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Research Article

Descriptive Analysis of Pulmonary Critical Care Program Directors in the United States

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Abstract

Purpose: To study the demographics, academic background, and scholarly productivity of program leadership in the field of pulmonary and critical care medicine (PCCM).

Methods: The ACGME website was accessed to obtain a list of all integrated PCCM fellowship programs and their respective program directors (PDs) and associate program directors (APDs). The variables collected from the publicly available data were age, sex, medical school, residency, and fellowship program attended, number of publications, citations, and h-index. Nonparametric statistics including Mann-Whitney U and Kruskal-Wallis tests were applied to compare differences between groups.

Results: A total of 138 PDs and 94 APDs were included in the study from 178 PCCM programs. 62% of the PDs and 57% of the APDs were male. The mean age of the total cohort was 49.75. A majority of the PDs and APDs went to American medical schools and had an allopathic medical

Conclusion: A majority of the PCCM PDs and APDs are male, have an MD degree, and are graduates of American medical schools, with the women representing only 32% of the PDs and 37% of the APDs. The research output of the male leadership was comparable to their female counterparts, with the former having a higher number of peer-reviewed publications, number of citations, and h-index.

Keywords: Pulmonary and Critical Care Medicine; Fellowship; ACGME; Program Directors

Introduction

Society of Critical Care Medicine (SCCM) pictured critical care training as an integrative endeavor in the 1970s. Although there are programs that offer separate pulmonary and critical fellowships, critical care is often integrated with pulmonary fellowship training. This binary specialization incorporates the principles of pulmonary mechanics and critical care pathophysiology. The leadership role is a fundamental skill required for physicians and, when incorporated with teamwork, leads to better patient outcomes. PDs shoulder this leadership responsibility with honor and privilege to train future pulmonary and critical care physicians. PDs have an enormous responsibility for developing, overseeing, and improving training programs while abiding by current accreditation requirements and

preparing for site visit reviews by the Accreditation Council for Graduate Medical Education (ACGME). As such, PDs play a pivotal role in education, but also in individual trainees' personal and professional growth.

There is scarce literature on the background and demographics of the PDs. The aim of this study is to evaluate the distribution of age, gender, medical training (medical school, graduate and fellowship), and scholarly productivity of PDs in the field of pulmonary and critical care medicine. It will be noteworthy because this study can be helpful for future comparative studies to assess the changing topography among the PD manpower including the burnout and turnover estimates.

Materials and Methods

This study is a cross-sectional study. Institutional review board approval was not required since no human subjects were involved. All the information gathered is publicly available.

Data source

An online search was conducted from July 2021 to September 2021. The ACGME website was accessed to obtain a list of all integrated pulmonary and critical care fellowship programs and their respective PDs. The information on PDs from pediatric pulmonology, non-integrated critical care medicine programs, and non-accredited training were excluded from the study.

Variables

Information about each PD was collected using publicly available resources. Data gathered were PDs age, sex, medical school, residency, and fellowship program that they attended. The educational background was scanned from the program-specific CV pages through the Google search engine (Alphabet Inc., Mountain View, CA). If PDs had additional fellowships, only their PCCM fellowship was included. In cases of lack of information on the program webpage, www.doximity.com (Doximity Inc., San Francisco, CA) and www.healthgrades.com (Healthgrades Operating Company Inc., Denver, CO) were used to gather the missing information. Scholarly information was collected from Scopus database and included the total number of peer-reviewed publications, citations, and Hirsch-index (h-index).

Statistical analysis

All data were initially stored in Excel 2016 (Microsoft Inc., Redmond, WA) and analyzed using SPSS version 23.0 (IBM, Armonk, New York). Nonparametric statistics including Mann-Whitney U and Kruskal-Wallis tests were applied to compare differences between groups. A *p*-value of <0.05 was considered significant.

