Pharmacy Fellowships: Challenges and Opportunities for Pharm D. Graduates

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Abstract

Introduction: Pharmacy fellowships are post-doctoral training programs intended to prepare pharmacy graduates for careers in research or the pharmaceutical industry. There are currently 131 pharmacy fellowship programs in the United States, but standardization, interest among students, and overall research regarding these fellowships are ambiguous at best. This literature review was conducted to describe common facilitators, challenges, contents and outcomes of fellowships, and to evaluate the group of programs as a whole.

Methods: To do this, articles were identified using PubMed and a Google search engine, and were reviewed in context with the study goals. The primary search term used was "pharmacy fellowship(s)."

Results: Key findings included articles describing the current state of pharmacy fellowships, the need for standardization, and how to pursue a pharmacy fellowship. A total of twelve articles were selected due to their relevance to the scope of this article.

Conclusion: The current state of fellowships, their subgroups, efforts to develop and organize the group of programs, and possible careers following training are discussed. Benefits and limitations of the current fellowship system are summarized based on the current and relevant literature. Furthermore, this literature review is intended to serve as an accumulation of the current data on pharmacy fellowships to guide students interested in applying for a fellowship program.

Keywords: Pharmacy fellowships; Clinical pharmacy; Global health

Introduction

Saturation of the job market in the field of pharmacy has led more and more students to seek out post-doctoral training including residencies and pharmacy fellowships in hopes of maintaining a competitive edge [1]. ASHP defines pharmacy fellowship as "a directed, highly individualized, postgraduate program designed to prepare the participant to become an independent researcher" with the ultimate goal of preparing the fellow for both independent and collaborative scientific research [2]. Despite these programs leading to non-traditional opportunities and career paths within the field of pharmacy, a study conducted by Sweet and others found only 4% of respondents applied for a fellowship, and what's more, only half of those were accepted into a fellowship program. Furthermore, a number of respondents pursuing post-doctoral training expressed desire for more information on pharmacy fellowships throughout the course of their Pharm.D education [1]. To address students' interest, this study aims to explore pharmacy fellowships as a path of post-doctoral training available to Pharm.D graduates, strengths and limitations of the pharmacy fellowship system in the United States, and job outlook for fellowship graduates.

Methods

A search of PubMed and Google was conducted from March to April 2016 using the key terms "pharmacy fellowship(s)." Results were sorted by most recent and relevance and articles were selected based on the relevance to pharmacy fellowships and post-doctoral training.

Review of Literature

Current state of fellowships

A pharmacy fellowship is defined as "a directed, highly individualized post-graduate program designed to prepare the participant to become an independent researcher" [3]. Currently, pharmacy fellowships can be offered through schools or colleges of pharmacy, healthcare institutions, or pharmaceutical companies. Programs are generally one year but can extend to two years [2]. Pharmacy fellowships are aimed at developing fellows to go into a wide variety of branches including independent research, the pharmaceutical industry, and academia. During a pharmacy fellowship program, up to 80% or more of a fellow's time may be spent engaging in research activities, with the remaining time often being devoted to formal education [3].

In 2009, the American College of Clinical Pharmacy (ACCP) released a commentary stating that in order to appropriately train pharmacists to become clinical or translational scientists, a Ph.D.
degree was recommended, as opposed to fellowship training. As expected, this recommendation caused quite a bit of debate within ACCP and within the profession. A study by McCarthy notes that the job opportunities and career pathways available to graduating pharmacists have changed greatly over the years, and this could potentially be due to a slight surplus of graduating pharmacists in recent years. Therefore, in 2013, ACCP reviewed this recommendation and reconsidered their stance [4].

