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Authors

Assemi, Mitra
Hudmon, Karen Suchanek
Sowinski, Kevin M
[et al.](#)

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RESEARCH

Educational Background and Academic Rank of Faculty Members within US Schools of Pharmacy

Mitra Assemi, PharmD,^a Karen Suchanek Hudmon, DrPH, MS, RPh,^{a,b} Kevin M. Sowinski, PharmD,^b Robin L. Corelli, PharmD^a

^a University of California, San Francisco School of Pharmacy

^b Purdue University College of Pharmacy, Indianapolis, Indiana

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Objective. To characterize the educational background and academic rank of faculty members in US schools of pharmacy, estimate the extent to which they are employed by institutions where they received previous training, and determine whether differences in degree origin and rank exist between faculty members in established (≤ 1995) vs newer programs.

Methods. A cross-sectional study was conducted using the American Association of Colleges of Pharmacy (AACCP) faculty database and demographic information from the public domain.

Results. Among 5516 faculty members, 50.3% held two or more types of degrees. Established schools had a higher median number of faculty members and a higher mean faculty rank than did newer schools.

Conclusion. The difference in mean faculty rank highlights the shortage of experienced faculty members in newer schools. Future research efforts should investigate educational attainment in correlation to other faculty and school characteristics and prospectively track and report trends related to pharmacy faculty members composition.

Keywords: pharmacy education, pharmacy faculty, workforce, academic teaching, leadership

INTRODUCTION

Over the past two decades, there has been a substantial growth in the number of pharmacy colleges and schools nationwide. This growth was partly in response to the shortage of pharmacists projected by US Health and Human Services in 2000.¹ Those projections were based on several observed factors, including but not limited to increasing prescription volume, expanded market growth and competition among the retail sector, growing complexity in medication therapy and expanded pharmacist roles and services, and changing workforce demographics.

In 1995, there were 75 schools of pharmacy in the United States, a number that had remained essentially unchanged for 25 years.² According to the Accreditation Council for Pharmacy Education (ACPE), as of April 2015 there were 130 US-based schools with accredited (full or candidate status) programs and three schools with precandidate status.³ In 1995, 34 358 students were enrolled in pharmacy professional degree programs,⁴ and by

2013 this number had risen to 62 801.⁵ As of 2010, growth in student numbers had been driven primarily through the enrollment expansion within existing programs.^{2,6}

Moving forward, however, continued growth in the number of pharmacy students is estimated to be driven primarily by new (post-1995) schools.⁶ This rapid expansion (73% more programs, and 83% more students) has led to an increased demand for faculty members to counter the existing shortage of qualified faculty members in schools of pharmacy.^{2,7} In an editorial, Romaneli and Tracy posited that external factors in health care and a projected surplus of pharmacists will further disrupt and challenge pharmacy academia.⁸

For schools of pharmacy to meet educational standards for the delivery of a professional program, specific criteria set forth by ACPE must be achieved. The guidelines provide quantitative and qualitative factors that must be met to ensure a mix of qualified faculty members.⁹ Included in these factors is the requirement for an appropriate mix of academic titles and experiences within each discipline and an adequate number of faculty members to allow for delivery of the curriculum, research and scholarship, faculty development, student/faculty mentoring activities, and university/school and public service.⁹

Corresponding Author: Mitra Assemi, PharmD, Department of Clinical Pharmacy, University of California, San Francisco School of Pharmacy, 533 Parnassus Ave. [U-585], Box 0622, San Francisco, CA 94143-0622. Tel: 559-499-6515. Fax: 559-499-6513. E-mail: Mitra.Assemi@ucsf.edu

Furthermore, factors such as the migratory paths of faculty members and the extent to which the school employs its own graduates—a potentially important factor defining the overall diversity of experience among faculty members at any given school—have not been studied. The global assessment of these factors is challenging, and the composition of faculty members in the pharmacy academy has not been well studied. To better understand these issues, the objectives of this study were to characterize the educational background and academic rank of faculty members in US schools of pharmacy, estimate the extent to which faculty members are employed by institutions where they received previous training, and determine whether differences in degree origin and rank exist between faculty members in established vs newer programs.

