

Which Physician Assistant Training Programs Produce Rural PAs? A National Study

KEY FINDINGS

- Rural PA production is concentrated in a small number of programs. From 2000 through 2012, 10% of PA programs produced 34% of rural PAs. Those same programs produced just 14% of all the PAs graduating in the same period.
- Mission matters. PA training programs with mission statements addressing rural health care produced higher proportions of rural PAs than other programs.
- Location matters. PA training programs located in rural areas were more likely to produce higher proportions of rural PAs than programs in urban areas.
- Program characteristics not strongly associated with higher production of rural PAs include private/public status, class capacity, pre-admission clinical experience requirements, type of institution or having a primary care mission.

INTRODUCTION/BACKGROUND

Employing more physician assistants (PAs) is often proposed as an important part of the solution to rural primary care shortages in the United States.¹⁻³ This idea is not new; in fact, the PA profession emerged in the early 1970s in part to address health care disparities and predicted primary care workforce shortages, especially in rural and underserved communities. Although designed to address various primary care needs, early PA programs often included curriculum that specifically prepared students for rural practice.^{1, 4} Federal policy also was instrumental in creating opportunities for PAs to fill rural roles through the 1977 Rural Health Clinics Act and the establishment of the National Health Service Corps.⁴ There was early success in training PAs who chose rural careers; in 1981, 27 percent of all PAs were practicing in communities of less than 10,000 residents. As the PA profession grew, the emergence of specialty roles for PAs was associated with declining rates of participation in primary care and an associated decreased propensity to choose rural careers.^{5, 6} By 2008, only 15 percent of PAs were practicing in rural areas.⁷ Other factors that may have contributed to this decline include longer training periods, higher pre-admission academic requirements,⁸ higher pre-training clinical experience requirements and the changing demography of the profession.^{2, 5, 6, 9, 10}

Despite the decline in participation in rural practice, PAs continue to enter the rural workforce at higher rates than primary care physicians and continue to make large contributions to the care of underserved rural populations.^{11, 12} Over 7,000 new PAs enter the workforce each year (compared to about 20,000 U.S. medical graduates) and constitute a substantial potential resource for rural populations experiencing the effects of health provider shortages. To sustain and grow the number and proportion of PAs who choose rural practice it is important to understand the personal and educational factors associated with that choice. Rural origins and rural clinical training are factors that are strongly associated with eventual rural practice,^{10, 13, 14} but very little is known about the PA training program factors associated with rural practice. The purpose of this study is to identify PA training programs that produce high proportions and/or high numbers of rural PAs, and the program characteristics associated with that success.

METHODS

PA GRADUATE DATA

This study used de-identified data from the National Commission on the Certification of Physician Assistants (NCCPA) on 90,227 PA graduates who passed the national PA certification exam and were therefore eligible to practice medicine as a PA as of December 31, 2012. The data from the NCCPA included the following information: gender, age (in a three year range), graduation year, state of residence, PA training program and a Rural Urban Commuting Area (RUCA) group code for the PA's address. The RUCA code was used to determine whether a PA was located in a rural or urban location. Whether the NCCPA assigned RUCA code represented a home or practice address was unknown. The RUCA group codes are treated as practice locations in this study.

We elected to limit the study to the 59,778 PAs for whom rural/urban location was known and who graduated from PA training between 2000 and 2012 (inclusive). Graduates from earlier years were excluded for two reasons. First, the NCCPA data does not indicate whether a PA is in active practice; it only indicates that the PA's certification is current (In 2012, the NCCPA required PAs to re-certify every seven years; that interval has recently been changed to ten years). Limiting the study to recent graduates increased the likelihood that retirees and PAs coming to the end of their careers were excluded from the study. Second, the Physician Assistant Education Association (PAEA) directory¹⁵ information used to determine many program characteristics (discussed below) reflects program information in 2012. Restricting the analysis to recent graduates increased the likelihood that the program characteristics identified from the PAEA Directory accurately reflected the nature of the programs when the graduate population was in training.

