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CONFERENCE ABSTRACTS

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Academic pharmacy

Empowering future pharmacy leaders in Thailand through an Innovative competency-based Pharm.D. Curriculum: The Sandbox 4+2 model for workforce transformation

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Background: Established in 2009, the Faculty of Pharmaceutical Sciences at Burapha University (RxBUU) has rapidly evolved into a leading academic hub in eastern Thailand, with a strategic vision to advance precision health and personalized medicine. In response to global healthcare transformation and increasing demands for a future-ready pharmacy workforce, RxBUU has re-envisioned its educational approach toward competency-based education and workforce transformation. The "Sandbox 4+2 Years" Doctor of Pharmacy (Pharm.D.) curriculum was developed to align pharmacy education with emerging healthcare needs, including precision medicine, pharmacogenomics, and advanced biopharmaceutical sciences. The program aims to cultivate pharmacists who are adaptive, interdisciplinary, and capable of delivering patient-centered care in complex health systems. Grounded in the RxBUU core values—Resilience, Excellence, Benevolence, Unity, and Utility—the curriculum integrates academic rigor with experiential learning. It emphasizes not only clinical competence but also ethical leadership, social accountability, and the ability to contribute to healthcare innovation at both national and global levels.

Method: The Sandbox 4+2 Pharm.D. program, approved by the Pharmacy Council of Thailand, commenced in 2025 and is designed using a competency-based framework that integrates knowledge, skills, and professional attributes across progressive learning stages. In the first two years, students build foundational competencies in biomedical and pharmaceutical sciences. This is followed by integrated pharmacotherapy, communication, and pharmacoepidemiology in the second and third years. Early experiential exposure is introduced alongside coursework in natural products, consumer protection, and pharmacy law. The fourth year focuses on advanced competencies in pharmacogenomics and precision medicine, preparing students for evolving roles in healthcare delivery. The final two years consist of full-time experiential education, where students engage in structured clerkships across multiple tracks, including Clinical Pharmacy, Pharmaceutical Sciences, and Community and Primary Care. Through partnerships with healthcare institutions, industry, and research centers, the program supports interprofessional collaboration, practice-based research, and real-world problem-solving, ensuring alignment with workforce transformation and healthcare system needs.

Results: Since its implementation in 2025, the program has enrolled 20 students. Experiential training spans diverse settings—hospital, community, industry, and research—across multiple regions and selected international sites. More than 20 preceptors have been engaged to support competency-based training. Students have completed 2 practice-based and service-learning projects. Early outcomes indicate high learner satisfaction, strong preceptor engagement, and improved readiness for diverse career pathways, reflecting alignment with national workforce transformation goals.

Conclusion: The Sandbox 4+2 Pharm.D. curriculum represents a competency-based and future-oriented model that supports pharmacy workforce transformation in Thailand. By integrating precision medicine, experiential learning, and professional values, the program prepares adaptable and globally competent pharmacy leaders.

Diagnostic assessment in direct patient care introductory pharmacy practice experiences

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Background: A diagnostic assessment in education is an evaluation designed to identify the learning needs of a student. Diagnostic assessment may be applied to pharmacy curricula and assessments by integrating assessments that identify student strengths and areas for improvement as they progress through the curriculum. Diagnostic assessment also enhance transparency and encourage students to identify areas in need of intervention. Results of these assessments may be utilized to provide students with growth opportunities with with growth opportunities to achieve academic success.

Objective: The purpose is to implement the diagnostic assessment framework to assessment in direct patient care introductory pharmacy practice experiences to promote student pharmacist success.

Method: The diagnostic assessment framework was integrated into third-year student pharmacist (P3) Direct Patient Care Introductory Pharmacy Practice Experience (IPPE) experiential education courses. Specifically, the framework was applied to prepare students for their final proficiency evaluation (FPE) at the end of the semester. This test is designed to evaluate students' readiness for the Advanced Pharmacy Practice Experiences (APPE) courses. Students were provided with the purpose of the FPE, the tasks of the FPE, and the criteria for success on the first day of the semester. Students completed a diagnostic assessment based on the FPE the first day of class and then received feedback and the recommended answers after the completion of the assessment. Students then had 12 weeks of IPPEs to practice skills needed for direct patient care and their FPE, i.e. medication reconciliations, patient interviews, and pharmacist consults during site visits. During the FPE at the end of the semester, students were re-assessed on their direct patient care. Objectives: Conduct patient interviews in a direct patient care setting. Perform medication reconciliation. Identify physical and patient specific factors to be considered when developing an assessment and plan. Develop appropriate assessments and plans based on relevant subjective and objective information, taking into consideration special populations, such as geriatrics and pediatrics. Identify and integrate socio-behavioral, socio-economic, and cultural beliefs/values, including barriers to care, when developing assessments and plans. Independently compose and document a direct patient care encounter.

Results: The diagnostic assessment framework was integrated into P3 Direct Patient Care IPPEs with 132 P3 student pharmacists.

Conclusion: The diagnostic assessment framework is a methodology from education that may be applied successfully to pharmacy curricula and assessments.

The competency gap between undergraduate pharmacy education and practice requirements in Turkey: A review from the professional contribution perspective of dermocosmetics, OTC and aromatherapy schools

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Background: The pharmacy profession is globally shifting from a product-oriented approach toward patient-centered pharmaceutical care. This transformation has made competencies related to minor ailment management, over-the-counter (OTC) counselling, dermocosmetic ingredient literacy, and the safe use of complementary approaches more prominent. Although the undergraduate core curriculum framework and accreditation standards in Türkiye provide a competency-based orientation, the emphasis on practice-oriented areas (OTC algorithms, dermocosmetic counselling, and aromatherapy safety) varies across faculties. In this context, Dermocosmetics School, OTC School, and Aromatherapy School in Türkiye have emerged as fully online continuing professional development (CPD) programs targeting pharmacists, assistant pharmacists, and pharmacy students.

Method: A systematic narrative review approach based on the PRISMA 2020 guidelines was adopted. Literature searches were planned in PubMed, Scopus, Web of Science, and ERIC databases using the keywords "pharmacy education", "competency-based education", "minor ailment management", "over-the-counter", "dermocosmetics", "cosmetics counselling", "aromatherapy safety", "continuing professional development", and "online learning". Inclusion criteria were limited to studies addressing the intersection of community pharmacy practice and pharmacy education/CPD. Publicly available program descriptions and module structures of the three programs in Türkiye were analysed through document analysis. Thematic analysis was conducted

to compare the programs in terms of (i) curriculum gap definitions, (ii) pedagogical design features, and (iii) claims regarding professional contributions.

Results: The literature indicates that minor ailment counselling is widespread in community pharmacy practice and that pharmacist-led models, when appropriately designed, can provide benefits in terms of healthcare system costs and workload reduction. Online learning demonstrates effectiveness comparable to face-to-face methods in terms of knowledge acquisition; however, the need for structured assessment methods such as simulation and Objective Structured Clinical Examinations (OSCEs) for skills transfer is emphasised. Variability in pharmacists' knowledge and practice in dermocosmetic and dermatology-based counselling has been reported, and data from Türkiye indicate a need for further education regarding pharmacists' roles and knowledge levels in dermocosmetics. In aromatherapy, adverse effects and safety risks have been documented, highlighting the need for evidence-based counselling to ensure safe use. The modular and case-based designs of the three online schools in Türkiye are consistent with CPD and adult learning principles; however, independent evaluation of outcomes and competency mapping remain generally limited.

Conclusion: Dermocosmetics School, OTC School, and Aromatherapy School can be considered online CPD models aimed at reducing the practice-oriented competency gap between undergraduate pharmacy education and rapidly evolving community pharmacy practice requirements in Türkiye. The strongest educational impact will be achieved through the integration of these contents into accredited curricula, supported by competency mapping and performance-based assessments such as OSCEs and simulated patient evaluations.

Mapping education for sustainable development in MPharm pharmacy curriculum: A Case study comparing bottom-up and genAI methods

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Background: Embedding Education for Sustainable Development (ESD) within professional programmes is now prioritised in national and institutional strategies, yet systematic, scalable methods for evidencing embeddedness remain tentative. This case study examines how ESD is integrated within a Masters in Pharmacy (M.Pharm) programme at Trinity College Dublin, and compared a bottom-up, expert-led mapping approach with a GenAI-assisted extraction and scoring system aligned to the University's ESD Curriculum Design Framework. The study helped verify the potential for GenAI tools to support University level mapping and provide a feedback loop to programme directors and institutional leadership on the level of embeddedness of ESD in postgraduate curriculums.

Method: The study applied a three-step curriculum mapping process of information provided in module descriptors. Firstly, evidence of ESD themes (UNESCO Sustainable Development Goals (SDGs)) in programme and module documentation were identified) and scores aggregated to biosphere, society, and economy tiers aligned with the Stockholm Resilience Centre's "SDG wedding cake". Integration of UNESCO's ESD competencies were then identified, and scores aggregated to the Head, Heart, and Hands domain framework. Finally, UNESCO ESD-aligned pedagogical approaches (learner-centred, action-oriented, transformative) were reviewed in all modules. The bottom-up approach involved a structured review of each module descriptor by the relevant module coordinators in the M.Pharm programme. In parallel, a GenAI large language model (LLM), GPT 5, was prompted with standardised extraction queries to generate evidence tables and populate the scorecard to determine the level of ESD embeddedness. The broader methodology and scoring system align with the institutional ESD mapping framework developed for the postgraduate baseline.

Results: Both approaches identified that ESD themes were present but unevenly distributed: societal and economy-tier SDGs were most consistently represented, whereas biosphere-tier SDGs were less explicit. Frequent opportunities for developing cognitive and socio-emotional ESD competencies such as systems thinking, critical thinking, collaboration, and integrated problem-solving were commonly identified. Both approaches consistently identified strong evidence of learner-centred pedagogies , and frequent integration of action-oriented approaches, whereas reference to transformative approaches was less frequent. GenAI workflow produced rapid first-pass readings of module descriptors and yielded programme-level summaries to prompt curriculum discussions, while the bottom-up review provided interpretive nuances where terminology was discipline-specific or implicit. Differences between expert review and GenAI were minimal, and generally indicated that expert-led review scored modules slightly lower than the GenAI workflow.

Conclusion: The case study demonstrates that a hybrid mapping strategy can be advantageous for M.Pharm education. GenAI rapidly highlights where ESD content already exists and identifies modules that could meet or exceed the "partial embeddedness" threshold with modest descriptor revisions, whilst expert review then validates these signals and can translate them into curriculum improvements. Priority enhancement areas identified by the process include: (i) strengthening explicit biosphere-tier SDG linkages within modules; (ii) expanding action-oriented and transformative learning opportunities through assessment design; and (iii) improving clarity and consistency in module descriptors for both human and AI-supported interpretation. More broadly, the study illustrates a feasible, evidence-based

route for integrating and monitoring ESD in a professional Masters programme while supporting institutional strategy and reporting obligations.