METHODS

This cross-sectional study characterized full-time faculty members, defined as those holding academic appointments reflective of teaching and/or research responsibilities, at US schools of pharmacy with full or candidate ACPE accreditation status as of August 1, 2011. An electronic roster of 6448 individuals characterized as faculty of American Association of Colleges of Pharmacy (AACP) member institutions was obtained from the association in August 2011. Data provided in the roster included first and last names, degree, highest degree, discipline, job title, institution, and state. During the initial phase of data screening, individuals who were the only faculty member listed at a school ($n=2$) or who were employed at non-US pharmacy schools ($n=345$) were excluded. The remaining 6101 individuals representing 122 US schools were included in the data collection.

For each faculty member, detailed Internet searches were conducted to collect information not available in the AACP database including degree(s) obtained (bachelor's of science in pharmacy (BSP Pharm), doctor of pharmacy (PharmD), any master's degree, doctor of philosophy (PhD), or other doctoral degree), whether non-PharmD doctoral degrees were conferred by a school of pharmacy, and the name and location (US or foreign) of the institution conferring the BSP Pharm, PharmD and PhD degrees. Educational background information was obtained from school, department, university, or individual faculty web pages. If no information was available from these sources, investigators conducted web-based searches by faculty name using LinkedIn (Mountain View, CA) and Google (Mountain View, CA) to identify education and training information. The term "junior faculty" described assistant professors and the term "senior faculty" described associate or full professors.¹⁰

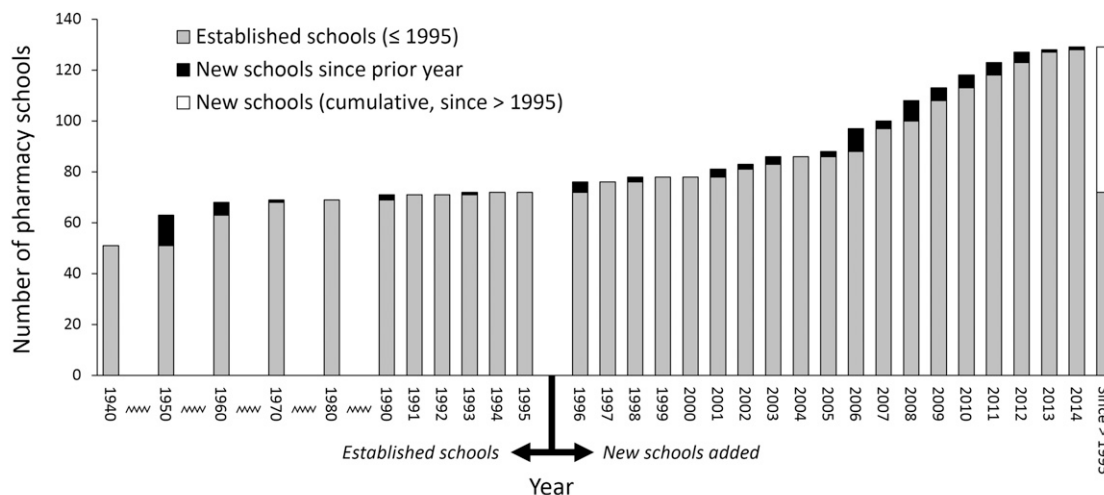
For each school, the year of establishment was ascertained via the ACPE website. These were dichotomized to categorize schools as "established" (older than 1995) vs "new" (established since 1995), reflecting the time point when there was a substantial increase in the total number of pharmacy schools^{2,10} (Figure 1). If two researchers could not independently identify information via the Internet regarding a specific faculty member, the terminal degree listed in AACP's database was used, and the remaining data were coded as "unable to determine." For quality assurance, the accuracy of 5% of all database entries was verified by three researchers. No researcher verified the same data that he or she was assigned to collect. Standard summary statistics were computed at the faculty level and, where appropriate, at the school level. Group comparisons were conducted using Chi-square analyses or Mann Whitney U tests, as appropriate. The a priori significance level was set at $p<0.05$. Analyses were conducted using SPSS, v22 (IBM, Armonk, NY).