PA PROGRAM DATA

Information on characteristics of PA training programs was collected from the PAEA Program Directory¹⁵ and program websites. Data collected included private/public status, information on class capacity, degrees offered, clinical experience requirements and the Carnegie code¹⁶ for the program's home institution.¹ Web searches were used to identify program information not available from the PAEA directory. In addition, program mission statements were reviewed from program websites to determine if the program missions addressed rural health and primary care issues. A total of 154 programs trained PAs between 2000 and 2012.

¹ The Carnegie Classification of Institutions of Higher Education was developed by the Carnegie Foundation to classify U.S. colleges and universities into comparable groups. In the basic classification used here, institutions are grouped primarily on the highest degrees granted at the institution. The status of "Special Focus Institutions", is assigned if the degrees granted are concentrated in a single group of related fields of study.

ANALYSIS

Several dimensions of PA training programs and their association with rural practice location were explored in this descriptive study including: private vs. public institution, Master's level vs. bachelor's level training, program pre-requisites, and training in same-state institutions. The association between gender and rural practice location was also explored. Finally, the programs that produced the highest proportion and numbers of rurally located PAs were identified. The University of Washington's Institutional Review Board determined that human subjects review was not required for this study. Analyses were completed using SPSS Statistical Software v 22.0. Standard chi-squared tests were used to determine the statistical significance of differences in proportions.

FINDINGS

PROGRAM CHARACTERISTICS

Characteristics of the programs that produced PAs between 2000 and 2012 (inclusive), along with the number of graduates trained, are presented in Table 1. Of the 154 programs 96 (62.3%) were located in private colleges/universities and 58 (37.7%) were in public institutions (including the U.S. military's Interservice PA training program). From 2000 through 2012, PA programs at private colleges/universities produced 37,241 (62.3%) NCCPA certified graduates, and public programs produced 22,537 (37.7%) graduates. Only a few programs (13.0%) were located in institutions granting only associate or baccalaureate degrees, with the majority being in master's or doctorate granting institutions. Fifteen programs (9.8%) were located in rural places and 23 (14.9%) had mission statements that addressed rural health care. Sixty-three (40.9%) programs called out a commitment to primary care in their mission statements. Mean annual class size among the study programs was 48.4, and varied substantially across the 154 programs (between 10 and 140 in 2013(not tabled)), as did the number of hours of clinical experience required for admission (between zero and 6240 in 2013 (not tabled)).

Table 1. Characteristics of PA training programs and total number of graduates, 2000-2012

	All Programs (n=154)*	Total number of certified graduates 2000-2012 (n=59,778)
Private/Public Status		
Private No. (%)	96 (62.3)	37,241 (62.3)
Public No. (%)	58 (37.7)	22,537 (37.7)
Type of College University		
Associates Colleges, No. (%)	8 (5.2)	2,153 (3.6)
Baccalaureate Colleges, No. (%)	12 (7.8)	2,844 (4.8)
Master's Colleges/Univ., No. (%)	46 (29.9)	15,965 (26.7)
Doctoral/Research Univ., No. (%)	46 (29.9)	20,317 (34.0)
Special Focus Institutions, No. (%)	34 (22.1)	15,402 (25.8)
Other/missing, No. (%)	8 (5.2)	3,097 (5.2)
Program Location by Census Region (n=153)*		
Northeast, No. (%)	48 (31.4)	18,375 (30.7)
Midwest, No. (%)	31 (20.3)	11,482 (19.2)
South, No. (%)	51 (33.3)	19,753 (33.1)
West, No. (%)	23 (15.0)	10,150 (17.0)

Table continued next page

Table 1. Characteristics of PA training programs and total number, of graduates, 2000-2012, (continued)