Most recently, ACCP noted that the National Institute of Health (NIH) has recently put more emphasis on clinical and translational research, specifically relating to drug therapy and disease management. They continue to say that pharmacists are “uniquely positioned” to engage in both bench and clinical research [4]. However, ACCP now asks whether or not “the profession can generate enough appropriately trained pharmacists to take advantage of these opportunities” [4]. Larochelle [3] conducted a search to identify current pharmacy fellowship programs using a combination of ACPE-accredited colleges and schools of pharmacy, ACCP, and a Google search engine. From their search, 131 programs were identified. Compare this to approximately 1,600 PGY1 residency positions available, and it becomes clear that there is an insufficient number of pharmacy fellowship programs available in the United States [4].

In a large study by Burgunda, in a group of 783 graduating pharmacy students, only thirty graduates (4%) pursued fellowships. Additionally, of these thirty students, only fifteen of them (50%) were successfully placed. Several students in the study noted the need for more information on fellowships. These statistics demonstrate not only the need for the development of more pharmacy fellowship programs, but also the need for more student education about fellowship programs and the potential job opportunities prior to application. (Table 1 and 2).

| Sponsoring College                        | Sponsoring Organization | Focus                                   | Length of Program |
|------------------------------------------|-------------------------|-----------------------------------------|-------------------|
| Creighton University                     | Creighton University Medical Center | Drug Information Research               | 2 years           |
| Duquesne University                      |                         | Clinical Research Fellowship            | 1-2 years         |
|                                         |                         | Pediatrics                              | 2 years           |
| East Tennessee State University          |                         | Community Pharmacy                      | 2-3 years         |
| Howard University                        |                         | Oncology                                | 2 years           |
| Massachusetts College of Pharmacy and Health Sciences-Boston | Brigham and Women's Hospital | Outcomes Research                        | 2 years           |
| Massachusetts College of Pharmacy and Health Sciences-Worcester | Charles River Labs | Pharmaceutical Sciences                  | 2 years           |
|                                         |                         | Saint Vincent Hospital                  | 2 years           |
| Midwestern University                    | Northwestern Memorial Hospital | Infectious Diseases                    | 2 years           |
| Northeastern University                  | Tufts-NEMC              | Critical Care                           | 2 years           |
| Ohio State University                    |                         | Pediatrics                              | 2 years           |
| Oregon State University                  |                         | Academic Research                       | 2 years           |
| Purdue University                        |                         | Global Health                           | 1 year            |
| Thomas Jefferson University              |                         | Academic and Ambulatory Care            | 1 year            |
| Touro University (CA)                    |                         | Health Policy and population health, health services research, outcomes research | 2 years           |
| University of Arkansas for Medical Sciences College of Pharmacy |                        | NA                                      | NA                |
| University of Buffalo                    | Novartis                | Drug Development                        | 2-3 years         |
| The State University of New York         | Clinical Pharmacokinetics Lab (CPL) | Protein Therapeutics                    | 2 years           |
|                                         | State University of New York Upstate Medical University | |                  |
|                                         | Pfizer or Novartis      | Drug Development                        | 2 years           |