RESULTS

Of the 6101 faculty members employed at 122 accredited US schools in 2011, 585 were excluded during the data collection phase because they were identified as holding a nonacademic appointed position (eg, accountant, admissions director, chief financial officer, librarian, research coordinator). Included in the analyses were 5516 faculty members who met the study inclusion criteria.

The median (IQR) number of faculty members per school was 42 (30-59), and this differed (Mann Whitney $U=297$; $p<0.001$) between established (median, 52; IQR, 40-66) and new schools (median, 26; IQR 17-34). The most common degrees attained by faculty members were PharmD (52.0%), BSP Pharm (33.4%), master's degree (27.8 %), and PhD (45.0%; of these, 41.4% were conferred by a school of pharmacy) (Table 1). Just over half of all faculty members (50.3%) held two or more types of degrees, with 935 (17.0%) holding both a BSP Pharm and a PharmD. Among all faculty members, nearly one third (31.5%) did not hold a pharmacy professional degree. Table 2 summarizes educational attainment for 3376 faculty members with one or more pharmacy professional degrees (BSP Pharm and/or PharmD), stratified by established vs new schools.

Among all faculty members with one or more pharmacy professional degrees (BSP Pharm and/or PharmD), the most common degree-conferring alma mater institutions were: University of Illinois Chicago ($n=119$), University of Tennessee ($n=119$), University of California San Francisco ($n=117$), University of Kentucky ($n=110$), and The University of Texas-Austin ($n=100$). For school of pharmacy-affiliated PhDs, the most common degree-conferring alma



* Fully-accredited or candidate status, whichever occurred first.

Figure 1. Year of First Accreditation Council for Pharmacy Education Accreditation Status* (BSP Pharm or PharmD): established vs new schools.

mater institutions were: Purdue University (n=55), University of Minnesota (n=51), University of Wisconsin-Madison (n=41), University of California San Francisco (n=37), and The Ohio State University (n=35).

Among all faculty members, 12.4% received one or more degrees (BSP Pharm, PharmD, or PhD) from outside of the United States, and this did not differ ($p=0.91$)

between established (12.4%) and new schools (12.5%). Similarly, the proportion of faculty members with a PhD conferred from an institution outside of the United States did not differ ($p=0.20$) between established (18.3%) and new schools (15.8%). Of 147 faculty members with both a PharmD and PhD degree, 80 (54.4%) received the two degrees from different institutions.

Table 1. Educational Attainment and Rank of Faculty Members (n=5516^a) at Schools of Pharmacy, n (%)

| Characteristic | Categories | Established Schools (n=78) | New Schools (n=44) | All Schools (n=122) |
|---|---------------------------------|----------------------------|--------------------|---------------------|
| Degree(s) obtained ^b | BSP Pharm | 1482 (33.9) | 360 (31.5) | 1842 (33.4) |
| | PharmD | 2232 (51.0) | 637 (55.8) | 2869 (52.0) |
| | Master's | 1224 (28.0) | 312 (27.3) | 1536 (27.8) |
| | PhD | 2027 (46.3) | 457 (40.0) | 2484 (45.0) |
| | SOP-affiliated PhD ^c | 729 (39.5) | 206 (49.6) | 935 (41.4) |
| | Other doctorate ^d | 145 (3.3) | 42 (3.7) | 187 (3.4) |
| Total number of degrees obtained ^c | 0 | 5 (0.1) | 0 | 5 (0.1) |
| | 1 | 2122 (48.5) | 614 (53.8) | 2736 (49.6) |
| | 2 | 1776 (40.6) | 398 (34.9) | 2174 (39.4) |
| | 3 | 448 (10.2) | 122 (10.7) | 570 (10.3) |
| | 4 | 23 (0.5) | 8 (0.7) | 31 (0.6) |
| Faculty rank ^f | Assistant Professor | 1659 (41.7) | 638 (66.7) | 2297 (46.6) |
| | Associate Professor | 1244 (31.3) | 223 (23.3) | 1467 (29.8) |
| | Full Professor | 1071 (27.0) | 96 (10.0) | 1167 (23.7) |

^an=4374 faculty members at established schools; n=1142 faculty members at new schools