	All Programs (n=154)*	Total number of certified graduates 2000-2012 (n=59,778)
Program Location by Census Division (n=153)*		
New England, No. (%)	8 (5.2)	3102 (5.2)
Mid-Atlantic, No. (%)	40 (26.1)	15,273 (25.5)
East North Central, No. (%)	21 (13.7)	7,775 (13.0)
West North Central, No. (%)	10 (6.5)	3,707 (6.2)
South Atlantic, No. (%)	30 (19.6)	11,861 (19.8)
East South Central, No. (%)	8 (5.2)	2,165 (3.6)
West South Central, No. (%)	13 (8.5)	5,727 (9.6)
Mountain, No. (%)	10 (6.5)	4,165 (7.0)
Pacific, No. (%)	13 (8.5)	5,985 (10.0)
Programs opening during study period, No. (%)	41 (26.6)	7,084 (11.9)
Programs closing 2000-2012, No. (%)	12 (7.8%)	2195 (3.7)
Annual Class Capacity		
Mean class capacity	48.4	--
Median class capacity	45.0	--
Annual Class capacity < 30, No. (%)	24 (15.6)	4,472 (7.5)
Annual Class capacity 31-50, No. (%)	71 (46.1)	25,748 (43.1)
Annual Class capacity >50, No. (%)	48 (31.2)	25,625 (42.9)
Missing capacity information, No. (%)	11 (7.1)	3,933 (6.6)
Clinical Experience Requirements†		
No experience required, No. (%)	62 (40.3)	26,071 (43.6)
Less than 500 hours, No. (%)	35 (22.7)	11,803 (19.8)
500 + hours, No. (%)	46 (29.9)	17,323 (29.0)
Missing, No. (%)	11 (7.1)	4581 (7.7)
Rural/urban program location*		
Urban, No. (%)	138 (90.2)	56,423 (94.4)
Rural, No. (%)	15 (9.8)	3,337 (5.6)
Program has Rural Mission		
No, No. (%)	117 (76.0)	46,021 (77.0)
Yes, No. (%)	23 (14.9)	8814 (14.7)
Missing, No. (%)	14 (9.1)	4,943 (8.3)
Program has Primary Care Mission		
No, No. (%)	77 (50.0)	29,829 (49.9)
Yes, No. (%)	63 (40.9)	25,006 (41.8)
Missing, No. (%)	14 (9.1)	4943 (8.3)

* Geographic characteristics of PA training programs were only available for 153 programs. Eighteen graduates of military PA programs from individual services (Army, Navy etc) that existed prior to the establishment of the U.S. military's Interservice program were consolidated into a single group and their training programs treated as a single program. No geographic characteristics were assigned to this group.

† Experience requirements as of 2012.

LOCATION AND CHARACTERISTICS OF THE PA GRADUATE POPULATION

The majority of the graduate population, (87.9%) was located in urban areas (Table 2). There were 7,201 (12.1%) PAs in rural areas. Though the study was restricted to recent (and thus younger) graduates, rural PAs were somewhat older than their urban counterparts ($P < .001$). Women made up 66.5% of rural PAs and 71.2% of urban PAs ($p < .001$). PAs in large rural places were younger than those located in small and remote places ($P < .001$). In the most isolated rural areas, 69.8% of the PAs were women compared to 65.6% in large rural settings. The regional distribution of PAs across rural vs. urban settings was variable, with rural PAs being more concentrated in the Midwest and South than in the Northeast and West ($p < .001$).

Table 2. Characteristics of certified PAs completing training between 2000 and 2012 – as of 12/31/2012

	All	Urban/Rural			Intra-rural			p value
	All 100.0% n=59,778	Urban 87.9% (n=52,577)	Rural 12.1% n=7,201	p value	Large Rural 57.7%* n=4,151	Small Rural 24.6%* n=1,775	Isolated Rural 17.7%* n=1,275	
Age				<.001 [†]				<.001
% 20-34	54.8	55.2	51.7	<.001	53.0	50.5	48.9	<.001
% 35-49	38.9	38.9	39.2	NS**	39.0	39.8	38.8	<.05
% 50-64	6.1	5.8	8.8	<.001	7.7	9.4	12.0	NS**
% 65+	0.2	0.2	0.2	NS**	0.3	0.3	0.2	<.001
Gender								
% Female	70.6	71.2	66.5	<.001	65.6	66.2	69.8	.02
% Male	29.4	28.8	33.5		34.4	33.8	30.2	
Home Census Region				<.001 ^{††}				<.001
% Northeast	25.1	26.0	18.9	<.001	20.7	12.5	22.3	<.001
% Midwest	19.4	18.0	29.7	<.001	28.0	31.0	33.7	<.001
% South	34.1	34.3	32.5	<.01	33.1	35.4	26.5	<.001
% West	21.4	21.8	18.9	<.001	18.3	21.2	17.5	<.05
Trained in same state as practicing								
% No	40.6	39.8	46.8	<.001	46.6	46.0	48.5	NS**
% Yes	59.4	60.2	53.2		53.4	54.0	51.5	

