

## The Growing Chasm Between Pharmacy Education and Practice: Time for Fundamental Reform or Pre-Program Bridges

Farshad H Shirazi<sup>a,b,c</sup>

<sup>a</sup> Dean, Pharmaceutical Sciences Research Center, Shahid Beheshti University of Medical Sciences, Tehran, Iran.

<sup>b</sup> Professor of Pharmacology and Toxicology, School of Pharmacy, Shahid Beheshti University of Medical Sciences, Tehran, Iran.

<sup>c</sup> Editor-in-Chief, Iranian Journal of Pharmaceutical Scientists.

For more than thirty years, serving in both academic halls and the pharmaceutical industry of Iran, including my role at the University-Industry relationships and my engagement with international pharmacy schools and professional societies worldwide, I have observed a pattern that deserves attention. The Doctor of Pharmacy (Pharm.D.) curriculum, in its current form, does not always prepare graduates for the full range of responsibilities they encounter in community pharmacies, hospital settings, or the pharmaceutical industry. This observation is not meant to diminish the many strengths of the program, but rather to suggest that a thoughtful adjustment could better align education with practice.

A central characteristic of many traditional pharmacy curricula is a strong emphasis on basic biomedical and pharmaceutical sciences, including chemistry, pharmacology, pharmaceuticals, and physiology, often taught as theoretical principles [1, 2]. While such foundational knowledge is essential, the proportion of basic science content relative to applied, practice-ready training appears higher than in some other educational systems [3, 4]. Comparative studies have suggested that curricula with a greater balance toward patient-centered and practical modules may produce graduates who feel more confident in their early professional roles [5, 6]. In the local context, graduates sometimes report feeling less prepared for the daily realities of pharmacy practice than they had hoped [7, 8].

Consider the community pharmacy environment. A newly graduated pharmacist may have a solid grasp of drug mechanisms but may have had limited exposure to inventory management, handling insurance software, recognizing prescription irregularities, or communicating effectively with patients who have varying levels of health complexity [9]. In many educational systems, community pharmacy rotations, business management modules, and simulated patient interactions are integrated into the core curriculum [10, 11]. In our setting, these elements could be strengthened.

In practice, clinical pharmacy has become an established component of the Pharm.D. Program. However, some graduates find it challenging to independently perform medication reconciliation, interpret laboratory data, or present patient cases to a nearby physician [5, 12]. Interprofessional education, learning alongside medical, nursing, or other health sciences students, remains limited in many programs, whereas it has become a standard feature in several international frameworks [13, 14]. Enhancing these skills would likely improve the role of the community pharmacist within the healthcare team.

The industrial sector presents a particularly noticeable gap. Most Pharm.D. Graduates entering industry have had little or no exposure to Good Manufacturing Practices (GMP), validation processes, supply chain logistics, or pharmaceutical marketing [15]. Many have never reviewed a batch record or observed a

quality control laboratory in operation. As a result, industry managers often find themselves investing considerable time and resources in basic training for new hires; a process that could be made more efficient if academic preparation were more closely aligned with industrial needs [16].

Meanwhile, the world of pharmacy practice is changing faster than the academic curriculum. Automation, artificial intelligence, and digital agents are already transforming drug dispensing, clinical decision support, and even drug discovery [17, 18]. In some countries healthcare transformation explicitly integrates AI training into pharmacy education [19]. Competency-based pharmacy education frameworks now include digital literacy and data interpretation as core entrustable professional activities [1]. Several schools have introduced mandatory modules on AI applications in pharmacy, from robotic dispensing to predictive analytics for medication adherence [20]. Many countries have begun revising their pharmacy curricula to include these elements, often with direct input from industry and regulatory bodies [21, 22, 23].

What appears to be missing is not just a few new topics. The entire pedagogical philosophy requires rethinking. Pharmacy education should be built on the principle that science is the foundation, but practice is the purpose. I propose two possible paths forward, and both deserve serious national discussion.

