

Residency Program Characteristics and Individual Physician Practice Characteristics Associated With Family Physician Scope of Practice

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Abstract

Purpose

A family physician's ability to provide continuous, comprehensive care begins in residency. Previous studies show that patterns developed during residency may be imprinted upon physicians, guiding future practice. The objective was to determine family medicine residency characteristics associated with graduates' scope of practice (SCoP).

Method

The authors used (1) residency program data from the 2012 Accreditation Council for Graduate Medicine Education Accreditation Data System and (2) self-reported data supplied by family physicians when they registered for the

first recertification examination with the American Board of Family Medicine (2013–2016)—7 to 10 years after completing residency. The authors used linear regression analyses to examine the relationship between individual physician SCoP (measured by the SCoP for primary care [SP4PC] score [scale of 0–30; low = small scope]) and individual, practice, and residency program characteristics.

Results

The authors sampled 8,261 physicians from 423 residencies. The average SP4PC score was 15.4 (standard deviation, 3.2). Models showed that SCoP broadened with increasing rurality. Physicians from unopposed (single) programs had higher

SCoP (0.26 increase in SP4PC); those from major teaching hospitals had lower SCoP (0.18 decrease in SP4PC).

Conclusions

Residency program characteristics may influence family physicians' SCoP, although less than individual characteristics do. Broad SCoP may imply more comprehensive care, which is the foundation of a strong primary care system to increase quality, decrease cost, and reduce physician burnout. Some residency program characteristics can be altered so that programs graduate physicians with broader SCoP, thereby meeting patient needs and improving the health system.

Family physicians are trained to provide continuous, comprehensive health care for individuals and families across all ages, genders, and various care settings. Although the scope of practice of family physicians is narrowing,^{1–3} strong primary care systems include comprehensiveness as a core pillar,⁴ and health systems with a robust number of primary care providers have better health outcomes.^{5,6} Additionally, a study in the United States found that patients of physicians with broader scope of practice experience lower overall costs and fewer hospitalizations.⁷ A recent study also shows an association between a broader scope of practice and lower levels of physician burnout.⁸ The ability to provide comprehensive care begins within

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residency; thus, residency training has the potential to influence the scope of skills obtained and used in later practice.

Growing evidence suggests that practice patterns developed during residency training may be imprinted upon physicians, guiding future practice long after they complete the residency program. Asch and colleagues were able to rank obstetrics–gynecology residencies by examining the correlation between complication rates of vaginal and cesarean deliveries and graduates' previous residency program.⁹ The clustering of complication rates by residency was unassociated with residents' board scores, with residency selection of trainees, or with location of current practice. Additionally, Chen and colleagues found that physicians who trained in regions with lower Medicare spending per beneficiary, compared with those trained in regions with higher Medicare spending, had lower *total* spending—even if they moved to practice regions in a different spending category from that of their residency training.¹⁰ A subsequent study supported this finding and further showed that these

cost differences were not associated with any discernible differences in quality measures.¹¹

Prior research has shown that rural physicians have a broader scope of practice than those in urban areas,¹² but little is known about scope of practice beyond these basic geographical differences. Based on the Accreditation Council for Graduate Medicine Education (ACGME) Program Requirements for Family Medicine, trainees should be able to attend any residency program and obtain skills for a broad scope of practice.¹³ Yet, it is unknown to what extent residency training may influence physician scope of practice. Our objective was to determine whether any residency-specific characteristics were associated with the future scope of practice of family physicians.

Method

Sample

We used (1) residency program data from the 2012 ACGME Accreditation Data System (ADS) and (2) self-reported

data supplied by family physicians when they registered for the American Board of Family Medicine (ABFM) Family Medicine Certification (FMC) examination from 2013 to 2016. To better match the training environment represented by the ACGME ADS data, we further restricted our sample to physicians who were completing their first recertification during our study period (2013–2016). These physicians would have completed residency training 7 to 10 years before recertification; during the study period, the ABFM altered the recertification period from 7 to 10 years, and physicians were able to choose their own recertification timing during this transition. All ACGME and ABFM data are confidential, and no programs or sponsoring institutions were identified.

