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Original Research

The Changing Characteristics of Anesthesiology Program Directors

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Introduction

Residency program directors (PD) play a critical role in conducting high quality graduate medical education (GME) programs that positively influence the development of future specialist physicians. We previously reported on characteristics of program directors of Accreditation Council for Graduate Medical Education (ACGME)-accredited anesthesiology residencies and established benchmark data from which comparisons could be made over time.[1] Several important GME changes have occurred since our initial study that may have impacted anesthesiology PD characteristics. These include implementation of the ACGME Next Accreditation System (NAS), transition to a single mechanism for accreditation of allopathic and osteopathic residencies, and ongoing changes in the sex distribution of the physician workforce. This study compares the characteristics of current anesthesiology programs and PDs with baseline data reported in our previous study.

Materials and Methods

The authors submitted this study to the institutional review board (IRB). The IRB determined it was exempt from further IRB approval.

All ACGME-accredited anesthesiology residency programs in the United States were identified using the ACGME website.[2] The ACGME website was also used to identify the residency PD and determine the date the PD was appointed. Additional program data obtained from this source included the date of initial ACGME program accreditation, current program accreditation status, and the number of ACGME-approved positions in each program. Program size was defined as large (>50 approved positions), medium (20–49 approved positions), or small (<20 approved positions).

The American Board of Anesthesiology (ABA) website was used to determine the date the PD achieved initial ABA certification, Maintenance of Certification in Anesthesiology (MOCA) participation status, and the date of the most recent ABA recertification.[3] PD academic rank was determined through review of program/department websites and lists of faculties. Senior academic rank was defined as *professor* or *associate professor*. Whether the PD also served as department chair was determined by comparing the ACGME list of PDs with individual department and residency program websites.

PD sex was determined by the name of the PD, by accessing photographs on program/department websites, through state medical boards, or by using standard electronic search engines. Date of birth was determined by reviewing state licensure board websites, online curriculum vitae, program/department websites, or using electronic search engines. Newly appointed PDs were defined as receiving their appointment between January 1, 2014, and January 31, 2017, in the current study and between January 1, 2006, and January 31, 2009, in our previous report.

Statistical Considerations

We compared current PD characteristics (age, sex, time since appointment, academic rank, certification status) and program characteristics (residency size, program accreditation data) with those in our previous study. Comparisons between groups were performed with Fisher exact tests for categorical variables and Wilcoxon rank-sum tests for continuous variables. Dichotomous variables are presented as counts with percentages. Continuous data are presented as median with 25% to 75% interquartile ranges (IQR). For all tests, 2-sided P values <.05 were considered significant.

Results

Program Characteristics

We identified 147 ACGME-accredited anesthesiology programs at the time of our review. The 16 additional programs constituted a 12.2% increase from the 131 programs identified in 2009. Thirteen programs received ACGME accreditation between January 1, 2015, and January 31, 2017. Nine of the 13 (69.2%) programs accredited during these 2 years were osteopathic residency programs newly accredited by the ACGME. The number of ACGME-approved positions per program ranged from 6 to 128 with a median of 40. All programs with fewer than nine residents were osteopathic programs with ACGME "Initial Accreditation" or "Pre-Accreditation" status. The number of programs classified as large (>50 resident positions) increased from 33 of 131 (25.2%) in 2009 to 57 of 147 (38.8%) in 2017 ($P = .05$; Figure 1). One hundred twenty-eight of 147 (87.1%) anesthesiology programs are listed as continued accreditation, 4 of 147 (2.7%) continued accreditation with warning, 7 of 147 (4.8%) initial accreditation, 7 of

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147 (4.8%) pre-accreditation, and 1 of 147 (0.7%) probationary status (Figure 2).

