

Original Research

Journal publications by pharmacy practice faculty evaluated by institution and region of the United States (2001-2003)

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ABSTRACT*

Objective: To compare the quantity of manuscripts published in journals by departments of pharmacy practice at schools and colleges of pharmacy in the United States for the years 2001-2003.

Methods: We utilized the Web of Science bibliographic database to identify publication citations for the years 2001 to 2003 which were then evaluated in a number of different ways. Faculty were identified via American Association of Colleges of Pharmacy rosters for 2000-2001, 2001-2002, and 2002-2003 academic years.

Results: Rankings were done based on the number of publications per institution and average number of publications per faculty member at an institution. Upon linear regression analysis, a relationship exists between an institution's faculty size and the total number of publications but not for tenure/nontenure-track faculty ratio. Rating highest in overall publication number did not guarantee high rankings in the average number of publications per faculty member at an institution assessment. Midwestern schools were responsible for more publications per institution than other regions. Many schools only generated minimal scholarship over this evaluative period.

Conclusion: While many schools have pharmacy practice faculty that strongly contributed to the biomedical literature, other schools have not. Pharmacy practice faculty in the Midwest publish more journal manuscripts than faculty in other regions of the country. More pharmacy schools need to engage their faculty in scholarly endeavors by providing support and incentives.

Keywords: Bibliometrics. Faculty. Pharmacy Schools. United States.

RESUMEN

Objetivo: Comparar la cantidad de manuscritos publicados en revistas por departamentos de práctica farmacéutica (farmacia práctica) en las escuelas y facultades de farmacia en los Estados Unidos entre los años 2001-2003.

Métodos: Utilizamos la base de datos bibliográfica de Web of Science para identificar las citas de publicaciones de los años 2001 a 2003 que fueron evaluadas de varias diferentes formas. Los académicos fueron identificados mediante los registros de la Asociación Americana de Facultades de Farmacia para los años académicos 2000-2001, 2001-2002, y 2002-2003.

Resultados: Se realizaron ranking con el número de publicaciones por institución y la media de publicaciones por miembro académico de la institución. Mediante un análisis de regresión lineal, existe una relación entre el tamaño de una institución y el número total de publicaciones, pero no para el ratio de académicos titulares/no titulares. Puntuar en lo más alto del ranking de publicaciones totales no garantizó las puntuaciones en la evaluación del número de publicaciones por miembro académico en la institución. Las facultades del Medio-Oeste fueron responsables de más publicaciones por institución que las otras regiones. Muchas facultades solo generaron una mínima producción durante este periodo de evaluación.

Conclusión: Mientras muchas facultades tienen académicos de farmacia práctica que contribuyen fuertemente a la literatura biomédica, otras facultades no. Los académicos de farmacia práctica del Medio-Oeste publicaron más manuscritos en revistas que los académicos de otras regiones del país. Más facultades de farmacia necesitan involucrar a sus académicos en acciones científicas proporcionando apoyo e incentivos.

Palabras clave: Bibliometría. Académicos. Facultades de farmacia. Estados Unidos.

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(English)

INTRODUCTION

Pharmacy practice faculty have many important roles and responsibilities including teaching, clinical practice, service and scholarship. While there was an attempt to define the general level of research

amongst pharmacists, these attempts have been hampered by methodological issues such as survey response rates and risks of selection bias.¹ To our knowledge, there has not been an objective and comprehensive comparison of the scholarly contributions to journals of individual pharmacy practice departments and departments in different regions of the country in the United States. As such, we sought to compare the quantity of manuscripts published in journals by departments of pharmacy practice at schools and colleges of pharmacy in the United States for the years 2001-2003.

METHODS

All faculty members in departments of pharmacy practice at accredited United States schools or colleges of pharmacy were eligible for inclusion in this analysis. Faculty members were identified through review of the American Association of Colleges of Pharmacy (AACP) faculty rosters for the academic years 2000-2001, 2001-2002 and 2002-2003. Faculty members (including deans and department heads if allocated to the pharmacy practice department in the roster) regardless of tracking (tenured, tenure track or non-tenure track) were included if they were listed as being members of the department of pharmacy practice at their respective institution. Part-time faculty and faculty emeritus were excluded from this analysis.

