

**BRIEF REPORT**

# National Study on the Contribution of Family Physicians to the US Emergency Physician Workforce in 2020

Christopher L. Bennett, MD, MA, W. Anthony Gerard, MD, John S. Cullen, MD, Janice A. Espinola, MPH, Ashley F. Sullivan, MS, MPH, Carson E. Clay, BA, and Carlos A. Camargo, Jr., MD, DrPH

**Background:** Family physicians provide a sizable portion of emergency care in the United States. However, there is limited work characterizing this population.

**Methods:** We completed a cross-sectional analysis of the 2020 American Medical Association Physician Masterfile that was inclusive of all clinically active physicians who designated emergency medicine as their primary or secondary specialty and had family medicine residency training and/or family medicine board certification. We used Accreditation Council for Graduate Medical Education information to determine family medicine residency training and data from the American Board of Medical Specialties to determine family medicine board certification status. We calculated physician density using US Census Bureau estimates; urban-rural assignments were based on Urban Influence Codes.

**Results:** We identified 4354 clinically active emergency physicians (9% of the overall emergency physician workforce). Of these, a majority were male (88%) and completed their training at least 20 years ago (84%), and a majority (59%) reported emergency medicine as their primary specialty. There is notable variation in physician density per 100,000 US population, and these densities declined compared with prior estimates from 2008.

**Conclusions:** We find that family physicians represent a sizable portion of the overall emergency physician workforce despite decreases in physician densities across the United States. (J Am Board Fam Med 2021;34:1221–1228.)

**Keywords:** Cross-Sectional Studies, Delivery of Health Care, Emergency Medicine, Family Medicine, Family Physicians, Workforce

## Introduction

The United States currently has a shortage of emergency physicians (EPs),<sup>1</sup> particularly in rural

areas.<sup>2,3</sup> We recently completed an analysis of all clinically active EPs in the United States. We found more EPs compared with 2008 but a decrease in the density of EPs in rural areas.<sup>2,3</sup> Further, we found that nearly a third of rural EPs reported prior family medicine (FM) residency

This article was externally peer reviewed.  
Submitted 16 April 2021; revised 5 July 2021; accepted 8 July 2021.

From Department of Emergency Medicine, Stanford University Medical Center, Palo Alto, CA (CLB); Staff Emergency Physician, Lebanon, PA (WAG); Providence Valdez Medical Center, Valdez, AK (JSC); Department of Emergency Medicine, Massachusetts General Hospital, Harvard Medical School, Boston, MA (JAE, AFS, CEC, CAC).

**Conflict of interest:** None.

**Author Contributions:** Bennett, Espinola, and Camargo full access to the data; Bennett and Camargo take responsibility for the integrity of the data and accuracy of the data analysis. Concept and design: Bennett and Camargo. Acquisition of data: Bennett, Espinola, and Camargo. Interpretation of data: all authors. Drafting of the manuscript: Bennett, Espinola, and Camargo. Critical revision of

the manuscript for important intellectual content: all authors. Statistical analysis and mapping: Espinola and Clay. Administrative, technical, or material support: Camargo. Supervision: Camargo.

**Corresponding author:** Christopher Bennett, MD, MA, Department of Emergency Medicine, Stanford University Medical Center, 900 Welch Road, Suite 350, Palo Alto, CA 94303 (E-mail: christopher.lee.bennett@gmail.com).

See Related Commentary on Page 1265.

training;<sup>3</sup> FM-trained EPs—who we will refer to as FM EPs—play an important role in emergency care in the rural United States,<sup>4,5</sup> but this population has not been well characterized. Our goal was to characterize the 2020 population of clinically active FM EPs and identify their geographic distribution.