Program Director Characteristics

PD characteristics are listed in Table 1. The median age of the current population of anesthesiology PDs is 52 years, which is unchanged from the median age reported in our 2010 study. The median time since appointment of the current population of anesthesiology PDs is 3.6 years compared to 3.7 years in 2009 ($P = .48$). Seventy eight of 147 (53.1%) PDs hold senior academic rank compared to 89 of 131 (67.9%) in 2009 ($P = .014$). The decrease in PDs with senior academic rank is due to significantly fewer PDs with the rank of professor in 2017 compared to 2009 (28 of 147 [19.1%] vs 43 of 131 [32.8%], $P = .009$, respectively), as the proportion of PDs that are associate professors did not change. There has been no significant change in the sex diversity of PDs in 2017 compared to 2009. In 2017, we identified 46 of 147 (31.3%) women PDs compared to 37 of 131 (28.2%) in 2009 ($P = .6$). Significantly fewer PDs also serve as department chairs in the current study compared to 2009 (8 of 147 [5.5%] vs 14 of 131 [18.3%], $P = .001$). Eight PDs are not ABA board certified. All are PDs at residencies previously accredited by the American Osteopathic Association who are eligible to serve as PD under specific modifications to the Common Program Requirements made by the ACGME.[4] Eighty-six of 139 (61.9%) PDs in 2017 hold time-limited ABA certificates compared to 26 of 129 (20.2%) in 2009 ($P = .001$).

Program director characteristics by sex in 2017 are listed in Table 2. There are no significant differences for any characteristic other than the number of PDs for whom we were unable to identify an academic rank. We were unable to identify the academic rank of 3 of 45 (6.5%) women PDs compared to 23 of 101 (22.8%, $P = .019$) men PDs. There were 8 men PDs who also serve as department chairs and no women PDs who did so ($P = .057$).

A comparison of characteristics of women PDs between the two time periods is shown in Table 3. There were no statistical differences other than an increase in the number with time-limited ABA certification in 2017 compared to 2009 (30 of 46 [66.7%] vs 7 of 37 [19.4%], $P = .001$), respectively. A comparison of characteristics of men PDs between the two time periods is shown in Table 4. The number of men PDs with senior academic rank decreased between 2009 and 2017, (67 of 94 [71.3%] vs 51 of 101 [50.5%], $P = .003$), respectively. The change in senior academic rank for men is due to a decrease in the number who are professors in 2017 compared to 2009 (20 of 101 [19.8%] vs 33 of 94 [35.1%], $P = .02$), respectively. The number of men PDs with time-limited ABA certification also increased between 2009 and 2017 (19 of 94 [20.2%] vs 56 of 94 [59.6%], $P = .001$), respectively.

Discussion

This study describes changes in anesthesiology program and PD characteristics over a time period that included implementation of the ACGME NAS, the transition of allopathic and osteopathic residency programs to the ACGME Single Accreditation System (SAS), and changes in the sex distribution of the physician workforce.

Program Characteristics

The number of anesthesiology residency programs and the number of large programs (>50 positions) increased from our previous study. The transition to the ACGME SAS that includes allopathic and osteopathic residencies was a major influence on residency program growth.[5] Nine of the 13 new ACGME-accredited anesthesiology residency programs during the study interval are transitioning osteopathic anesthesiology residencies. These nine osteopathic residency programs represent 90% of the osteopathic anesthesiology residencies in the United States. The only osteopathic anesthesiology residency program without ACGME accreditation is reported to be closing.[6]

The implementation of the ACGME NAS with extension of program accreditation cycle length to 10 years prohibited use of accreditation cycle length as a meaningful metric. Program accreditation status was categorized as "Continued Accreditation," "Continued Accreditation with Warning," "Initial Accreditation (new programs)," "Initial Accreditation with Warning," "Pre-Accreditation," "Probationary Accreditation," or "Withhold/Withdrawal of Accreditation."