Results

A total of 138 PDs and 94 APDs were included in the study from 178 PCCM programs. PDs were predominantly male, constituting 62% (86/138) of the cohort vs female (45/138 [33%]) and unknown (7/138 [5%]) (Figure 1a). APDs had a similar distribution of male (54/94 [57%]) vs. females (35/94 [37%]) and unkown (5/94 [6%]) (Figure 1b). There was a significantly higher number of female APDs than female PDs ($p < 0.001$). The mean age of the total cohort was 49.75 years (SD 9.426). There was no significant difference between the mean age of PDs [mean, SD] (49.79, 9.347) and APDs (49.68, 9.6). However, females were slightly younger than their male counterparts [mean, SD] (47.6, 8.2vs. 50.9, 9.8; $p = 0.018$) (Figure 2). Three-quarters (97/130) of PDs attended US medical schools. The APDs showed a similar trend, with 70% attending US medical schools. An overwhelming majority (91%) of PDs had an allopathic medical degree (MD) vs. only five (4%) with osteopathic medical degree (DO) (data missing for 5%). Similarly, most APDs had an MD (92%). Full breakdown represented in table 1 and 2.

Figure 1: Comparison of gender distribution amongst. A. PCCM PDs, and b. PCCM APDs.

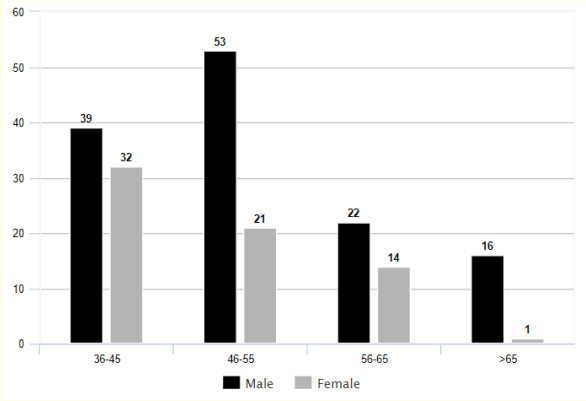

Figure 2: Age distribution of the PCCM PDs and APDs divided by gender.

Degree	PD (138)	APD (94)
MD	126 (91%)	86 (92%)
DO	5 (4%)	3 (3%)
Data missing	7 (5%)	5 (5%)

Table 1: Distribution of MD vs DO degree amongst the PDs and the APDs.

Medical School	PD (138)	APD (94)
AMG	97 (70%)	66 (70%)
IMG	29 (21%)	20 (22%)
US-IMG	4 (3%)	3 (3%)
Data missing	8 (6%)	5 (5%)

Table 2: Distribution of medical schools attended by the PDs and the APDs.

The most common medical schools attended were New York University School of Medicine (4), Johns Hopkins University School of Medicine (4), Temple University School of Medicine (4), and Weill Cornell Medical College (4). Amongst the residency programs, the most common were University of Washington (3), Loma Linda University Health Education Consortium Program (3), University of Chicago (3), UCSF (3), Northwestern University (3), University of Michigan (3), Boston University Medical Center (3), Mayo School of Graduate Medical Education (3), Mount Sinai School of Medicine (3), and University of Pennsylvania (3).It is noteworthy that all the most commonly attended medical schools lie in the northeast region of the US but the most commonly attended residency programs have a much broader distribution with Midwest region (12) leading the other regions, followed by the northeast (9) and the west (9). The median year of fellowship for the cohort was 2008. Amongst fellowships, the most common PCCM fellowship programs attended were University of Colorado (4) and Mayo School of Graduate Medical Education (4). There was no significant difference between the PDs and APDs in the number of years in practice [mean, SD] (22.6, 9.5vs 22.9, 10; p = 0.847). However, there was a significant difference in the number of years in practice between the females and the males [mean, SD] (20, 8.4vs 24.2, 10.2; p = 0.003)

There was no significant difference between PDs and APDs in the mean number of publications [mean, SD] (24.4, 32.8 vs 25.5, 64.1; p = 0.573), citations (944.3, 2914 vs 785.7, 3022.4; p = 0.771), and their h-index (9.2, 10.7vs 8.3, 11.2; p = 0.508). However, there was a significant difference between males and females in the number of publications [mean, SD] (30.1, 58.6vs 15.6, 15.5; p = 0.036), citations (1162.2, 3647.6vs 383.6, 612.3; p = 0.047), and their h-index (10.1, 12.8vs 6.6, 5.9; p = 0.023).

