

Reframing Non-Traditional PharmD Career Opportunities Across Drug Development, Regulatory, and Academia

The Journal of Clinical Pharmacology
 2026, 66(5) e70197
 © 2026 American College of Clinical
 Pharmacology.
 DOI: 10.1002/jcph.70197

Michael Nome, PharmD, RPh, Myong Jin Kim, PharmD, FCP, Janelle Burnham, MD, FCP, Thomas D. Nolin, PharmD, PhD, FCP , Alexander J. Prokopienko, PharmD, PhD , and On behalf of the ACCP Public Policy Committee

The American College of Clinical Pharmacology (ACCP) is committed to advancing and highlighting the scope of opportunities available to PharmD (Doctor of Pharmacy) students. As the landscape of pharmacy practice evolves, it is crucial that we raise awareness among prospective and current PharmD students about the dynamic non-traditional career paths available to them. The profession of pharmacy is facing challenges related to declining PharmD educational program enrollment and decreased degree satisfaction.^{1,2} In this position statement, we will address these challenges and discuss alternative or non-traditional career pathways for PharmD graduates.

First, it is important to acknowledge how the PharmD education positions graduates to excel in a wide range of alternative career pathways. Typically, PharmD educational training is a post-baccalaureate program that is 4 years in duration, comprised of three years of extensive didactic coursework and a full final year of immersive work experience with advanced pharmacy practice experiences. Coursework covers areas such as pharmacotherapy, pharmacokinetics/biopharmaceutics, human physiology/pathophysiology, pharmacology/toxicology, medicinal chemistry, and pharmacy practice experience. This curriculum ensures that PharmD graduates have a foundational grasp of drug development and patient care, making them highly valuable in diverse healthcare settings. PharmDs also bring a unique combination of clinical expertise and practical experience to drug development, which is essential for creating safe and effective therapies. As the pharmaceutical industry continues to advance, the skills and knowledge of PharmD graduates are increasingly crucial in ensuring the successful

development, regulation and commercialization of new drugs.

Despite the value and versatility of PharmD training, currently there is an acute decline in enrollment in PharmD programs and ongoing professional dissatisfaction in some traditional pharmacy roles. This is a challenge that requires the broader healthcare community's attention. Several factors contribute to these issues, including the dwindling profitability of pharmacies, which has led to understaffing and, consequently, an increased degree of community pharmacist burnout. In parallel, the U.S. retail/community pharmacy sector has experienced substantial contraction and consolidation, with store closures, reduced operating hours and leaner staffing models. As a result, many PharmD graduates perceive fewer stable long-term opportunities in traditional community settings and increased competition for available positions. This evolving employment landscape further reinforces the need to broaden awareness of PharmD career pathways beyond traditional roles.^{3,4} This burnout is evident in the Maslach Burnout Inventory-Human Services Survey (MBI-HSS) and a work-factor-based questionnaire of Community pharmacists.² Of the 411 community pharmacists who participated in a burnout survey, 308 (74.9%) reported experiencing burnout in at least one of the three subscales: emotional exhaustion (68.9%), depersonalization (50.4%), and reduced personal accomplishment (30.7%).^{2,5,6} This professional

Submitted for publication 24 March 2026; accepted 15 April 2026.

Corresponding Author:

Alexander J. Prokopienko, PharmD, PhD, ACCP Public Policy Committee,
 PO Box 1758, Ashburn, VA 20146 ACCP Public Policy Committee,
 Ashburn, VA USA
 Email: info@accp1.org

dissatisfaction may be influencing a decline in PharmD program enrollment, with significant decreases in the number of students interested in pursuing pharmacy careers. For instance, in the Fall of 2011, there were 106,815 applicants to pharmacy schools, a figure that dropped to 76,525 by the Fall of 2015 and 33,922 as of Fall of 2023. In less than a decade, pharmacy school applications decreased by more than 68%.^{2,5}

Furthermore, there has been a distressing decline in satisfaction in traditional pharmacy roles among PharmD graduates. This is evident from an American Association of Colleges of Pharmacy (AACP) survey of graduates from 2018 to 2023, in the response to the question “If I were starting my college career over again, I would choose to study pharmacy”; on average, 20% of students matriculating into pharmacy school later regret their decision. In contrast, a relatively stable 9% of graduating medical students stated they would not pursue a medical degree over the same period.⁶ This level of dissatisfaction and the decline in PharmD enrollment may also be partially attributed to the absence of universally recognized provider status to remunerate pharmacists for their professional services and patient care activities, especially in the current outpatient setting. Without adequate reimbursement for professional services, most primary and ambulatory clinic settings lack any financial incentive to maximize pharmacists as part of the core patient care team.