Designation as Pre-Accreditation was initiated to identify AOA-approved programs transitioning to the ACGME SAS (effective January 1, 2015).[4]

Program Director Characteristics

The median time since PD appointment did not change between the two time periods in our study. This metric reflects the median number of years the current PD population has been in this role. It does not reflect the mean duration of tenure of anesthesiology PDs. In other words, the median time since PD appointment measures the collective level of PDs with relatively new appointments. The ACGME resource data book includes more detailed information addressing PD turnover and tenure.[7] For example, the median and mean durations of appointment for anesthesiology PDs since July 1, 2007, is 5.2 and 6.4 years, respectively.[7] To our surprise, anesthesiology ranks among the specialties with the highest PD turnover (15.6% in 2016–2017).[7] Only preventative medicine (19.7%) and neurological surgery (16.4%) reported a higher PD turnover rate.[7]

The reported decrease in PDs with senior academic rank was largely a result of a decrease in men PDs with the rank of professor ($P = .02$). The diminishing prevalence of PDs who also serve as department chairs likely influenced these data. The number and percentage of women enrolled in ACGME-accredited anesthesiology residencies remained stable between 2017 and 2009 (35.4% in 2016–2017 vs 37.5% in 2009–2010).[8,9] The number and percentage of women anesthesiology PDs did not change significantly between the two study periods. Our previous study found 28.2% of PDs were women compared with 31.3% in the current population. The absence of a significant change in the percentage of women anesthesiology residents is of interest, given the increasing number of women medical students. However, the percentage of women anesthesiology residents and percentage of women anesthesiology PDs are similar in 2009 and 2017. This may indicate a need to evaluate mechanisms to make

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anesthesiology a more popular specialty choice for women.

This study was not designed to measure diversity criteria other than sex and age. Though difficult to accurately obtain, it would be desirable to also measure diversity more broadly, including the number of PDs from groups that are underrepresented in medicine. Ongoing analysis is required to ensure we are training an anesthesiology workforce sufficient to meet the needs of society. Similar efforts are required to support diversity and inclusion in academic anesthesiology leadership positions. The unexpected finding of a relatively high rate of PD turnover could negatively impact residency training in anesthesiology. This finding should be assessed through further study and might be addressed by activities that encourage an increased program director duration of service, such as greater recognition of the PD role for appointment to senior academic rank.

This study has several limitations. These include the presence of multiple uncontrolled variables, such as the impact of transition to the SAS and the continued trend of separating the responsibilities of the PD from those of the department chair. Data were not collected on whether programs were Advanced (3-year), Categorical (4-year), or a combination of both. Some significant differences reflect only the passage of time; for example, the significant increase in the number of PDs with time-limited certificates reflects the ABA transition in 2000. The study is also limited by being mostly observational. It provides no insight beyond reflection on many factors that may influence the outcomes. For example, it does not address the important issue of explicit or implicit sex bias on the observed number of women PDs.

Conclusions

The number of ACGME-accredited anesthesiology residency programs and the number of large programs (>50 residents) increased significantly between 2009 and 2017. The increase in the number of ACGME-accredited anesthesiology programs is largely the result of implementing the ACGME SAS. There was a statistically significant decrease in the number of ACGME-accredited anesthesiology program directors with senior academic rank (associate professor and professor). This may be influenced by the continuing trend to uncouple the roles of PD and department chair. ACGME-accredited program director characteristics that were similar in our studies include program director age, the median time since appointment as program director, and program director sex.

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Abstract

Background: Residency program directors (PD) play a critical role in graduate medical education (GME) programs. We previously published a manuscript that defined the population of programs and program directors of ACGME-accredited anesthesiology residencies and established benchmark data for comparison.1 This study compares characteristics of current anesthesiology programs and PDs with baseline data reported in our previous study.

Methods: Data were gathered through review of ACGME and American Board of Anesthesiology (ABA) websites, medical licensure records, residency program websites, and electronic search engines. Program characteristics assessed included accreditation status, number of approved positions, and previous osteopathic accreditation. PD characteristics assessed included age, academic rank, sex, time since appointment, ABA certification, and simultaneous appointment as department chair.