For this evaluation, we used the Web of Science bibliographic database (The Thomson Corporation; www.thomsonisi.com) to identify relevant publication citation records. The Web of Science's "Science Citation Index Expanded" indexes all significant document types (original research, reviews, editorials, letters, etc.) for approximately 6,376 unique journals. Each citation record contains information such as the publication's title, authors, abstract, institutional affiliations and addresses, keywords, cited references and other document details. The Web of Science database was used in this evaluation because of its unique "analyze" function that allows users to review the results of queries through various pre-built reports as well as to download query results into a spreadsheet program for further manual analysis.

We used the "advanced search" page for this evaluation. This page allows the creation of complex queries using two-character field tags and multiple query combinations. The initial query was limited to the years 2001-2003 and used the two-character field tag "AU" (searches only the author field within a record) and included each faculty members name combined with the Boolean operator "OR". Names were entered as last name, first initial, middle initial (when available) as listed in the AACP Faculty Rosters. Following the listing of each author, this query was combined using the Boolean operator "AND" with the two-character field tag "AD" and the word "pharm" (searches only the address field of a record for the word "pharmacy"). Resulting citation records of publications were then further scrutinized using the above-mentioned "analyze" function. First, citation records for meeting abstracts, letters to the editor, and corrections were

excluded since these publication types generally do not undergo rigorous peer review. Next, citation records not containing an affiliation with an accredited U.S. school or college of pharmacy in the address field was excluded, yielding our final listing of publication citation records.

This final listing of publication citation records was then examined both manually and using the Web of Science analysis tools. In this evaluation we report general publication statistics and publication statistics by institution (taking faculty size, ratio of tenured/tenure-track to non-tenure-track and regional considerations into account). Data on the number of faculty per institution and faculty "tracking" (e.g., tenured, tenure-track or non-tenure track) were obtained from AACP's institutional database.

The relationship between the number of publications and either faculty size or the ratio of tenured/tenure-track (TT) to non-tenure-track (NTT) faculty were assessed through the use of linear regression with a p value of <0.05 being statistically significant.

According to the ascribed methodology above, we counted the number of publications per institution. As such, if 4 authors from the same institution were all on the same publication, the institution would get credit for one publication. If there were faculty at two pharmacy schools collaborating on the same project, according to our methodology, both institutions would get credit for one publication.

RESULTS

General Publication Statistics

There were 2,374 full-time pharmacy practice faculty members affiliated with a U.S. school or college of pharmacy during the 2001-2003 evaluation period and 2,593 citations were found upon initial query of their names. Of these, 347 were excluded electronically by limiting the query to full articles, reviews or editorials and 350 were excluded electronically due to their lack of affiliation with an accredited U.S. school or college of pharmacy. Thus 1,896 publications authored by Pharmacy practice faculty were identified for the years 2001 – 2003.

Publication Statistics By School or College of Pharmacy

Institutions' rankings (ranking of pharmacy practice faculty publication of manuscripts in journals included in Web of Science within an institution) by both the total number of publications per institution and an institution's average number of publications per faculty member are provided in Table 1. While the top 10% of institutions (based on total numbers of publications) had pharmacy practice faculty averaging 27 publications per institution per year, the bottom 10% averaged less than 1 publication per year.

When all institutions were assessed, there is a relationship between an institution's faculty size and the total number of publications produced ($p < 0.001$)

but there does not appear to be a strong relationship between an institution's TT/NTT faculty ratio and the total number of publications produced ($p=0.30$).

Table 2 evaluates the total number of manuscripts published in journals included in Web of Science for all institutions in a geographical region and the

mean number of publications per institution within that region. Institutions in the Midwest were responsible for more publications per institution than the other regions. The South region was responsible for more publications per institution than the West, while the Northeast region was responsible for the least publications per institution.