Importantly, expanding awareness of non-traditional career pathways should be viewed as complementary to, rather than in competition with, traditional and established clinical practice advancement pathways such as collaborative practice agreements, statewide protocols, and related credentialing or training frameworks that support pharmacists in initiating, modifying, or managing medication therapy.^{7,8} These non-traditional roles are not “less clinical,” instead, they apply the PharmD clinical foundation in different contexts such as evidence generation, regulatory decision-making, medication policy, data-driven evaluation of outcomes, and drug development.^{7,8} Together, clinical practice pathways and non-traditional pathways represent a broader ecosystem of patient impact enabled by PharmD training. In this paper, we aim to recognize the value of traditional patient-care roles while expanding visibility into additional PharmD career paths that apply the same clinical foundation in different professional contexts.

Overall, it is becoming clear that there is an evolving landscape in the pharmacy profession, with new and diverse opportunities beyond traditional retail and hospital settings. As such, there is a growing need to raise awareness of these alternative opportunities and simultaneously prepare students for these roles.

PharmDs are well-equipped to adapt and excel in the evolving pharmacy landscape and contribute to the profession’s growth and impact.⁹

Highlighting and championing alternative career paths can serve as a potential solution to address PharmD enrollment decline and some professional dissatisfaction in traditional pharmacy roles. Clinical pharmacology serves as a prime example of a promising career pathway—PharmDs can work across academia, regulatory, and industry settings in this area. Pharmacists are well-positioned to succeed in these roles due to their comprehensive didactic and clinical training. This example is just one among many others detailed in Table 1, which illustrates the breadth of non-traditional opportunities available.

This non-exhaustive list of non-traditional career paths, detailed in Table 1, describes where PharmDs continue to impact patient care and public health. Raising awareness of these alternative career pathways is critical, and we propose a roadmap for pharmacy students to prepare for these roles (Figure 1) and provide alternative avenues for professional growth and fulfillment. However, it is important to also acknowledge that PharmDs can pursue additional training such as MD, PhD, various MS programs, MBAs, or other degrees that will further expand their career opportunities.

Many pharmacists experience burnout due to some traditional roles’ high demands and limited scope. Alternative careers shown in Table 1 may offer more professional fulfillment in work environments that provide autonomy, opportunities for mastery, and a sense of purpose, as these elements are key motivators for job satisfaction and can significantly reduce burnout. By aligning one’s career with personal values and interests, and continuously engaging in professional development, individuals can enhance their fulfillment, which in turn helps mitigate the factors that contribute to burnout.⁶ Non-traditional roles can also provide the opportunity to contribute to policymaking and groundbreaking research and scholarship, shaping the minds and practices of future pharmacists. Therefore, engaging in these roles can potentially lead to greater job satisfaction, as pharmacists can see the tangible impacts of their work on a larger scale, thereby reducing burnout and professional dissatisfaction prevalent in the field and increasing optimism, which will inspire more students to join the pharmacy community.

The ACCP’s call to action underscores the need for pharmacy schools, students, and professional organizations to collaborate in creating clear pathways to these alternative careers. Pharmacy schools should integrate hands-on learning and interdisciplinary education into their curricula and offer specialized training experiences and certifications in areas like clinical drug development, clinical pharmacology, and regulatory