Discussion and Conclusion

Our study was designed to perform a descriptive analysis of the demographics, academic background and scholarly productivity of the PCCM program leadership in the United States. Significant differences were found in the gender representation in the role of both PD and APD. The mean age was approximately 49 years for both PD and APD positions. Additionally, a minority of PDs and APDs were found to have training in international medical schools or osteopathic schools.

Amongst the numerous demographic variables assessed in the study, the difference in gender was remarkable. Only 32% of the PDs and 37% of the APDs were female. The females in leadership positions were noted to be younger than males. Academic output quantified as the number of publications, citations, and the h-index were comparable between males and females. This observation was similar to trends in other medical specialties such as cardiology and gastroenterology. In a study conducted by Khan., *et al*. in 2015, only 14% of the PDs in cardiology fellowship were females [1]. Additionally, this representation at the leadership level is likely due to similar enrollment numbers in first-year female PCCM fellows in

training programs across the country. Only 33% and 30% of first-year fellows were female in the academic years of 2019/2020 and 2010/2011, respectively [2]. This polarity in the gender distribution within PCCM fellowships has been postulated to be at multiple transition points, especially by the number of resident applicants. This disparity brings in questions about incentives for women to apply for PCCM fellowship, interview selection and process, and the subsequent ranking methods [4]. This underrepresentation has been identified in the past, with numerous factors such as a lack of mentorship, female role models, and a balance between personal and professional life.

Our study also noted that 4% of the PDs and 3% of APDs had graduated from osteopathic schools. The representation of osteopathic graduates amongst PCCM fellowships has steadily increased from 5% in 2010/2011 to 13% in 2019/2020 [2]. The median year of fellowship graduation of PDs and APDs in our study was 2008 and is reflected in the representation of DOs at fellowship leadership positions. The ACGME, American Osteopathic Association (AOA), and the American Association of Colleges of Osteopathic Medicine (AACOM) agreed to transition to a single accreditation system in July 2020, the effect of which will become apparent in the upcoming cycle of fellowship match [5]. Osteopathic graduates will have more accessible to all fellowships programs, including PCCM, and will help to bridge a significant national shortage of pulmonary and critical care specialists [6].

The ABIM FasTrack program data indicates the International Medical Graduates (IMG) representation in the fellowship in the last decade has remained consistently high: 63% in 2010/2011 to 60% in 2019/2020 [2]. However, only 25% of PCCM fellowship PDs and 26% of the APDs graduated are IMGs. The reasons for this could be related to the mandatory immigration requirements for many IMGs to work at nonacademic institutions in underserved areas after completion of their training.

There are several limitations to our study. Our study was a cross-sectional analysis, without temporal trends, and serves primarily as a baseline for future studies. Additionally, the study analyses the data from the era prior to the COVID-19 pandemic and does not consider the pandemic's direct effects on the career choices of physicians within the PCCM fellowship [7-9]. The results of the study do not include variables in the background of included sample size, such as academic involvement at the institution, duration of tenure, burnout, awards, and recognition as these parameters are less publically available. The study results cannot be extrapolated to the entire PCCM community, as leadership roles in national and regional organizations and committees were not considered. Additionally, several important confounders were not analyzed, such as work hours and compensation, both of which are highly variable across institutions and geography. These factors could influence the decision to pursue a career in academic medicine.

In conclusion, a majority of the PCCM PDs and APDs are male, have an MD degree, and are graduates of American medical schools, with the women representing only 32% of the PDs and 37% of the APDs. The research output of the male leadership was comparable to their female counterparts, with the former having a higher number of peer-reviewed publications, number of citations, and h-index. Further studies can be performed to look into the evolving trends and changes in the demographics, representation, and academic output of the leadership of the PCCM programs across the country.

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