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| University of California- Los Angeles | Terasaki Foundation | Transplantation | 1 year |
| University of Cincinnati |  | Transplantation | 1 year |
| University of Colorado | Kaiser Permanente- Colorado | Outcomes Research | 2 years |
| University of Connecticut | Hartford Hospital | Outcomes Research | 2 years |
| University of Florida |  | Family Medicine | 2 years |
| University of Houston College of Pharmacy | St. Luke's Episcopal Hospital | Infectious Disease | 2 years |
| University of Illinois at Chicago | UIC Center for Pharmacoeconomic Research | Infectious Disease | 2 years |
|  |  | Outcomes Research | 2 years |
|  |  | Transplantation | 2 years |
| University of Iowa |  | Ambulatory Care | 2 years |
|  |  | Translational Research | 2 years |
| University of Kentucky |  | Infectious Diseases | 2 years |
| University of Maryland | Maryland Poison Center | Toxicology | 2 years |
|  |  | Health Outcomes | 1-2 years |
| University of Michigan |  | Nephrology | 2 years |
|  |  | Translational Research | 2 years |
| University of Minnesota |  | NA | NA |
| University of Missouri Kansas City |  | Regulatory Pharmaceuticals | 2 years |
| University of Nebraska | Nebraska Medical Center | Critical Care | 2 years |
|  |  | Pharmacoeconomics and Outcomes Research | 2 years |
| University of New Mexico | New Mexico Poison and Drug Information Center |  | NA |
|  | University of New Mexico Health Sciences Center | Cardiovascular Pharmacotherapy | 2 years |
|  |  | Academic Research | 2 years |
|  |  | Drug Development | 2 years |
|  |  | Infectious Diseases | 2 years |
|  |  | Pharmacokinetics | 2 years |
|  |  | Regulatory Affairs | 2 years |
|  | Carolinas Poison Center | Toxicology | 2 years |
|  |  | Nanotechnology | 2-3 years |
|  |  | Community Pharmacy Academia | 2 years |
|  |  | Educational Research | 1 year |
|  |  | Neocritical Care Pharmacotherapy | 2 years |
|  |  | Clinical Pharmacology | 2 years |
| University of Pittsburgh | Heart Failure Pharmacotherapy | 2 years |
|--------------------------|-------------------------------|---------|
|                           | HIV Pharmacotherapy           | 2-3 years|
|                           | Oncology                      |         |
|                           | Geriatric Pharmacotherapy     | 2 years |
|                           | Community Care                | Not specified|
|                           | Outcomes Research, Pharmacoeconomics | 2 years |

| University of Rhode Island | Providence Veterans Affairs Medical Center | Infectious Diseases | 2 years |
|---------------------------|------------------------------------------|--------------------|---------|
|                           | Janssen Scientific Affairs               | Medical Information and Clinical Practice | 2 years |
|                           | McNeil Consumer Healthcare               | Medical Information and Regulatory Affairs | 2 years |

| University of the Science in Philadelphia | University of South Carolina | Palmetto Health Richland | Infectious Diseases | 1 year |
|------------------------------------------|-----------------------------|-------------------------|--------------------|--------|
| University of South Florida College of Pharmacy | University of Southern California | My Matrixx | Managed Care Pharmacy | 1 year |
| University of Tennessee, Memphis | University of Texas at Austin | Scott and White Health Plan | Managed Care Pharmacy | 2 years |
| University of Utah | University of Utah | Scott and White Health Plan | Managed Care Pharmacy | 2 years |
|                           | Allergan                      | Outcome Research       | 2 years |
|                           | Bayer                         | Policy                  | 2 years |
| Virginia Commonwealth University | Wayne State University | Infectious Diseases | Cardiology | 2 years |
| Western University of Health Sciences | University of Utah | Allergan | Outcome Research | 2 years |
|                                      |                            | Bayer                  | Policy | 2 years |
|                                      |                            | Other                  | 1 year |
| [o] No Academic Partner | Western University of Health Sciences | Achaogen Inc. | Drug Development | 2 years |
|                           |                            | Alnylam Pharmaceuticals | Drug Development | 2 years |
|                           |                            | Cetero Research        |        |
|                           |                            | Charleston Area Medical Center Health Education | Drug Development | 2 years |
|                           |                            | National Institutes of Health | Pharmacokinetics | 2 years |
|                           |                            | St. Jude’s Research Hospital | Clinical Pharmacy | Not specified |
|                           |                            | University Health System Consortium | | |

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Table 1: Traditional Pharmacy Fellowships (Non-Industry).