## Methods

We performed a cross-sectional, secondary analysis of the 2020 American Medical Association (AMA) Physician Masterfile as reported previously;<sup>2,3</sup> the AMA Masterfile is a comprehensive database that includes every physician with a medical license.<sup>2,3,6</sup> The FM EP population of interest was all clinically active physicians who designated emergency medicine (EM) as their primary or secondary specialty and had FM residency training and/or FM board certification. Residents and those not clinically active (eg, primarily researchers, teaching faculty, nonclinical administrators, or physicians who retired or semi-retired) were excluded given our interest in clinically active EPs.<sup>2,3</sup> We used Accreditation Council for Graduate Medical Education (ACGME) information to determine FM residency training and American Board of Medical Specialties (ABMS) data to determine FM board certification status.

As described previously, physician location was classified into US Census divisions.<sup>2,3</sup> Corresponding population sizes were classified using US Office of Management and Budget groups.<sup>2,3</sup> Urban Influence Codes were used to assign each EP's county location (urban, large rural, or small rural); FM EP population density was calculated using county-level 2019 Census Bureau population estimates.<sup>2,3</sup>

Data were analyzed using Stata 15.1 (StataCorp; College Station, TX). First, we grouped FM EPs by board certification status: FM board certification with or without EM board certification, EM board certification, board certification but not in FM or EM, and no board certification. In the primary analysis, those with both FM and EM board certification ( $n = 736$ ) were classified under the FM board certification group. In a sensitivity analysis, we split the FM board certification group by those with isolated FM board certification versus those with dual FM and EM board certification. Second, we examined FM EPs' characteristics by sex. Physician population density was mapped using ArcMap 10.6.1 (ESRI; Redlands, CA). The MassGeneral Brigham (Boston) Institutional

Review Board determined that this study met criteria for exemption. This study followed the Strengthening in the Reporting of Observational Studies in Epidemiology guidelines for observational studies.<sup>7</sup>

## Results

We identified 4354 EPs with FM training and/or FM board certification (9% of the overall EP workforce). The majority (83%) were FM board certified, but a small subset lacked either FM or EM board certification (1%) or had no board certification (7%) (Table 1). Overall, a majority were male (88%) and located in urban areas (79%). Most (84%) completed their training at least 20 years ago, and a majority (59%) reported EM as their primary specialty. EPs in small rural areas were similarly aged (median age of 65 years [interquartile range (IQR) 60 to 69 years]) as EPs in large rural areas (65 [58 to 69]) and urban areas (65 [58 to 69]) but more often FM trained (small rural: 92%, large rural: 87%, urban: 82%,  $P < .001$ ), had completed their training at least 20 years ago (small rural: 89%, large rural: 87%, urban: 84%,  $P = .003$ ), and more frequently reported FM board certification (small rural: 87%, large rural: 86%, urban: 82%,  $P < .001$ ). The majority of all groups reported EM as their primary specialty (small rural: 53%, large rural: 58%, urban: 60%,  $P = .04$ ).

FM EPs with isolated FM board certification (compared with those with dual FM and EM board certification) were younger (63 [58 to 67] vs 69 [66 to 72]), more often female (13% vs 9%), more often in rural (both large [14% vs 10%] and small rural [10% vs 3%]) areas, and less likely to report EM as their primary specialty (49% vs 82%) (Appendix Table 1). Stratified by sex, female EPs (compared with male EPs) were younger (62 [54 to 67] vs 65 [59 to 69]) but had similar geographic distribution (eg, by US Census division) and were similarly located in urban (77% vs 79%) and rural (large rural [14% vs 13%] and small rural [9% vs 9%]) areas. Additional comparisons of FM EPs stratified by sex are presented in Table 2.