Table 1. Non-Traditional Alternative Opportunities for PharmDs

| Professional setting and/or function | Non-traditional job opportunities with brief descriptions | | | |
|--|--|--|--|---|
| Academic opportunities | Administrative roles: Leads curriculum oversight, experiential education, program strategy, and accreditation activities | Clinical faculty positions: Practice-based teaching, patient care, and scholarship in ambulatory, inpatient, or specialty settings | Research: Conducts scholarship, including translational research, clinical research, and outcomes research, and mentors trainees | Teaching: Delivers didactic content and skills training, provides career mentoring, and supports interprofessional education |
| Clinical research and development | <p>Clinical operations: Executes clinical trials, including site activation, monitoring approach, quality oversight, timeline management, and issue resolution</p> <p>Clinical scientist: Leads clinical study protocol design, endpoint strategy, benefit risk assessment, cross functional trial strategy, data analysis and interpretation of study results</p> | <p>Clinical outcomes specialist: Defines and implements clinical outcome assessment strategy, including patient-reported outcomes and clinician reported outcomes, supports endpoint selection, validation, and analysis alignment</p> <p>Clinical supply: Forecasts investigational product needs, manages packaging and labeling, distribution, cold chain, and accountability</p> | <p>Clinical pharmacology: Leads the design of pharmacokinetic and pharmacodynamic strategy, designs Phase I clinical pharmacology studies, supports dose selection, evaluates special populations, contributes to prescribing information</p> <p>Patient safety and pharmacovigilance: Evaluates safety signals, oversees case processing, supports risk management, and aggregates safety reporting</p> | <p>Clinical project manager: Integrates program plans, budgets, and deliverables, and coordinates cross functional governance and execution</p> <p>Pharmacometrics, modeling and simulation: Builds population pharmacokinetic and pharmacodynamic models and exposure response analyses to inform trial design and dosing</p> <p>Toxicology consultant: Interprets non-clinical safety packages and supports risk communication</p> |
| Consulting | Health informatics consultant: Optimizes medication data systems, analytics, and clinical decision support tools | Health policy analyst: Evaluates policy impact, benefit design, and legislative and regulatory implications | Pharmaceutical consultant: Advises on drug development, evidence strategy, and medical and regulatory deliverables | |
| Marketing and brand | <p>Competitive intelligence: Monitors pipeline and competitors and synthesizes insights to inform strategy</p> <p>Product manager: Owns brand plan execution, coordinates launch readiness, and measures performance</p> | Market access: Supports payer strategy, formulary access, contracting support, and value communication | Market strategy: Positions product value, supports forecasting and segmentation, and develops messaging with medical and legal review | Pharmaceutical marketing specialist: Develops promotional and educational materials, ensures clinical accuracy, and aligns with compliance review |
| Medical affairs | <p>Evidence generation lead: Plans observational studies and registries and aligns evidence generation with publication strategy</p> <p>Medical writer: Develops manuscripts, briefing documents, regulatory submission modules, and clinical/regulatory documents such as protocols, clinical study reports</p> | <p>Health economics and outcomes research analyst: Assesses clinical and economic value, builds economic models, and supports payer relevant evidence and access dossiers</p> <p>Real world data analyst: Designs and analyzes real world evidence studies using claims and electronic health record data, generating insights into safety, effectiveness, and value</p> | <p>Medical information: Responds to healthcare professional inquiries, creates and maintains scientific response documents, and develops frequently asked questions resources</p> <p>Scientific communications: Supports congress planning, publications, and scientific slide development, ensuring accurate scientific storytelling</p> | <p>Medical science liaison: Engages healthcare professionals and key opinion leaders for scientific exchange, gathers field insights, and supports medical strategy</p> <p>Scientific director: Develops scientific platforms, supports evidence strategy, and leads external scientific engagement</p> |

(Continued)

Table 1. (Continued)

| Professional setting and/or function | Non-traditional job opportunities with brief descriptions | | | |
|---|---|---|--|---|
| Other non-traditional roles | Clinical informatics pharmacist: Uses health information technology and data to improve medication-use safety and workflow | Formulary manager: Evidence-based evaluation of medications and operational management of formulary systems, typically supporting P&T committee processes and utilization management tools | Nuclear pharmacy: Radiopharmaceutical preparation and quality assurance, regulatory compliance, and patient safety | |
| Regulatory affairs | Chemistry, manufacturing, and controls regulatory affairs: Supports quality and manufacturing submissions, comparability assessments, changes, and lifecycle management | Labeling specialist: Drafts and maintains prescribing information and manages labeling negotiations and updates | Regulatory affairs manager: Leads regulatory strategy and aligns development plans with global requirements | Regulatory affairs specialist: Supports regulatory submissions, health authority interactions, and response coordination |
| United States Food and Drug Administration opportunities | Clinical analyst: Supports evidence synthesis, review logistics, and scientific documentation Labeling reviewer: Ensures labeling supports safe and effective use and aligns evidence with communication | Clinical pharmacology reviewer: Assesses pharmacokinetics, pharmacodynamics, exposure response, dosing, and special populations Pharmacometrics reviewer: Evaluates model-informed drug development evidence and simulation analyses | Drug information: Evaluates medication information and supports communications and education Project manager: Coordinates review timelines, meetings, action items, and integration across review disciplines | Epidemiology reviewer: Evaluates real-world safety signals and post-marketing study design Safety reviewer: Evaluates clinical and postmarketing safety evidence and recommends risk mitigation approaches |