^bCategories are not mutually exclusive

^cFor 223 faculty (9.0% of PhD degrees conferred), school of pharmacy (SOP) affiliation was not determinable. Percentage computed based on PhD degrees for which affiliation was determinable (n=2261)

^dOther doctoral degrees include medical doctor (n=94), juris doctor (n=30), doctor of veterinary science (n=13), doctor of public health (n=6), other (n=44)

^eTotal count includes BSP Pharm, PharmD, master's, PhD, or other doctorate. Does not include non-pharmacy undergraduate degrees and counts only one degree of each type per faculty member. Categories not mutually exclusive

^fExcludes n=585 for whom rank was not determinable

Table 2. Educational Attainment of Faculty Members [n=3,776^a Holding One or More Professional Degrees, n (%)]

| Degree(s) Obtained | Additional Degree ^b | Established Schools (n=78) | New Schools (n=44) | All Schools (n=122) |
|---|--------------------------------|----------------------------|--------------------|---------------------|
| BSPHarm degree only | | 70 (2.4) | 22 (2.6) | 92 (2.4) |
| PharmD degree only | | 1252 (42.6) | 423 (50.6) | 1675 (44.4) |
| BSPHarm and PharmD degrees only | | 641 (21.8) | 131 (15.7) | 772 (20.4) |
| BSPHarm degree (n=907) with additional degree ^c | Master's | 372 (52.5) | 105 (52.8) | 477 (52.6) |
| | PhD | 547 (77.3) | 156 (78.4) | 703 (77.5) |
| | Other doctorate | 23 (3.2) | 4 (2.0) | 27 (3.0) |
| PharmD degree (n=1934) with an additional degree ^d | Master's | 125 (8.6) | 42 (8.8) | 167 (8.6) |
| | PhD | 90 (6.2) | 12 (2.5) | 102 (5.3) |
| | Other doctorate | 7 (0.5) | 6 (1.3) | 13 (0.7) |
| BSPHarm and PharmD degrees (n=935) with additional degree | Master's | 108 (14.0) | 27 (16.8) | 135 (14.4) |
| | PhD | 36 (4.7) | 9 (5.6) | 45 (4.8) |
| | Other doctorate | 4 (0.5) | 0 | 4 (0.4) |

^an=2940 faculty members at established schools; n=836 faculty members at new schools

^bCategories not mutually exclusive

^cDoes not include faculty members who also have obtained a PharmD degree

^dDoes not include faculty members who also have obtained a BSPHarm degree

Of faculty members who had a determinable rank of assistant, associate, or full professor (n=4931), 46.6% were assistant professors, 29.8% were associate professors, and 23.7% were full professors (Table 1), and this differed between established and new schools ($\chi^2=212.7$, $p<0.0001$; excludes one new school that had three faculty administrators with no determinable faculty rank). Compared to new schools, greater proportions of faculty members were observed at more senior ranks among established schools.

Just over one fifth of faculty members (n=1209; 21.9%) were employed at the time by a school where they had received their BSPHarm, PharmD, or school of pharmacy-affiliated PhD. For individuals with a BSPHarm and/or PharmD, 31.8% (n=1200 of 3776) were employed by an alma mater school. For individuals with a school of pharmacy-affiliated PhD, 14.8% (n=138 of 935) were currently working at their PhD alma mater school. Nearly three quarters of pharmacy schools (88 of 122, 72.1%) employed at least one alumnus faculty member (with a BSPHarm, PharmD, or school of pharmacy-affiliated PhD). For 40% of schools, 25% or more of their faculty members were alumni. The remaining 34 schools without an alumni faculty member were all founded after 1995. At schools established prior to 1996, faculty members employed by their alma mater ranged from 5% to 50%, with a median of 27%.

DISCUSSION

Our study provides a snapshot of the educational background of faculty members at US schools of pharmacy. Almost all faculty members possess either a PharmD

or another advanced degree (ie, master's or PhD), which is consistent with accreditation standards for faculty members in pharmacy education.⁹ Our finding that 31.5% of faculty members did not hold a professional degree was consistent with those reported from an AACP task force in 2008.¹¹ One in two individuals held more than one professional (BSPHarm, PharmD) and/or advanced degree (eg, master's, PhD).

