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ORIGINAL ARTICLE

# Rural Versus Urban Family Medicine Residency Scope of Training and Practice

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## ABSTRACT

**Background and Objectives:** Little is known about how rural and urban family medicine residencies compare in preparing physicians for practice. This study compared the perceptions of preparation for practice and actual postgraduation scope of practice (SOP) between rural and urban residency program graduates.

**Methods:** We analyzed data on 6,483 early-career, board-certified physicians surveyed 2016-2018, 3 years after residency graduation, and 44,325 later-career board-certified physicians surveyed 2014-2018, every 7 to 10 years after initial certification. Bivariate comparisons and multivariate regressions of rural and urban residency graduates examined perceived preparedness and current practice in 30 areas and overall SOP using a validated scale, with separate models for early-career and later-career physicians.

**Results:** In bivariate analyses, rural program graduates were more likely than urban program graduates to report being prepared for hospital-based care, casting, cardiac stress tests, and other skills, but less likely to be prepared in some gynecologic care and pharmacologic HIV/AIDS management. Both early- and later-career rural program graduates reported broader overall SOPs than their urban-program counterparts in bivariate analyses; in adjusted analyses this difference remained significant only for later-career physicians.

**Conclusions:** Compared with urban program graduates, rural graduates more often rated themselves prepared in several hospital care measures and less often in certain women's health measures. Controlling for multiple characteristics, only rurally trained, later-career physicians reported a broader SOP than their urban program counterparts. This study demonstrates the value of rural training and provides a baseline for research exploring longitudinal benefits of this training to rural communities and population health.

## INTRODUCTION

Health care workforce shortages in rural communities have persisted for decades. When coupled with lack of resources in rural communities, this further exacerbates access to health care, resulting in negative health outcomes for rural populations. Rural training has been shown to influence choice of rural practice, which could help alleviate this workforce maldistribution.[1] Rural training may also promote a broader scope of practice (SOP), to the further benefit of rural communities.

The SOP in family medicine is not limited by patient gender, age, disease process, or site of care.[2] Nevertheless the SOP of family physicians has been decreasing in the last 20 years in areas such as care of children,[3] inpatient medicine,[4] maternity care,[5,6] and endoscopy.[7] Despite this decline, recent graduates of family medicine residencies intend a broader SOP[8] and report levels of preparation for a more comprehensive scope than they eventually practice.[9,10] Conceptual modeling and theory behind family physician SOP point to the influence of personal (physician age, gender, education and training, career stage), workplace (health system administration, work culture), environmental (rural location, geographical location), and population factors (patient demographics, social barriers to care).[11,12] Narrowing SOP was found to be influenced at specific career points, including residency education.[12] The context of training in residency can influence SOP, with broader SOP for graduates with more rural training and from single-residency institutions.[12,13]

Rural residencies have been defined and characterized in a variety of ways.[14–16] They are often smaller and have fewer resources compared to urban residencies, such as lack of financial support and fewer faculty and teaching resources.[17] Compared with urban residency programs, higher proportions

of graduates from rural residency programs choose rural practice.[16] Even though rural residency programs have increased in number over the past decade, during the period we studied, rural residents represented less than 5% of all family medicine trainees.[1] Rural versus urban practice location also influences SOP, as past research has found that rural physicians have a broader SOP than urban physicians, particularly in primary care.[18,19] Little is known, however, about how rural versus urban residency preparation may contribute to eventual SOP. To address the gaps in knowledge about the potential value of rural and urban training, our study analyzed self-reported perception of preparation for practice and actual SOP of rural- and urban-trained early-career family physicians 3 years postresidency graduation. Finally, we examined rural- and urban-trained, later-career family physicians' self-reported SOP and current practice location.

## METHODS

### Data Sources

We pooled data from two distinct validated surveys conducted by the American Board of Family Medicine (ABFM). The first is the National Graduate Survey (NGS), administered 3 years after residency graduation to all ABFM board-certified physicians from 2016-2018 (graduates from 2013-2016; demographics shown in Table 1 ).[20] Response rates for this survey varied from 66.7%-67.8% during this time.[21] The second is the ABFM Continuing Certification Examination Registration Questionnaire (RECERT), a mandatory (100% response) component of the registration process administered to later-career physicians applying to continue their ABFM certification every 7 to 10 years after initial certification, from 2014-2018.[22] Details of the data collection methods for these surveys have been described elsewhere, but in summary, both are administered electronically on the ABFM website. The NGS physicians receive up to five reminders to complete the survey over a calendar year and the RECERT is completed during two distinct registration windows during the year. We used The RTT Collaborative list of residencies defined as rural if the primary family medicine practice of that program was in a rural location according to a Rural-Urban Commuting Area Code (RUCA) of 4 or greater and where more than half of residents' training time is spent in a rural location by the same definition.[14,23,24] We use the RUCA definition of rural throughout our study, including for practice location; any location not meeting this definition of rural is considered urban. Rurally-trained physicians are those who completed a rural residency.