| Sponsoring College                           | Sponsoring Organization           | Focus                                           | Length of Program |
|----------------------------------------------|-----------------------------------|------------------------------------------------|-------------------|
| University of the Science in Philadelphia    | Janssen Scientific Affairs        | Medical Information and Clinical Practice       | 2 years           |
| McNeil Consumer Healthcare Health Economics  | Medical Information and Regulatory Affairs | 2 years                                      |
| Alexion                                      | Global Medical Information        | 2 years                                        |
| Becton Dickinson                             | Global Medical Affairs            | 2 years                                        |
| Biogen                                       | Health Economics and Outcomes Research | 2 years                                      |
| Biogen                                       | Regulatory Affairs                | 2 years                                        |
| Biogen                                       | Safety and Benefit Risk Management | 2 years                                      |
| Genzyme                                      | US Payer Access (MS)              | 2 years                                        |
| Genzyme                                      | Clinical Documentation            | 2 years                                        |
| Genzyme                                      | Global Commercial Strategy        | 2 years                                        |
| Genzyme                                      | Global Pharmacovigilance and Epidemiology | 2 years                                      |
| Genzyme                                      | Medical Affairs                   | 2 years                                        |
| Genzyme                                      | Regulatory Affairs                | 2 years                                        |
| Norvatis                                     | Early Clinical Development        | 2 years                                        |
| Pfizer                                       | Clinical Research Pharmacy        | 2 years                                        |
| Pfizer                                       | Clinical Supply Chain Strategy and Management | 2 years                                      |
| Pfizer                                       | Quality Assurance                 | 2 years                                        |
| Sunovion                                     | Medical Information               | 2 years                                        |
| Takeda Pharmaceuticals                        | Global Medical Information        | 1 year                                         |
| Takeda Pharmaceuticals                        | Global Pharmacovigilance          | 2 years                                        |
| Northeastern University Bouve College of Health Sciences | Alnylam | Medical Affairs | 2 years |
| Purdue                                       | Eli Lilly                         | Regulatory, Drug Information                   | 2 years           |
| Purdue                                       | Johnson and Johnson               | Regulatory, Advertising and Promotion          | 2 years           |
| Purdue                                       | Hook Drug Foundation              | Community Practice Research                    | 2 years           |
| Purdue                                       | Eli Lilly                         | Medication Safety                              | 2 years           |
| Rutgers                                      | Takeda Pharmaceuticals             | Global Regulatory Affairs                      | 2 years           |
| Rutgers                                      | Acorda                            | Clinical Development and Medical Affairs        | 2 years           |
| Rutgers                                      | Regulartory Affairs               | 2 years                                        |