Results: The number of programs increased from 131 to 147 (12.2%) and was mostly (9/13, 68.2%) due to new ACGME-accreditation of preexisting osteopathic programs. PD age, sex, and time since appointment (3.6 years) did not differ between study periods. The number of PDs with senior academic rank and the number who also serve as department chairs decreased significantly.

Conclusions: The number and size of anesthesiology programs increased since our last study. This can be largely explained by ACGME accreditation of osteopathic programs. PD characteristics are similar except for a decrease in the number with senior academic rank and the number who also serve as department chairs. There was no change in the percentage of women PDs between the study periods. The high rate of anesthesiology PD turnover and low median duration of appointment merit further investigation.

Key Words: graduate medical education, residency program director, residency, sex, diversity

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Figures

Figure 1. *Comparison of ACGME accredited anesthesiology residency program size distribution in 2009 and 2017.*

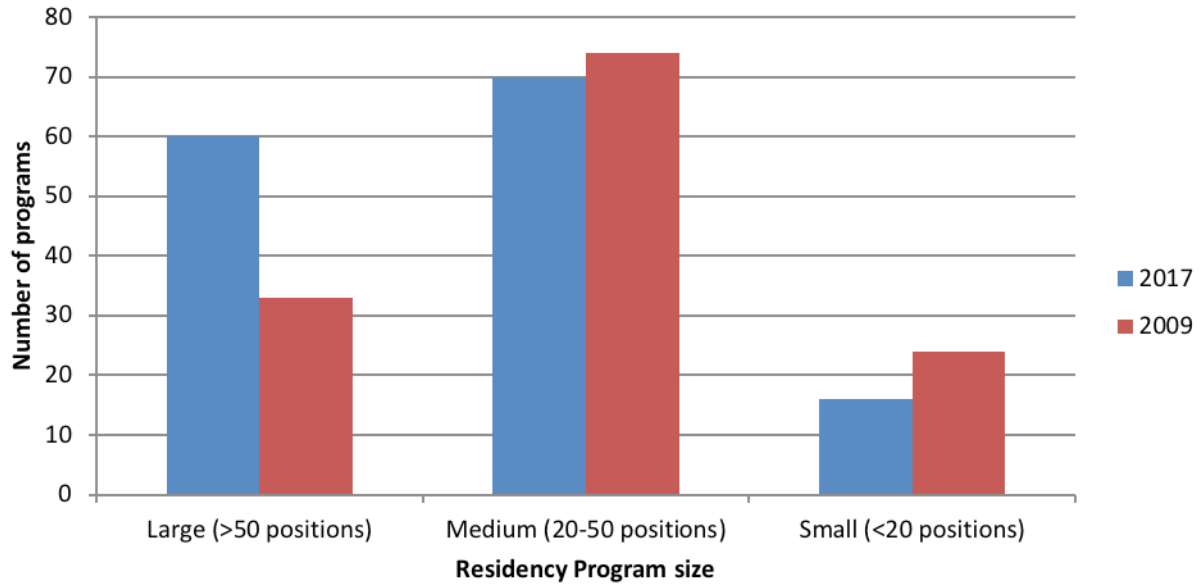
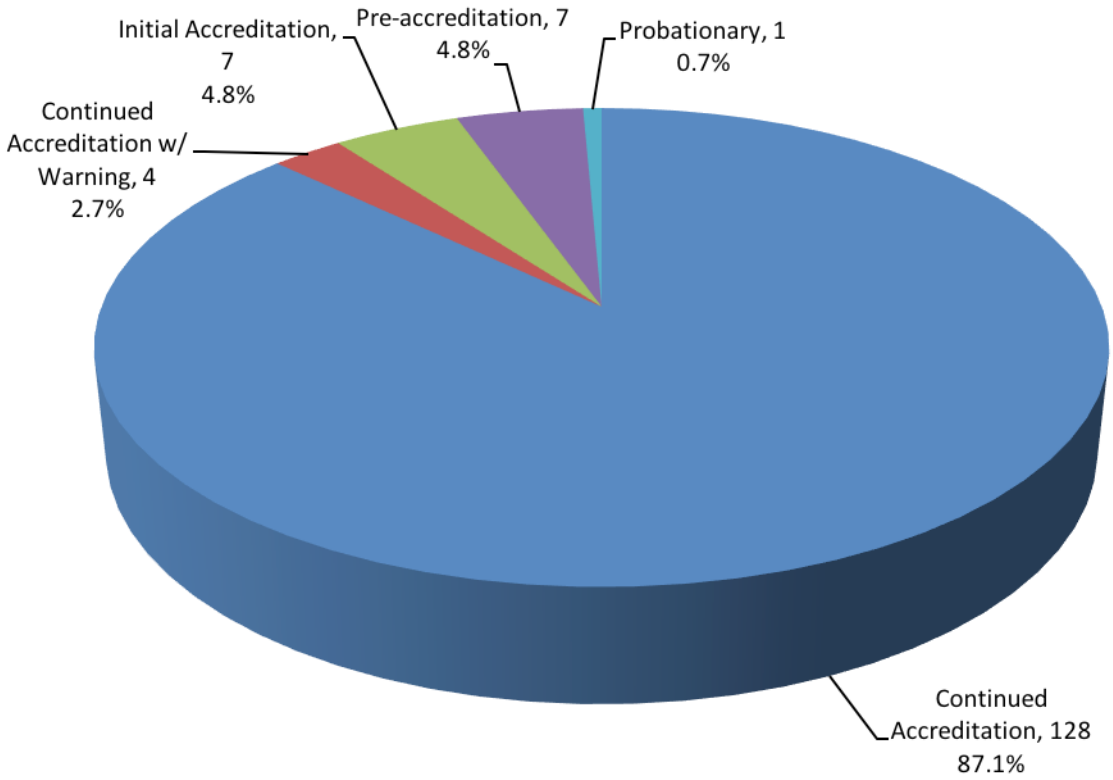


