and a hospital-owned health center serving a middle to lower income, urban population. We describe the results of a survey of all graduates of the University of Massachusetts Medical School's (UMMS) family medicine residency over a 30-year span, focusing on physicians' practice settings, patient population characteristics, and levels of community engagement.

We hypothesized that (1) alumni who trained in the CHC would be more likely to serve underserved populations in a variety of settings through practice in HPSAs and (2) those who trained in the rural site would be more likely to subsequently practice in rural areas. We determined that if our hypotheses were confirmed, the results of this study would reinforce the importance of ensuring that adequate training opportunities in CHCs and rural sites exist for residents. Results of the community engagement elements of the study are reported elsewhere.¹⁷

Methods

Subjects and Setting

A departmental database was used to identify all physician graduates from the University of Massachusetts university-based family medicine residency since its first class completed training in 1976. Designed as a university-based program with an emphasis on community-based, longitudinal training experiences, the program's founders developed three community-

based training sites: Family Health Center of Worcester (a federally funded CHC); Hahnemann Family Health Center (urban practice), a hospital-owned health center serving a working class population; and the Barre Family Health Center (rural practice), a hospital-owned health center in a rural community 30 miles west of the city. In the first, second, and third years of training, residents practice at their primary sites 0.5–1 day, 1.5–2 days, and 2–2.5 days, respectively.

In the residency's first 10 years, there was a single program match number for all three sites, but incoming residents chose their health center practice site. Subsequently, the program moved to three program match numbers, one for each health center although the program inpatient curriculum, governance structure, and selection committee continued to be unified.

Instrument

To construct a questionnaire eliciting information about graduates' practice settings and aspects of medical training, we revised a questionnaire used in an earlier study of physicians' community dimensions of practice¹⁸ and added questions describing sociodemographic characteristics including age, gender, and medical school. Participants were asked to report practice in family medicine or other specialty as well as dimensions of practice including care for adults, children, seniors, prenatal care only, obstetrics, and/or care in hospital.

Graduates were asked to detail dates and locations for each practice following residency. Additionally, they were directed to check boxes that described the sociodemographic characteristics of the population that applied to each practice (racially/ethnically diverse, predominantly poor, limited English speakers), related community characteristics (urban, suburban, rural), and their type of practice (private, federally designated HPSA, community or migrant community health center, academic, hospital based, Indian Health Service, homeless, Veteran's Administration). Finally, we included questions on potential influences about likelihood of practice with underserved populations, including additional training after residency (fellowship, master's in public health, master's in business administration), NHSC scholarship or loan repayment obligation, expressed interest at the start of residency in serving underserved populations (not interested/moderately interested/very interested), and the extent of medical school and residency clinical training in areas that included urban medicine, rural medicine, and underserved population medicine (limited/moderate/extensive). Using results of a pilot test with six physicians in a variety of practice settings, the survey instrument was edited for clarity. The study was approved by the University of Massachusetts Institutional Review Board's Human Subjects Committee.

Procedure

A survey packet that included a letter from the department chair explaining the purpose of the study, a blank questionnaire with a stamped return addressed envelope, and two new \$1 bills was mailed to each graduate. Guided by Dillman's Mail and Internet Surveys,¹⁹ approximately 2 weeks after the initial mailing, a postcard reminder/thank you was sent to each graduate. Three additional follow-up efforts were made to target nonrespondents via e-mail and/or direct mailings, the latter including full survey packets.

We defined a practice as largely concerned with care to underserved populations if respondents noted practice in a federally recognized underserved practice type, including HPSA, community or federally qualified health centers, Indian Health Service, or practice with migrant and/or homeless populations. In cases where graduates indicated that they were practicing in an HPSA but not in any of the other categories of HPSA descriptors, surveys were individually checked to ensure accurate categorization into underserved versus not underserved areas.

Data Analysis

Data were double entered into an EpiInfo database and analyzed using SPSS/PC statistical software (V14 SPSS, Inc, Chicago, 2006). Univariate and bivariate statistics (chi-square tests, *t* tests, and one-way analyses of variance, as appropriate) were used to describe respondents and their practice settings and types. To examine graduate differences by ambulatory training site (ie, CHC, rural and urban practices), statistical tests assessed significance at the .05 level. Using covariates guided by bivariate analyses results, logistic regression analyses were used to evaluate the two outcome variables: practicing in an HPSA site initially and currently.