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| Company                          | Position and Responsibilities                                                                 | Duration |
|---------------------------------|-------------------------------------------------------------------------------------------------|----------|
| Actelion                        | Global Clinical Science and Epidemiology                                                        | 2 years  |
| AstraZeneca                     | US Medical Affairs- Therapeutic Area Concentration, US Medical Affairs- Medical Operations/Patient Safety, Global Regulatory Affairs- Oncology | 2 years  |
| Bayer Healthcare Consumer Care  | Global Pharmacovigilance and Product Quality and Safety, Global Medical Affairs and Medical Development, Global Product Development and Innovation, Innovation and Research and Development Category Leadership, Rx-to-OTC Switch, US Regulatory Affairs | 2 years  |
| Bayer Healthcare Pharmaceuticals| Business development and liensing, Clinical Operations, Corporate and Government Customers (US Managed Markets), Early Pipeline Strategic Marketing, Global Market Access/Health Economics Outcomes Research, Global Regulatory Affairs, Medical Communications, Global Medical Affairs- Oncology | 2 years  |
| Bristol-Myers Squibb            | Regulatory Affairs, Advertising and Promotion, Immunoscience: Medical Information/Medical Science Liaison, Virology Medical: Medical Information/Medical Strategy, Cardiovascular Medical: Medical Information/Worldwide Medical Content | 1 year   |
|                                | Oncology Medical: Medical Information/ Clinical Trial Investigations/ Medical Science Liaison, Worldwide and US Medical Strategy: Immuno-Oncology, Oncology Medical: Worldwide Medical Content/ US Medical Strategy, US Medical Knowledge Management, Health Economics and Outcomes Research | 2 years  |
|                                | Cardiovascular Medical: Medical Information/Worldwide Medical Content, Policy and Advocacy, Strategic Analytics and Business Intelligence | 2 years  |
| Catalent                        | Applied Drug Delivery                                                                           | 2 years  |
| Celgene Corporation             | Global Scientific Communications, Global Medical Information                                     | 1 year   |
| Company                  | Department/Position                              | Duration |
|-------------------------|--------------------------------------------------|----------|
| Global Clinical Research and Development | 2 years                              |          |
| Global Regulatory Affairs       | 2 years                              |          |
| US Economics and Outcomes Research | 2 years                              |          |
| US Medical Affairs           | 2 years                              |          |
| Global Market Insights       | 2 years                              |          |
| Daiichi-Sankyo              | Medical Affairs                          | 2 years  |
| Genentech Inc.              | Clinical Operations                      | 2 years  |
| Genentech Inc.              | Clinical Science- Late Stage Development     | 2 years  |
| Genentech Inc.              | Medical Affairs/Medical Science Liaison      | 1 year   |
| Genentech Inc.              | Regulatory Affairs                        | 2 years  |
| Genentech Inc.              | US Medical Affairs                        | 2 years  |
| Johnson and Johnson         | Global Scientific Engagement              | 2 years  |
| Promotional Compliance      | 2 years                              |          |
| Novartis                  | Clinical Pharmacology                     | 2 years  |
| Novartis                  | Clinical Research and Development          | 2 years  |
| Novartis                  | Drug Regulatory Affairs                    | 2 years  |
| Novartis                  | Scientific Communications/Medical Information | 2 years |
| Novartis                  | Commercial Strategy/Brand Marketing        | 2 years  |
| Pfizer Consumer Health     | Clinical Research and Development          | 2 years  |
| Pfizer Consumer Health     | Global Medical Affairs                     | 2 years  |
| Pfizer Consumer Health     | Global Regulatory Affairs                  | 2 years  |
| Pfizer Inc.               | Global Medical Information/Global Medical Affairs | 2 years |
| Pfizer Inc.               | Medical Affairs: Global Established Pharma  | 1 year   |
| Pfizer Inc.               | Medical Affairs: Oncology                  | 1 year   |
| Roche                     | Clinical Science Translational Medicine     | 2 years  |
| Sanofi Aventis             | Clinical Documentation                     | 2 years  |
| Sanofi Aventis             | Global Pharmacovigilance and Epidemiology   | 2 years  |
| Sanofi Aventis             | Global Regulatory Affairs                  | 2 years  |
| Sanofi Aventis             | Health Outcomes Research and Communications | 2 years |
| Pfizer Consumer Health     | Pharmacy Account Team/Channel Development   | 2 years  |
| Pfizer Consumer Health     | Strategic Marketing                       | 2 years  |
| Pfizer Inc.               | US/Global Cardiovascular Medical Affairs    | 2 years  |
| Pfizer Inc.               | US/Global Patient Advocacy and Public Affairs | 2 years |
| Pfizer Inc.               | US Medical Information Services             | 1 year   |
| Sunovion                  | Regulatory Affairs                        | 2 years  |
| Company/University | Position                                     | Duration |
|--------------------|----------------------------------------------|----------|
| TEVA Pharmaceuticals | Regulatory Affairs: Global Branded and Generic Products | 2 years  |
| Allergan Inc.      | Global Regulatory Strategy                   | 2 years  |
|                    | Clinical Development                          | 2 years  |
|                    | Regulatory Affairs: Advertising and Labeling | 2 years  |
| American Regent    | Medical Affairs and Pharmaceutical Marketing | 2 years  |
|                    | Clinical Research and Development             | 2 years  |
| Daiichi Sankyo     | Clinical Development Oncology                 | 2 years  |
|                    | Clinical Safety                               | 2 years  |
| St. John's University | TAP Pharmaceuticals                           |          |
| University of Illinois in Chicago | Clinical Research and Drug Development              | 2 years  |
| University of North Carolina at Chapel Hill | GlaxoSmithKline Medical Affairs       | 2 years  |
| University of Southern California | United Therapeutics Medical Affairs         | 2 years  |
| University of Texas at Austin | Novartis Pharmacoeconomics & Outcomes Research / Market Access (Oncology) | 2 years  |
| [o] No Academic Partner | Allergan Inc. Clinical Development            |          |
|                    | Drug Delivery Sciences                        |          |
|                    | Global Pharmaceutical Science                |          |
|                    | Infectious Diseases Pharmacology             |          |
|                    | Medical Affairs                               |          |
|                    | Pharmaceutical Development                   |          |
|                    | Pharmacokinetics and Pharmacodynamics        |          |
| Centocor Inc.      | Pharmacoeconomics & Outcomes Research / Market Access (Oncology) | 2 years  |
| Eli Lilly           |                                              |          |
| PPD (Contract research organization) |                                              |          |
| Procter and Gamble |                                              |          |
| Roche Laboratories Inc. |                                              |          |
| Upsher-Smith Laboratories |                                              |          |