### Variables

#### *Main Outcomes*

We used data from both surveys for SOP comparisons. We only used data from the NGS of early-career physicians to analyze perceived residency preparation for practice. The NGS asked respondents to indicate whether their residency training adequately prepared them to practice for each of 30 subject areas and procedures (yes/no), and if they were currently practicing the subject area or procedure (yes/no; see Table 2 for complete list of procedures and clinical activities). Perceived residency preparedness and current practice were the main outcomes of interest.

We used an individual's scaled score measuring overall SOP for primary care to compare rural vs urban-trained residents. Scores ranged from 0-30, with higher scores indicating a broader scope. The calculation of the overall scaled SOP score has been validated for use in analysis.[25] We analyzed each of the data sets (NGS and RECERT) separately to account for slight differences in each survey, scaling the scores to be approximately equivalent for comparison.[25] This resulted in 5,334 early-career and 37,233 later-career physicians included in overall SOP score analyses. The RECERT asked later-career physicians to indicate the procedures and services currently part of their practice (see Table 2 for complete list). They were not asked about residency preparation, and thus RECERT data was only used for creation of the overall SOP score.

#### *Covariates*

We controlled for the following demographic and background characteristics, when available, in each multivariate analysis: age (at time of questionnaire), gender (male/female), underrepresented-in-medicine (URM) status (Black/African American, American Indian/Alaska Native, or Native Hawaiian/Other Pacific Islander race, and Latino/Hispanic of any race, including multiracial individuals indicating any URM race or ethnicity), medical degree type (osteopathic/allopathic), international medical graduate (IMG) status (medical degree from United States or Canada vs another country), current practice location geography (rural or urban), practice in an underserved site (Rural Health Clinic [RHC], Federally Qualified Health Center [FQHC], or Indian Health Service [IHS] vs none), residency program census region, and delivery of both inpatient and continuity care (as opposed to only inpatient or only continuity care). The NGS did not ask race or ethnicity prior to 2018, and therefore we decided not to include URM status in early-career physician analyses as it would have greatly reduced our sample size. We categorized practice location ZIP codes of early- and later-career physicians using RUCA codes, defining RUCA codes 4 or higher as rural.[23]

### Data Analyses

#### *Scope of Practice Analysis*

We used t tests to compare individual scope items and overall SOP scores for those trained in rural vs urban residencies and multivariate linear regression to control for available covariates.

#### *Residency Preparation and Current Practice Analysis*

We used $\chi^2$ tests to compare rural and urban residency graduates on perceived preparedness for and current practice in 30 clinical areas and procedures as well as multivariate logistic regressions adjusting for available covariates. Current practice of each procedure was treated as a separate outcome, resulting in 30 separate multivariate logistic regressions. We converted all odds ratios to relative risks to account for the commonality

of the outcomes in the study population (Table 2 andTable 3).[26]

We used Stata 16 (StataCorp, College Station, TX) for all analyses and report differences that were statistically significant at *P*<.05. The University of Washington Human Subjects Division deemed this study not human research and granted an exemption from formal review.

## RESULTS

### Perceived Residency Preparation for Current Practice

Of the 6,483 NGS survey respondents, 272 (4.2%) were trained in a rural residency (Table 1). Graduates attended 32 rural residencies (7% of all residency programs included in the NGS sample). The mean respondent age was 35.9 years; age differences between rural and urban residency graduates were not significant. Compared to urban-trained graduates, a higher percentage of rural residency graduates were male (49.6% to 43.2%; *P*<.05), international medical graduates (43.8% to 33.7%; *P*<.001), and currently practicing inpatient medicine (51.3% to 39.5%; *P*<.001). Just over half of rurally-trained physicians (51.0%) practiced in a rural location, compared to 16.6% of urban-trained physicians (*P*<.001). The majority of respondents from both groups attended residency programs in the Midwest and the South, although a larger proportion of rurally trained physicians attended programs in the South (45.2% to 32.3%; *P*<.001) and a smaller proportion in the West (12.9% to 22.8%; *P*<.001) compared to urban-trained graduates. There was no significant rural/urban difference in degree type: 16.7% of all respondents were osteopathic physicians.