Drug therapy problems among children and adolescents on antiretroviral therapy in Nigeria: Prevalence, documentation gaps, and the case for pharmacist-led intervention

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Background: Drug therapy problems (DTPs) are events involving pharmacotherapy that interfere with achieving desired treatment outcomes and require professional judgement to resolve. They are classified across four domains: indication (unnecessary therapy or untreated conditions), effectiveness (wrong drug or subtherapeutic dosing), safety (adverse drug reactions or excessive dosing), and adherence (non-compliance with prescribed therapy). Paediatric-specific challenges, including formulation unavailability, weight-based dosing complexities, caregiver-administered drug manipulation, and limited pharmacovigilance infrastructure, compound this risk. In Nigeria, studies by Aderemi-Williams et al. (2021) report DTP prevalence of 21.9–27.4% among patients on ART, yet systematic screening and documentation of DTPs in paediatric HIV settings remain largely absent. This gap undermines the pharmacist's clinical role and prevents the timely identification and resolution of medication-related harm.

Objective: To determine the prevalence and typology of DTPs among CALHIV attending ART facilities in Nigeria; to identify healthcare provider and facility-level factors associated with DTP recognition and documentation; and to evaluate the impact of a pharmacist-led, caregiver-focused intervention delivered across two high-burden states on DTP rates and viral load outcomes over a 12-month intervention period.

Method: A quasi-experimental, mixed-methods design is employed across six geopolitical zones (n=720 CALHIV dyads at baseline). Healthcare providers (HCPs) at each site complete a validated questionnaire covering DTP familiarity, reporting practices, perceived caregiver contributions to DTPs, and facility-level pharmacovigilance mechanisms. Clinical data are abstracted from patient folders and medication care cards to document DTP types, co-medications (including multivitamins, herbal preparations, and prophylaxis), and ART regimen change rationales. At the two intervention sites (Lagos and Kaduna), a structured pharmacist-led intervention will be delivered: comprising caregiver education modules, DTP identification training, ART dosing aids, and routine DTP screening checklists. Viral load suppression at 12 months serves as the primary outcome. Sample size for the intervention phase is 64 participants (n=32 per site), calculated at 80% power using DTP prevalence of 27.4%.

Results: The pilot study (n=40 HCPs; n=39 patient records, Osogbo, Osun State) revealed a striking paradox: while 95.0% of HCPs reported familiarity with the concept of DTPs, systematic DTP documentation in patient folders and medication care cards was consistently absent or inadequate across all reviewed records. Co-medications beyond standard ART prophylaxis — including multivitamins and herbal preparations, which carry significant drug–interaction risk — were rarely recorded. Indications for ART regimen switches lacked standardized categorization, with 'ageing out of a pediatric dosing range' absent as a documented reason. Among the 23.1% of patients with unsuppressed viral loads (>1,000 copies/mL), no corresponding DTP entries were identified — suggesting either no DTP assessment occurred or findings were not captured. Pharmacists constituted most of the HCP cadre (55.0%), indicating both an opportunity and an unmet mandate for pharmacy-led DTP governance.

Conclusion: A critical and concerning disconnect exists between HCPs' self-reported DTP awareness and actual documentation practice in Nigerian pediatric ART settings. This gap leaves CALHIV exposed to undetected and unresolved medication-related harm, directly contributing to viral non-suppression. This study's intervention arm will provide the first rigorously evaluated evidence of pharmacist-led DTP management on pediatric HIV outcomes in Nigeria.

Pilot study assessing caregiver-related factors and drug therapy problems influencing viral load suppression among children and adolescents on ART in Nigeria: Multisite scale-up

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Background: Multisite, mixed-methods research in resource-limited settings faces unique operational challenges that can

undermine data validity if not systematically addressed at the design stage. Pilot studies serve the essential function of testing instrument clarity, assessing data abstraction feasibility, identifying logistical barriers, and validating sampling procedures before full-scale deployment. This is particularly important in paediatric HIV research, where multiple data sources (clinical folders, medication care cards, caregiver questionnaires, HCP interviews) must be triangulated, and where the quality of routine documentation varies markedly across facilities. Given the six-zone, quasi-experimental design of this PhD study spanning over 700 caregiver-CALHIV dyads across Nigeria, a robust pilot was essential to ensure methodological rigour before national scale-up.

Objective: To assess the feasibility and operational readiness of a national multisite study examining caregiver-related factors and drug therapy problems (DTPs) influencing viral load suppression among CALHIV in Nigeria, including instrument clarity, data abstraction validity, stakeholder engagement, logistical workflow, and the identification of protocol refinements required before full-scale deployment.

Method: A descriptive pilot study was conducted at the State Specialist Hospital, Asubiaro, Osogbo, Osun State, a public tertiary ART facility. A purposive sample of 40 caregiver-CALHIV dyads (children and adolescents aged 0–21 years who are on ART) was enrolled. An online self-administered caregiver questionnaire, a structured clinical data abstraction form, and a healthcare provider questionnaire were administered. Average questionnaire completion time, response completeness, instrument clarity, data entry workflow, and stakeholder cooperation were evaluated. Ethical approval was in place before commencement. The pilot was not designed to be statistically powered but rather to inform protocol refinements for the six-site national study.

Results: Thirty-nine of 40 enrolled dyads (97.5%) returned complete data, indicating excellent feasibility. The average questionnaire completion time was 10 minutes, within the acceptable range for clinic-based administration. Caregiver and HCP cooperation was rated as high, with no significant refusals. However, five critical protocol refinements were identified: (1) baseline viral load collection is not programme-supported, necessitating protocol adjustment to rely on current viral load data; (2) only baseline CD4 counts are routinely collected (28.2% not available), limiting immunological profiling; (3) DTP documentation in patient folders was consistently absent, requiring the addition of a dedicated HCP DTP screening visit; (4) co-medications including multivitamins and herbal preparations require integration into the caregiver questionnaire rather than data abstraction only; and (5) ART regimen change rationale coding should include 'ageing out of a paediatric dosing range' as a discrete option. These refinements have been incorporated into the final multisite protocol.

Conclusion: This pilot study successfully validated the overall feasibility of the national study design, confirming the clarity and acceptability of instruments and the cooperative engagement of both caregivers and healthcare providers. The identification of five substantive protocol refinements, particularly around DTP documentation and viral load data availability, demonstrates the indispensable value of pre-study piloting in complex, multi-stakeholder HIV research in Nigeria. These lessons are directly applicable to researchers designing multisite pharmacist-led or clinical pharmacy intervention studies in low- and middle-income countries (LMIC) settings. The refined protocol is now ready for deployment.

Gamifying pharmacist education: Transitioning from digital interactivity to an immersive pharmacist education escape room experience

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Background: Engaging pharmacists in continuing professional development requires innovative approaches that go traditional didactic lectures. Gamified learning, particularly the use of educational escape rooms, has been shown to successfully engage adult learners and improve clinical problem-solving skills within pharmacy education (Eukel et al., 2017). Following the successful implementation of a digitally gamified symposium at a previous global scientific symposium, a novel, fully immersive Pharmacist educational escape room (PEER) experience was developed for the current global congress. This evolved intervention blends physical and digital environments, utilizing live actors, artificial intelligence (AI), and virtual reality (VR). The goal of this innovation is to educate pharmacists on specific therapeutic medications and clinical applications.

Method: The previous educational iteration, a continuing professional development-accredited symposium, utilized gamified tools such as rapid “flash play” digital activities and real-time polling to reinforce key concepts. To elevate this educational model, a physical escape experience was designed. Pharmacist participants collaborate in small teams to solve clinical puzzles within a simulated environment, interacting with live actors, AI-driven patient scenarios, and VR interfaces. The puzzles drive the application of clinical reasoning, medication specific knowledge, and current literature understanding to successfully resolve the patient case. The design of the escape room is uniquely designed in such a way to ensure pharmacist engagement and enjoyment by creating a fail forward environment so all participants can complete the experience. Pre- and post-experience assessments will evaluate knowledge acquisition, clinical confidence, and overall learner engagement in addition to metrics gathered from the PEER.

Results: The foundational digital gamification model launched last year by this team previously reached 90% room capacity, attracting 263 attendees from 33 countries. Engagement metrics demonstrated high participation, with 79% of attendees completing at least one interactive module. Attendees' self-rated understanding of the clinical topic designated as “good” or “excellent” rose significantly from 36% pre-symposium to 72% post-symposium. (see Giraldi et al 2026 poster) This robust foundational data informed the structural design of the new immersive experience. While data for the novel escape experience are pending, outcomes are projected based on established educational literature. It is hypothesized that integrating physical, time-constrained physical puzzles with advanced technology (VR/AI) will yield exceptional engagement and satisfaction rates, which frequently exceed 95% in similar pharmacy-based escape room models (Cole & Ruble, 2021) Furthermore, the immersive environment is predicted to significantly improve post-intervention knowledge scores and enhance critical non-cognitive skills, such as clinical reasoning, interprofessional communication, and collaborative problem-solving (Zhang et al., 2024). By simulating real-world healthcare pressures, this multifaceted format is expected to seamlessly translate theoretical brand and clinical knowledge into practical, applied competencies.

Conclusion: Gamified learning has demonstrated efficacy in engaging healthcare professionals like pharmacists, effectively enhancing competence and confidence in applying clinical knowledge within patient care. Transitioning from screen-based gamification to a multi-sensory, tech-enabled escape experience represents a promising, evidence-based frontier in pharmacy education, offering a highly memorable and interactive method for clinical dissemination.

Driving change in Australia through an innovative and fit for purpose capability framework

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Background: Innovation with purpose is core for the Australian Pharmacy Council (APC) work, in accreditation standards, policy development, practice frameworks and collaboration, creating opportunities to advance capabilities of the pharmacy profession. Capability Frameworks and Accreditation Standards must evolve to produce pharmacists who are able to work effectively with, and provide support for, Australia’s diverse population. The Pharmacy Board of Australia (PharmBA), the national regulator, requested APC to develop a national Pharmacist Capability Framework with the intention to foster good practice and enhance efficiency and consistency across health professions. APC is the national standard-setting and accreditation authority for pharmacy education and training. Accreditation is a valuable tool to ensure educational quality and shape the health workforce of the future. Education needs to evolve to prepare future-ready health practitioners who can thrive in an increasingly complex and diverse healthcare landscape. As scopes of practice expand and new models of care emerge, graduates must be equipped not only with clinical capability but also with adaptability, digital fluency, collaborative skills and the ability to work respectfully and effectively with diverse cultural groups in a multicultural society. Educators and regulators play a critical role in foundational capabilities to ensure that day one pharmacists are prepared to lead and transform practice. The Capability Framework describes entry to practice capabilities of a newly registered pharmacist who is adaptable to future practice change. It will be used by APC for accreditation of pharmacy programs and by education providers to innovate their curricula to ensure fit for purpose graduates.

Method: A comprehensive and systematic literature review was undertaken to identify consensus capabilities aligning with emerging roles and contemporary professional standards. The literature review informed early versions of the framework. Extensive stakeholder consultation was undertaken including consensus panels with subject matter experts and national public consultation. National guidance (1) on developing professional capabilities was followed. The project was overseen by Governance and Reference Groups with expertise in pharmacy education, training and regulation.

Results: The Framework development was supported by detailed review of thirteen other frameworks, 114 people attending public consultation forums, and 28 additional written submissions. In total more than 1,300 pieces of feedback were received. Analysis of feedback informed the final version which was released to the profession in April 2026.