We also identified notable variation in FM EP density by area per 100,000 US population (total [1.3], urban [1.2], large rural [2.1], and small rural [2.0]). Given prior 2008 data, this represents FM EP density decreases in all areas (total [−0.5], urban [−0.4], large rural [−0.5], and small rural [−0.4] areas).<sup>3</sup> Physician density is presented in Figure 1 (EPs per 100,000 population by county) and Figure 2 (percent FM EPs among all EPs by county) for all clinically active FM EPs. Although the panels

**Table 1. Comparison of Family Medicine Trained and/or Board Certified Emergency Physicians by Board Certification**

Characteristics	All Family Medicine EPs, n = 4354		Family Medicine Board Certification, n = 3596		General Emergency Medicine Board Certification, n = 388		Neither Family Medicine nor Emergency Medicine Board Certification, n = 51		No Board Certification, n = 319		P Value*
	n	%	n	%	n	%	n	%	n	%	
<b>Demographics</b>											
Age, y (median [IQR])	4354	65 (59 to 69)	3596	64 (59 to 69)	388	66 (58 to 70)	51	67 (62 to 71)	319	65 (60 to 71)	<0.001
<b>Age categories, y</b>											
25 to 44	138	3	110	3	14	4	1	2	13	4	<0.001
45 to 64	1991	46	1701	47	135	35	21	41	134	42	
≥65	2225	51	1785	50	239	62	29	57	172	54	
Female sex	531	12	429	12	56	14	5	10	41	13	0.48
International medical graduate	701	16	589	16	33	9	8	16	71	22	<0.001
<b>Geography</b>											
<b>US Census division</b>											
New England	175	4	149	4	15	4	2	4	9	3	<0.001
Mid Atlantic	341	8	281	8	34	9	4	8	22	7	
East North Central	590	14	496	14	36	9	9	18	49	16	
West North Central	391	9	349	10	19	5	2	4	21	7	
South Atlantic	903	21	728	20	100	26	8	16	67	22	
East South Central	415	10	341	10	28	7	5	10	41	13	
West South Central	586	14	491	14	33	9	10	20	52	17	
Mountain	366	8	305	9	40	10	5	10	16	5	
Pacific	561	13	441	12	80	21	6	12	34	11	
<b>MSA population size</b>											
≥1,000,000	1722	40	1367	38	203	52	26	51	126	40	<0.001
250,000 to 999,999	939	22	801	22	74	19	9	18	55	17	
100,000 to 249,999	474	11	398	11	38	10	4	8	34	11	
<100,000	65	1	54	2	4	1	2	4	5	2	
Unknown	1154	27	976	27	69	18	10	20	99	31	
<b>Urban influence</b>											
Urban	3402	79	2781	78	340	88	40	78	241	76	<0.001
Large rural	560	13	479	13	33	9	7	14	41	13	
Small rural	372	9	322	9	12	3	4	8	34	11	
<b>Training</b>											
<b>Residency</b>											
Emergency medicine	403	9	176	5	200	52	3	6	24	8	<0.001
Family medicine	3646	84	3181	88	162	42	21	41	282	88	
Internal medicine	66	2	29	0.8	14	4	19	37	4	1	
Pediatrics	11	0.3	6	0.2	3	0.8	2	4	0	0	
Surgery	62	1	38	1	9	2	6	12	9	3	
Internship only	58	1	58	2	0	0	0	0	0	0	
Other residency	13	0.3	13	0.4	0	0	0	0	0	0	
None	95	2	95	3	0	0	0	0	0	0	

*Continued*

**Table 1. Continued**

Characteristics	All Family Medicine EPs, n = 4354		Family Medicine Board Certification, n = 3596		General Emergency Medicine Board Certification, n = 388		Neither Family Medicine nor Emergency Medicine Board Certification, n = 51		No Board Certification, n = 319		P Value*
	n	%	n	%	n	%	n	%	n	%	
Years since completed medical training											0.006
<5	44	1	34	1	1	0.3	1	2	8	3	
5 to 9	98	2	79	2	13	3	0	0	6	2	
10 to 19	520	12	415	12	66	17	4	8	35	11	
≥20	3597	84	2973	85	308	79	46	90	270	85	
Primary specialty of emergency medicine	2563	59	2004	56	363	94	9	18	187	59	<0.001

EPs, emergency physicians; IQR, interquartile range; MSA, metropolitan statistical area.