**Table 2: Industry Fellowships.**
Sub groups of fellowships

One challenge for professional pharmacy students is the discord between fellowship programs and their categorization. A disconnect between labels for fellowships, expectations among students of fellowship focus, and a blending of the use of the terms “residency” and “fellowship” have potentially caused difficulty in finding and applying for fellowships [2]. These misunderstandings of program offerings and content are a potential source of difficulty in the application process for students.

In order to remedy this difficulty, various authors have suggested methods for standardizing fellowships. For example, Larochelle [3] suggested separation of fellowship types into two categories, which they termed “traditional fellowships” and “industrial fellowships.” In this categorization scheme, traditional fellowships were those in which the ultimate goal was development of the fellow as an independent researcher and future primary investigator. These programs are traditionally highly individualized and their focus is determined by the fellow and preceptors involved. In contrast, industrial fellowships maintain a component of individually driven research, but are focused on development of a catered set of skills and experience for a focused field of pharmacy such as pharmacovigilance, regulatory affairs, or drug safety. Mueller [5] described an alternative method of fellowship categorization with four major categories: clinical practice combined with research and fellowship programs.

While these recommendations for categorizing fellowships are not comprehensive, they do highlight the difficulties that students can face in applying and researching large numbers of varied fellowship programs, and they make recommendations for the potential standardization of fellowships into subtypes in order to ease differentiation of available programs.

ACCP optional accreditation, what is assessed

Pharmacy fellowship programs have the option to be reviewed and recognized by ACCP as a program that meets their guidelines for research and fellowship training programs. This is an optional peer review process conducted by ACCP's Research Fellowship Program Review Committee (RFPRC). This committee reviews four areas of a fellowship program including: training program requirements, preceptor qualifications, fellowship applicant criteria, and fellowship experiences. The purpose of reviewing these areas is to ensure programs meet the minimum requirements set forth while still allowing for an individualized training program [5].

The guidelines for the fellowship training program are very broad. The training program requirements stipulate that a program should be at least two years, of which 3,000 hours should be devoted to research. Additional requirements include availability of advanced educational opportunities, appropriate facilities, qualified instructors, institutional support, and access to literature and facilities. Additionally, preceptors are evaluated and should be exemplary and qualified members in their field as evidenced by past, present, and ongoing research. Requirements for applicants include masters or doctoral degrees, clinical experience preferred, and interest in the field of research. Lastly, there are requirements of the fellowship experience including completion of one research project along with experience with various areas of the research method [5].

As previously mentioned, Larochelle reported 131 fellowship programs in the United States, and as of 2009, only 11 programs were found to have undergone the ACCP review process [3]. This ACCP review process represents an underused resource available to standardize and guide fellowship programs.