Conclusion: The development of this evidence-based, contemporary framework provides consistency across the pharmacy profession and establishes a foundation for best practice that will elevate professional standards in the delivery of care. The Framework defines the capabilities of a newly registered pharmacist who is adaptable to evolving practice settings. This work aligns with FIP Developmental Goal 13 by developing and implement needs- and evidence-based practice-related policies aligning with broader national health policies and priorities.

Bridging education and practice: Strengthening pharmacist preceptor capability in workplace-based assessment in Australia

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Background: Workplace-based assessment (WBA) is a cornerstone of contemporary health professional education to evaluate competence in authentic clinical settings and support the transition from graduate to independent practitioner. In Australia, intern pharmacists complete a period of supervised practice before registration, during which preceptors assess their performance using WBA approaches. Preceptors are registered pharmacists who play a critical role in enhancing interns' learning, ensuring they develop the professional and clinical skills necessary for safe practice. While WBA is embedded within the Australian pharmacy internship framework, preceptors commonly balance supervision with demanding clinical workload and may have varying levels of experience and confidence in applying WBA consistently in practice. Providing accessible, practice-relevant professional development for preceptors has the potential to strengthen the consistent implementation of WBA and enhance the quality of interns' workplace learning. The Australian Pharmacy Council (APC) serves as the national standard-setting and accreditation authority for pharmacy education and training. In response to this professional need, we developed a flexible, online professional development program using microlearning principles to support preceptors in building the knowledge and practical skills required to implement WBA during intern supervision. The objective of this project was to design, deliver and evaluate a flexible, evidence-informed online learning program that enables preceptors to integrate high-quality observation, feedback, and assessment practices into routine workplace supervision.

Method: A needs assessment was conducted with preceptors supervising intern pharmacists through an online survey that explored their experiences with WBA, confidence in observation and feedback, perceived challenges in implementing WBA, and their preferences for professional development formats. The survey findings directly informed the design of a flexible, online professional development program that uses microlearning principles to support preceptors in implementing WBA in routine supervisory practice. The program comprises four self-paced modules and a companion webinar, delivered through the Blackboard learning management system. The modules feature interactive media, authentic workplace scenarios, insights from both preceptors and interns, and evidence-based online teaching strategies. Participants were invited to provide feedback following each module and the webinar to evaluate the program's relevance, usability, and perceived value.

Results: The WBA program was launched nationally in March 2026 and is available to pharmacists across Australia. Program uptake and participant feedback data are being collected and will be analysed to evaluate engagement, perceived relevance and usability. Findings will be presented at the conference.

Conclusion: This initiative demonstrates how purposeful educational innovation can strengthen the connection between education, practice, and workforce development in pharmacy. Developed in response to the evolving needs of pharmacist intern training in Australia, the program equips preceptors with practical skills to deliver effective WBA. By strengthening supervision and workplace learning, the initiative enhances workforce capability, supports early-career pharmacist development, and enables pharmacists across practice settings to contribute to ongoing professional and practice transformation. The flexible microlearning approach responds to the realities of contemporary pharmacy practice, offering an accessible and scalable model for lifelong professional development that supports those supervising the next generation of pharmacists.

Traditional and AI-supported constructivist learning in health professions education: Preparing the future pharmacy workforce

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Background: Preparing healthcare professionals to address complex health challenges requires innovative educational approaches that integrate science, practice, and technology. Constructivist learning theory supports active, contextualised, and collaborative knowledge construction and is widely recognised as a valuable framework for health professions education (HPE). However, its comprehensive implementation across programmes remains limited. At the same time, artificial intelligence (AI) is increasingly used in education, yet its alignment with constructivist learning principles and its potential role in preparing healthcare professionals, including pharmacists, for clinical practice is not well understood. This study examined traditional and AI-supported constructivist learning strategies in undergraduate HPE and their influence on students' preparedness for clinical practice.

Method: A mixed-methods approach was used. In the quantitative phase, 466 undergraduate students from HPE programs at Qatar University completed the Constructivist Practices in the Learning Environment questionnaire,

assessing seven constructivist domains. In the qualitative phase, focus groups were conducted with a purposive sample of students (n=26). Thematic analysis explored experiences of active engagement, real-world relevance, social interaction, self-regulation, and AI use.

Results: The findings indicated that 'Making meaning through real-life examples' was the highest-rated domain (mean=3.84, SD=0.89), reflecting strong emphasis on contextualized learning. 'Conceptual conflicts and dilemmas' scored lowest (mean=2.57, SD=0.94), indicating limited exposure to cognitive challenge. Qualitative findings showed that clinical rotations, collaborative activities, and AI tools supported reflection, inquiry, and personalized learning. Students perceived AI as supportive but emphasized the need for instructor guidance.

Conclusion: Integrating AI into constructivist learning environments can enhance active, collaborative, and personalised learning in HPE. Strengthening constructivist teaching strategies and providing structured guidance for AI use may improve clinical readiness and support the preparation of future healthcare professionals, including pharmacists, to contribute to patient-centred care and resilient health systems.

Examining the perception of undergraduate pharmacy students towards their leadership competencies: A mixed-methods study

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Background: Leadership development is crucial for pharmacy students to meet the evolving demands of healthcare. However, research on pharmacy students' perceptions of their leadership competencies and development opportunities remains limited. This study explores students' perceptions at the College of Pharmacy at Qatar University (CPHQU), regarding their leadership knowledge, skills, attitudes, and available opportunities for leadership development.

Method: An explanatory mixed-methods approach was employed. The quantitative phase involved the development, validation and administration of a questionnaire to all undergraduate CPH-QU students (N = 187), with a minimum required sample size of 126 students. Data were analyzed using SPSS®, incorporating both descriptive and inferential analysis. In the qualitative phase, four virtual focus groups (FGs) were conducted via Microsoft Teams®, guided by a topic guide based on the Medical Leadership Competency Framework. The FGs were transcribed verbatim and analyzed thematically using NVivo®.

Results: The questionnaire response rate was 98.4% (184 responses out of 187), with a usability rate of 70.1% (129 responses out of 184) after excluding students who only completed the demographic section. The study indicated a fair level of leadership knowledge (Median [IQR] = 59.0 [7.0]), skills (Mean [SD] = 109.9 [11.9]), and attitude toward leadership (Median [IQR] = 38.0 [7.0]) among students. Qualitative data further confirmed that the CPH-QU supports the development of students' leadership knowledge, skills and positive attitudes through various curricular and extracurricular opportunities. Key opportunities highlighted by students included interprofessional education (IPE), clinical rotations, and the integration of leadership concepts within various courses. To further enhance leadership development, students recommended expanding IPE to be implemented in clinical rotations, standalone leadership courses and establishing exchange programs with international institutions.

Conclusion: Conclusions Students exhibit a fair level of leadership knowledge and skills, acknowledging their importance for their future professional roles as pharmacists. The importance of practical experience was particularly emphasized, with those having prior leadership experience showing a notably more positive attitude toward leadership. These findings highlight the need for a structured, comprehensive approach to leadership development in pharmacy education to more effectively prepare students for their professional careers.

Introducing global health to first-year pharmacy students through an interactive workshop

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Background: Global health and equitable access to medicines are increasingly important components of pharmacy practice. Despite this, early pharmacy education often lacks structured opportunities to explore global pharmacy systems, medicine supply challenges, and the broader role of pharmacists in international health. This gap may limit students' awareness of global career pathways, and the impact pharmacists can have beyond local practice. Integrating global health concepts early in the curriculum can foster wider perspectives and support the development of socially responsible practitioners.

Objective: This workshop aimed to introduce first-year pharmacy students to global health concepts, with a focus on medicine supply and the role of pharmacists within global systems, including contributions to the United Nations Sustainable Development Goals. The objectives were to

enhance students' understanding of global pharmacy challenges and to encourage engagement with global career pathways.

Method: A blended teaching approach was used, combining didactic and interactive elements. The session included teaching on global health, medicine supply, and the pharmaceutical management framework. It was co-delivered with a pharmacist from the Liverpool School of Tropical Medicine, who contributed real-world insights. Students then participated in small-group activities analysing case studies of pharmacies in international settings, including Mozambique and Liberia. Each group received photographs of a pharmacy and a country information sheet outlining healthcare structures, pharmacy education, and contextual factors. Students were asked to identify strengths, areas for improvement, and challenges faced by pharmacists, considering factors such as conflict, geography, and funding. Evaluation was conducted using a post-workshop online questionnaire consisting of seven questions (Likert scale and open-text). Data from 48 respondents were analysed descriptively.

Results: Student feedback indicated high levels of satisfaction, with 85% reporting they were satisfied and 13% somewhat satisfied. All respondents (100%) agreed or strongly agreed that the workshop improved their understanding of medicine supply challenges and the role of pharmacists in global health. Qualitative responses supported these findings, with students describing the session as "very interesting" and expressing increased interest in global pharmacy careers, including comments such as "this is a career path I have never thought about but I want to learn more."

Conclusion: The workshop was effective in improving students' understanding of global pharmacy practice and increasing awareness of the pharmacist's role in global health. The use of interactive, context-based learning and real-world case studies encouraged student engagement throughout the session. This work supports the integration of global health education within early pharmacy curricula and contributes to broader efforts to prepare pharmacists for global practice.

Creating the element of choice in undergraduate pharmacy curricula allowing students to explore alternative pharmacy careers

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Background: The MPharm Curriculum in the United Kingdom (UK) is outcome driven in-line with the General Pharmaceutical Council (GPhC) Education and Standards for the training of pharmacists. The recent adoption of prescribing into the undergraduate pharmacy (MPharm) curriculum has reinforced the need to meeting these standards and producing day one ready clinical graduates. As such, there is limited room for choice or exploration of non-clinical careers. To address this, we have created option days where final year student pharmacists pick from 2/6, facilitating exploration of non-clinical areas where their pharmacy skills apply. The work presented here aimed to capture student views on these and inform future opportunities.

Method: All final year students (N=146) ranked 1-3 preferences for the following options: List A: Plants as medicines- visit to local botanical gardens, Pharma Industry-site visit to Astra Zeneca, and Global health – visit to the Liverpool School of Tropical Medicine (LSTM); List B: Aesthetics, Business, and Complementary and Alternative Medicine. In all cases, students were given their first or second choices. All options had some element of didactic teaching in the morning delivered by university academics or invited topic experts, with hands-on activities, and or tours in the afternoon sessions. Views were captured using an anonymous electronic feedback questionnaire on MSForms. Data was extracted to MSExcel, descriptive statistics were collated and free-text responses thematically analysed.

Results: Overall, 52 students completed the feedback questionnaire. Most of these (24) had attended the Pharma industry site visit, the option with the least responses was Global health (9). Students enjoyed the days describing them as "complete eye openers", "engaging and interactive" and an "opportunity to have a lovely day out in the middle of a hectic year", and useful to see the different roles out there for pharmacists. In terms of things they liked least, there were minimal responses to this question, but some expressed a wish to do all 6 of the options, rather than only 2/6, others felt that there was a lot of information provided in a single day. When asked to share their key take home points from the experiences these focused on them now having insight into the wide variety of areas that they could use their pharmacy skills in the future and for those that undertook the Global Health option at LSTM, how their role as a pharmacist can improve global health inequalities. Many felt that they option days have made them want to pursue the topic area in

the future (49/52 said yes or maybe to this). Finally, 94.1% would recommend their option days to other students.