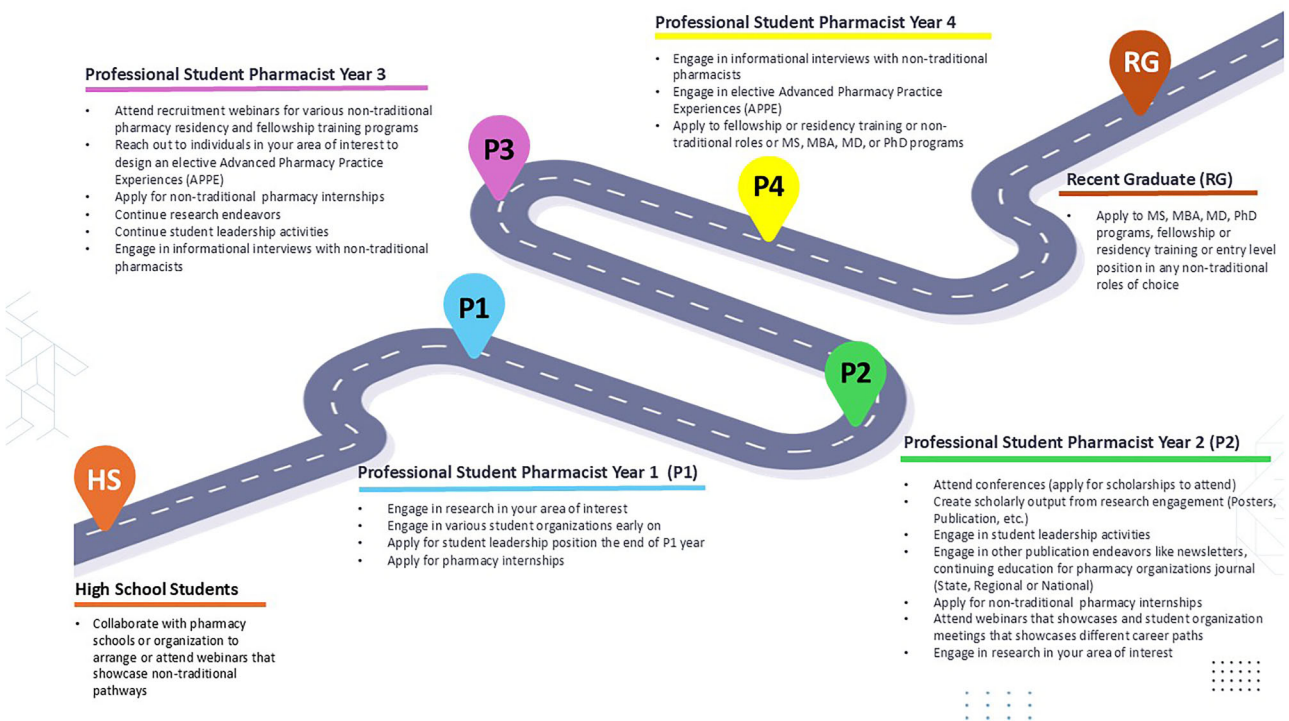


Figure 1. Highlights potential trajectories for students and graduates interested in non-traditional PharmD career, including strategies for high school (HS) students (encouraging early exposure to pharmacy careers through job shadowing, internships, and mentorship programs); pharmacy students (professional years 1–4 [P1–P4]) (highlighting the importance of engaging in research, internships, and leadership roles to prepare for diverse career paths); and graduates (emphasizing continuous professional development and the pursuit of specialized training and certifications in areas like clinical pharmacology, regulatory affairs, and industry positions).

affairs. Students should actively seek out internships, research opportunities, and leadership roles to make themselves competitive for these positions. Professional organizations, as key stakeholders, play a crucial role in supporting these efforts by promoting digital storytelling, partnering with schools, and sponsoring scholarships and conferences. Their involvement is essential in ensuring the pharmacy profession remains dynamic, fulfilling, and attractive to future generations, ultimately improving PharmD enrollment and enhancing patient care.