* Percent of rural total (n=7201)

** Not statistically significant

† Overall chi-square for age group

†† Overall chi-square for region

PROGRAM CHARACTERISTICS AND PRODUCTION OF RURAL PAs

To assess possible associations between the PA training program characteristics identified in Table 1 and the proportion of graduates in rural locations, programs were ranked according to the proportion of their graduates in rural locations. As shown in Figure 1, across the 154 programs, the mean percentage of rural graduates was 13.0 percent; the median was 9.1 percent, and the proportion of graduates in rural areas ranged from 0.0% to 87%. The characteristics of the 30 programs in the upper quintile of the distribution (shown in green) were then compared to those in the lower four quintiles (124 programs) using chi-square analysis. Results are shown

in Table 3. Programs with higher rural productivity were much more likely to be located in a rural place (40.0% of programs vs. 2.4% of programs, $p < .001$) and to have a mission statement that addresses rural health care (32.1% vs. 12.5%, $p < .05$). Other characteristics including private/public status, type of college/university, class capacity, clinical experience and having a primary care mission were not associated with higher rural production.

Logistic regression analysis (not tabled) was also performed using the proportion of graduates in rural settings ($< 80\%$ vs $\geq 80\%$) as the dependent variable, and rural program mission, private vs. public status, institution type, region, class capacity, and clinical experience requirements as independent variables. The same two variables identified as significantly associated with higher rural production in Table 3 (rural mission and rural location) were significant in the resulting model. Other variables were not statistically significant and inclusion of them did not improve the model.

Figure 1. Proportion of PA graduates in rural areas by program, 2012 (154 programs*)