Bivariate analyses showed that, compared with urban program graduates, rural residency graduates were more likely to report being prepared for all six types of hospital-based care queried (intensive care, pediatric care, lumbar puncture, ventilator management, intubation, and thoracentesis), casting, cardiac stress tests, pediatric hospital care, neonatal circumcision, osteopathic manipulative treatment, and end-of-life care. Rural residency graduates reported they were less prepared on two of eight measures of gynecologic care (endometrial biopsy and colposcopy) as well as pharmacologic HIV/AIDS management (Table 2 ). Some of these differences, including intensive care, intubation, thoracentesis, endometrial biopsy, colposcopy, casting, osteopathic manipulative treatment, HIV/AIDS management, and hepatitis C management, remained significant in multivariate models (not shown).

### Self-reported Current Practice of Individual Scope of Practice Components

Table 2 also shows the bivariate distribution of self-reported current practice for the same areas and procedures. There were fewer significant differences between rural- and urban-trained physicians in self-reported current SOP than for residency preparation in these areas. A higher percentage of rural- than urban-trained physicians currently practiced pediatric hospital care (26.8% vs 19.1%; *P*<.01), intensive care (38.5% vs 21.9%; *P*<.001), intubation (50% vs 34.3%; *P*<.001), and ventilator management (41.9% vs 30.5%; *P*<.01), all rural/urban residency differences that were parallel to those for residency preparation. A higher percentage of urban residency graduates reported current practice of IUD insertion and removal and implantable birth control, differences not reported in residency preparation for these procedures.

In multivariate analyses (Table 3 ), perceived residency preparedness was a statistically significant predictor (*P*<.001) for currently practicing all subject areas and procedures, even when controlling for current practice location in addition to other relevant physician characteristics. The magnitude of the effect of residency preparedness on practice varied considerably across items. Physicians who felt prepared to perform pediatric outpatient care were slightly more likely (13%) than physicians who felt unprepared by their residencies to practice in this area, while prepared physicians were 13 times as likely as the unprepared to provide pregnancy termination (95% CI 10.4–16.2). Rurally-trained physicians were less likely than urban physicians to provide IUD insertion/removal (relative risk [RR]=0.78, 95% CI 0.61–0.95, *P*<.05) and implantable long-acting reversible contraception (RR=0.78, 95% CI 0.61–0.96, *P*<.05) but more likely to practice intensive care (RR=1.40,95% CI 1.14–1.70, *P*<.01) and end-of-life care (RR=1.14, 95% CI 1.03–1.24, *P*<.05).

Current practice in a rural location was also a significant predictor of practicing many procedures, even when controlling for preparation. These included all procedures in the categories of care of children, hospital-based care, and women's health (excluding pregnancy termination).

### Overall Scope of Practice Score

Early-career rural and urban program graduates scored 16.5 (95% CI 16.1–16.8) and 16.1 (95% CI 16.0–16.1, *P*<.05), respectively, on the overall scope measure, but this difference was not significant in an adjusted linear model. Practicing in a rural location ($\beta$=1.10, 95% CI 0.94–1.26, *P*<.001) was the strongest predictor of a higher score, while being older ($\beta$=-0.02, 95% CI -0.04–-0.01, *P*<.001) and an IMG ($\beta$=-0.78, 95% CI -0.92– -0.64, *P*<.001) were associated with lower SOP scores (Table 4 ).

In contrast, later-career physicians from rural programs reported a significantly broader scope than urban program graduates, (15.7 vs 14.7, *P*<.001), respectively, and the difference remained significant in the adjusted linear model. Among later-career physicians, practicing in a rural location ($\beta$=1.90, 95% CI 1.81–1.99, *P*<.001), having an MD degree ($\beta$=0.56, 95% CI 0.44–0.68, *P*<.001), and attending a residency in the Midwest ($\beta$=0.54, 95% CI 0.43-0.64, *P*<.001) or West ($\beta$=0.16, 95% CI 0.05-0.28, *P*<.01) were significant predictors of a higher SOP score. Female ($\beta$=-0.55, 95% CI -0.63– -0.48, *P*<.001), older ($\beta$=-0.03, 95% CI -0.03– -0.02, *P*<.001), IMG ($\beta$=-1.52, 95% CI -1.61– -1.42, *P*<.001), and URM physicians ($\beta$=-0.93, 95% CI -1.06– -0.80, *P*<.001) were more likely to have lower SOP scores compared to their counterparts.