Conclusion: Overall, we have shown that introducing an element of choice is possible on a busy MPharm programme. It positively impacts the student experience and provides them with insight into non-clinical careers facilitating career support prior to graduation. Based on the positive student responses we plan to continue with the option days offering a broader educational experience in addition to meeting the GPhC standards.

A scoping review of global pharmacy students' career decisions, key motivations, influences and common patterns

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Background: Pharmacy education is central to developing a sustainable healthcare workforce. Pharmacy students' career decisions are shaped by personal, social, educational, and professional factors that vary across regions and economic contexts. These decisions influence workforce distribution, professional satisfaction, and health system capacity. Although numerous studies explore pharmacy students' career preferences, most are country-specific, and global evidence remains fragmented. A consolidated understanding of international trends is needed to identify common patterns, regional differences, and gaps in career preparation. This scoping review synthesises global evidence on pharmacy students' motivations, influences, and career preferences to inform education and workforce planning.

Objective: This review aimed to examine global patterns in pharmacy students' career decision-making by identifying preferred career pathways, exploring key motivations and influences, examining gender and regional differences, and assessing the role of mentorship and experiential learning.

Method: A scoping review was conducted using Arksey and O'Malley's framework and guided by the Population Concept Context approach. A systematic search of PubMed and Google Scholar identified peer-reviewed qualitative and quantitative studies published in English. Two reviewers independently screened studies using predefined criteria. Data were extracted using a standardised charting form and were synthesised thematically using narrative analysis. Twenty-seven studies from developed and developing countries were included.

Results: Hospital pharmacy was the most frequently preferred career pathway, reported as the top choice in nine countries. Academia and research emerged as the second most preferred pathway, particularly where postgraduate training was associated with professional advancement. Pharmaceutical industry roles were less frequently selected. Key motivations influencing career choice included job security, income potential, interest in healthcare and patient care, professional status, and societal perceptions of pharmacy. Family influence was prominent, especially in collectivist cultures. Gender disparities were evident globally, with female students comprising the majority of pharmacy cohorts and often prioritising work–life balance and job stability. Male students more frequently favoured alternative professions perceived to offer higher remuneration or faster career progression. Regional differences showed that pharmacy was not always students' first choice of study, particularly in some developing countries. Concerns regarding job satisfaction, extended training requirements, and limited career flexibility were commonly reported. Mentorship and experiential learning consistently had a positive influence, with exposure to real-world practice associated with greater confidence, clearer career direction, and improved professional satisfaction.

Conclusion: This review highlights shared global trends alongside important regional and gender-based differences in pharmacy students' career decisions. Strengthening mentorship, expanding experiential learning, and aligning curricula with workforce needs are critical to improving career satisfaction and retention. Addressing professional perception and gender-related barriers is essential for developing a resilient and sustainable global pharmacy workforce.

Empowering future healthcare professionals: A qualitative study on deprescribing education at a mid-south USA health science centre

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Background: In recent years, as populations around the world have aged and multimorbidity has become more prevalent, polypharmacy has emerged as a significant clinical challenge. Polypharmacy is a leading contributor to increased risks of adverse drug reactions, drug–drug interactions, medication burden, and reduced adherence. For healthcare professional students (HPS), a deep understanding of deprescribing is essential for developing a patient-centred, safety-focused approach to pharmacotherapy, which extends beyond initiating treatment and prioritizes ongoing re-evaluation of the benefit–risk balance of medication use. An effective

deprescribing process relies on collaboration among an interprofessional team, drawing on varying expertise of medical, nursing, pharmacy, dentistry, occupational therapy, and physical therapy professionals. Integrating deprescribing into curricula enhances healthcare students' clinical reasoning by encouraging them to thoughtfully weigh the benefit of the medication with the risks, keeping the patient's treatment goals in mind. As future clinical practitioners, HPS are uniquely positioned to initiate deprescribing efforts. Their perspectives provide valuable insights into the strengths and skills needed to communicate effectively with patients and ultimately improve patient outcomes. This study aims to characterize HPS' perspectives on the inclusion of deprescribing in their education, and to discuss lessons learned and opportunities for engaging students in addressing deprescribing.

Method: This prospective qualitative study utilized virtual semi-structured focus groups (FG). Participants were recruited from seven colleges within a health science center located in the mid-South region of the United States of America. Guided by Linsky et al.'s conceptual model of deprescribing, the research commenced following Institutional Review Board (IRB) approval. Virtual FG were held until thematic saturation was reached. Three researchers collaboratively conducted thematic analysis using Dedoose®, a qualitative analysis software. Codes were organized into categories based on shared characteristics, which enabled the identification of overarching themes. Methodological rigor was maintained through the application of Lincoln and Guba's criteria.

Results: The sample included 36 HPS. This heterogeneous group provided a comprehensive perspective on interprofessional collaboration and educational experiences related to deprescribing. A central theme emerged: Fostering Collaboration Through Interprofessional Education. HPS highlighted the widespread occurrence of polypharmacy in various healthcare settings, yet they called attention to the limited information they received on how to effectively counteract polypharmacy during their training. HPS emphasized that educational institutions are pivotal in offering expanded opportunities for interprofessional collaboration and experiential learning, suggesting that expanding interprofessional collaboration opportunities.

Conclusion: The findings highlight the need for increased interprofessional deprescribing initiatives by integrating comprehensive deprescribing education into healthcare training programs. Equipping future healthcare providers with these essential skills will optimize patient outcomes HPS degree programs should evaluate their existing curricula to identify deprescribing educational efforts and support resources for their effective implementation, if necessary. Future efforts should prioritize shared interprofessional training modules, and longitudinal studies are needed to determine whether early deprescribing education reduces polypharmacy-related harms in practice.

Harnessing student strengths as a catalyst for engagement and supportive learning in academic advanced pharmacy practice experiences (APPEs)

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Background: Educational research increasingly emphasizes personalized learning approaches that recognize individual student differences. In professional programs such as pharmacy, understanding and leveraging students' strengths and interests can shape their educational experiences. When students identify and apply their strengths, they are more likely to experience greater engagement, motivation, and academic success. This approach is particularly valuable during elective academic advanced pharmacy practice experiences (APPEs), where applying theoretical knowledge in real-world settings is essential for professional development. Tailoring learning experiences to students' interests and abilities may foster deeper learning and better prepare them for the challenges of pharmacy practice. One strategy for identifying these strengths is the Intention/Reflection (I/R) practice. The I/R framework uses structured prompts that encourage students to identify their strengths and areas for growth, establishing personalized learning objectives before the APPE. After the rotation, students reflect on their development and consider how they might improve in future experiences. Applying this practice during APPEs may support more meaningful experiential learning while promoting self-directed learning, engagement, and motivation. The aim of this study was to characterize student pharmacists' strengths and examine how these strengths are applied during academic elective APPEs through the I/R process.

Method: Two colleges of pharmacy in the United States offering five-week elective academic APPEs implemented the I/R practice to encourage students to reflect on their strengths before and after the rotation. A qualitative retrospective design was used to explore student experiences over time. I/R responses collected from 2023 to 2026 were imported into Dedoose®, a qualitative analysis software program, and analyzed thematically. Data were coded inductively, and investigators independently reviewed codes, categories, and emerging themes before reaching consensus through collaborative discussion.

Results: In a sample of 23 student pharmacists enrolled in an elective academic APPE, students demonstrated the ability to leverage personal strengths. Two key themes emerged: strong preparation and organizational skills, and effective utilization of feedback. Commitment to preparation and continuous organizational improvement supported high

levels of engagement, demonstrated through active participation and collaboration. Motivation appeared both intrinsic and collective, as students pursued personal development while contributing to the learning community. Their proactive communication, organization, and responsiveness to feedback reflected characteristics of self-directed learners who take ownership of their educational experiences. Furthermore, a thoughtful incorporation of feedback and the use of digital tools enhanced instructional delivery, while students maintained a positive outlook throughout the rotation.

Conclusion: The findings suggest that the I/R practice can support student pharmacists as a tool to identify and apply their strengths during APPEs. By encouraging reflection on preparation, organization, communication, and responsiveness to feedback, the I/R process supported behaviors associated with self-directed learning and sustained engagement. These results indicate that structured intention-setting and reflection may be a valuable, low-cost strategy for fostering deeper learning and professional development during experiential education. Incorporating similar reflective practices into APPEs may help educators better align learning activities with students' strengths while promoting motivation, adaptability, and continuous improvement in pharmacy training.

Acquiring a higher level of training evaluation after a decade of offering a patient/medication safety elective course to pharmacy students

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Background: PHM322 is a Patient/Medication Safety elective course that has been offered to Year 3 PharmD students since 2014. After a decade of offering this course, the objective of this project is to acquire a higher level of training evaluation – Kirkpatrick's Level 3 (Behaviour) and Level 4 (Results) – to advance medication safety education through reviewing student and practitioner perspectives on safety and quality improvement in pharmacy practice.

Method: An online questionnaire was developed and adapted from the validated Attitudes to Patient Safety Questionnaire III from the literature. Between June and August 2025, the questionnaire was administered to all cohorts of 342 students/alumni who have taken PHM322 from 2014 to 2025. Quantitative survey data obtained were analyzed using descriptive statistics, and qualitative responses were subject to thematic analysis. Student engagement data with course content that was presented on the PHM322 online learning management system (LMS) were also reviewed to serve as an objective data source.

Results: Of the 342 invitations, 172 had valid email addresses, and 62 responses from 9 cohorts of students/alumni were received (i.e., 36% response rate). Respondents (i.e., pharmacy practitioners) showed comfort discussing their own medication incidents (78-90%) and those of their colleagues (72-84%). Participants agreed that PHM322 improved their understanding of medication-incident causes (96.9-100%), patient safety issues (81.8-100%), error prevention principles (89.5-96.9%), and their role as pharmacy professionals in advancing patient safety (90.9-100%). Frequently accessed PHM322 topics, as calculated by students' average weekly views on the LMS were case-based examples and systematic approaches to identifying medication safety-related issues, implying that application-based teaching and structured frameworks for medication incident analyses promote learner engagement beyond classroom attendance.

Conclusion: Higher levels of training evaluation were achieved in this 10-year review of a patient/medication safety elective course as supported by PharmD students/graduates' comfort in discussing medication incidents in practice, understanding contributing factors to errors, awareness of patient safety issues, error prevention principles, and their professional role in advancing patient safety. Findings from this program evaluation initiative will help inform future iterations of PHM322. Emphasizing patient safety competencies and teaching strategies valued by learners will help advance patient safety training in pharmacy education.

Integrating Quality Improvement Education into Pharmacy Curriculum: What We Learned from the Literature

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Background: Integrating quality improvement (QI) education in a pharmacy curriculum will equip students with the knowledge and skills needed to conduct QI initiatives in practice. This project is aimed to share lessons learned from the literature, including how pharmacy faculties integrate QI education into their programs, barriers to its implementation, and student perceptions of QI education delivery.