Figure 2. *Accreditation status of ACGME approved anesthesiology residency programs in 2017.*



Figures *continued*

Table 1. *Characteristic of ACGME-Accredited Anesthesiology Residency Program Directors Between Time Periods*

	2017	2009	*P* Value
Number Identified	147	131	
Age (y)[a]	52 (46–60)	52 (47–56)	0.34
Academic Rank[b]			
Senior Academic Rank[^]	78 (53.1)	89 (67.9)	0.014
Professor	28 (19.1)	43 (32.8)	0.009
Associate Professor	50 (34.0)	46 (35.1)	0.89
Assistant Professor	42 (28.6)	32 (24.4)	0.49
Instructor	1 (0.7)	1 (0.8)	1.000
None/Unknown	26 (17.7)	10 (7.6)	0.019
Sex[b]			
Male	101 (68.7)	94 (71.7)	0.60
Female	46 (31.3)	37 (28.2)	
Program Director Appointment Duration (y)[a]	3.6 (1.5–8.2)	3.7 (1.4–5.9)	0.48
Dual Appointment as Program Director and Chair[b]	8 (5.5)	24 (18.3)	0.001
Primary ABA Certificationb	139 (94.6)	129 (98.5)	0.10
Time-Limited Certificates*	86 (61.9)	26 (20.2)	<.001
Non-Time Limited Certificates	53 (38.1)	104 (79.8)	0.001
Recertified	58 (39.5)	49 (47.6)	
MOCA Participation	100 (68.0)	NA	

ACGME – Accreditation Council for Graduate Medical Education.
ABA – American Board of Anesthesiology.
[a] Median (25%–75% interquartile range).
[b] Number (%).
[^] Senior Academic Rank includes Professors and Associate Professors.
* Time-limited certification information missing for 1 program director from 2009.