\*Bivariate comparisons were tested using Kruskal-Wallis,  $\chi^2$ , and Fisher’s exact tests, as appropriate.

demonstrate FM EPs across the country, they seem most prevalent at the edges of our previously reported band of underserved states (from North Dakota to Texas)—the “EP desert.”<sup>3</sup>

### Discussion

We find that FM EPs represent a sizable portion of the clinically active EP workforce and most are male and in urban areas. Although less than a quarter were located in rural areas, the rural proportions presented here are higher than those of the overall EP population (we recently reported that only a minority of all EPs are in either large [6%] or small [3%] rural areas).<sup>3</sup> We also found that FM EPs are older than the overall EP workforce and FM EPs in small and large rural areas are older than counterparts from the overall EP workforce.<sup>3</sup> Further, compared with 2008,<sup>3</sup> we find decreases in FM EP density across the United States (overall, urban, large rural, and small rural). Our findings characterize a rural, predominately male subpopulation of older FM EPs, who more often have isolated FM board certification, and who provide care in already underserved areas of the country where overall EP density is declining—“EP deserts.”<sup>3</sup>

However, our work has limitations.<sup>2,3</sup> First, our study was limited to physicians who self-designated EM as their primary or secondary specialty. Family physicians who provide emergency care in the United States may not necessarily identify as EPs. As such, we likely slightly underestimate the number of

actual FM EPs.<sup>4,5</sup> Second, we are unable to account for the contributions of osteopathic EPs. Data are linked only to ACGME and ABMS; there is no equivalent osteopathic database.<sup>2,3</sup> This is a previously noted limitation.<sup>2,3</sup> Despite this, our work is still the most current and comprehensive study on clinically active FM EPs in the United States. Third, we are unable to account for the impact graduating EM residents will have on the FM EP workforce. We recently demonstrated increasing densities of EPs in urban areas,<sup>3</sup> EM resident graduates have historically not taken jobs in rural areas.<sup>8</sup> This absence of EM residency-trained EPs has likely contributed to the large share of FM EPs providing emergency care in more remote areas.

COVID-19 has significantly impacted the EP workforce.<sup>9</sup> Fewer jobs,<sup>9</sup> an increase in the number of EM residency programs,<sup>10</sup> and a potential surplus of EPs by 2030<sup>11</sup> may collectively mean that new graduates joining the workforce will now relocate to areas and work in rural settings where FM EPs predominate.

Efforts that promote an increased physician presence in rural America are required. As FM EPs leave the workforce, “EP deserts” will persist and likely expand. However, addressing the need for rural EPs will require concerted effort.<sup>2,3</sup> Incentivizing relocation efforts through loan repayment and expanding the number of rural EM rotations have been suggested.<sup>12,13</sup> In the absence of any significant change, we anticipate that declining EP densities (both all EPs and FM EPs) in rural America will contribute to

**Table 2. Comparison of Family Medicine Emergency Physicians by Sex, n = 4354**

Characteristics	All Family Medicine EPs,				P Value*
	Male (n = 3823)		Female (n = 531)		
	n	%	n	%	
<b>Demographics</b>					
Age, y (median [IQR])	3823	65 (59 to 69)	531	62 (54 to 67)	<0.001
Age categories, y					<0.001
25 to 44	101	3	37	7	
45 to 64	1691	44	300	57	
≥65	2031	53	194	37	
International medical graduate	630	16	71	13	0.07
<b>Geography</b>					
US Census division					0.87
New England	148	4	27	5	
Mid Atlantic	302	8	39	7	
East North Central	519	14	71	13	
West North Central	340	9	51	10	
South Atlantic	789	21	114	22	
East South Central	371	10	44	8	
West South Central	512	13	74	14	
Mountain	321	8	45	9	
Pacific	498	13	63	12	
MSA population size					0.03
≥1,000,000	1503	39	219	41	
250,000 to 999,999	815	21	124	23	
100,000 to 249,999	433	11	41	8	
<100,000	52	1	13	2	
Unknown	1020	27	134	25	
Urban influence					0.77
Urban	2993	79	409	77	
Large rural	487	13	73	14	
Small rural	325	9	47	9	
<b>Training</b>					
Residency					<0.001
Emergency medicine	322	8	81	15	
Family medicine	3232	85	414	78	
Internal medicine	59	2	7	1	
Pediatrics	8	0.2	3	0.6	
Surgery	57	1	5	0.9	
Internship only	57	1	1	0.2	
Other residency	12	0.3	1	0.2	
None	76	2	19	4	
Years since completed medical training					<0.001
<5	29	0.8	15	3	
5 to 9	76	2	22	4	
10 to 19	421	11	99	19	
≥20	3221	86	376	73	
Primary specialty of emergency medicine	2244	59	319	60	0.55