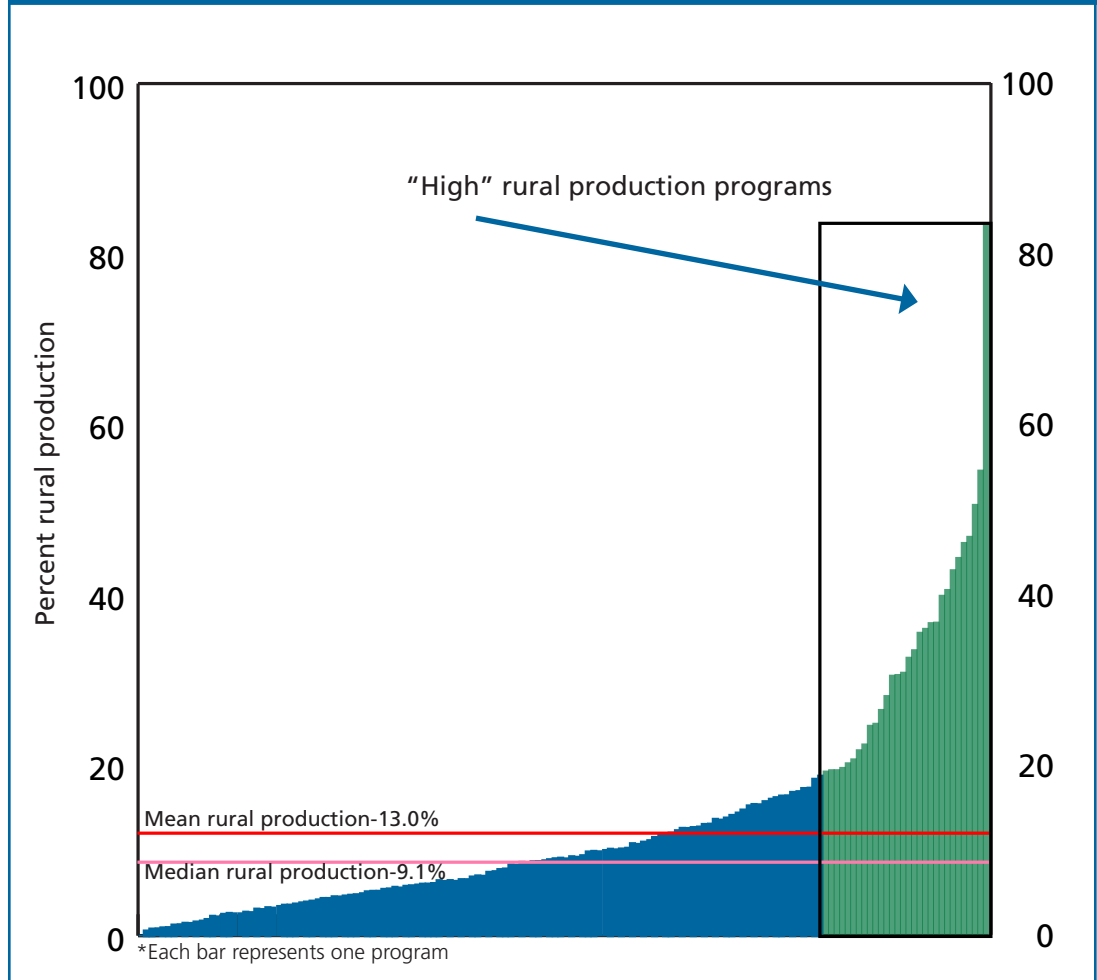


Table 3. Characteristics of PA training programs by levels of rural PA production, 2000-2012

	Programs lower than 80 th percentile in rural production (124 programs)	Programs higher than 80 th percentile in rural production (30 programs)	p-value
Private/Public Status			
Private, No. (%)	79 (63.7)	17 (56.7)	NS*
Public, No. (%)	45 (36.3)	13 (43.3)	
Type of College University (n=146)			
Associates/Baccalaureate Colleges, No. (%)	13 (11.1)	7 (24.1)	NS
Master's Colleges/Univ., No. (%)	35 (29.9)	11 (37.9)	
Doctoral/Research Univ., No. (%)	38 (32.5)	8 (27.6)	
Special Focus Institutions, No. (%)	31 (26.5)	3 (10.3)	
Program Location by Census Region (n=153)			
			NS
Northeast, No. (%)	40 (32.5)	8 (26.7)	
Midwest, No. (%)	20 (16.3)	11 (36.7)	
South, No. (%)	42 (34.1)	9 (30.0)	
West, No. (%)	21 (17.1)	2 (6.7)	
Programs opening during study period,			
Opened before 2000, No. (%)	91 (73.4)	22 (73.3)	NS
Opened 2000-2012, No. (%)	33 (26.6)	8 (26.7)	
Annual Class capacity (n=143)			
Annual Class capacity < 30, No. (%)	18 (15.7)	6 (21.4)	NS
Annual Class capacity 31-50, No. (%)	55 (47.8)	16 (57.1)	
Annual Class capacity, No. (%) >50	42 (36.5)	6 (21.4)	
Clinical Experience Requirements* (n=143)			
No experience required, No. (%)	48 (42.1)	14 (48.3)	NS
Less than 500 hours, No. (%)	28 (24.6)	7 (24.1)	
500 + hours, No. (%)	38 (33.3)	8 (27.6)	
Rural/urban program location (n=153)			
Urban, No. (%)	120 (97.6)	18 (60.0)	<.001
Rural, No. (%)	3 (2.4)	12 (40.0)	
Program has Rural Mission (n=140)			
No, No. (%)	98 (87.5)	19 (67.9)	<.05
Yes, No. (%)	14 (12.5)	9 (32.1)	
Program has Primary Care Mission (n=140)			
No, No. (%)	64 (57.1)	13 (46.1)	NS
Yes, No. (%)	48 (42.9)	15 (53.6)	

*Not statistically significant

WHICH PA TRAININGS PROGRAMS PRODUCE RURAL PAs?