Job outlook/career path

Although there has been a shift in fellowship opportunities as a whole and a lack of standardization of programs, career opportunities following graduation from a fellowship program still highly correlate with the focus of respective fellowships. Traditionally, pharmacy fellowship graduates would most likely transition into faculty positions at schools of pharmacy, as the majority of fellowships were research based [6]. This path continues to be an opportunity for students, especially because positions in academia for clinical researchers are expected to increase [4].

However, the majority of fellowship graduates now fill positions in pharmaceutical companies or regulatory agencies, as there has been a growth in industry based fellowships [7]. Within these organizations, a pharmacist’s role is distinct but generally involves research, communications, or regulatory aspects of workflow. Clinical development research is a mainstay for fellowship trained pharmacists, where an employee typically manages clinical trials, organizes protocols, and creates reports of the trials. Opportunities within economic and outcomes research also exist, and could be growing [7]. Communications itself is a broad area as a career path, as pharmacists now serve as medical science liaisons, who disseminate clinical information to entities outside of the company, and as part of medical affairs and information teams, who develop content and programs for these entities. Many fellowship graduates also work in marketing, developing effective and appropriate advertising strategies. In regulatory affairs, many pharmacists develop strategies to effectively communicate with regulatory agencies and ensure compliance with policies, or are part of the regulatory agencies and communicate with the pharmaceutical company [8].

The major organizations that provide these opportunities commonly collaborate with schools of pharmacy to create fellowships designed specifically to train pharmacists for the respective careers. Predictably, retention within a company and department after graduation from a fellowship is high (56.2% and 74.6% respectively) shown by a survey held by Melillo [7]. Consequently, a pharmacy fellowship provides the greatest opportunity to obtain an industry position post-graduation.

How to pursue

For students pursuing a pharmacy fellowship in the United States, there are few reliable or comprehensive resources available. However, one of the most helpful resources is the Industry Pharmacists Organization [9], which provides information for students interested in pursuing a pharmacy fellowship. Students can become a member for free, which allows them access to exclusive resources. Some of the highlights of the IPhO website include webinars for students that provide information about opportunities for pharmacists in the pharmaceutical industry. IPhO also has a pharmacy fellowship catalog and a guide to fellowships at the American Society of Health-System Pharmacists (ASHP) Midyear Clinical Meeting, which help candidates
decide on the exact fellowship programs he or she wants to pursue. Additionally, IPhO provides a feature called FellowMatch, allowing candidates to see which positions are open at different institutions [9]. The candidate is able to upload any supplemental materials and apply to multiple industry fellowship programs through this service. While other organizations such as ACCP and American Pharmacists Association (APhA) reference pharmacy fellowships as a potential course for study on their websites, IPhO by far has the most abundant resources for students interested in pursuing fellowships. Nevertheless, not all resources are free to students on IPhO’s website, and should not be used as a sole resource for fellowship program education.

Conclusion

Pharmacy fellowships provide Pharm.D. graduates with unique opportunities to engage in clinical and translational research and prepare fellows to become individual researchers. They have been shown to reliably lead to careers focusing on research or industry, including roles in medical communications and regulatory affairs, but there are many barriers preventing students from pursuing programs. Currently, there are not enough programs to take advantage of these unique opportunities, and in many cases there is not enough education provided to student pharmacists throughout the Pharm.D. curriculum to foster interest. Additionally, the lack of clarity in categorization of fellowships presents a difficulty for students and professionals trying to understand their role in pharmacy, prompting recommendations to ease the application process and increase differentiation among the various opportunities that pharmacy fellowships provide. ACCP does offer a peer review service for fellowship programs to help standardize fellowships, although the program is currently highly underutilized. Nevertheless, there are organizations such as IPhO that serve as a resource for students. Continued study and collaboration can help organize and standardize fellowship programs to increase their visibility as an opportunity for students and develop to ensure the training provided prepares students for careers they were designed for.

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