EPs, emergency physicians; IQR, interquartile range; MSA, metropolitan statistical area.

\*Bivariate comparisons were tested using Kruskal-Wallis,  $\chi^2$ , and Fisher's exact tests, as appropriate.

Figure 1. Family medicine emergency physician density per 100,000 population by county.

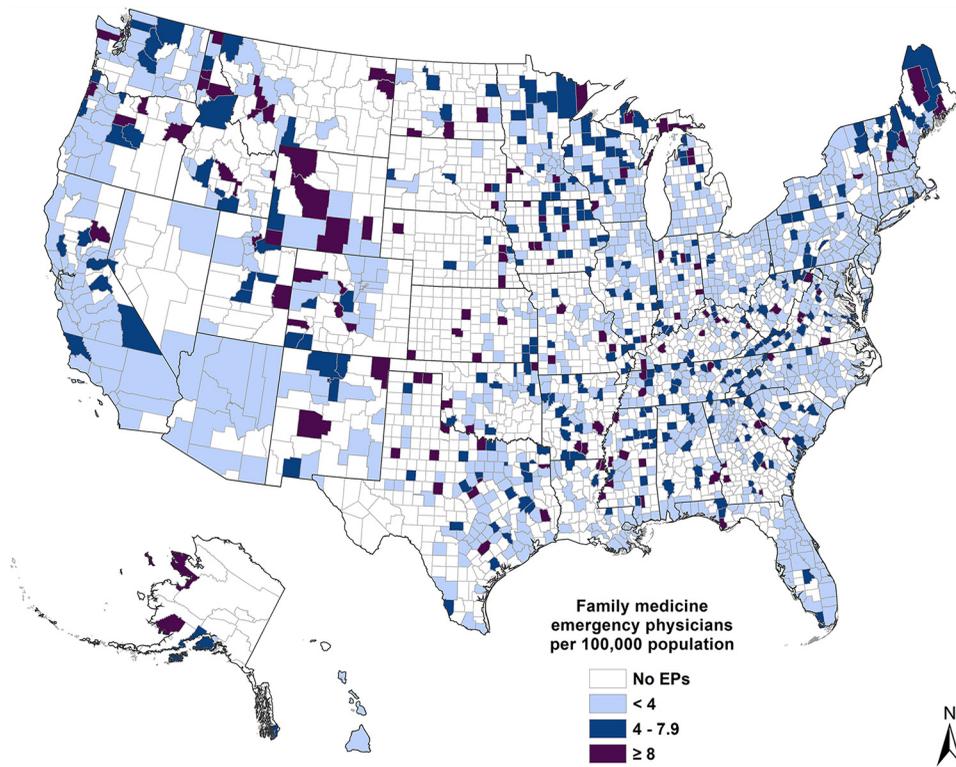
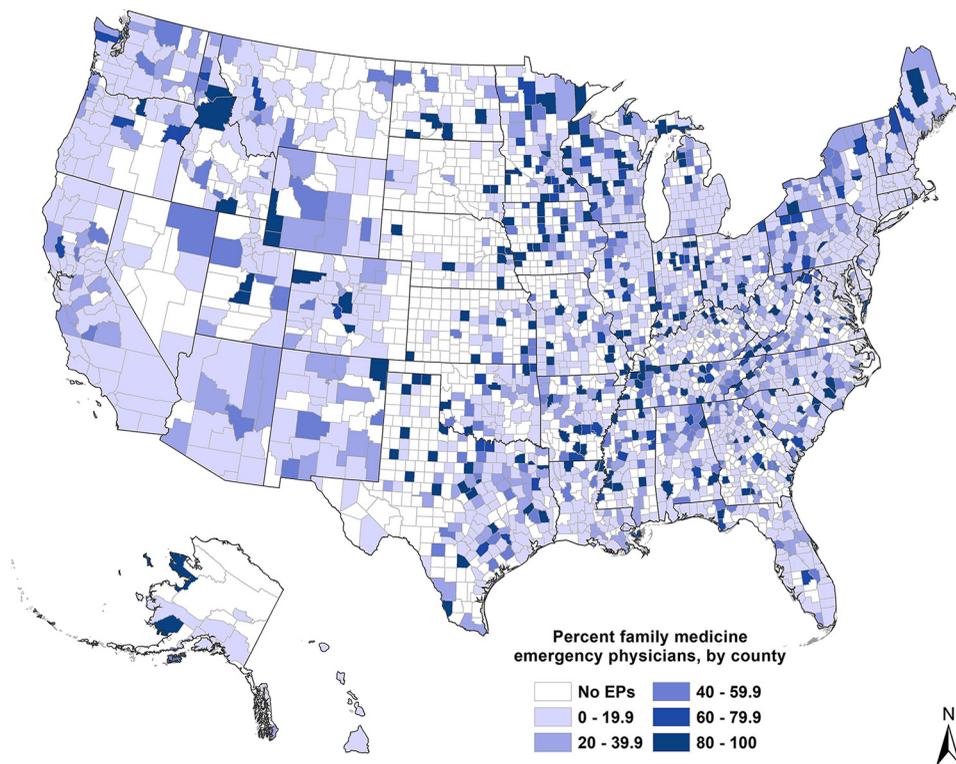