The fifteen programs that produced the most rurally located PAs, numerically and/or proportionally are identified in Table 4. Numerically, the U.S. military's Interservice PA training program produced the most rural PAs during the study period (283). However, those 283 graduates constitute only 16 percent of the total certified graduates from that program during the study period (1741, not tabled). In contrast, some programs with very high proportions of graduates in rural areas, such as the University of the Cumberlands (23 graduates, 87% rural), were smaller or newer programs with a small total number of certified graduates as of 2012. There were also several programs that produced both large numbers of rurally located graduates and a high proportion of rurally located graduates, including the University of North Dakota (234 graduates, 47% of total), Central Michigan University (184 graduates, 37% of total), Alderson-Broaddus University (162 graduates, 34% of total) and Southern Illinois University – Carbondale (144 graduates, 51% of total).

The fifteen programs that produced the largest number of rurally located PAs, about 10 percent of the total number of programs, produced 34.3 percent (2467) of the 7201 rural PAs included in the study. Overall, those programs produced only 14.8% of the total 59,778 PA graduates included in the study. The fifteen programs with the highest proportions of rural PA graduates produced only 6.3 percent of the total PA graduates during the study period, but produced 21.7 percent of the rurally located PA graduates.

Table 4. PA training programs produce highest counts and proportions of rurally located graduates, 2012 (Certified PAs who graduated between 2000 and 2012)

Programs with highest counts of graduates in rural locations		Programs with highest proportions of graduates in rural locations (State)	
	Number of graduates in rural locations		Percent of graduates in rural locations
Interservice PA Program (US military)	283	University of the Cumberlands (KY)	87 %
University of North Dakota	234	Franklin Pierce University (NH)	60 %
Mountain State University (WV)*	189	Southern Illinois University - Carbondale	51 %
University of Kentucky	185	Mountain State University (WV)*	47 %
Central Michigan University	184	University of North Dakota	47 %
Alderson-Broaddus University (WV)	162	Bethel University (TN)	45 %
Lock Haven University of Pennsylvania	153	Pennsylvania College of Technology	43 %
Wichita State University (KS)	150	The University of Findlay (OH)	41 %
Southern Illinois University - Carbondale	144	Rocky Mountain College (MT)	40 %
University of Nebraska	143	Lincoln Memorial University (TN)	37 %
St. Francis University (PA)	138	Central Michigan University	37 %
University of Washington	132	University of South Dakota	36 %
Des Moines University (IA)	127	Union College (NE)	36 %
Pennsylvania College of Technology	126	Alderson-Broaddus University (WV)	34 %
University of New England (ME)	117	Harding University (AR)	33 %
Total	2467	--	--

* Program closed 2013

CONCLUSIONS

SUMMARY

The purpose of this study was to identify PA training programs that are successful at producing rural PAs and to describe the training program characteristics associated with that success. We used individual level data from the NCCPA and publically available program data to determine the number and proportion of each program's recent graduates that were located in rural areas. Programs were ranked according to the proportion of their certified graduates located in rural areas. The 30 programs ranking in the upper quintile of rural production were compared to the remaining 124 programs.

Location of the training program in a rural area and having a mission statement that addressed rural issues were the only program characteristics significantly associated with higher proportions of rural graduates. Private/public status of the college or university, type of college or university, annual class capacity, and clinical experience requirements for admission were not associated with higher levels of production of rurally located graduates. There was also wide variation in the level of production of rural PAs, ranging from zero to over 80 percent. We also found that high levels of rural PA production were concentrated in a relatively small number of programs. Just ten percent of the programs in the study produced over 34 percent of the rural graduates while producing only 14 percent of the overall PA graduates.