The first path is a fundamental restructuring of the Pharm.D. Curriculum itself. Under this model, the first half of the program would focus on core biomedical and pharmaceutical sciences, but taught with a constant eye on application. The second half would be a series of track-specific intensive modules: one for community pharmacy (including management, insurance, patient communication, and automation systems), one for hospital pharmacy (including clinical reasoning, pharmacotherapy case discussions, and interprofessional teamwork), and one for industrial pharmacy (including GMP, quality assurance, regulatory affairs, marketing, and supply chain). Each track would include at least 6–12 months of immersive, supervised practice in real settings. This model has been successfully implemented in many pharmacy schools that offer “pathways” or “concentrations” [24, 26].

The second path, perhaps more immediately feasible is the creation of voluntary “pre-programs” for final-year students or new graduates. These would be three to six month, certificate-bearing programs offered jointly by universities and professional bodies: a Pre-Community Pharmacy Program, a Pre-Hospital Pharmacy Program, and a Pre-Industrial Pharmacy Program. Each would be taught predominantly by practitioners, experienced community pharmacists or regional pharmacy associations, clinical pharmacists, or industry managers, with university supervision. The curriculum would be almost entirely practical: simulations, real-life case studies, site visits, and supervised hands-on work. Students would emerge not as experts, but as ready-to-train employees who understand the language, workflows, and basic expectations of their chosen field. Industry partners could observe and select future employees directly from these programs, creating a pipeline that benefits all parties.

Such “pre-programs” are not theoretical. In some countries, a structured pre-industrial pharmacy training program involving 200 hours of practical work reduced the time needed for new hires to become productive by nearly 50% [18]. In some other regions, a mandatory pre-registration community pharmacy training year, co-supervised by academic and practice mentors, dramatically improved graduate confidence and reduced medication errors in the first year of practice [19]. And in some other countries, pilot “bridge” programs for hospital pharmacy have shown measurable gains in clinical skills [14, 22, 25]. The International Pharmaceutical Federation (FIP) has repeatedly called for practice-ready education and supports the concept of transitional training periods between graduation and independent practice [23].

Iran has the talent, the industrial capacity, and the academic infrastructure to implement either the curriculum reform or the pre-programs. The Ministry of Health and Medical Education, the universities, and the pharmaceutical associations and industries must sit together to think of one of these models. A pilot program, tested in a small number of institutions and evaluated over one or two academic years, could provide valuable data on feasibility and outcomes. The cost of inaction is measured in wasted human potential, unsafe pharmacy

practice, and an industry that must import skills instead of cultivating them at home.

In conclusion, the current pharmacy curriculum has many strengths, but it may not fully prepare graduates for the diverse responsibilities of community, hospital, and industrial practice. A thoughtful rebalancing of basic science with applied training, or the introduction of voluntary pre-programs, could help bridge the observed gap. Students deserve an education that equips them for the realities of their profession; patients deserve pharmacists who are confident and competent from the start; and the healthcare system as a whole would benefit from a smoother transition from classroom to practice. The discussion is timely, and the options are worth exploring.