## DISCUSSION

Our findings show that overall, proportionally more rurally-trained physicians felt prepared by their residency program to practice a wide range of procedures compared to their urban-trained counterparts. These findings suggest that rural family medicine residency programs may offer a broader scope of training than urban programs. Feeling prepared was the factor with the largest consistent association influencing current practice among our measures. However, when controlling for many factors, rural vs urban residency training did not explain the likelihood of currently practicing a specific procedure among early-career physicians. Perceived residency preparedness was the most significant predictor of current practice scope in our analyses, regardless of site of training. It is likely that the decision to provide specific services is a complex and nonlinear one, influenced by other variables unmeasured by these data.

We also observed no significant difference in overall SOP scores between rural- and urban-trained early-career physicians, when controlling for relevant factors. However, rurally-trained, later-career physicians reported a broader SOP than their urban program counterparts. Though we did not compare the two groups directly in our statistical analyses, we also found that later-career physicians in both urban and rural practice had a slightly narrower scope compared to early-career physicians. This is consistent with previous research showing the decline of practice scope with age, and further reinforces the influence of personal factors on SOP.[8,11,12] More research, including longitudinal studies, is needed to examine the role of residency training and other workforce, environmental, and population factors—the local health care economy, local workforce supply, health care regulations, experiences in practice, demands of practice, and continuing learning opportunities12—in SOP trends over a physician's career.

Regardless of whether physicians had trained in rural or urban residencies, among both early- and later-career physicians, rural practice location was a significant predictor of a broader overall SOP. Rural physicians may need to maintain a broader SOP and develop specific skills over the course of their careers to meet rural community needs.[27,28]

These findings provide evidence for the value of current and future initiatives to strengthen and expand the availability of rural residency programs. Rurally-trained physicians, who are more likely to practice in rural areas over the course of their careers,[16] can be uniquely valuable to rural communities due to their broad scope of training and preparation to care for rural populations.[29] More can be done to increase rural training opportunities. The Accreditation Council for Graduate Medical Education is making efforts to support programs in rural and underserved settings, where constraints and contextual factors differ from those faced by large urban programs.[30] A more equitable distribution of funding and other resources across rural and urban academic settings would also help support rural residency programs.[12,29]

Study limitations include biases associated with self-reported information collected via survey. We do not know if this would cause people to over- or underreport the content of their practice or their sense of preparedness. Those who enter rural programs may be more tolerant of risk and thus feel better prepared to manage the uncertainty inherent in rural generalist practice. The survey items available for analysis ask about "maternity care" and "OB ultrasound" but do not specifically ask about other aspects of obstetric care, large components of traditional family medicine scope of practice. Although we use the early- and later-career data sets, they are separate cohorts and therefore we cannot match longitudinally or compare directly. The data do not include physicians, particularly osteopathic, who did not seek ABFM certification. Unmeasured differences may exist between rural and urban programs as well as their residents and graduates. Survey respondents may not be representative of the population of all practicing family physicians. The majority of our sample attended residencies in the Midwest and South, which is reflective of the location of most rural residencies in the United States,[31] although it does further limit sample representativeness with respect to the West and Northeast regions. While our results show that feeling prepared by residency means a family physician is more likely to report practicing a skill or procedure, it was beyond the scope of this study to examine how well they are performing, and how performance relates to objective ratings of quality of care and patient satisfaction. Further studies are needed to investigate the connection between residency preparedness, scope of practice, and quality of care.

In conclusion, rural vs urban training predicted perceived preparation for some aspects of practice, but it did not predict SOP for early-career physicians. However, physicians who felt prepared for practice following either rural or urban residency training and who also chose rural practice provided a broader SOP than physicians practicing in urban locations. The difference in self-reported SOP between rural and urban program graduates was significant among later-career rural program graduates even though their overall SOP score was lower. Given that rurally-trained physicians are more likely to choose rural practice, this study's findings provide further evidence for the value of rural residency education in meeting the needs of rural communities.

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### Presentations

This study was presented at the following meetings:

- The RTT Collaborative Annual Meeting, April 2021.

• AAMC 2021 Group on Diversity and Inclusion & Health Workforce Research Joint Virtual Conference, May 2021.

• 2022 AAMC Virtual Health Workforce Research Conference, May 2022.

• Academy Health Annual Research Meeting, June 2022.