Figures *continued*

Table 2. *Program Director Characteristics of Anesthesiology Residency Programs by Sex in 2017*

	Female (n = 46)	**Male (n = 101)**	***P* Value**
Academic Rank[a]			
Senior Academic Rank	27 (58.7)	51 (50.5)	0.378
Professor^	8 (17.4)	20 (19.8)	0.823
Associate Professor	19 (41.3)	31 (30.7)	0.260
Assistant Professor	16 (34.8)	26 (25.7)	0.325
Instructor	0 (0.0)	1 (1.0)	1.000
No Academic Rank	3 (6.5)	23 (22.8)	0.019
Program Director and Department Chair[a]	0 (0.0)	8 (8.0)	0.057
Age (y)[b]	52.5 (45.3–62.0)	52.0 (45.8–59.0)	0.661
Duration Since Appointmentb	3.3 (1.5–8.2)	4.1 (1.5–7.9)	0.644
Appointment Within Last 3 Years[a]	22 (47.8)	38 (37.6)	0.280
ABA Certification[a]	45 (97.8)	94 (93.1)	0.100
Time-Limited Certification[a]	15 (33.3)	38 (40.4)	0.460

[a] Number (%).
[b] Median (IQR).
^ Senior Academic Rank includes Professors and Associate Professors.

Table 3. *Characteristics of Women Anesthesiology Program Directors in 2017 vs 2009*

	2017 (n = 46)	**2009 (n = 37)**	***P* Value**
Academic Rank[a]			
Senior Academic Rank	27 (58.7)	22 (59.5)	1.00
Professor^	8 (17.4)	10 (27.0)	0.42
Associate Professor	19 (41.3)	12 (32.4)	0.50
Assistant Professor	16 (34.5)	13 (35.1)	1.00
Instructor	0 (0)	0 (0)	1.00
No Academic Rank	3 (6.5)	2 (5.4)	1.00
Department Chair[a]	0 (0)	3 (8.1)	0.09
Age (y)[b]	53 (45–62)	53 (47–56)	0.44
Duration of Appointment[b]	3.3 (1.5–8.5)	3.4 (0.9–6.9)	0.37
Appointment Within Last 3 Years[a]	22 (47.8)	18 (48.7)	1.00
Time-Limited Certification[a,*]	30 (66.7)	7 (19.4)	<.001

[a] Number (%).
[b] Median (IQR).
* One woman PD in 2017 was not ABA certified.
^ Senior Academic Rank includes Professors and Associate Professors.

Tables

Table 4. *Characteristics of Men Anesthesiology Program Directors in 2017 vs 2009*

	2017 (n = 101)	**2009 (n = 94)**	***P* Value**
Academic Rank[a]			
Senior Academic Rank	51 (50.5)	67 (71.3)	0.003
Professor^	20 (19.8)	33 (35.1)	0.02
Associate Professor	31 (30.7)	34 (36.2)	0.45
Assistant Professor	26 (25.7)	19 (20.2)	0.40
Instructor	1 (1.0)	1 (1.1)	1.00
No Academic Rank	23 (22.8)	8 (8.5)	0.01
Department Chair[a]	8 (8.0)	21 (22.3)	0.008
Age (y)[b]	52 (46–59)	51 (46–56)	0.54
Duration of Appointment[b]	4.1 (1.5–7.9)	3.9 (1.7–5.7)	0.62
Appointment Within Last 3 Years[a]	38 (37.6)	40 (42.6)	0.56
Time-Limited Certification[a,*]	56 (59.6)*	19 (20.2)	<.001

[a] Number (%).
[b] Median (IQR).
* One woman PD in 2017 was not ABA certified.
^ Senior Academic Rank includes Professors and Associate Professors.