To make non-traditional pathways actionable, students benefit most from structured programming, not only awareness. Examples include elective sequences or concentrations (e.g., clinical pharmacology, regulatory affairs, industry pharmacy, health outcomes), applied skills training (e.g., PK/PD and biostatistics workshops, scientific writing, data analytics), and purpose-built experiential opportunities such as specialized APPEs with industry, payers/managed care, academic research groups, or federal agencies (e.g., FDA). Early exposure through mentoring, alumni engagement, and longitudinal projects can help students build a coherent narrative of skills and impact that is legible to non-traditional employers.^{10–16} A roadmap in Figure 1 details steps and recommendations for each stage of the educational journey to help students and graduates explore and succeed in non-traditional pharmacy careers.

Recommendations for Pharmacy Organizations:

- Embark on digital storytelling by collaborating with healthcare social media personalities; the Student Society of Health-System Pharmacists (SSHP); the American Pharmacists Association–Academy of Student Pharmacists (APhA-ASP), Student National Pharmaceutical Association (SNAPhA), Industry Pharmacists Organization (IPHO), and multiple state pharmacy associations to distribute materials.¹²
- Reconsider Accreditation Council for Pharmacy Education (ACPE) limitation to non-patient-related clerkship hours to allow students to explore more non-traditional roles.¹⁰
- Facilitate structured non-traditional experiential opportunities (e.g., dedicated APPE tracks and summer internships with FDA/federal agencies, industry partners, payer organizations, and academic clinical pharmacology groups) so students can build role-relevant competencies and mentorship networks.^{13–17}
- Coordinate job shadow or virtual one on one opportunity for high school students aspiring to join healthcare.¹⁷
- Create a mentorship program to match high schoolers with various PharmD professionals in non-traditional roles.¹⁷
- Encourage creating internships geared towards high school and PharmD students by members.
- Relevant organizations can sponsor scholarships and conference attendance for students.
- Relevant organizations can partner with high schools and colleges of pharmacy to expand their efforts to increase high school and undergraduate students' awareness of pharmacy.^{11,18}
- Emphasize exposure to diverse pharmacy career pathways within the first semester of the academic curriculum.¹¹
- Amplify clinical Pharmacology and non-traditional pharmacy achievement via local television or other media channels.¹⁷

Recommendations to Schools of Pharmacy:

- Raise awareness of non-traditional opportunities and pathways (see Figure 1) in the first year of training.
- Emphasize relevant laboratory work and hands-on learning like PK/PD modeling.
- Promote other core scientific disciplines (biostatistics) and their contributions to drug development (i.e., importance of interprofessional education).
- Engage students in contracting, team effectiveness, communication, and project management training.
- Modifying interprofessional case studies to include situations in non-traditional pharmacy roles.
- Leveraging other nearby pharmacy schools to create robust hybrid (virtual and remote) career fairs to promote non-traditional pharmacy roles.
- Providing student pharmacists with concentrations, certificates, or dual-degree options aligned to non-traditional careers (e.g., clinical drug development, clinical pharmacology, regulatory affairs, medical affairs, pharmacovigilance, project management, health outcomes, and business training, such as an MBA pathway or business certificates).¹⁷
- Actively engage with alumni working in non-traditional roles to provide advice to pharmacy students.

Recommendations for Students:

- Students can take proactive steps to prepare their experiences to be competitive for non-traditional roles. These steps can include engaging in research, publications, seeking out internships, student leadership, and attending pharmacy conferences and alumni events (see Figure 1 roadmap).
- Seek out APPEs is your role of interest, for example, the ASHP, ACCP, AMCP, FDA or Centers for Disease Control and Prevention (CDC) pharmacy student experiential program.^{13–16,19}

- When aligned with career goals, students may also consider additional formal training (e.g., PhD, MD, MS, MBA, business certificate).