Data

We linked the residency experience of physicians in our sample to their practice information using data from the ACGME and ABFM. The ACGME collects program information including details on faculty, enrollment, and practice site exposures (e.g., rural or urban). Programs are required to update their data annually. We used ACGME-collected program data from 2012 to determine the following family medicine residency program characteristics:

- geographic region (classified as South, Northeast, Midwest, and West, per U.S. census regions),
- program size, as determined by the number of residents per year (classified into groups of 1–6, 7–9, and 10 or more),
- whether the residency program was opposed or unopposed (i.e., single programs with no additional competing residency training programs),
- whether the hospital where a majority of rotations occurred was classified as a major academic teaching hospital (defined as any hospital with a ratio of interns and residents to beds of 0.25 or greater), and
- rural training exposure (determined by what percentage of time residents spent rotating in rural sites, which were determined by linking each site's mailing address to the Rural–Urban Commuting Area and classifying it into 1 of 4 categories: urban, large rural, small rural, and frontier).

During the study period, family physicians wishing to continue their ABFM board certification completed the FMC examination every 7 to 10 years. As part of the examination application, individuals were required to complete a practice demographic questionnaire; thus, we have a 100% completion rate for the physicians in our sample. Questions asked for information about practice characteristics, such as geographic location and practice type (e.g., private/group, hospital affiliated, integrated practice, public, solo, or urgent/emergent care). The FMC questionnaire included a list of separate clinical activities or services that represent the broad scope of practice possible by family physicians. Physicians indicated whether they provided each service via a “yes/no” question.

Finally, we collected individual physician demographic characteristics from ABFM databases to determine additional measures that may influence scope of practice (age, gender, degree type, and location of medical school). All ABFM and FMC data are self-reported by physicians.

Analysis

To represent the scope of practice for a given individual, we calculated the Scope of Practice for Primary Care (SP4PC) score, which is based on the sum of the number of clinical activities reported.¹⁴ This score ranges from 0 to 30 points, with a lower total indicating a narrower scope of practice. Physicians not performing direct patient care were not asked practice characteristic questions and were excluded from the study. If a physician registered for multiple examinations, we retained the data from the initial test because that information was more proximate to residency training.

We merged the ACGME ADS data for family medicine residency programs with the ABFM demographic and practice data by matching last residency training site. Using our merged data, we assessed the need for a multilevel model, as physicians were clustered within residency programs. The intraclass correlation for the SP4PC score was only 9%; we chose not to use a multilevel model.

Using linear regression models, we examined the relationship between the SP4PC score of individual physicians

and individual, practice, and residency program characteristics. Our first model included current practice characteristics and individual characteristics. Our second model assessed the association of scope with individual, current practice, and residency characteristics. We compared R^2 in the models to determine the percentage of variation explained at the individual and residency levels. We performed all analyses using Stata 14.0 (StataCorp, College Station, Texas). The American Academy of Family Physicians and the George Washington University institutional review boards provided ethical approval for this study.

Results

Sample characteristics

The study sample included 8,261 physicians applying for ABFM recertification between 2013 and 2016. The 2012 ACGME ADS database included a total of 456 family medicine residencies, of which 423 could be matched to ABFM diplomates in our sample. Because of the flux of residency programs, we excluded residents from programs that existed during the initial certification period but which subsequently closed and from programs that opened after the initial certification period.

Among the diplomates included in our study sample, the average age was 43.3 years (standard deviation [SD], 5.3 years), 52.7% were female, and 12.8% graduated from an osteopathic medical school (i.e., DO). International medical graduates (IMGs) were 25.8% of the population (see Table 1). The average SP4PC score was 15.4 (SD, 3.2). Among the family medicine residency programs in our sample, 42.3% graduated 1 to 6 residents per year, 40.4% graduated 7 to 9 residents, and 17.3% graduated more than 10 residents (see Table 2). Of the 423 residency programs, 12.3% included rotations in rural sites (and 6.4% provided greater than 50% of training time in such a site), 41.8% of residencies were based in a major teaching hospital, and 45.6% were unopposed.

Residency characteristics associated with scope of practice

We ran linear regression models to layer individual, practice, and residency characteristics onto scope of practice. Physician scope varied across several

Table 1

Characteristics of American Board of Family Medicine First-Time Recertifiers (2013–2016) Who Have Matching ACGME-Accredited Family Medicine Residency Program Data From the Accreditation Data System in 2012^a

Characteristic	No. (% of 8,261)
Female	4,354 (52.7)
Medical degree (MD)	7,204 (87.2)
International medical graduate	2,131 (25.8)
Practice organization type	
Group practice	3,074 (37.2)
Hospital affiliated	1,561 (18.9)
Integrated practice	917 (11.1)
Other	570 (6.9)
Public	900 (10.9)
Solo practice	644 (7.8)
Urgent/emergent care	595 (7.2)
Practice location	
Urban	7,080 (85.7)
Large rural	471 (5.7)
Small rural	603 (7.3)
Frontier	107 (1.3)

Abbreviation: ACGME indicates Accreditation Council for Graduate Medical Education.