Method: A literature search was conducted in Scopus and ProQuest. The search did not limit articles by timeline, country/region, or study design. Articles were screened with search terms "quality improvement" or "continuous improvement" in titles; and "pharmacy student", "pharmacy training", or "pharmacy education" in abstracts or keywords. Relevant papers were selected for an in-depth review and thematic analysis.

Results: Scopus and ProQuest searches generated 27 and 26 results, respectively. After removing duplicates and screening, six papers were included for thematic analysis, three of which were affiliated with Canadian pharmacy faculties and three with American schools. QI principles are well received and effectively applied by pharmacy students, especially in experiential and interprofessional practice settings. Students who were engaged in elective QI training strongly supported its integration as a core component of the pharmacy curriculum. Some American pharmacy schools were successful in implementing QI practicums as mandatory curricular components, with similar positive feedback received from students and faculty. Barriers to deliver widespread and hands-on/practical QI education/training include a lack of faculty expertise on the subject matter and limited time within the curriculum.

Conclusion: A key competency for pharmacy graduates in Canada, pertaining to the Association of Faculties of Pharmacy of Canada (AFPC) Educational Outcomes, is the ability to contribute to optimizing health care delivery by applying QI strategies. Despite strong support for QI education, a lack of faculty expertise on QI and time constraints within the curriculum present challenges. Future work could explore integration of QI education in existing pharmacy curricular components, such as, interprofessional education activities and Advanced Pharmacy Practice Experience rotations. Faculty development in QI may also help advance delivery of QI education going forward.

Community health fairs as effective tools to improve access to metabolic screenings and identify cardiometabolic risk and health disparities

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Background: Cardiometabolic diseases like hypertension, diabetes, and dyslipidemia remain leading contributors to morbidity and mortality. Early detection through screening is critical for prevention and disease management, yet many face barriers to routine healthcare due to limited access, cost, or transportation. Community health fairs can address these gaps by providing preventive services in accessible community settings. From 2023–2025, the pharmacy school conducted over 20 community health fairs across Los Angeles (LA) County offering free screenings for blood pressure (BP), glucose, cholesterol, and body fat analysis (BFA). These screenings also generated data on cardiometabolic risk factors, healthcare access, and potential geographic and ethnic health disparities. The purpose of this study was to evaluate the reach and clinical impact of community health fairs by assessing prevalence of cardiometabolic risk factors, determining referral needs based on screening results, and identifying potential demographic, geographic, and ethnic disparities in hypertension, diabetes, and dyslipidemia screening outcomes.

Method: This IRB-exempt retrospective study analyzed de-identified data from community health fairs conducted between 2023-2025. Demographics and measurements including BP, fingerstick glucose, point-of-care lipid panel, body mass index (BMI), and body fat percentage (BF%) were stored in REDCap, a secure HIPAA-compliant database. Referral criteria were based on established clinical thresholds: BP ≥130/80 mmHg, fasting plasma glucose (FPG) ≥100 mg/dL or random plasma glucose (RPG) >140 mg/dL, and total cholesterol (TC) ≥200 mg/dL or low-density lipoprotein (LDL) >100 mg/dL. Participants younger than 18 years were excluded. Student pharmacists conducted screenings, provided education, and referred participants. Descriptive, inferential, and chi-square analyses evaluated screening outcomes, referral patterns, and demographic differences. Beginning in 2024, participants were asked about their last healthcare provider (HCP) visit to assess healthcare access.

Results: Across 23 community health fairs, 1,415 participants received screenings. The mean age was 49.2 years, and 59.1% were female. Asians represented the largest participant group (36.3%), followed by Hispanic/Latinos (32.6%). Student pharmacists conducted 1,239 glucose, 1,167 BP, 1,022 lipid panels, and 854 BFA screenings. Participants were referred if thresholds were surpassed for BP (28.1%, N=328), dyslipidemia (37.1%, N=379), or abnormal glucose (21.9%, N=271). Outreach for hypertension (93.8% of health fairs), blood glucose (44%), and cholesterol (100%) was considered successful since referral rates exceeded the diagnostic gap (county prevalence minus participants with existing diagnosis). Referral density varied significantly by region ($p<0.001$), with South LA demonstrating the highest referral burden. Ethnic disparities were observed ($p<0.001$), with Black/African American participants showing the highest average BP and Hispanic/Latino participants the highest prevalence of elevated glucose. Among 794 participants surveyed, 29.1% saw a HCP within the previous three months, while 21.7% had not seen a HCP for >1 year, particularly among adults aged 26–39 years.

Conclusion: Community health fairs effectively expand access to preventive services, identify individuals at risk, and highlight geographic and ethnic health disparities. These findings support how pharmacist-led screenings contribute to early detection and referrals, and how community health fairs are tools for preventive healthcare access and guidance for targeted public health interventions.

A comprehensive study on perceptions toward drug abuse among health educators and various social groups in Gyeonggi Province

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Background: In recent years, drug-related crimes have surged unprecedentedly across the Republic of Korea, expanding rapidly to encompass ordinary citizens and adolescents. Gyeonggi Province recorded some of the highest regional rates of these drug-related crimes. Despite this escalating public health crisis, a critical lack of public awareness regarding the severity of drug addiction remains a serious problem. Accurate empirical data reflecting local realities is required to establish effective and customized prevention and rehabilitation policies. Such interventions relied heavily on frontline stakeholders, including school health educators, parents, and prevention instructors. However, the specific perception gaps and systematic needs of these groups remained uncharacterized. Therefore, the aim of this comprehensive study was to systematically investigate the perceptions, attitudes, and prevention education needs of various community stakeholders. Ultimately, this study could provide an evidence-based foundation for establishing robust drug management policies in Gyeonggi Province.

Method: A cross-sectional survey was conducted with 585 participants recruited through the Gyeonggi Province Council. The cohort comprised school health educators (68%), parents (13%), drug prevention instructors (10%), and other residents (9%). The sample was predominantly female (89%), with the largest demographic in their forties (42%). A structured questionnaire was used to assess personal interest in drug issues, primary sources of information, perceptions of addiction, and awareness of referral institutions. This tool also evaluated the awareness of the severity of local drug abuse, the needs for prevention education, the adequacy of available materials, and the priorities of policy needs. The responses were summarized using descriptive statistics, and subgroup comparisons were systematically conducted by respondent categories.

Results: A majority of respondents (72%) reported high interest in drug-related issues. Mass media served as the primary information source (55%), followed by institutional education (44%). Notably, 84% perceived individuals with drug dependency merely as offenders requiring legal punishment or persons with impaired judgment. Only 14% viewed them as patients requiring medical treatment, and 2% considered them a vulnerable group needing social support. Approximately 59% recognized local drug abuse as a serious concern. While 93% emphasized the necessity of prevention education targeting adolescents (86%), only 21% possessed adequate educational materials. Furthermore, 54% described existing resources as functionally insufficient. Consequently, standardized curriculum development (32%) and instructor capacity building (28%) emerged as the most cited policy priorities. Psychological counseling and educational support (37%) were identified as the most critical social services for drug users.

Conclusion: The findings revealed critical deficits in awareness, educational resources, and prevention infrastructure within Gyeonggi Province. Stigmatizing views toward drug dependency remained prevalent, characterized by a dominant focus on punitive measures rather than public health interventions. These results underscored an urgent necessity for evidence-based, destigmatizing prevention programs and standardized curricula targeting adolescents. Pharmacy professionals could play a crucial role in leading community-based initiatives and advocating for policies that prioritize prevention education and rehabilitation over criminalization. Integrating drug abuse prevention into pharmacy practices could serve as a sustainable strategy for building long-term community resilience against drug-related harmfulness. Supported by a grant from the GYEONGGIDO ASSEMBLY, Republic of Korea.

SPARK-ED: A pioneering convergence education programme for establishing sports pharmacy and anti-doping strategies in South Korea

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Background: As professional and recreational sports participation increases, the demand for specialised healthcare regarding safe medication use and doping risk management has grown significantly in South Korea. Recognising this critical need, the Korean Society of Sports Pharmacy (SPARK) was launched to foster specialised professionals and collaborative research initiatives. Objectives: This study introduces SPARK's initiatives and the

implementation of the "SPARK-ED", a comprehensive convergence education programme designed to meet the diverse needs of athletes and the general public.

Method: SPARK leadership conducted brainstorming sessions to investigate athletes' needs, professional demands, and public service requirements. The SPARK-Ed curriculum was developed based on the survey reports from the Korean Anti-doping Agency (KADA), literature reviews, and benchmarks from World Anti-doping Agency (WADA) and International Olympic Committee (IOC) programs. The curriculum was delivered using an online Learning Management System (LMS). It emphasising self-paced, sustainable knowledge updates tailored to various sports genres and doping risk levels.

Results: Launched in January 2026, SPARK-Ed provides 23 multidisciplinary lectures by experts in pharmacy, medicine, sports, traditional medicine, nutrition, and doping analysis. The curriculum is structured into five core modules: 1) Understanding Doping Codes, 2) WADA Prohibited Lists, 3) Athlete Management and Healthy Sports, 4) Doping Test Procedures and Analytical Technologies, and 5) Field Stories. To ensure competency, participants should achieves a score of 80% or higher on module-specific quizzes to advance to the subsequent topics. The curriculum effectively delivers practical knowledge, intervention skills, enabling participants to apply personalised athlete care, safe over-the-counter (OTC) recommendations, supplement use.

Conclusion: SPARK-ED represents a critical establishment in advancing sports pharmacy in South Korea. This framework is expected to solidify the pharmacist's integral role with other professionals in global anti-doping efforts and multidisciplinary sports medicine.

Pharm.D. experiential training in hospitals: Evolution of the second-year hospital introductory pharmacy practice experience at Université de Montréal

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Background: In the entry to practice Pharm.D. program at Université de Montréal, students complete a 4-week hospital introductory pharmacy practice experience (IPPE) at the end of the second year. This practicum (PHA2510), the second of seven experiential placements, enables students to develop competencies by integrating into healthcare teams and participating in clinical activities. Its primary objective is to provide exposure to hospital pharmacy practice, the medication use process, and the provision of pharmaceutical care, including in areas where some subjects may not yet have been formally taught. This rotation has been part of the curriculum since the Pharm.D. program inception in 2007. The objective was to describe the structure and evolution of the 4-week second year hospital IPPE clerkship in the Pharm.D. program at Université de Montréal.

Method: A documentation review was conducted, focusing on the 4-year, 164 credit Pharm.D. program. Clerkship manuals, discussions with pharmacists, and student performance statistics were analysed to characterize the development of the clerkship over time.