Table 1. Publication Statistics by Institution 2001-2003

Institution Name	No. Pub	Rank - No. Pub	Tot. No. Faculty	No. NTT Faculty	No. TT Faculty	TT/NTT Ratio	Pubs/Faculty	Rank - Pubs/Faculty
University of Illinois [^]	99	1	119.3	107.7	11.7	0.1	0.8	50
University of Tennessee	91	2	38.3	17.3	21.0	1.2	2.4	13
University of Pittsburgh	86	3	45.0	38.3	6.7	0.2	1.9	20
University of Texas - Austin	83	4	20.3	12.3	8.0	0.6	4.1	2
University of Michigan	82	5	39.0	29.0	10.0	0.3	2.1	16
University of Wisconsin	80	6	19.3	18.3	1.0	0.1	4.1	2
University of Minnesota	73	7	25.3	11.3	14.0	1.2	2.9	9
University of Iowa	72	8	28.7	17.0	11.7	0.7	2.5	12
University of North Carolina	71	9	20.3	11.7	8.7	0.7	3.5	5
University of Colorado	65	10	25.3	20.0	5.3	0.3	2.6	11
Wayne State University	64	11	20.7	11.7	9.0	0.8	3.1	7
University of California San Francisco	63	12	34.3	32.0	2.3	0.1	1.8	21
University of Florida	62	13	22.0	12.3	9.7	0.8	2.8	10
University of Connecticut	61	14	14.3	10.0	4.3	0.4	4.3	1
Ohio State University	61	14	16.7	6.3	10.3	1.6	3.7	4
Purdue University	51	16	23.3	10.3	13.0	1.3	2.2	14
University of Missouri	51	16	23.3	12.0	11.3	0.9	2.2	14
Virginia Commonwealth University	51	16	30.7	20.3	10.3	0.5	1.7	25
University of Kentucky	49	19	27.3	11.3	16.0	1.4	1.8	21
Medical University of South Carolina	48	20	27.4	4.0	23.3	5.8	1.8	21
University of Arizona	43	21	14.3	7.0	7.3	1.0	3.0	8
University of Georgia	42	22	20.3	7.7	12.7	1.7	2.1	16
Creighton University	41	23	28.7	8.3	20.3	2.4	1.4	29
University of the Sciences in Philadelphia	40	24	24.3	13.3	11.0	0.8	1.6	27
University of Maryland	39	25	28.3	21.3	7.0	0.3	1.4	29
University of Washington	37	26	11.3	2.7	8.7	3.3	3.3	6
Texas Tech University	37	26	36.0	26.3	9.7	0.4	1.0	41
Albany College of Pharmacy - Union University	35	28	20.7	10.3	10.3	1.0	1.7	25
University of Houston	34	29	19.0	14.7	4.3	0.3	1.8	21
University of New Mexico	32	30	15.7	2.3	13.3	5.7	2.0	18
University of Southern California	32	30	37.7	37.7	0.0	0.0	0.8	50
University of Nebraska	29	32	14.7	0.0	14.7	Not Estimable	2.0	18
West Virginia University	29	32	19.7	8.7	11.0	1.3	1.5	28
University of Mississippi	28	34	20.7	11.0	9.7	0.9	1.4	29
University of Arkansas for Medical Sciences	28	34	31.7	16.0	15.7	1.0	0.9	44
University of the Pacific	27	36	18.7	0.3	18.3	55.0	1.4	29
State University of New York at Buffalo	25	37	18.0	12.7	5.3	0.4	1.4	29
Rutgers University	25	37	24.0	19.7	4.3	0.2	1.0	41
Washington State University	24	39	16.7	8.3	8.3	1.0	1.4	29
University of Kansas	22	40	19.7	11.7	8.0	0.7	1.1	39
University of Utah	21	41	15.0	10.0	5.0	0.5	1.4	29
Auburn University	21	41	24.3	9.0	15.3	1.7	0.9	44
University of Oklahoma	21	41	34.0	27.0	7.0	0.3	0.6	56
Northeastern University	18	44	20.7	14.7	6.0	0.4	0.9	44
University of Cincinnati	17	45	13.3	5.3	8.0	1.5	1.3	36
Ferris State University	17	45	16.3	0.0	16.3	Not Estimable	1.0	41
Mercer University	17	45	18.3	6.7	11.7	1.8	0.9	44
Western University of Health Sciences	16	48	14.0	9.7	4.3	0.4	1.1	39
Idaho State University	16	48	18.0	5.0	13.0	2.6	0.9	44
University of South Carolina	15	50	12.7	11.7	1.0	0.1	1.2	37