^aThe mean age of the 8,261 recertifiers at recertification was 43.3 (standard deviation [SD] = 5.3). Their mean Scope of Practice for Primary Care score was 15.4 (SD = 3.2).

individual and residency characteristics (Table 3). Model 1 included individual and practice characteristics with an R^2 of 0.178, whereas Model 2 added residency characteristics and increased the R^2 to 0.184. The R^2 for a model including residency characteristics alone was 0.037 (results not shown).

Both models indicate that geographic region of practice and rurality of practice both influence scope of practice. Physicians practicing in the Midwest and West have a greater scope than those practicing in the South and Northeast. Compared with urban practices, being in a frontier practice was associated with 2.23 or 2.37 more points on the SP4PC score (Model 2 and Model 1, respectively). Practice type influenced SP4PC score to varying degrees; to illustrate, compared with the reference group of a private/group practice, a public practice had a lower scope (coefficient = -2.31 in Model 1), whereas a solo practice had a slightly higher

scope (coefficient = 0.23 in Model 1). Being female, older, and having a DO degree were all associated with narrower scope (coefficient = -0.29 , -0.03 , and -0.23 , respectively, in both Model 1 and Model 2). Being an IMG had the largest contribution among individual physician characteristics and was associated with a lower scope of practice (coefficient = -0.95 in Model 1).

Adding in residency program characteristics (Model 2) further emphasized the influence of geography. To illustrate, compared with those who trained in the South (reference group), those who trained in the West had a broader scope of practice (0.53 points on the SP4PC score), and those with rural exposure had greater scope than those without (0.34 and 0.61 points on the SP4PC score for, respectively, greater than 50% of time during training exposed to rural training and 1% to 50% of time exposed to rural training). Graduates of residency programs centered in a major teaching hospital had a narrower scope of practice (coefficient = -0.18), and those from unopposed programs had a broader scope of practice (coefficient = 0.26). We detected no association between the program size in 2012 and scope of practice.

Discussion

Our study of over 8,000 family physicians seeking initial recertification with the ABFM from 2013 to 2016 showed that individual, practice, and residency characteristics were all associated with family physicians' scope of practice. However, models with individual and practice variables explained 14% more variation than those with only residency variables. Specific to residency characteristics, location in the West or Midwest, rural rotations, and an unopposed nature of the residency program increased scope of practice of family physicians—even after controlling for the physicians' current practice geography and organization. These findings are important since a broader scope of practice implies more comprehensive care. More comprehensive care is the foundation of a strong primary care system, which increases quality, reduces hospitalizations, decreases cost, and lowers physician burnout^{6–8}—all of which are, in turn, essential for achieving the Quadruple Aim.¹⁵

Table 2

Characteristics of ACGME-Accredited Family Medicine Residency Programs in 2012

Characteristic	No. (% of 423)
Number of graduating residents per year	
1–6	179 (42.3)
7–9	171 (40.4)
10+	73 (17.3)
Region	
Northeast	75 (17.7)
South	141 (33.3)
Midwest	121 (28.6)
West	86 (20.3)
Associated with a major teaching hospital	177 (41.8)
Rural training	
No rural exposure	371 (87.7)
1%–50% rural exposure	25 (6.0)
51%+ rural exposure	27 (6.3)
Unopposed program	193 (45.6)

Abbreviation: ACGME indicates Accreditation Council for Graduate Medical Education.

Our main findings—that residency geographic location in the West or Midwest and exposure to rural settings during residency broaden scope of practice—are consistent with other studies showing that rural family physicians often have a broader scope of practice.¹⁶ Studies show that family physicians often stay within 50 miles of residency after graduating¹⁷ and that those who train in rural programs are more likely to stay in rural areas.¹⁸ Importantly, our findings show that associations with program training geography are maintained even when controlling for individual and practice characteristics that may differ from residency characteristics, such as geographic and rural location. This new finding raises important questions:

1. Does the training provided by these types of residencies (Western/Midwestern, rural, unopposed) include a broader scope of practice?
2. Does the training deliver a greater level of preparedness? and
3. Do the residents attending these programs vary in some way that we did not measure?