Results: The clerkship is offered in university and non university hospitals. Students are present five days/week under the supervision of a clinical pharmacist. They complete a portfolio (learning contract, success plan, activity checklist, evaluation tool, and logbook). Training sites are selected according to accreditation criteria, and supervising pharmacists hold the title of Associate Clinician. Students develop competencies in pharmaceutical care, community services, and practice and operations management, while applying core professional domains such as professionalism, communication, collaboration, scientific reasoning, lifelong learning, and leadership. Since its implementation, the clerkship has evolved significantly, particularly regarding pharmacy operations. During the COVID 19 pandemic, one of the four weeks was delivered virtually through an online platform featuring instructional videos. Topics include pharmacy departement organization, prescribing rules, roles of pharmacists and technical staff, medication management, clinical research and the Special Access Program, care pathways, medication circuits on care units, and quality and risk management. Eight videos from the virtual program remain mandatory, with additional optional resources available. A virtual panel with pharmacy managers was added and, since 2024, the final week has returned to in person delivery. Between 2010–2011 and 2024–2025, 2,956 students completed the clerkship across 116 accredited sites, 68% of which were university hospitals. The program relies on 1,065 associate clinicians. Midway through the rotation, students complete a self assessment and success plan based on formative feedback. Evaluation uses a standardized grid, and students also assess the rotation. Among 537 evaluations over the past three years, satisfaction was high: clarity of expectations (91%), patient exposure (97%), learning environment (98%), preceptor contact time (98%), quality of feedback (95%), supervision (99%), preceptor professionalism (99%), and willingness to recommend the rotation (97%). The overall practicum success rate is 99%.

Conclusion: Early exposure to hospital pharmacy practice is essential in pharmacy education. Following a first year community rotation, the second year hospital clerkship is feasible and effective, supported by a large network of training sites and clinicians. The rotation underscores the critical role of institutional pharmacy practice in patient care.

Profile of the teaching of legislation at the faculty of pharmacy of the Université de Montréal: Evolution from 2001 to 2026

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Background: Pharmacy is a highly regulated profession. In Canada, pharmacy practice is governed by both federal and provincial legislation, which together define the legal framework for the profession. During undergraduate and postgraduate training, pharmacists must understand the applicable legal environment and be able to address legal issues encountered in practice. To support this requirement, several educational tools and teaching approaches have been developed to facilitate the learning of pharmaceutical legislation within pharmacy training programs. The objectif was to describe the teaching of pharmaceutical legislation in undergraduate (PharmD and pharmacy qualification program) and postgraduate (continuing professional development) pharmacy education.

Method: Descriptive study. Using faculty archives and the expertise of the professor responsible for this teaching, we developed a profile of the courses offered, constructed a chronological timeline, and identified successive iterations of the courses and educational tools over time.

Results: Initially, pharmaceutical legislation was taught using documents from multiple sources, including federal regulatory authorities and professional regulatory bodies. In a second phase, a reference textbook was developed. A pedagogical framework was established, including conceptual organization, learning objectives, and a detailed table of contents. The first edition of the textbook was published in 2005 (800 pages), and the 21st edition was released in August 2025. The current version includes 15 chapters and approximately 1,200 pages. To date, nearly 8,000 pharmacy students and internationally trained pharmacists in Quebec have used this reference as part of their training. In a third phase, a web-based learning platform was created using Moodle (Studium) to support teaching activities. The platform includes formative and summative questions organized by chapter, such as true/false questions, multiple-choice questions, and short-answer questions. In a fourth phase, teaching formats were adapted to different learner groups. In the PharmD program, legislation is taught through a weekly interactive course over one semester (2 credits, 30 hours) combining team-based case discussions and classroom exchanges. In the pharmacy qualification program for internationally trained pharmacists, the course consists of four integrative sessions (2.5 credits) focused on discussion and application of key concepts. For continuing professional development, an independent study course (3 credits) is offered, with optional email exchanges with the instructor. Since 2014, a legislation blog (http://lsspharmacie.wordpress.com), maintained by a pharmacy student, summarizes and comments on approximately 40 legal decisions involving pharmacists each year (448 decisions have been summarized and published since the beginning), helping students and practitioners stay informed about legal developments affecting pharmacy practice. Overall, the courses and associated tools are highly valued by students. For example, PharmD course evaluations exceeded the average scores of the reference teaching group for course planning (3.7 vs 3.4), teaching materials (3.6 vs 3.4), teaching skills (3.8 vs 3.4), interest in teaching (3.8 vs 3.3), and professor–student relationship (3.7 vs 3.6).

Conclusion: This study describes the teaching of pharmaceutical legislation to pharmacy learners preparing for professional practice. It highlights a multifaceted pedagogical approach combining a comprehensive reference textbook, a web-based learning platform, and diverse teaching strategies tailored to different learner populations. Keywords: Pharmaceutical legislation; pedagogy; pharmacy practice.

Pharmacist-led interprofessional care for patients with mental disorders in a university pharmacy: an experience report

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Background: Interprofessional care models have demonstrated positive impacts on health outcomes across a range of clinical conditions. Nevertheless, gaps remain regarding the effective participation of pharmacists within interprofessional healthcare teams, particularly in outpatient settings. These gaps may arise from the lack of structured protocols guiding pharmacist involvement or the limited integration of pharmacists into collaborative care models. Mental disorders are prevalent conditions associated with substantial social, professional and economic burden. In many cases, conventional care centred primarily on the prescriber may be insufficient to achieve adequate symptom control and restore quality of life. Considering the complex and subjective nature of mental disorders, such as bipolar disorder, expanding points of patient care through interprofessional collaboration may contribute to improved clinical outcomes. To describe the implementation and operational workflow of a pharmacist-led interprofessional care model for patients with mental disorders in a university pharmacy setting.

Method: This study presents an experience report describing the organisation and workflow of an interprofessional outpatient care model implemented at the University Pharmacy of the Federal University of Paraíba (UFPB), João Pessoa, Brazil. The service involves pharmacists, pharmacy students and a physician from the university faculty. Established in 2018, the Pharmaceutical Care Outpatient Clinic provides care for patients with mental disorders. Following the COVID-19 pandemic, the service was adapted to a remote model using information and communication technologies to conduct teleconsultations and telemonitoring. The first consultation consists of a pharmacist-led screening conducted by a pharmacist preceptor and a pharmacy student. During this consultation, clinical and social information is collected, including medical history, primary symptoms, family history, socioeconomic conditions and comorbidities. Initial recommendations may include referral to other healthcare professionals or services, as well as suggestions for non-prescription medicines or dietary supplements when appropriate. When necessary, patients are referred for a second consultation involving an interprofessional team composed of pharmacists and a physician. During this consultation, diagnostic assessment and therapeutic decisions may be established. Subsequently, pharmacists conduct regular telemonitoring and follow-up consultations, including the monitoring of patient-reported outcomes and questionnaire scores. Pharmaceutical care activities include support for medication adherence, health education, monitoring of therapeutic outcomes and communication with the prescriber regarding potential medication adjustments or optimisation of pharmacotherapy.

Results: The outpatient clinic currently follows approximately 180 active patients with mental disorders. The implementation of telehealth strategies enabled continuity of care during the COVID-19 pandemic and expanded access to patients from different regions of the country. The interprofessional model facilitates coordinated care, allowing pharmacists to contribute to treatment monitoring, patient education and identification of medication-related needs throughout follow-up.

Conclusion: This experience highlights the potential of pharmacist-led interprofessional care for managing patients with mental disorders in outpatient settings. Pharmacists may play an active role in treatment monitoring, promoting medication adherence, supporting therapeutic decision-making and identifying medication-related needs during follow-up. The model described represents a feasible approach to strengthening collaborative care and may be adapted to other healthcare settings seeking to expand access, continuity of care and integration between professionals in mental health services.

Establishing the AFPLP Academy: Harmonizing pharmacy education in lusophone countries

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Background: The Association of Pharmacists of Portuguese-Speaking Countries (AFPLP) represents the pharmaceutical profession across three continents and seven countries, encompassing around 300 million people and more than 400,000 pharmacists. Its mission is to promote professional development, strengthen scientific cooperation, and advance pharmaceutical education throughout the Lusophone community. Although the diversity of academic curricula across member countries is a valuable asset, it also creates challenges for academic mobility, professional recognition, and convergence of core competencies in pre-graduate pharmacy education.

Objective: In response to these challenges and building upon the 2020 AFPLP Resolution on the "Core Areas of Pre-Graduate Pharmaceutical Education in the Lusophone Space," AFPLP proposes the establishment of the AFPLP Academy, a permanent academic forum designed to foster structured dialogue among universities, professional organizations and policymakers.

Method: The proposal for the AFPLP Academy is grounded in the institutional commitments established by the 2020 AFPLP Resolution, which defined a minimum core curricular framework for pharmacy education and recommended alignment with international educational standards, particularly the International Pharmaceutical Federation's (FIP) Nanjing Statements, including their 2024 update. The Academy is designed as a collaborative platform composed of academic representatives from universities offering pharmacy degrees in AFPLP member countries, alongside representatives from AFPLP leadership and partner professional organizations. Its activities will include the systematic mapping existing curricula, conducting technical discussions on curricular convergence, and monitoring implementation of the agreed core training framework. The Academy will operate through regular virtual meetings, annual in-person sessions, and thematic working groups

addressing specific educational and professional challenges. In its initial phase, the Academy will particularly integrate institutions from countries with more established academic infrastructures, namely Angola, Brazil, Cape Verde, Mozambique and Portugal

Results: The establishment of the AFPLP Academy is expected to create a permanent mechanism dedicated to improving pharmacy education. Key strategic areas of work include reviewing and updating the core curricular areas defined in the 2020 Resolution, distinguishing essential and complementary domains in alignment with competency-based education and continuing professional development models. The Academy will also conduct a curricular mapping across member countries to identify convergences, gaps, and opportunities for progressive harmonization. The initiative aims to strengthen links between academia and professional practice by promoting structured internships, encouraging participation of practicing pharmacists in training, and fostering collaboration with regulatory bodies. Beyond education, the Academy will support scientific cooperation among Lusophone institutions by promoting collaborative research and facilitating academic exchange. Attention will also be given to challenges related to attracting and retaining students and academic staff in pharmaceutical sciences.

Conclusion: The creation of the AFPLP Academy represents a strategic step toward strengthening pharmaceutical education and scientific collaboration in the Lusophone world. By providing a structured platform for academic dialogue, the initiative will support progressive convergence standards while respecting institutional autonomy and national specificities. Ultimately, the Academy aims to enhance the quality, relevance, and international recognition of pharmacy education across Portuguese-speaking countries, contributing to the development of a highly qualified pharmaceutical workforce capable of responding to global health challenges and improving access to pharmaceutical care.

How education providers educate pharmacists? Preliminary insights from Portugal's Continuous Professional Development System (2020–2025)

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Background: Pharmacists' qualification is a fundamental requirement for their effective contribution to the health system. Maintaining the quality of professional practice requires the continuous updating of existing knowledge and the acquisition of new knowledge, in line with scientific developments. The Portuguese Pharmaceutical Society (PPS) introduced a system of Continuing Professional Development (CPD) for pharmacists in 2004. This CPD system is a pioneering professional qualification framework in Portugal, ensuring that pharmacists' knowledge, competences and skills are kept continuously up to date. Currently all practising pharmacists in Portugal are required to participate in the CPD programme. Each CPD cycle lasts five years, during which pharmacists must obtain 15 CPD points through participation in educational activities and professional practice. The PPS accreditation process is managed through an online platform, where training providers, as well as pharmacists themselves, may submit educational activities for accreditation. All educational activities are classified according to the area of pharmaceutical professional practice they address, with up to three labels assigned per activity. Since 2018, activities have also been classified as either "core" (directly related to professional practice) or "satellite" (not directly related to pharmaceutical practice but relevant to professional development).