## References

- Rhoney DH, Schumacher DJ, Chen AMH, Brock TP, Stowe CD. Before the waters rise: building the levee for competency-based pharmacy education. *Am J Pharm Educ.* 2026;90(1):101901.
- Mobley WC, Chen AMH, Dutta AP, et al. The role of biomedical and pharmaceutical sciences in pharmacy education and practice. *Am J Pharm Educ.* 2024;88(12):101312.
- O'Neill C, Sheridan F, Ryan C, et al. Enhancing the practice readiness of pharmacy graduates: integrating prescribing and public health to meet evolving NHS demands. *Curr Pharm Teach Learn.* 2025;17(12):102468.
- Eslami K, Kheiry avarvand O, Kouti L, Izadpanah M. Comparison of Iran's and world's leading faculties approved curriculum in the field of pharmacy, in terms of pharmaceutical care education. *Jundishapur Sci Med J.* 2016;15(1):58-63.
- Silavizadeh F, Ahmadraji Z, Khalili H, et al. Clinical pharmacy in Iran: where do we stand? *Arch Pharm Pract.* 2013;4(2):47-52.
- Salamzadeh J. New doctor of pharmacy curriculum of the I. R. Iran: needs and gaps. *Iran J Pharm Res.* 2010;6(4):223-224.
- Saramunee K, Krska J, Mackridge A, et al. How to enhance pharmacy students' readiness to work in primary care. *Pharm Educ.* 2024;24(1):45-52.
- Saramunee K, Krska J, Mackridge A, et al. Primary care pharmacy competencies of graduates from a community-focused curriculum: self- and co-worker assessments. *Pharmacy (Basel).* 2025;13(5):139.
- Talasaz AH, Nourian M, Mozaffari S, et al. Curriculum mapping of accredited pharmacy programs in the United States. *Curr Pharm Teach Learn.* 2023;15(7):656-662.
- Al-Diery T, Al-Haqan A, Al-Taweel D, et al. Unlocking findings of entrustable professional activities for trainee development, entrustment, and practice readiness in pre-registration pharmacy training: a systematic review. *Am J Pharm Educ.* 2025;89(9):101485.
- Khalid S. Preparing MPharm graduates for practice: integrating understanding of community pharmacy, mental health and digital health. *Pharm J.* 2025;294(7885):online.
- Kheir N, Zaidan M, Younes H, El Hage M, El Hage R. The Implementation of the North American clinical training model in UAE pharmacy schools: the gap between standards. *J Pharm Pract.* 2022;35(2):280-285.
- Khan MU, Anwar M, Khan H, et al. Exploring pharmacy professionals insights for advancing the pharmacy curriculum: a qualitative study. *Curr Pharm Teach Learn.* 2026;18(7):102623.
- Rahim A, Khan TM, Hassali MA. Current status and future suggestions for improving the Pharm D curriculum towards clinical pharmacy practice in Pakistan. *BMC Med Educ.* 2021;21(1):125.
- Alghalbie F, Haughey S, Reid J. Perspectives on artificial intelligence use in pharmacy education in Northern Ireland: a qualitative study based on the unified theory of acceptance and use of technology. *Curr Pharm Teach Learn.* 2026;18(1):102490.
- Alsultan AF, Aljabr W, Alharbi F, et al. Preparing for an AI-driven future: insights from Saudi pharmacy students. *PeerJ.* 2026;14:e20600.
- Ali M. Will AI reshape or deform pharmacy education? *Curr Pharm Teach Learn.* 2025;17(3):102274.
- Bajis D, Chaar B, Penm J, Moles R. Competency-based curricula in the Eastern Mediterranean Region schools of pharmacy: a framework-informed mixed method study. *J Pharm Policy Pract.* 2026;19(1):2612865.
- Saramunee K, Krska J, Mackridge A, et al. How to enhance pharmacy students' readiness to work in primary care. *Pharm Educ.* 2024;24(1):45-52.
- O'Neill C, Sheridan F, Ryan C, et al. Enhancing the practice readiness of pharmacy graduates: integrating prescribing and public health to meet evolving NHS demands. *Curr Pharm Teach Learn.* 2025;17(12):102468.
- Rhoney DH, Thornby KA, Brock T, et al. Evaluating the need for competency-based pharmacy education (CBPE): the report of the 2023–2024 Academic Affairs Standing Committee. *Am J Pharm Educ.* 2024;88(8):100728.
- Peraman R, Palaiani S, Izham MIM. Are doctor of pharmacy curricula in developing countries adequate to train graduates to provide pharmaceutical care? *Arch Pharm Pract.* 2020;11(1):1-5.
- International Pharmaceutical Federation (FIP). FIP global competency framework (GbCF): supporting the development of foundation level pharmacists. The Hague: FIP; 2020.
- Bajis D, Moles R, Chaar B, et al. Stakeholders' perspectives on quality assurance of pharmacy education in the Eastern Mediterranean Region. *Am J Pharm Educ.* 2018;82(10):6482.
- Al-Ghananeem AM, Malcom DR, Riley B, et al. Pharmacy education in the Eastern Mediterranean Region: challenges and opportunities. *J Pharm Pract.* 2020;33(4):489-496.
- Boura F, El Hajj M, Awaisu A, Kheir N. Pharmaceutical care education at pharmacy colleges in the Middle East and North Africa region: a systematic review. *J Clin Pharm Ther.* 2022;47(8):1134-1148.



Iranian Journal of Pharmaceutical Sciences

2025: 21 (1): 495-497

<https://journals.sbm.ac.ir/IJPS>



Editorial Letter