Additional questions include whether the residency's primary clinic site represents different practice organization types,

Table 3

Adjusted Associations Between SP4PC Score and Individual, Practice, and Residency Characteristics Among American Board of Family Medicine First-Time Recertifiers (2013–2016) Who Have Matching ACGME-Accredited Family Medicine Residency Program Data from the Accreditation Data System in 2012 (n = 8,261)^a

Category	Characteristic or measure	Model 1 coefficient ^b (SD)	Model 2 coefficient ^b (SD)
Residency	Geographic location		
	South	—	Ref
	Northeast	—	0.02 (0.12)
	Midwest	—	0.29 (0.12) ^c
	West	—	0.53 (0.12) ^d
	Amount of rural exposure provided		
	None	—	Ref
	1%–50%	—	0.61 (0.14) ^d
	> 50%	—	0.34 (0.18) ^c
	Number of residents graduating per year		
	1–6	—	Ref
	7–9	—	–0.06 (0.08)
	10+	—	–0.05 (0.09)
	Major teaching hospital	—	–0.18 (0.07) ^c
Unopposed	—	0.26 (0.07) ^d	
Practice	Geographic location		
	South	Ref	Ref
	Northeast	0.48 (0.11) ^d	0.52 (0.13) ^d
	Midwest	1.11 (0.09) ^d	0.88 (0.12) ^d
	West	0.93 (0.08) ^a	0.63 (0.11) ^d
	Rurality		
	Urban	Ref	Ref
	Large rural	1.00 (0.14) ^d	0.90 (0.14) ^d
	Small rural	1.95 (0.13) ^d	1.83 (0.13) ^d
	Frontier	2.37 (0.29) ^d	2.23 (0.29) ^d
	Type		
	Private/group	Ref	Ref
	Hospital affiliated	0.11 (0.09)	0.11 (0.09)
	Integrated practice	–1.22 (0.11) ^d	–1.21 (0.11) ^d
	Public	–2.31 (0.13) ^d	–2.32 (0.13) ^d
	Solo	0.23 (0.11) ^c	0.25 (0.11) ^c
	Urgent/emergent care	–0.70 (0.13) ^d	–0.69 (0.13) ^d
	Other	–2.13 (0.13) ^d	–2.13 (0.13) ^d
Individual	Female	–0.29 (0.06) ^d	–0.29 (0.06)
	Age (per 1-year increase)	–0.03 (0.006) ^d	–0.03 (0.006) ^d
	Doctor of osteopathy (DO)	–0.23 (0.10) ^c	–0.23 (0.10) ^c
	International medical graduate	–0.95 (0.08) ^d	–0.91 (0.08) ^d

Abbreviations: SP4PC indicates Scope of Practice for Primary Care; ACGME, Accreditation Council for Graduate Medical Education; SD, standard deviation.

^aThe R² score was 0.178 for Model 1 and 0.184 for Model 2.

^bThe coefficient represents the change in SP4PC score based on each of the variable brackets compared with the reference category.

^cP < .05.

^dP < .01.

^eP < .1.

whether insurance and malpractice mechanisms located in these geographic areas vary, and whether cultural acceptance of family physicians providing certain types of services differs by geographic area. Given that family physicians provide the majority of care in rural areas (despite less than 10% of training occurring in these locations¹⁹), maintaining a broad scope of practice within residency programs is crucial for meeting the needs of patients once graduates distribute widely, especially to geographic locations where practice settings may be very different from the training environment.

We found that those family physicians who trained at a major teaching hospital had a smaller scope of practice and that those from unopposed programs had a broader scope—even after controlling for their current practice characteristics. While these patterns may be the results of the training received at each type of institution, they may also reflect the desired career choices of the individuals who attended these programs. For example, physicians who choose a residency program at a major teaching hospital may want a career more heavily involved in teaching, research, or additional nonclinical duties. Conversely, those who choose an unopposed program may do so with the intent of practicing broadly, or they may feel an increased level of preparedness to perform certain clinical activities and, in turn, incorporate these activities into their practice at a greater level than those who completed a residency with multiple programs. Medical school students often choose residency programs based on the dichotomy of community-based or university-based programs,²⁰ which often correlate to, respectively, unopposed programs or major teaching hospitals, and differences in their desired future careers may influence this choice. Despite these possibilities, educational opportunities at all family residency programs should allow for residents to be sufficiently trained in a broad scope of practice, as future career desires may change and family physicians should be responsive to the needs of their patient population.