LIMITATIONS

There are two main limitations to this study that dictate some degree of caution in interpreting the results. First, the NCCPA location information for each PA is based on a single ZIP code in the NCCPA data. There is no way to know whether the location is related to a home address or a practice address. While it is probably reasonable to infer that most PAs living in rural areas (defined by RUCA code) are probably working in rural areas,¹⁷ there is no way to know this with any certainty. The second limitation is that every PA included in the study is assumed to be in practice. It is likely that the data include some PAs who are no longer in practice. We attempted to mitigate this issue by including only PAs who graduated from 2000 through 2012 and were more likely to be in active practice than PAs from older graduation cohorts. It should also be noted that this study does not address the issue of rural retention of PAs. The NCCPA data only includes information on location at the time of PA certification (or re-certification). Accurate study of provider retention requires information on the locational history of providers.^{10,16}

“MISSION MATTERS”

The findings of this study suggest strongly that, at least in the case of PA training, “mission matters.” Programs with mission statements that mentioned rural populations or rural health care were significantly more likely to produce rural PAs than those that did not. Future work should address how rural mission is expressed across the three main dimensions of PA education: admissions procedures (including prerequisites), the content of didactic training, and clinical training. Previous work on both PAs and physicians^{2, 8, 10, 13, 14, 18-20} indicates that rural clinical training is critically important in connecting the student with rural interests to actual rural practice. The programs identified in this study could form the basis for a study of best practices for PA trainers aiming to sustain or improve their output of graduates with an interest in rural practice.

OTHER PROGRAM AND INSTITUTIONAL CHARACTERISTICS

We also found that most institutional characteristics (other than rural location) were not strongly associated with high levels of rural production of PAs. Programs with high proportions of rural graduates varied in size from very small (annual class sizes of around 20) to very large (annual class sizes of more than 100). They were found in a number of types of institutions, from programs granting associate degrees to doctorate granting research universities. In addition, the clinical experience required for admission to PA school varied substantially among successful programs from no required experience to requirements in excess of 500 hours. Taken together, these findings suggest that it is possible to achieve high levels of rural PA production across a wide variety of institutional settings.

POLICY IMPLICATIONS

Historically, federal policy contributed enormously to the success of the PA profession and the growth of the PA workforce, especially via the Rural Health Clinics Act of 1977 and the establishment of the National Health Service Corps.^{1, 4} A more recent example was the Expansion of Physician Assistant Training program under the Affordable Care Act, which provided funding for PA programs to increase the number of training slots for PA students interested in primary care careers.²¹ State law and policy also bear on the success of the PA profession in rural areas. Substantial variation in state laws governing PAs continues to exist especially with respect to scope of practice, licensure, prescriptive authority and supervision requirements.²² The findings from this study could be useful in developing and enhancing programs aimed at further support of development of the rural PA workforce at both national and state levels. These findings will also be of interest to PA educators, particularly those with a mission-based focus on training PAs for the care of rural populations.

This study focused particularly on identifying the characteristics of PA training programs that produced a large proportion of graduates who located in rural areas. Future work that identifies what makes those programs effective can help guide mission-driven and policy-driven efforts to increase the number and proportion of PAs entering rural careers. Large programs that are already successful at producing a high proportion of rural PAs, such as Central Michigan University or the University of North Dakota may be of special interest to policy-makers looking for models of PA training that produce both a large proportion and a large number of rural PAs. At the same time, it should be kept in mind that a very large number of rural PAs are trained in programs that produce only an average, or slightly above average, proportion of rural graduates. A good example of this is the U.S. military's Interservice PA training program. Only 16 percent of its graduates are rurally located, just slightly above the average rate of 13%. However, since it is such a large program, 16 percent translates into 283 rural located graduates trained between 2000 and 2012, almost 4 percent of all the rural PAs included in the study. Modest proportional increases in the production of rural PAs at large programs could have significant impact on the supply of PAs serving rural populations.

While the number of PAs in rural areas has remained high as the profession has grown, the proportion of PAs participating in the rural workforce has dropped substantially. The findings of this study indicate that there are many effective program configurations that are associated with training PAs who will go on to careers caring for rural populations. Future work should address what successful programs are doing with respect to admissions, didactic and clinical training so that successful models can be evaluated and adapted for use in other PA training programs, especially those with a rural mission.

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