Objective: The aim of this study was to analyse the educational activities submitted by training providers over a six-year period (2020–2025), in order to identify training trends, examine pharmacists' main areas of interest, and assess the principal training providers involved.

Method: Preliminary data were retrieved from the PPS CPD online platform. In this preliminary analysis, only educational activities submitted by training providers were included; individual submissions by pharmacists were not considered. All educational activities were classified as previously described.

Results: In this preliminary study, 1,896 activities were analysed, from 209 different training providers. A very high proportion of these activities (97.73%) were accredited. Of

the 1,853 accredited activities, 89.69% were classified as core and 10.31% as satellite. Activities were promoted mainly by pharmacy sector associations, consultancy and training companies, the PPS, and the pharmaceutical industry. Academia accounted for only 3.13% of the accredited activities. The most frequent topics were "community pharmacy" (26.17%), "counselling" (13.63%), "hospital pharmacy" (8.12%), "pharmaceutical sciences" (4.18%), and "pharmacology and pharmacotherapy" (3.10%).

Conclusion: This preliminary study shows annual increasing interest in submitting CPD activities for accreditation between 2020 and 2025, but it also demonstrates that academia could play a more interventive role in the lifelong learning education of portuguese pharmacists. Furthermore, in view of the development of new pharmaceutical competences, together with the recent revision of the syllabus required for specialist qualification, it appears relevant to promote training activities in the areas covered by these training programmes. A key limitation of this study is that it includes only educational activities submitted for accreditation, as training activities available in the market that were not reviewed by the PPS were not considered. Analysis of all activities, including those submitted by pharmacists, is planned for April 2026.

Impact of longitudinal experiential education on professional identity formation

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Background: Professional identity formation (PIF) is a critical outcome of pharmacy education, shaping how learners internalize professional values, roles, and responsibilities. Experiential education, particularly when delivered longitudinally, offers sustained authentic practice environments that may uniquely support PIF. However, evidence-informed best practices for intentionally leveraging longitudinal experiential models to enhance PIF remain limited.

Objective: The primary purpose of this research was to identify best practices for enhancing the impact of longitudinal experiential education on professional identity formation among pharmacy learners.

Method: A mixed-methods design was employed across multiple longitudinal experiential education models. A systematic review was conducted to evaluate the best models and identify validated PIF instruments. Qualitative data were collected using validated PIF instruments to conduct semi-structured interviews with a panel of experts on longitudinal experiential education and PIF. Moreover, focus group interviews were conducted with a global sample of students, preceptors, and faculty at various pharmacy meetings. Data were analyzed using longitudinal comparative statistics and thematic analysis to identify patterns associated with growth in professional identity.

Results: Recent studies revealed that learners participating in longitudinal experiential pathways demonstrated stronger and more sustained gains in professional identity formation compared with those in traditional block-based experiences. Key best practices associated with positive PIF outcomes included continuity of practice sites and preceptors, structured and guided reflection, early and progressive responsibility for patient care, intentional integration of didactic and experiential curricula, and strong preceptor role modeling. Lessons learned highlighted the importance of preceptor development, alignment of assessment strategies with PIF outcomes, and institutional support for longitudinal partnerships. Challenges included variability in site capacity, preceptor workload, and ensuring equity of learning experiences.

Conclusion: Longitudinal experiential education can significantly enhance professional identity formation when intentionally designed and supported. This study identifies actionable best practices and lessons learned that can guide pharmacy programs in optimizing experiential education to foster reflective, value-driven, and practice-ready professionals. These findings have implications for curricular design, faculty and preceptor development, and global pharmacy education initiatives. Keywords: professional identity formation, experiential education, longitudinal learning, pharmacy education, preceptor development

Development and launch of a bachelor of science in pharmaceutical sciences with informatics: Preparing future leaders for a data-driven healthcare landscape

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Background: The rapid evolution of artificial intelligence (AI), data science, and informatics has created a growing demand for pharmaceutical scientists who possess both domain expertise and computational proficiency. The World Economic Forum identifies AI literacy, big data analysis, and analytical thinking among the most critical workforce competencies required by 2030. In response, the College of Pharmacy and Health Sciences (COPHS) at Butler University (Indiana, USA) developed and launched a Bachelor of Science in Pharmaceutical Sciences with Informatics (BSPS) to prepare graduates for the evolving needs of the pharmaceutical and biotechnology industries.

Method: Program development followed a stakeholder-centered, evidence-based process. Listening tours with pharmaceutical and biotechnology industry leaders identified key graduate competency priorities in transferrable skills: problem-solving, flexibility and agility, leadership, and written and verbal communication. Stakeholders also emphasized the importance of patient-centered drug development, underscoring the need for graduates to understand patient needs throughout the medicines lifecycle. Curriculum design integrated these findings with national benchmarking of comparable BSPS programs, incorporating shared coursework with the PharmD program to support interdisciplinary collaboration. Experiential learning was embedded as a program requirement through cooperative (Co-Op) placements or research immersion, reflecting evidence that such experiences are essential for developing transferable skills. To address global medicine supply chain challenges, a partnership with Butler's business school provides students exposure to business analytics and supply chain management. Industry and biotech partnerships further anchor the curriculum in applied pharmaceutical research.

Results: The BSPS program launched successfully at Butler University in Fall 2025. The 126-credit-hour curriculum is organized around five core pillars: pharmaceutics, regulatory science, cheminformatics, healthcare analytics, and bioinformatics. Stakeholder listening tours confirmed strong regional industry support, with employers highlighting the integration of transferable analytical skills and experiential learning as key differentiators. The Co-Op program places students in biotechnology and pharmaceutical industry settings for six months beginning in the summer of their second year. As an alternative to a Co-Op, students may pursue faculty-mentored research immersion. Faculty productivity data at Butler University demonstrates a strong record of undergraduate co-authorship in prestigious journals. Distinctive features of the BSPS program include four sequenced informatics courses—Informatics in Pharmaceutical Sciences, Prediction: Machine Learning and Statistics, AI and Drug Discovery, and Translational Bioinformatics. Furthermore, the program leverages the integration of business analytics and supply chain management to equip professionals with the tools needs to mitigate global medicine shortages.

Conclusion: The Butler University BSPS with Informatics represents a timely and strategic response to the data-driven transformation of pharmaceutical sciences. By integrating foundational science with AI, informatics, and immersive experiential education, the program prepares graduates for careers in industry, regulatory science, and graduate studies. The stakeholder-informed curriculum design offers a replicable model for institutions seeking to develop graduates responsive to the evolving demands of drug discovery and healthcare. Future evaluation will assess graduate outcomes, employer satisfaction, and contributions to regional bioscience workforce development.

Quantitative and qualitative assessment of interprofessional competency of advanced pharmacy practice experience (APPE) students APS-029 - Quantitative and Qualitative Assessment of Interprofessional Competency of Advanced Pharmacy Practice Experience (APPE) Students

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Background: Interprofessional education (IPE) is essential for preparing practice-ready pharmacists who can effectively collaborate within healthcare teams (team-ready). Developing interprofessional skills throughout the pharmacy curriculum is critical for achieving competence in collaborative practice. Early curricular experiences focus on building foundational knowledge and introducing students to interprofessional interactions. As students' clinical and professional expertise grows, their ability to participate meaningfully in healthcare teams also increases. Advanced Pharmacy Practice Experiences (APPEs) provide a unique opportunity for students not only to refine clinical skills but also to further develop their ability to function effectively within interprofessional teams. During these experiences, students can demonstrate competencies aligned with the Interprofessional Education Collaborative (IPEC) competencies, which guide interprofessional collaborative practice. IPEC represents 21 national health professions associations and has established a set of competencies that have been adopted by the Accreditation Council for Pharmacy Education (ACPE) to meet IPE accreditation requirements for pharmacy programs. To evaluate student development in interprofessional collaboration during experiential education, assessment strategies aligned with IPEC competencies and Entrustable Professional Activities (EPAs) are needed. The purpose of this proposal is to describe the assessment process used to document interprofessional competence of students during APPEs and demonstrate the ways in which these tools have been used to inform the IPE curriculum.

Method: In 2019, two assessment tools were developed to assess APPE student competency in interprofessional practice, one preceptor evaluation, and one student reflection. Both tools were completed monthly during APPE rotations. For preceptors, the existing APPE evaluation was modified to include four items specifically aligned with IPEC competencies and EPAs. For students, they were asked to provide a narrative description of one meaningful IPE collaborative practice experience during the rotation. Data collected from these APPE evaluation tools over five years were compiled and analyzed. Quantitative analysis included summary statistics of competency ratings to evaluate student achievement of expected performance levels. Qualitative analysis involved categorizing and summarizing the reported

meaningful IPE experiences to identify common themes and types of collaborative activities.

Results: Aggregate results of each of the four IPEC-aligned competency assessments were averaged per class, which was >3.5 (average range 3.5-3.9) in each of the years (scale 1-4, with a minimal acceptable score of 3). Additionally, the monthly rating of each of these questions was analyzed for each student. A longitudinal analysis was done for any student who had 1 or more ratings below 3 on any of the 4 IP questions to confirm that they had achieved competence. Ultimately, all students each year met a minimal rating. The meaningful IPE experience themes were categorized into direct patient care consults, IP Committee, IP Rounds, pharmacist IP intervention, and IP Observations. Outcomes data was provided to the curricular and assessment committees to document IP interactions, and refinements were made based upon their feedback.

Conclusion: These findings provide insight into the quality of students' interprofessional engagement occurring during APPE rotations and demonstrate how experiential assessment data can be used to inform continuous improvement of the pharmacy IPE curriculum.

Characterizing pharmacy student interprofessional interactions during advanced pharmacy practice experiences APS-030 - Characterizing Pharmacy Student Interprofessional Interactions During Advanced Pharmacy Practice Experiences

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Background: Understanding and documenting the types of interprofessional (IP) interactions that Doctor of Pharmacy students experience is important for informing curricular design, optimizing IP learning, and ensuring students are team-ready when entering pharmacy practice. Variability of Advanced Pharmacy Practice Experiences (APPEs), combined with students' ability to self-select rotations, creates challenges in systematically documenting and evaluating IP engagement during these experiences. To address this need, a tool and process was developed to capture IP interactions during APPEs.

Method: In 2019, a structured documentation form was developed as part of the APPE assessment process. The form captures the type of health professional or student with whom the pharmacy student engaged, the type and frequency of interactions, and student's self-assessment of the IP team experience. Professional categories included physician, physician assistant (PA), nurse, advanced practice nurse (NP), dietitian, social worker/case manager, physical or occupational therapist (PT/OT), and others. Interactions were classified as: •Not applicable: the discipline was not part of the team during the reporting period •Present, no interaction: the discipline was present, but there was little or no interaction with the pharmacy student or pharmacist •Occasional interaction: interaction occurred 1–4 times during the month •Routine engagement: frequent interaction occurring daily or multiple times per week •Written communication only: interaction occurred through written communication (e.g., progress notes or referrals) Students complete the form monthly throughout APPE rotations. The data is reviewed annually to verify exposure to IP team members and used to provide feedback to the experiential oversight committee.