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**TABLE 1. Characteristics of Early-Career Physicians Responding to the ABFM National Graduate Survey, 2016-2018**

| | Rural Residency Graduates, N=272 (4.2%) | Urban Residency Graduates, N=6,211 (95.8%) | All Graduates, N=6,483 | *P* Value |
|---|---|---|---|---|
| **Age, Years, n (%)** | | | | NS |
| Mean (SD) [Range] | 36.1 (4.6) | 35.9 (4.5) | 35.9 (4.5) [28 – 65] | |
| 28 – 34 | 131 (48.2) | 3,032 (48.8) | 3,163 (48.8) | |
| 35 – 39 | 97 (35.7) | 2,287 (36.8) | 2,384 (36.8) | |
| 40+ | 44 (16.2) | 892 (14.4) | 936 (14.4) | |
| **Gender, n (%)** | | | | **.035** |
| Female | 137 (50.4) | 3,530 (56.8) | 3,667 (56.6) | |
| Male | 135 (49.6) | 2,681 (43.2) | 2,816 (43.4) | |
| **Degree Type, n (%)** | | | | NS |
| Allopathic (MD) | 232 (85.3) | 5,169 (83.2) | 5,401 (83.3) | |
| Osteopathic (DO) | 40 (14.7) | 1,042 (16.8) | 1,082 (16.7) | |
| **Medical School Location, n (%)** | | | | **.001** |
| International (IMG) | 119 (43.8) | 2,095 (33.7) | 2,214 (34.2) | |
| United States/Canada | 153 (56.3) | 4,116 (66.3) | 4,269 (65.9) | |
| **NGS Survey Year, n (%)** | | | | NS |
| 2016 | 88 (32.4) | 1,981 (31.9) | 2,069 (31.9) | |
| 2017 | 91 (33.5) | 2,068 (33.3) | 2,159 (33.3) | |
| 2018 | 93 (34.2) | 2,162 (34.8) | 2,255 (34.8) | |
| **Rural Practice Location (RUCA>4), n (%)** | | | | **<.001** |
| Yes | 130 (51.0) | 966 (16.6) | 1,096 (18.0) | |
| Large rural | 74 (29.0) | 477 (8.2) | 551 (9.0) | |
| Small rural | 39 (15.3) | 359 (6.2) | 398 (6.5) | |
| Isolated small rural | 17 (6.7) | 130 (2.2) | 147 (2.4) | |
| No (urban) | 125 (49.0) | 4,872 (83.5) | 4,997 (82.0) | |
| **Practices Inpatient Medicine, n (%)** | | | | **<.001** |
| Yes | 136 (51.3) | 2,396 (39.5) | 2,532 (40.0) | |
| No | 129 (48.7) | 3,674 (60.5) | 3,803 (60.0) | |
| **Practices Outpatient Continuity Care, n (%)** | | | | **.013** |
| Yes | 200 (74.9) | 4,962 (81.0) | 5,162 (80.8) | |
| No | 67 (25.1) | 1,161 (19.0) | 1,228 (19.2) | |
| **Principal Practice Site (of Those Practicing Continuity Care), n (%)** | | | | **<.001** |
| Hospital-owned practice | 105 (51.0) | 1,939 (37.9) | 2,044 (38.4) | |
| Independently owned practice | 27 (13.1) | 773 (15.1) | 800 (15.0) | |
| Managed care/HMO practice | 9 (4.4) | 380 (7.4) | 389 (7.3) | |
| Safety-net practice | 45 (21.8) | 817 (16.0) | 862 (16.2) | |
| Academic health center | 10 (4.9) | 578 (11.3) | 588 (11.0) | |
| Other* | 10 (4.9) | 636 (12.4) | 646 (12.1) | |
| **Practices Both Inpatient Medicine and Continuity Care, n (%)** | | | | **.048** |
| Yes | 176 (66.4) | 4,371 (72.0) | 4,547 (71.8) | |
| No | 89 (33.6) | 1,699 (28.0) | 1,788 (28.2) | |
| **Residency Program Census Region, n (%)** | | | | **<.001** |
| Northeast | 38 (14.0) | 1,069 (17.3) | 1,107 (17.2) | |
| Midwest | 76 (27.9) | 1,704 (27.6) | 1,780 (27.6) | |
| South | 123 (45.2) | 1,991 (32.3) | 2,114 (32.8) | |
| West | 35 (12.9) | 1,403 (22.8) | 1,438 (22.3) | |

Abbreviations: ABFM: American Board of Family Medicine; IMG: international medical graduate; HMO: health maintenance organization. **Bold values indicate significance at** *P*= .05. NS: not significant at *P*= .05. Missing cases: Inpatient medicine, 148; continuity care, 93; principal practice site, 1,154. Census region, 44. Safety net practice: federal qualified health care [FQHC] or rural health clinic [RHC]; *"Other" includes: Indian Health Service, government clinic nonfederal, federal, work site clinic, and other-unspecified.