Results

A total of 350 graduates were identified. Since three graduates were determined to have died, survey packets were mailed to 347 physicians. Twenty-one surveys were returned marked "undeliverable," and no current address could be identified. Of the remaining surveys, 262 completed questionnaires were returned, for a response rate of 80.4% (75.5% of the original sample).

Table 1 details demographic information about the respondents. Their ages ranged from 29 to 63 years, with a mean age of 44.9 (standard deviation [SD]=8.4 years). While women comprised almost half of the graduates, there was little racial and ethnic diversity. Respondents were fairly equally represented among the three ambulatory training sites, with approximately one third at each. Fifty percent of the graduates reported current practice in Massachusetts, with fully two thirds practicing in the six New England states. Nonrespon-

dents, compared to respondents, were more likely to be female and to have had their residency continuity practice at the hospital-owned urban health center.

The characteristics of graduates' current practices (Table 1) show that the vast majority reported providing care for adults, children, and senior patients (89.3%, 83.6%, and 74.0%, respectively). Only 57.3% noted active engagement in hospital care of their patients, with 28.6% providing prenatal care and 19.8% performing deliveries. Characteristics of patients seen by respondents showed contributions to care of racially and ethnically diverse populations (52.3%) and limited-English-proficiency patients (19.8%) as well as predominantly poor populations (28.2%).

Table 1

Demographic Characteristics of Respondents and Their Current Practice Characteristics (n=262)

Demographic (Active n)	Mean ± SD (Range)
Age (231)	45 ± 8 (29-63)
Gender (234)	Frequency (%)
Female	115 (49.1)
Male	119 (50.9)
Race (233)	Frequency (%)
White	205 (88.0)
Black/African American	7 (3.0)
Asian/Pacific Islander	12 (5.1)
Other	9 (3.9)
Medical Schools Represented (218)	97
Residency Training Site (262)	Frequency (%)
Federally qualified health center	82 (31.3)
Rural	93 (35.5)
Hospital-licensed urban	87 (33.2)
Practice Characteristic (262)	Frequency (%)
Adult	234 (89.3)
Children	219 (83.6)
Hospitalized patients	150 (57.3)
Prenatal only	23 (8.8)
Prenatal with delivery	52 (19.8)
Geriatric	194 (74.0)
Racially/ethnically diverse	137 (52.3)
Predominantly poor	74 (28.2)
Limited English speakers	52 (19.8)
Urban	91 (34.7)
Rural	79 (30.2)
Suburban	116 (44.3)

SD—standard deviation

When comparing initial to current practices, the only population proportion that diminished was care of a predominantly poor population (35.2% to 28.2%). Asked to describe their current practice communities, 44.3% described current practices as suburban, 34.7% urban, and 30.2% rural. (Percents total greater than 100% since some respondents reported care for more than one geographically defined group.)

Across all three ambulatory training sites, 54 (20.6%) of the 262 graduates initially entered underserved practices; this diminished to 39 (14.9%) for current practices ($X^2=66.2$; $P<.001$) (Table 2). Graduates trained at the CHC were more likely to initially ($X^2=35.6$; $P<.001$) and currently ($X^2=20.0$; $P<.001$) practice in underserved settings than graduates of the urban and rural centers. Additionally, if current practice was described as an HPSA site, the CHC-trained graduates were also more likely to remain for a greater number of years in these locations. Fully 42.7% of these graduates began their careers in HPSA areas; 29.3% reported current practice in such designated sites. Likewise, graduates trained at the rural site were significantly more likely to report serving rural patients in their initial ($X^2=6.7$; $P=.035$) as well as in their current ($X^2=8.2$; $P=.017$) practice settings, with no decrease seen comparing initial to current practice.