In conclusion, declining PharmD program enrollment and rising professional dissatisfaction are challenges facing the pharmacy profession. Addressing these issues requires a multifaceted approach that includes highlighting the diverse and rewarding career opportunities available to PharmDs beyond traditional roles. By raising awareness of non-traditional opportunities, we seek to inspire current and prospective students to consider these exciting career opportunities.

Pharmacy schools, students, and professional organizations must collaborate to create clear pathways to these alternative careers. This includes emphasizing hands-on learning, promoting interdisciplinary education, and providing specialized training and certifications. Importantly, engaging students early in their academic journey with diverse career options can significantly shape their professional satisfaction and commitment to the field.

The ACCP is deeply committed to supporting these initiatives and encourages all stakeholders to take proactive steps. Let us work together to transform the pharmacy landscape, train the best and brightest future pharmacists, and unlock the full potential of PharmD professionals.

Together, we can ensure that the pharmacy profession remains dynamic, fulfilling, and attractive to future generations. The future of pharmacy is bright, and by embracing these alternative career paths, we can achieve greater professional satisfaction, improve PharmD enrollment, and ultimately enhance patient care.

Acknowledgments

Microsoft Copilot (Microsoft Copilot; accessed August 2024 and March 2026) was used to assist in paraphrasing and improving readability of author-drafted text in this manuscript. The authors reviewed and edited all Copilot-assisted text and took full responsibility for the accuracy, originality, and integrity of the content. No AI tool was used to generate, alter, or manipulate research data or results. The opinions expressed in this article are those of the authors on behalf of the American College of Clinical Pharmacology and should not be interpreted as the position of the entities or institutions at which the authors are employed.

ACCP Policy Committee Members

Kenneth T. Moore, DBE, MS, FAHA, FCP, Sagar Sudhakar Bachhav, PhD, Sihem Bihorel, MS, PharmD, PhD, Peter L. Bonate, PhD, Janelle Burnham, MD, Ayyappa Chaturvedula, PhD, FCP, Mohamed Elmeliy, PhD, Michael B. Fania,

PharmD, MD, MBA, Sindura Gollamudi, MS, Amandeep K. Gupta, MBBS, MD, Dip SEM, Matthew Hruska, PharmD, PhD, Kajal Larson, PhD, Yi Ting (Kayla) Lien, PhD, Suresh Mallikaarjun, PhD, FCP, Dhananjay Marathe, PhD, Michael Nnamdi Nome, PharmD, Sonia Pahwa, PhD, Sudhakar M. Pai, PhD, Alexander J. Prokopenko, PharmD, PhD, Yuli Qian, PhD, Ammar Raza, MBBS, MBA, FCP, PCTM, D.Diab, PGD E&D, FFPM (RCP, UK), Samuel Roiko, PhD, Jinshan Shen, PhD, Suneeet Shukla, PhD, Mahipal Gurram Sinnollareddy, PhD, Peter H. Wiernik, MD, Xinning Yang, PhD, Yichao Yu, PhD, Amir Yousef, PhD.

Conflicts of Interest

The authors declare no conflicts of interest.

Data Availability Statement

Data sharing not applicable to this article as no datasets were generated or analyzed during the current study.