Figure 2. Family medicine emergency physician percent among all clinically active emergency physicians by county.



an accelerated use of nonphysician models of care with an increased presence of nurse practitioners, physician assistants, and/or telehealth.<sup>14,15</sup>

To see this article online, please go to: <http://jabfm.org/content/34/6/1221.full>.

## References

1. Reiter M, Wen LS, Allen BW. The emergency medicine workforce: profile and projections. *J Emerg Med* 2016;50:690–3.
2. Ginde AA, Sullivan AF, Camargo CA, Jr. National study of the emergency physician workforce, 2008. *Ann Emerg Med* 2009;54:349–59.
3. Bennett CL, Sullivan AF, Ginde AA, et al. National study of the emergency physician workforce, 2020. *Ann Emerg Med* 2020;76:695–708.
4. Peterson LE, Puffer JC, Nasim U, Petterson S, Newton WP. Family physicians' contributions to rural emergency care and urban urgent care. *J Am Board Fam Med* 2019;32:295–6.
5. Banks GC, Gerard AW, Yu K, Bullock KA, Members, AAFP Member Interest Group Emergency Medicine/Urgent Care. Family physicians play integral role in emergency medicine. *Ann Fam Med* 2017;15:82–86.
6. AMA Physician Masterfile. American Medical Association. Available from: <https://www.ama-assn.org/about/masterfile/ama-physician-masterfile>. Accessed March 21, 2021.
7. Von Elm E, Altman DG, Egger M, Pocock SJ, Gøtzsche PC, Vandenbroucke JP, STROBE Initiative. The Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) statement: guidelines for reporting observational studies. *Lancet* 2007;370:1453–7.
8. Wadman MC, Clark TR, Kupas DF, et al. Rural clinical experiences for emergency medicine residents: a curriculum template. *Acad Emerg Med* 2012;19:1287–93.
9. Washington Post; January 4, 2021. Young ER doctors risk their lives on the pandemic's front lines. But they struggle to find jobs. Available from: <https://www.washingtonpost.com/health/2021/01/04/er-doctors-covid-jobs/>. Accessed March 30, 2021.
10. ACGME Data Resource Book. Available from: <https://www.acgme.org/About-Us/Publications-and-Resources/Graduate-Medical-Education-Data-Resource-Book>. Accessed March 30, 2021.
11. Reiter M, Allen BW. The emergency medicine workforce: shortage resolving, future surplus expected. *J Emerg Med* 2020;58:198–202.
12. Renner DM, Westfall JM, Wilroy LA, Ginde AA. The influence of loan repayment on rural healthcare provider recruitment and retention in Colorado. *Rural Remote Health* 2010;10:1605.