Bivariate analyses showed that among respondents reporting interest in serving the underserved as residency began, there was a significant, positive association with subsequent practice in underserved areas in their initial as well as in their current practice ($X^2=22.1$; $P<.001$ and $X^2=10.5$; $P=.001$, respectively). These same graduates were significantly more likely to have elected to train in the CHC site ($X^2=4.1$; $P=.043$). Interestingly, this was also true for the hospital-owned urban center ($X^2=4.8$; $P=.029$).

A National Health Service Corps scholarship or loan repayment was associated with initial practice in underserved sites for all respondents ($X^2=12.0$; $P<.001$) but not so for current practice. Graduates reporting extensive residency experience caring for patients from underserved populations were significantly more likely to have trained at the CHC ($X^2=35.6$; $P<.001$); this experience was also associated with practice initially and currently in an underserved site ($X^2=14.4$; $P<.001$ and $X^2=7.3$; $P=.007$, respectively). Medical school training experiences caring for underserved populations were not associated with underserved practice selection ($X^2=0.69$; $P=.41$).

Logistic regression analyses (Table 3) showed that physicians who completed ambulatory training in the CHC were greater than five times more likely to report having practiced initially and greater than four times more likely to describe current practice in an HPSA than respondents trained at the hospital-owned urban site (OR=5.61; 95% CI=2.01–15.7 and OR=4.53; 95% CI=1.43–14.35, respectively). Alumni with an NHSC commitment were also more likely to have begun practice in an HPSA (OR=2.96; 95% CI=1.23–7.14); this relationship did not retain statistical significance for current practice, however (OR=1.67; 95% CI=0.67–4.20). Compared to graduates who did not report having an interest in serving the underserved as residency began, graduates who reported such interest were more likely initially (OR=3.87; 95% CI=1.65–9.05) and currently (OR=2.82; 95% CI=1.14–7.00) to report practicing in an HPSA.

Comparing each decade's graduation cohort to the previous decade's graduates, there was a significant increase in the likelihood of graduates reporting practice in an HPSA both initially (OR=1.63; CI=1.02–2.61) and currently (OR=1.67; CI=1.01–2.76). Gender also

Table 2

Frequency and Percent Distribution of Initial and Current Practices in Underserved and Rural Settings by Health Center Training Site (n=262)

Residency Training Site	n	Underserved (%)		Rural (%)	
		Initial Practice*	Current Practice**	Initial Practice†	Current Practice††
Community Health Center	82	35 (42.7)	24 (29.3)	21 (25.6)	22 (26.8)
Urban Center	93	9 (9.7)	6 (6.5)	24 (25.8)	21 (22.6)
Rural Center	87	10 (11.5)	9 (10.3)	36 (41.4)	36 (41.4)
Total	262	54 (20.6)	39 (14.9)	81 (30.9)	79 (30.2)

* $X^2=35.6$; $P<.001$ ** $X^2=20.0$; $P<.001$ † $X^2=6.7$; $P=.035$ †† $X^2=8.2$; $P=.017$

Table 3

Factors Associated With Initial and Current Practice in Underserved Areas Following Logistic Regression Analysis

Variable (Referent Group)	Odds Ratio (95% CI) Initial Practice	Odds Ratio (95% CI) Current practice
CHC (versus urban) trained	5.61 (2.01-15.70)	4.53 (1.43-14.35)
Rural (versus urban) trained	1.01 (0.34-2.97)	1.65 (0.52-5.27)
NHSC commitment (versus no commitment)	2.96 (1.23-7.14)	1.67 (0.67-4.20)
Very interested in underserved at start of residency (versus little/no interest)	3.87 (1.65-9.05)	2.82 (1.14-7.00)
Extensive training in underserved medicine during residency (versus little or moderate training)	1.14 (0.39-3.28)	1.10 (0.35-3.42)
Cohort years of residency graduation*	1.63 (1.02-2.61)	1.67 (1.01-2.76)
Female (versus male)	0.46 (0.21-1.00)	1.06 (0.48-2.34)
White (versus non-white)	1.65 (0.54-5.08)	2.69 (0.69-10.51)

* Cohort year of graduation was coded as an ordinal variable with 1=1976–1985, 2=1986–1995, and 3=1996–2005.