References

1. Patel SK, Kelm MJ, Bush PW, Lee HJ, Ball AM. Prevalence and risk factors of burnout in community pharmacists. *J Am Pharm Assoc.* 2021;61(2):145-150. <https://doi.org/10.1016/j.japh.2020.09.022>
2. Antrim AA. Despite rapid growth of institutions, pharmacy school applications decline. *Pharmacy Times*. Published April 5, 2023. Accessed August 22, 2024. <https://www.pharmacytimes.com/view/despite-rapid-growth-of-institutions-pharmacy-school-applications-decline>
3. National Community Pharmacists Association. Local pharmacies on the brink, new survey reveals. Published February 27, 2024. Accessed March 3, 2026. <https://ncpa.org/newsroom/news-releases/2024/02/27/local-pharmacies-brink-new-survey-reveals>
4. Guadamuz JS, Alexander GC, Kanter GP, Qato DM. More US pharmacies closed than opened in 2018–21; independent pharmacies, those in Black, Latinx communities most at risk. *Health Aff.* 2024;43(12):1703-1711. <https://doi.org/10.1377/hlthaff.2024.00192>
5. American Association of Colleges of Pharmacy. Student applications, enrollments and degrees conferred reports. Accessed March 3, 2026. <https://www.aacp.org/research/institutional-research/student-applications-enrollments-and-degrees-conferred>
6. Steeb DR, Cain J, Haines ST. Reconsidering pharmacy: we need to turn career regret into career options. *Am J Pharm Educ.* 2024;88(4):100678. <https://doi.org/10.1016/j.ajpe.2024.100678>
7. Cernasev A, Aruru M, Clark S, et al. Empowering public health pharmacy practice—moving from collaborative practice agreements to provider status in the U.S. *Pharm J Pharm Educ Pract.* 2021;9(1):57. <https://doi.org/10.3390/pharmacy9010057>
8. American College of Clinical Pharmacy, McBane SE, Dopp AL, et al. Collaborative drug therapy management and comprehensive medication management-2015. *Pharmacotherapy.* 2015;35(4):e39-e50. <https://doi.org/10.1002/phar.1563>
9. Urlick BY, Meggs EV. Towards a greater professional standing: evolution of pharmacy practice and education, 1920–2020. *Pharm Basel Switz.* 2019;7(3):98. <https://doi.org/10.3390/pharmacy7030098>
10. Kanmaz T, Newman K, Skrabal M, Smith MD, Wang Y, Stultz K. A call to action to remove ACPE limits on non-patient care

- elective advanced pharmacy practice experiences. *Am J Pharm Educ.* 2023;87(4):ajpe9055. <https://doi.org/10.5688/ajpe9055>
11. DeRemer CE, Shaddock R, Anderson KV, Curtis SD. Measuring the immediate impact when first-year pharmacy students are introduced to diverse career pathways. *Curr Pharm Teach Learn.* 2021;13(11):1503-1509. <https://doi.org/10.1016/j.cptl.2021.09.008>
 12. Chahine EB, Beedle AM, Carter CW, et al. Innovative ideas, strategies, and resources to attract students to the pharmacy profession: Report of the 2023–2024 AACP Student Affairs Committee. *Am J Pharm Educ.* 2024;88(8):100730. <https://doi.org/10.1016/j.ajpe.2024.100730>
 13. US Food and Drug Administration. *FDA pharmacy student experiential program*. Published August 20, 2025. Accessed March 3, 2026. <https://www.fda.gov/about-fda/scientific-internships-fellowships-trainees-and-non-us-citizens/fda-pharmacy-student-experiential-program>
 14. Academy of Managed Care Pharmacy. Experiential learning - APPE/IPPE directory. Accessed March 3, 2026. <https://www.amcp.org/resource-center/group-resources/student-pharmacist-center/APPE-IPPE-Directory>
 15. American Society of Health-System Pharmacists. Experiential education program-ASHP. Accessed March 3, 2026. <https://www.ashp.org/pharmacy-student/ASHP-Experiential-Education-Program>
 16. American College of Clinical Pharmacy. Professional leadership advanced pharmacy practice experience (APPE). Accessed March 5, 2026. <https://www.accp.com/education/appe.aspx>
 17. Hemstreet B, Moriarty F, Ecoy GAU, et al. Strategies to improve enrolment in schools of pharmacy FIP AIM handbook (Summary version). International Pharmaceutical Federation; 2023. Accessed March 3, 2026. <https://www.fip.org/file/5520>
 18. Hughes JA, Park HC, Christensen-Grant D, Fuentes DG. Achieving enrollment outcomes by aligning applicant recruitment and selection with unique organizational niches. *Am J Pharm Educ.* 2021;85(4):7743. <https://doi.org/10.5688/ajpe7743>
 19. Centers for Disease Control and Prevention. Pathways for Students and Graduates. Published September 11, 2025. Accessed March 5, 2026. <https://jobs.cdc.gov/working-at-cdc/student-intern-jobs/pathways.html>