**TABLE 2.** Percentage of Early-Career Physicians Reporting Perceived Preparedness and Current Practice by Residency Program Type, NGS 2016-2018

| | % Reporting Perceived Preparedness | | % Currently Practicing | |
|---|---|---|---|---|
| Residency Graduates | Rural Graduates, N=272 (4.2%) | Urban Graduates, N=6,211 (95.8%) | Rural Graduates, N=272 (4.2%) | Urban Graduates, N=6,211 (95.8%) |
| **Subject Area/Procedure** | | | | |
| **Care of Children** | | | | |
| Pediatric outpatient care | 91.1 | 91.6 | 73.6 | 76.4 |
| Newborn hospital care | 85.6 | 87.8 | 23.0 | 23.9 |
| Pediatric hospital care | **82.2**** | **75.1** | **26.8**** | **19.1** |
| Neonatal circumcision | **86.3*** | **80.2** | 18.1 | 17.5 |
| **Hospital-Based Care** [a] | | | | |
| Intensive care | **78.9***** | **65.2** | **38.5***** | **21.9** |
| Lumbar puncture | **64.7*** | **55.7** | 33.1 | 31.0 |
| Intubation | **78.7***** | **58.3** | **50.0***** | **34.3** |
| Ventilator management | **60.3*** | **50.8** | **41.9**** | **30.5** |
| Central line placement | **61.8**** | **49.9** | 32.4 | 26.7 |
| Thoracentesis | **54.4***** | **37.7** | 24.3 | 20.9 |
| **Women's Health** | | | | |
| Maternity care | 88.2 | 90.2 | 23.0 | 25.8 |
| Endometrial biopsy | **56.3*** | **62.9** | 23.8 | 25.5 |
| IUD insertion and removal | 74.4 | 78.3 | **32.1**** | **41.2** |
| Implantable LARC | 65.2 | 69.0 | **30.9**** | **39.1** |
| Colposcopy | **50.4*** | **56.9** | 16.2 | 13.4 |
| Uterine aspiration/D&C | 13.3 | 16.6 | 4.6 | 4.7 |
| Pregnancy termination | 10.4 | 13.2 | 2.7 | 3.0 |
| Basic OB ultrasound | 55.6 | 57.5 | 16.6 | 14.8 |
| **Musculoskeletal Services** | | | | |
| Casting | **61.5***** | **45.3** | **35.9*** | **29.1** |
| Joint aspiration and injection | 90.4 | 88.4 | 72.5 | 74.6 |
| Musculoskeletal ultrasound | 14.8 | 12.4 | 6.8 | 9.8 |
| **Miscellaneous Services/Procedures** | | | | |
| Vasectomy | 16.3 | 18.2 | 2.6 | 4.7 |
| Cardiac stress test | **35.6**** | **28.0** | 14.0 | 11.2 |
| Osteopathic manipulative treatment | **20.7*** | **15.3** | 13.6 | 11.5 |
| Buprenorphine treatment | 8.5 | 10.0 | 9.1 | 9.8 |
| (Pharmacologic) HIV/AIDS management | **20.7**** | **28.7** | 16.6 | 19.5 |
| (Pharmacologic) hepatitis C management | 24.8 | 27.1 | 24.9 | 21.9 |
| End-of-life care | **87.4*** | **82.6** | **75.9***** | **61.8** |
| Behavioral health care | 83.7 | 87.3 | 87.2 | 88.2 |
| Integrative health care/CAM | 24.1 | 24.7 | 18.5 | 19.5 |

Abbreviations: NGS: American Board of Family Medicine National Graduate Survey; IUD: intrauterine device; LARC: long-acting reversible contraception; D&C: dilation and curettage; CAM: complementary and alternative medicine. **Bold values are significant at *P*=.05**; *Significant at *P*<.05; **Significant at P<.01; ***Significant at *P*<.001. [a]These questions are only asked of physicians providing inpatient care. Missing cases, residency preparedness: pediatric outpatient care, 42; newborn hospital care, 43; pediatric hospital care, 44; neonatal circumcision, 53; intensive care, 43; maternity care, 44; endometrial biopsy, 48; IUD insertion and removal, 47; implantable LARC, 47; colposcopy, 48; uterine aspiration/D&C, 67; pregnancy termination, 79; basic OB ultrasound, 48; casting, 53; joint aspiration and injection, 53; musculoskeletal ultrasound, 53; vasectomy, 53; cardiac stress test, 55; osteopathic manipulative treatment, 55; buprenorphine treatment, 56; (pharmacologic) HIV/AIDS management, 56; (pharmacologic) hepatitis C management, 56; end-of-life care, 43; behavioral health care, 44; integrative health care/CAM, 44. Missing cases, current practice: pediatric outpatient care, 133; newborn hospital care, 134; pediatric hospital care, 135; neonatal circumcision, 145; intensive care, 135; maternity care, 135; endometrial biopsy, 140; IUD insertion and removal, 140; implantable LARC, 141; colposcopy, 141; uterine aspiration/D&C, 174; pregnancy termination, 164; basic OB ultrasound, 141; casting, 145; joint aspiration and injection, 145; musculoskeletal ultrasound, 145; vasectomy, 145; cardiac stress test, 148; osteopathic manipulative treatment, 148; buprenorphine treatment, 148; (pharmacologic) HIV/AIDS management, 148; (pharmacologic) hepatitis C management, 148; end-of-life care, 135; behavioral health care, 135; integrative health care/CAM, 135.