CI—confidence interval
CHC—Community Health Center

was associated with underserved practice, with women less likely to initially practice in these settings. Neither extensive training in underserved medicine during residency nor respondent race was associated with either initial or current underserved practice. Finally, although respondents from the rural center were significantly more likely to report rural practice, graduation from this site was not associated with underserved practice.

Discussion

Our study results suggest that residency training in a CHC was associated with a future career in service to underserved populations at entrance into practice as well as in current practice. While it is noteworthy that nearly one third of study physicians trained in a CHC reported currently practicing in an HPSA, the significant decline in HPSA location when comparing physicians' initial and current practices tempers enthusiasm for the outcomes of our program. Nevertheless, our findings join those recently reported in the WAMI system that family physicians trained in CHCs were significantly more likely to remain committed to practice in underserved settings.¹⁷

The finding that physicians trained in a CHC go on to practice in underserved settings was not a surprise. We surmise that this training environment reinforces existing interest in serving traditionally underserved

individuals. CHCs provide comprehensive and multidisciplinary care to the populations that they serve, making it easier for physicians to deal with the myriad socioeconomic and behavioral health issues their patients confront. Availability and provision of these services may reinforce the notion that one can be successful in these challenging settings. Moreover, faculty in the ambulatory care sites included in this residency training program also serve as role models, practicing side by side on teams with residents. Lastly, residents learn to appreciate the excitement of serving a global population with individual patients typically expressing high levels of gratitude for the care received.

That graduates with an NHSC commitment were significantly more likely to enter practice in an HPSA was not an unexpected outcome; the lack of association with current practice in a HPSA, while disappointing, was also consistent with other findings of the 3-year average tenure in underserved practice reported among NHSC awardees.¹⁵

In the multivariate analyses there was no association between self-rated extensive residency experience in underserved medicine. It may be that the level of respondents' reported interest at the start of residency in serving underserved populations, a variable also included in the logistic regression analyses, dominated any independent effect that training would have. Alternatively, residents from all three training sites may have considered their hospital experiences as well as their ambulatory site when answering this question. We were surprised that reported training experiences in underserved medicine during medical school were not associated with initial underserved practice. Certainly, rural tracks have been associated with future rural practice,^{12,13} and graduation from our rural ambulatory residency practice site was significantly associated with future care of rural populations. Inaccurate recall of experiences during residency may also explain these results.

The study is unique in that it represents 3 decades of residency training experience from a single program using a unified curriculum but with three distinctly different continuity-training sites. Additionally, we surveyed all graduates regarding many of the potential influences on practice choice in underserved sites.

Limitations

Nevertheless, this study had several limitations. First, the survey was sent to graduates of one program in Massachusetts and while the results are consistent with studies such as those from the WAMI program, they may not be fully generalizable. Second, respondents self-reported practice in underserved sites and

self-selected practice descriptors, eg, rural, suburban, urban, limited-English speaking, racially diverse, or predominantly poor patient population. To provide greater accuracy, future analyses may include verification of practice addresses and use of GIS analysis to map office locations to confirm federally designated HPSA and medically underserved area (MUA) status. Additionally, since approximately two thirds of the respondents completed residency more than 10 years ago, self-reported recall of interest in underserved practice at the start of residency and reported training experiences with underserved populations may be subject to recall bias.

Training site selection bias by residency candidates based on future career interest may also influence our findings. While the residency has one curriculum, it has three different match numbers and applicants rank their preferred ambulatory training site. Nevertheless, the survey included questions asking all graduates about their level of interest in underserved practice at the start of residency. While CHC-trained alumni did identify interest in underserved populations more frequently than non-CHC-trained graduates, multivariate analysis controlled for these variables, and residency practice in a CHC was independently associated with future underserved practice. Finally, we did not ask about characteristics of hometown or socioeconomic status of families in which residents were raised, factors that have shown to be correlated with practice choice in other studies.¹⁸

Conclusions

The results of this study support design and expansion of family medicine residency training experiences in community health centers as a strategy for expanding the physician workforce for HPSAs. This is critical when public policy has favored expansion of safety net practices while at the same time the nation is experiencing a growing shortage of primary care physicians.

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