Importantly, residency size had no significant effect on determining

graduates' scope of practice. We hypothesized that graduates of small programs would more likely have a greater scope of practice as a result of more exposure and experience for residents—similar to an unopposed training environment. However, the lack of association may reflect that residency programs are increasing their class size only to meet patient population needs, that greater exposure to repetitive experiences does not broaden scope of practice, and/or that smaller residency programs have fewer faculty to role model all the different activities that might increase scope.

With regard to individual characteristics, we found that female physicians, DOs, and IMGs had a smaller scope of practice, which is consistent with other studies using similar data.¹² These findings are important. DOs and IMGs provide a large amount of primary care in rural settings,²¹ and female physicians constitute an increasingly larger percentage of the overall workforce; thus, for these family physicians to maintain a scope of practice that reflects population needs is crucial. Further research to examine these subsets of physicians is important to ensure that a majority of a patient's health care needs are met. Combining the ACGME and American Osteopathic Association residency programs by 2020 may be one mechanism to meet this need.

Finally, we found that geographic location and practice organization type influenced scope of practice. Rural family physicians often maintain a broad scope of practice out of necessity; fewer subspecialists practice in rural areas.¹² Previous studies have also reported differences in scope based on geographic region, likely due to cultural acceptance. However, influences of practice organization may be more nuanced. Type of practice organization is often associated with the availability of specialty or procedural resources both within and outside the clinic, the business model for throughput, and specific patient populations and patient resources—each of which, in turn, affects provider scope. Recent studies have shown that hospital-based practices provide more low-value care and make more specialty referrals than community-based practices.²² This difference may reflect ideals of increasing throughput and reimbursement in these hospital-based

practices, rather than family physicians' scope of practice. Alternatively, the difference may be that certain types of employers, health insurance providers, or malpractice insurance providers do not understand the power of primary care and comprehensiveness to improve outcomes and lower overall costs.¹¹ Our results show that physicians working in hospital-based practices actually have a scope of practice similar to those working in private and group practices, and broader scope than public clinics, such as federally qualified health centers. Thus, more research is needed to elucidate the underpinnings of these differences. Emphasizing the value of a broad scope of care and its effectiveness for improving health outcomes and decreasing physician burnout may be a mechanism to retain providers and improve patient satisfaction.

This study had some limitations. We used ACGME program characteristics from 2012, although physicians initially certified between 2003 and 2009. Programs may have changed slightly; however, the likelihood of large program characteristics changing (e.g., association with an academic medical center or geographic location/rurality) is low. Second, the SP4PC score is a cumulative score reflecting the number of distinct clinical activities performed (measured with yes/no questions) rather than a measure of the frequency with which a physician provides any of the activities. Additionally, this is a cross-sectional study that cannot address causality. Finally, numerous variables determine scope of practice, and we have not identified or included all of them in our study. As a result, we acknowledge a level of unmeasured confounding.

Our study offers insight into residency program characteristics that may influence scope of practice for family physicians. We believe that maintaining a broad scope of training for residents is vital—even for programs within communities where certain skills may seem unnecessary—since residency training may influence future practice abilities. The imprinting of residency could be considered when establishing new programs and/or when reforming the curricula of standing programs. Increasing training opportunities in the West and Midwest, increasing exposure to rural locations, and/or emphasizing unopposed training experiences may be

means not only for creating a workforce able to more comprehensively care for the population in proximity to these training institutions but also for graduating physicians with a greater scope of practice who choose to work elsewhere.

Conclusions

The importance of residency training should be emphasized. Training provides physicians with the skills needed for their initial scope of practice. Research shows that as physicians continue in their careers, scope of practice declines (likely based on a number of individual and practice characteristics).²³ Physicians beginning their career with the most comprehensive scope of practice possible may be important for meeting the needs of any patient population. Although training program characteristics may not be as closely associated with scope of practice as other types of characteristics (e.g., practice type, geography), their influence is easily observable, and manipulating aspects of training—specifically, increasing exposure to rural locations and/or emphasizing unopposed training experiences—may increase the likelihood of producing a physician with a wide scope of practice who can better serve the patient population.

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