TABLE 3. **Patterns of Early-Career Family Physicians' Current Practice by Procedure, Illustrated Using Adjusted Relative Risks, NGS 2016-2018**

| | n | Rural Residency Program [REF: Urban] | 95% CI | Perceived Residency Preparedness | 95% CI | Rural Practice Location [REF: Urban] | 95% CI |
|---|---|---|---|---|---|---|---|
| **Care of Children** | | | | | | | |
| Pediatric outpatient care | 6,062 | 0.96 | (0.87-1.03) | **1.13** | **(1.10-1.16)** | **1.12** | **(1.09-1.15)** |
| Newborn hospital care | 6,062 | 0.79 | (0.59-1.04) | **1.88** | **(1.61-2.16)** | **1.63** | **(1.47-1.80)** |
| Pediatric hospital care | 6,062 | 0.95 | (0.71-1.26) | **2.42** | **(2.12-2.71)** | **2.44** | **(2.22-2.66)** |
| Neonatal circumcision | 6,062 | 0.74 | (0.52-1.03) | **4.28** | **(3.74-4.71)** | **1.80** | **(1.59-2.03)** |
| **Hospital-Based Care**[a] | | | | | | | |
| Intensive care | 6,062 | **1.40** | **(1.14-1.70)** | **2.25** | **(2.05-2.44)** | **1.44** | **(1.29-1.61)** |
| Lumbar puncture | 2,408 | **0.71** | **(0.50-0.98)** | **2.41** | **(2.26-2.54)** | **1.63** | **(1.45-1.81)** |
| Intubation | 2,408 | 0.85 | (0.63-1.12) | **2.07** | **(1.93-2.20)** | **2.11** | **(1.96-2.24)** |
| Ventilator management | 2,408 | 0.99 | (0.71-1.31) | **2.31** | **(2.15-2.45)** | **1.85** | **(1.65-2.04)** |
| Central line placement | 2,408 | 0.75 | (0.52-1.05) | **2.51** | **(2.32-2.70)** | **1.91** | **(1.68-2.13)** |
| Thoracentesis | 2,408 | **0.66** | **(0.43-0.99)** | **3.28** | **(3.01-3.52)** | **1.97** | **(1.69-2.28)** |
| **Women's Health** | | | | | | | |
| Maternity care | 6,062 | **0.76** | **(0.57-0.99)** | **2.30** | **(2.00-2.58)** | **1.45** | **(1.30-1.59)** |
| Endometrial biopsy | 6,062 | 1.10 | (0.83-1.42) | **3.30** | **(3.16-3.41)** | **1.28** | **(1.12-1.44)** |
| IUD insertion and removal | 6,062 | **0.78** | **(0.61-0.95)** | **2.06** | **(1.99-2.12)** | **1.15** | **(1.05-1.25)** |
| Implantable LARC | 6,062 | **0.78** | **(0.61-0.96)** | **2.17** | **(2.11-2.22)** | **1.16** | **(1.06-1.27)** |
| Colposcopy | 6,062 | 1.31 | (0.93-1.81) | **4.01** | **(3.58-4.43)** | **1.43** | **(1.21-1.67)** |
| Uterine aspiration/D&C | 6,016 | 0.69 | (0.34-1.37) | **11.00** | **(9.38-12.62)** | **2.55** | **(1.92-3.35)** |
| Pregnancy termination | 6,014 | 1.50 | (0.66-3.28) | **13.20** | **(10.42-16.19)** | 0.69 | (0.42-1.11) |
| Basic OB ultrasound | 6,062 | 0.96 | (0.67-1.34) | **2.96** | **(2.63-3.30)** | **1.66** | **(1.43-1.90)** |
| **Musculoskeletal Services** | | | | | | | |
| Casting | 6,062 | 0.83 | (0.66-1.03) | **2.22** | **(2.12-2.32)** | **1.69** | **(1.56-1.82)** |
| Joint aspiration and injection | 6,062 | **0.89** | **(0.79-0.98)** | **1.28** | **(1.27-1.29)** | **1.15** | **(1.12-1.18)** |
| Musculoskeletal ultrasound | 6,062 | **0.61** | **(0.37-1.00)** | **5.21** | **(4.7-5.71)** | 1.13 | (0.91-1.40) |
| **Miscellaneous Services / Procedures** | | | | | | | |
| Vasectomy | 6,062 | 0.60 | (0.26-1.40) | **12.57** | **(10.59-14.44)** | 1.18 | (0.86-1.62) |
| Cardiac stress test | 6,062 | 0.94 | (0.65-1.33) | **4.87** | **(4.45-5.28)** | **1.44** | **(1.19-1.72)** |
| Osteopathic manipulative treatment | 6,062 | 1.09 | (0.66-1.73) | **5.30** | **(4.79-5.79)** | 1.16 | (0.90-1.49) |
| Buprenorphine treatment | 6,062 | 1.16 | (0.76-1.73) | **4.86** | **(4.35-5.39)** | 0.85 | (0.68-1.08) |
| HIV/AIDS management | 6,062 | 1.09 | (0.79-1.45) | **3.63** | **(3.46-3.78)** | **0.83** | **(0.70-0.98)** |
| Hepatitis C management | 6,062 | 1.23 | (0.94-1.56) | **3.45** | **(3.32-3.56)** | 1.07 | (0.93-1.23) |
| End of life care | 6,062 | **1.14** | **(1.03-1.24)** | **1.34** | **(1.31-1.38)** | **1.31** | **(1.26-1.35)** |
| Behavioral health care | 6,062 | 0.99 | (0.93-1.03) | **1.09** | **(1.09-1.10)** | **1.05** | **(1.03-1.07)** |
| Integrative health care/CAM | 6,062 | 1.05 | (0.76-1.40) | **3.72** | **(3.56-3.87)** | 0.97 | (0.82-1.14) |