One in ten (12.4%) faculty members received one or more degrees from outside the United States. The educational and professional experiences these individuals bring with them may help further diversify academia beyond traditional demographic factors.^{12,13} While the quality of training at unaccredited international schools is not known, individuals trained at these institutions are valuable resources as both pharmacy education and the profession adopt an increasingly global perspective within and across academic institutions and health care settings. This increased diversity also has practical implications for schools and the academy. Best practices for orientation and acculturation of faculty members educated abroad to US pharmacy education and practice and for mentoring efforts to facilitate longer-term job satisfaction, individual success, and retention, remain to be determined.

Currently, little is known regarding the extent of "in-breeding" or its effects within pharmacy academia. Our study revealed that one in five faculty members were employed by a school where they had received one or more professional degrees and/or PhD degree. The proportions were higher for those holding a professional degree (31.8%) and lower for those with a school of pharmacy-affiliated PhD (14.8%). Most schools (72.1%) employed

at least one alumnus, and all established schools had one or more alumni of its professional and/or PhD degree program(s) on faculty.

Factors influencing career decisions of pharmacy faculty members are described,¹⁴ but reasons graduates return to their alma mater for employment at some point in their career remains unexplored. Nurturing home-grown talent might facilitate recruitment and retention and potentially offset some efforts required to orient new faculty members to an institution or curriculum. Drawing upon an institution's own graduates, however, might come with hidden costs, such as inadvertently squelching diversity achieved through the addition of individuals with educational and professional experiences from outside the program, institution, and/or geographical region. Future studies might focus on the impact alumni composition among faculty members has on recruitment and retention, as well as the extent to which graduates return to their alumni institutions as administrative leaders (eg, department heads or deans).

Finally, our results related to academic rank are consistent with those from previous studies that investigated the distribution and trends related to faculty rank at US pharmacy schools.^{10,11,15} Newer schools had a significantly fewer faculty members and a lower mean faculty rank than did established programs, which could impact faculty mentoring and retention. While previous reports projected a shortage of both basic sciences and practice faculty members,^{7,11} continued annual growth in both pharmacy and PhD graduates is predicted to alleviate any faculty shortage in the near future.^{16,17} While this growth might ultimately diminish the current shortage of qualified candidates for academic positions, there remains an ongoing need for long-term faculty retention to ensure a healthy balance in academic rank within schools. Newer programs must also identify ways to increase the numbers of experienced faculty members to mentor junior faculty members to enhance retention and success.

These study findings, including those related to rank, depend on self-reported information from schools to AACP for inclusion in the annual roster, and differences might exist in how schools classify and report faculty members to AACP.¹¹ Any errors of omission and/or misinformation within the original AACP faculty roster could, therefore, have impacted the study results. The public domain was the primary source for the data in this study, and web-based information, including that found on social media and/or professional web sites, was not validated. Given that the study sample included the known population at a point in time, these limitations are unlikely to significantly impact findings. Our study was conducted using a faculty roster from 2011/2012; given the extent of growth within

programs, the shortage of qualified individuals for academic positions, and the fact that faculty composition can be dynamic rather than static, the results for some institutions might already have changed.

Additionally, it is possible that new schools had not yet fully populated their entire faculty workforce at the time of data collection. As such, the total number of faculty members at those schools would be lower, and the cross-section of faculty members might not be fully representative of their final faculty population (ie, after the full pharmacy degree program is developed). Despite these factors, this study provides new information that could guide further quantitative and qualitative research on the workforce at schools of pharmacy. Additional research and prospective monitoring of newly hired faculty characteristics (eg, postgraduate training and board certification)¹⁸ is needed to characterize and further investigate factors associated with advancement of faculty members within academic pharmacy and the capacity of pharmacy schools to meet accreditation standards.⁹

CONCLUSION

This study characterized the educational background and rank of pharmacy faculty members in the United States and provided additional insight regarding the educational attainment of pharmacy faculty members. As the growth in programs continues, future research efforts should investigate educational attainment in correlation to other faculty members (eg, demographics, credentials, discipline, experience) and school characteristics and prospectively track and report trends related to pharmacy faculty composition.

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