13. Talley BE, Ann Moore S, Camargo CA, Rogers J, Ginde AA. Availability and potential effect of rural rotations in emergency medicine residency programs. *Acad Emerg Med* 2011;18:297–300.
14. Brown DF, Sullivan AF, Espinola JA, et al. Continued rise in the use of midlevel providers in US emergency departments, 1993 to 2009. *Int J Emerg Med*. 2012;21:1–5.
15. Zachrison KS, Boggs KM, Hayden E, et al. Understanding barriers to telemedicine implementation in rural emergency departments. *Ann Emerg Med* 2020;75:392–9.

**Appendix Table 1. Comparison of Family Medicine Emergency Physicians with Isolated Family Medicine or Dual Family Medicine and Emergency Medicine Board Certification, n = 3596**

Characteristics	Isolated FM Board Certification (n = 2860)		Dual FM and EM Board Certification (n = 736)		P Value*
	n	%	n	%	
<b>Demographics</b>					
Age, y (median [IQR])	2860	63 (58 to 67)	736	69 (66 to 72)	<0.001
Age categories, y					<0.001
25 to 44	93	3	17	2	
45 to 64	1573	55	128	17	
≥65	1194	42	591	80	
Female sex	364	13	65	9	0.004
International medical graduate	512	18	77	10	<0.001
<b>Geography</b>					
US Census division					<0.001
New England	108	4	41	6	
Mid Atlantic	216	8	65	9	
East North Central	395	14	101	14	
West North Central	303	11	46	6	
South Atlantic	583	20	145	20	
East South Central	295	10	46	6	
West South Central	426	15	65	9	
Mountain	216	8	89	12	
Pacific	306	11	135	18	
MSA population size					<0.001
≥1,000,000	1036	36	331	45	
250,000 to 999,999	617	22	184	25	
100,000 to 249,999	310	11	88	12	
<100,000	42	1	12	2	
Unknown	855	30	121	16	
Urban influence					<0.001
Urban	2142	75	639	87	
Large rural	409	14	70	10	
Small rural	297	10	25	3	
<b>Training</b>					
<b>Residency</b>					
Emergency medicine	29	1	147	20	<0.001
Family medicine	2665	93	516	70	
Internal medicine	14	0.5	15	2	
Pediatrics	3	0.1	3	0.4	
Surgery	26	0.9	12	2	
Internship only	35	1	23	3	
Other residency	6	0.2	7	1	
None	82	3	13	2	
Years since completed medical training					0.002
<5	29	1	5	0.7	
5 to 9	53	2	26	4	
10 to 19	350	13	65	9	
≥20	2346	84	627	87	
Primary specialty of emergency medicine	1402	49	602	82	<0.001

EM, emergency medicine; FM, family medicine; IQR, interquartile range; MSA, metropolitan statistical area.

\*Bivariate comparisons were tested using Kruskal-Wallis,  $\chi^2$ , and Fisher's exact tests, as appropriate.