Models adjusted for: age, gender, medical degree type, international medical graduate, residency program census region, and practice of inpatient and continuity care. [a]These questions are only asked of physicians providing inpatient care, except for intensive care. Abbreviations: NGS: American Board of Family Medicine National Graduate Survey; IUD: intrauterine device; LARC: long-acting reversible contraception; D&C: dilation and curettage; OB: obstetric; CAM: complementary and alternative medicine. **Bold values are significant at *P* =.05.**

TABLE 4. **Linear Regression Results ($\beta$-Coefficients) for Overall Scope of Practice Score of Early and Later-Career Family Physicians, NGS and RECERT 2014 -2018**

| | Early-Career FM Physicians | | Later-Career FM Physicians | |
|---|---|---|---|---|
| | **N=5,334** | **95% CI** | **N=37,233** | **95% CI** |
| **Average SOP Score** | 16.1 | [16.0–16.8] | 14.7 | [14.7–14.8] |
| **Rural program** [REF: urban] | −0.07 | [-0.37–0.24] | **0.32*** | **[0.11–0.54]** |
| **Rural practice location** [REF: urban] | **1.10** | **[0.94–1.26]** | **1.90** | **[1.81–1.99]** |
| **Female** gender [REF: Male] | 0.04 | [-0.08–0.16] | **−0.55** | **[-0.63– -0.48]** |
| **Age** [linear] | **−0.02** | **[-0.04– -0.01]** | **−0.03** | **[-0.03– -0.02]** |
| **MD degree** [REF: DO] | −0.13 | [-0.29–0.04] | **0.56** | **[0.44–0.68]** |
| **International medical graduate** [REF: US/Canada] | **−0.78** | **[-0.92–-0.64]** | **−1.52** | **[-1.61– -1.42]** |
| **URM** [REF: non-URM] | n/a | – | **−0.93** | **[-1.06– -0.80]** |
| **Practices inpatient + continuity care** | **2.82** | **[2.69–2.95]** | n/a | |
| **Residency Program Census Region [REF=Northeast]** | | | | |
| Midwest | **0.51** | **[0.32–0.69]** | **0.54** | **[0.43–0.64]** |
| South | −0.002 | [-0.18–0.18] | **−0.51** | **[-0.62– -0.41]** |
| West | **0.97** | **[0.78–1.16]** | **0.16*** | **[0.05–0.28]** |

Abbreviations: SOP: scope of practice; URM: underrepresented in medicine. **Bold values aresignificant at *P* <.001 except where indicated**; *later-career rural program *P*=.003; later-career residency program census region—West *P*=.006.

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