Table 1. Publication Statistics by Institution 2001-2003

Institution Name	No. Pub	Rank - No. Pub	Tot. No. Faculty	No. NTT Faculty	No. TT Faculty	TT/NTT Ratio	Pubs/Faculty	Rank - Pubs/Faculty
Saint John's University	15	50	18.7	0.0	18.7	Not Estimable	0.8	50
Long Island University	14	52	30.0	27.0	3.0	0.1	0.5	59
University of Toledo	13	53	10.7	3.3	7.3	2.2	1.2	37
University of Rhode Island	13	53	15.7	9.7	6.0	0.6	0.8	50
Nova Southeastern University	13	53	27.0	25.7	1.3	0.1	0.5	59
Massachusetts College of Pharmacy - Boston	12	56	30.3	30.3	0.0	Not Estimable	0.4	65
Saint Louis College of Pharmacy	12	56	33.3	28.3	5.0	0.2	0.4	65
Temple University	11	58	14.7	10.0	4.7	0.5	0.8	50
Samford University	10	59	23.3	14.0	9.3	0.7	0.4	65
University of Wyoming	9	60	10.3	1.7	8.7	5.2	0.9	44
Southwestern Oklahoma State University	9	60	14.7	4.0	10.7	2.7	0.6	56
Duquesne University	9	60	14.7	5.3	9.3	1.8	0.6	56
Midwestern University - Glendale	8	63	16.7	13.7	3.0	0.2	0.5	59
Campbell University	8	63	23.3	0.3	23.0	69.0	0.3	70
Drake University	7	65	15.0	10.3	4.7	0.5	0.5	59
University of Montana	6	66	13.0	6.7	6.3	1.0	0.5	59
Oregon State University	6	66	15.7	6.0	9.7	1.6	0.4	65
Massachusetts College of Pharmacy - Worcester	5	68	7.0	6.7	0.3	0.1	0.7	55
Shenandoah University	5	68	13.0	13.0	0.0	Not Estimable	0.4	65
Florida A&M University	5	68	22.0	3.7	18.3	5.0	0.2	75
Midwestern University - Chicago	5	68	28.7	20.0	8.7	0.4	0.2	75
North Dakota State University	4	72	12.0	8.7	3.3	0.4	0.3	70
Howard University	4	72	13.3	0.0	13.3	Not Estimable	0.3	70
Butler University	4	72	15.7	4.7	11.0	2.4	0.3	70
South Dakota State University	4	72	16.0	14.0	2.0	0.1	0.3	74
University of Louisiana	2	80	19.3	3.7	0.0	0.0	0.1	79
Palm Beach Atlantic College	2	76	3.7	0.7	10.0	15.0	0.5	59
Wilkes University	2	76	10.7	1.3	10.3	7.8	0.2	75
University of Puerto Rico	2	76	11.7	9.7	5.7	0.6	0.2	75
Hampton University	2	76	15.3	4.7	14.7	3.1	0.1	79
Texas Southern University	1	81	8.0	1.3	6.7	5.0	0.1	79
Ohio Northern University	1	81	8.7	2.3	6.3	2.7	0.1	79
Lake Erie College of Osteopathic Medicine*	0	83	1.3	1.3	0.0	Not Estimable	0.0	83
Xavier University	0	83	14.0	6.3	7.7	1.2	0.0	83

NNT=Non-Tenure Track; TT=Tenured or Tenure Track; No.=number; Tot.=total

Mean=3-year average (2000-2001, 2001-2002 and 2002-2003) per Institution

^University of Illinois reports adjunct faculty in AACP roster. These faculty members were entered into the Web of Science Search and thus counted in faculty numbers.

* Lake Erie College of Osteopathic Medicine first appeared in AACP Roster in the 2002-2003 academic year;

DISCUSSION

A project such as this has certain limitations that should be appreciated. We used Web of Science to determine the number of published manuscripts over this time period. Numerous journals, including pharmacy journals such as *US Pharmacist* and *Drug Topics*, are not included in this database and would not be reflected in the rankings. This evaluation does not include other forms of scholarship such as writing book chapters or monographs which are also important scholarly endeavors. If a faculty member used a derivation of her/his name rather than the name included in the AACP roster, they would not be included in this evaluation. If they were not included in the AACP roster, they would not be included. Given the limitations in Web of Science, we cannot break out

which publications were original research manuscripts and which were review articles or case reports. Web of Science defines a review article as any article having more than 100 references and thus could not be used for this purpose. As such, some institutions that rate higher or lower than another institution in total publications might have a larger or smaller number of research manuscripts.

Given all of these inherent limitations, our evaluation still has merit as long as it is used as one but not the only measure to gauge an institution's pharmacy practice department's level of scholarly productivity. Our study results are not dependent on survey response rates, we used a powerful search engine with filtering capabilities that allowed this study to be completed, the search engine has 6376 reputable journals in it, and we applied prospective

objective definitions. This evaluative period can serve as a benchmark so that future evaluations can be conducted and compared to this time period to see how pharmacy practice scholarship is developing and to what extent individual schools are contributing. If only one measure of scholarly success can be used, we believe that our measure of scholarly productivity is superior to measuring only federal grant dollars, the normal comparator for Pharmaceutical Sciences faculty.^{2,3} Grant funding is an input that allows scholarship to occur. It is the

publication of the findings or the review of published data that enhances general knowledge or patient care, not the allocation of grant dollars. Also, focusing solely on federal or foundation grant dollars disenfranchises or discounts non-tenure track faculty who have important non-research scholarly contributions to make in the form of review articles and case reports and discounts researcher initiated projects funded by the pharmaceutical or device industry.⁴

Table 2. Publications by Region* of the United States		
Region	Publication Count	Publications Per Institution
All Mid-Western Institutions (n=22)	809	36.8
University of Illinois	99	
University of Michigan	82	
University of Wisconsin	80	
All Southern Institutions (n=30)	829	27.6
University of Tennessee	91	
University of Texas - Austin	83	
University of North Carolina	71	
Western Institutions (n=15)	405	27.0
University of Colorado	65	
University of California San Francisco	63	
University of Arizona	43	
Northeastern Institutions (n=16)	371	23.2
University of Pittsburg	86	
University of Connecticut	61	
University of the Sciences in Philadelphia	40	
Table lists total number of publications per region, the mean number of publications per number of institutions in that region and the three institutions per region with the greatest number of publications. *Regions as determined by the US Department of Commerce, Economics and Statistics Administration and the US Census Bureau (available at: www.census.gov/geo/www/us_regdiv.pdf). N=number of institutions.		

When we ranked pharmacy practice departments by the numbers of publications per departmental faculty member, there was some substantial shuffling amongst the top 25 institutions. This suggests while some departments are smaller than others that either a greater percentage of the faculty across a department contribute to scholarship or that the contributions of a few high producers of scholarship is not weighed down by a larger faculty size in this calculation. We did not make a judgment or determination as to whether it was best to evaluate pharmacy practice departments based on total publication number or number of publications per faculty member because both have merit. Rating high in both types of rankings would seem to be the ideal positioning for an institution since it shows that they are well represented in terms of faculty numbers and that they seeded their department with scholars.

There is great disparity in scholarly publications across institutions. While the top 10% of pharmacy practice departments (based on total numbers of publications) averaged 27 publications per department per year, the bottom 10% averaged less than 1 publication per year. This is not only institution specific but also region specific where pharmacy practice faculty in the Northeast averaged only 63% of the numbers of publications per institution as those in the Midwest.

While larger pharmacy practice departments generally publish more manuscripts than smaller departments, the number of tenure versus non-tenure track faculty does not seem to play a major role in determining scholarly output. It is likely, however, that tenure track faculty contribute more to research endeavors than non-tenure track faculty who may devote their efforts to other scholarly pursuits. Future work in this area to define the nature of the contributions is needed but is outside the scope of this project.

CONCLUSIONS

While many schools have pharmacy practice faculty that strongly contributed to the biomedical literature, other schools have not. Pharmacy practice faculty in the Midwest publish more journal manuscripts than faculty in other regions of the country. More pharmacy schools need to engage their faculty in scholarly endeavors by providing support and incentives.

CONFLICT OF INTEREST

None declared.

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