Results: An inventory of professionals and professional students' interactions during APPE rotations was summarized and analyzed. Reported outcomes included the extent of exposure to various health professions, the frequency, type, and practice sites of IP interactions, and student self-assessments of IP team experiences. Since implementation, all students documented significant interactions with other professions. Through 2024, after completing 9 months of APPEs, 100% reported some interaction with physicians, nurses and at least one allied health professional during each academic year. When reviewed by APPE rotation, the average annual exposure was >65% of the APPEs documenting interactions with physicians, >60% with nurses, and >60% with NPs. Fewer than 50% of APPE rotations documented interactions with allied health professionals; when present, these interactions involved social workers, dietitians, PAs, and PT/OTs. Acute care (medicine and medical/surgical) APPEs provided the most consistent opportunity for IP interaction, followed by ambulatory care, community, drug policy development/medication safety, and electives. In describing the type of IP interactions, students reported frequent or occasional interactions in 60-70% of APPEs with physicians, 60-70% with nursing, 50% with NPs, and between 20-30% with other professions, depending upon the year. Engagement with other professional students was also tracked but observed less consistently.

Conclusion: This form has generated both quantitative and qualitative data documenting the scope of pharmacy student interprofessional interactions during experiential rotations. Students are exposed to a wide range of healthcare professionals and ongoing monitoring is important. These data inform efforts to further enhance and optimize interprofessional learning within the curriculum.

From pipeline literacy to workforce readiness in drug development: graduate outcomes from a biopharmaceutical sciences undergraduate program

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Background: The increasing complexity of drug development requires a workforce capable of understanding the full pipeline, from early discovery to post-marketing and market access. However, most undergraduate life science programs remain discipline-specific and do not explicitly develop this integrative perspective, referred to here as "pipeline literacy." The Bachelor of Biopharmaceutical Sciences program at the Université de Montréal was designed to address this gap through a competency-based curriculum integrating scientific, clinical, regulatory, and economic dimensions of drug development. The current study examined how this integrated educational model contributes to workforce development by analyzing graduates' academic and professional trajectories and identifying key success factors.

Method: A longitudinal descriptive study was conducted on 565 graduates (2012–2023). Graduate trajectories were reconstructed using publicly available professional data (LinkedIn, ResearchGate) and institutional academic records, allowing characterization of outcomes one year after graduation and later. Outcomes included entry into the workforce, further education pathways, and distribution of careers across the drug development continuum.

Results: One year after graduation, 11% of graduates had entered the workforce directly, a proportion higher than that observed in comparable non-clinical life science programs (~3%). Early career roles were distributed across key sectors of drug development, including quality assurance (17%), medical information (13%), clinical research (13%), clinical research associate roles (11%), pharmacovigilance (9%), and regulatory affairs (9%), with additional representation in market access and related domains. Most graduates pursued further education. Among those enrolled in additional training one year after graduation, 44.0% entered professional MSc programs, 28.3% pursued research-based MSc degrees, and 15.1% enrolled in PharmD programs. Research trajectories covered diverse domains including fundamental research (27%), formulation (21%), pharmacoepidemiology (10%) and pharmacoeconomics (8%). Professional MSc programs were more strongly oriented toward applied roles in pharmacoeconomics (35.1%), clinical research coordination (23.4%), and regulatory affairs (14.9%), supporting development of competencies in later-stage development and market access. Longer-term outcomes demonstrate a diversified distribution of careers across the biopharmaceutical ecosystem, including clinical research coordination (15.6%), market access (12.2%), pharmacy (10.7%), regulatory affairs (5.7%), quality assurance (5.7%), and pharmacoeconomics (5.7%). These results indicate that graduates contribute across all stages of the drug development continuum, supporting a flexible and responsive workforce. These outcomes are supported by integration with industry and practice settings, experiential learning through internships, and real-world case-based learning to support competency development and professional identity formation.

Conclusion: An undergraduate program structured around the drug development continuum can effectively support workforce development by fostering both pipeline literacy and career readiness. This model aligns with FIP Workforce Development Goals by integrating competency-based education, experiential learning, and stakeholder engagement. It offers a transferable framework for academic pharmacy programs seeking to better align education with evolving workforce needs.

Physical assessment educational interventions in pharmacy education: A scoping review

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Background: To identify and describe published studies evaluating the impact of physical assessment (PA) training beyond vital signs in pharmacy education, and to summarize the types of PA techniques covered, instructional methods used, and reported outcomes on learners' knowledge, confidence, and skills.

Method: A scoping review was conducted using MEDLINE and Embase (Ovid), with the latest search completed on November 7, 2024. Studies published between January 1, 2014, and November 2024 were included if they reported on PA training beyond vital signs for pharmacy students or practicing pharmacists. Full-text screening and data extraction were performed independently by two reviewers. Data were synthesized descriptively to summarize PA techniques instructed, teaching methods used, learner outcomes, and implementation challenges. We reported study designs and outcomes separately for pre–post evaluations versus post-only surveys.

Results: Thirteen studies were included, most from the United States, involving pharmacy students (n=9) or practicing pharmacists (n=4). Study designs were quantitative, using post- or pre/post-intervention surveys. Interventions included multi-session training programs (n=7) and single-session workshops delivered over one or two days (n=6). All six pre-post studies reported significant

improvements in learners' knowledge, skills, and confidence, whereas post-intervention-only studies reported high self-rated outcomes following training. Cardiovascular and pulmonary assessments were the most frequently covered, often using lectures, manakins, and peer role-play as instructional methods. Only four studies assessed whether PA techniques were used in practice after training, and several studies reported PA content at the system level without technique-specific detail, limiting technique-level synthesis. Common implementation challenges included limited hands-on time, cost and logistical constraints for manakins and standardized patients, and scalability barriers for experiential practice.

Conclusion: PA training beyond vital signs appears feasible in pharmacy education and continuing professional development and is associated with improvements in learners' knowledge, skills, and confidence. However, variability in PA content, instructional methods, and evaluation approaches limits conclusions about overall educational value and durability. These findings support a more structured and coordinated approach to PA skills training in pharmacy education, with defined core competencies and scalable hands-on instruction, and highlight the need for clearer guidance for pharmacy education research designs that can better assess educational value and durability to inform future implementation.

What physical assessment skills matter most? Insights for pharmacy education

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Background: As pharmacists' scope of practice continues to expand in Canada, physical assessment (PA) skills are increasingly recognized as essential to support clinical decision-making, minor ailment management, medication optimization, and patient triage. Despite this evolution, the integration of advanced PA skills into pharmacy curricula remains inconsistent and is rarely guided by a structured pedagogical approach. Educators must balance growing curricular demands with the need to prepare graduates for evolving clinical roles, while also determining which PA skills are most relevant to pharmacy practice. This study aimed to identify priority PA skills for pharmacy education and to inform the development of a practice-aligned pedagogical approach to support clinical reasoning in entry-to-practice training.

Method: A qualitative study was conducted using four semi-structured focus groups with 22 pharmacists involved in teaching, curriculum development, and clinical practice at the Université de Montréal. Participants were purposively sampled to reflect a range of clinical experiences, including community, hospital, and academic settings. Participants reviewed a broad range of PA skills across body systems and discussed their relevance, feasibility, and integration into pharmacy education. Discussions extended beyond the PharmD program to include perspectives on advanced pharmacotherapy master's training and continuing education for practicing pharmacists. Data were transcribed and analyzed using thematic analysis to identify key prioritization principles and educational implications.

Results: Four key criteria emerged to guide the prioritization of PA skills: frequency of use in practice, clinical utility, complexity of performance and interpretation, and acceptability to pharmacists. Participants consistently identified throat, ear, dermatologic, selected neurological, and lower-limb assessments as high-priority skills with strong alignment to pharmacy practice. PA training was perceived as most valuable when directly linked to medication-related decision-making, triage, and identification of red flags. Participants frequently described these skills as "quick wins" that could be feasibly integrated into curricula while providing immediate clinical value. Findings also highlighted the importance of integrating PA longitudinally across the curriculum using active learning approaches, including simulation, case-based learning, peer practice, and interprofessional collaboration. The importance of aligning PA teaching with authentic clinical scenarios and reinforcing skills through repeated exposure across the curriculum was also emphasized.

Conclusion: This study provides practice-informed insights to guide the selection and teaching of PA skills in pharmacy education. PA training was perceived as a meaningful strategy to enhance clinical reasoning, promote more holistic patient assessment, and increase learner confidence. The findings also emphasize the importance of preceptor development and continuing education to support sustained integration into practice. By grounding curricular decisions in practice realities, this work provides actionable insights for programs seeking to implement sustainable and meaningful PA training. These results offer actionable direction for pharmacy programs seeking to align PA training with evolving professional roles.

Implementation of a creative arts project in a top 200 drugs course

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Background: Top 200 Drug courses are often utilized in pharmacy programs to provide students with a foundation of key drug knowledge for the most commonly prescribed drugs in the United States. These courses can be challenging as they

require learning vast amounts of information with little curricular context which often results in students utilizing rote memorization as their primary learning method. Purpose: The purpose of this project was to describe the implementation and evaluation of student performance on a Top 200 creative arts group project and impact on learning relevant drug information.

Method: During Fall 2023, 63 first-year student pharmacists at Washington State University's College of Pharmacy and Pharmaceutical Sciences were tasked with developing a creative art project to aid in the learning of drug information in a Top 200 Drugs course. At the beginning of the semester, students in groups of two to four were randomly assigned a pharmacologic class of medications to create a creative project. No specific format was required, but potential options included creating a song, visual art, infographic, dance, or video. Final projects had to include the following elements: brand and generic names, pharmacologic class, indications, contraindication(s), Boxed Warning(s), adverse effects, and important counseling points. Projects were presented at the end of the semester prior to the final exam in the course. Projects were graded by three independent faculty reviewers to assess inclusion of required elements, content accuracy, presentation/organization, and creativity/originality. Project grades were compiled and analyzed. Final exam scores from the WSU Fall 2023 cohort were compared to the final exam scores for the Fall 2022 cohort where creative projects were not utilized.

Results: Projects for the Spokane campus included videos (n=5), physical posters (n=6), digital posters (n=4), and one story. The average overall project score was 92% with most groups receiving 100% for including all required elements within their projects (15/16 groups). The majority of groups received full credit for content accuracy and creativity/originality (9/16 groups for both respectively) while presentation/organization was the area with lowest student performance. The average final exam score for the cohort in 2023 was 88%, compared to 79% on the similar content in the previous year.

Conclusion: A novel Top 200 Drugs project was developed as an opportunity for imagination and originality in a course where memorization is often the primary learning method. Overall students performed well on the activity with a variety of creative projects presented. Comparison of final exam data between cohorts shows a potential positive impact of creativity on learning key drug information. However, this conclusion is limited by a small sample size and does not consider other classroom variables that shifted. Further research on the incorporation of creativity into pharmacy education is needed.

Evaluating factors impacting student pharmacist willingness to ask patients about mental health

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Background: Mental Health First Aid (MHFA) training is an evidence-based training that provides skills to identify signs and symptoms, early-intervention techniques, support and referral strategies for individuals experiencing a mental health or substance use challenge. Research with pharmacy students shows that MHFA training provides an immediate reduction in self-reported mental health stigma and increases trainees' intention to ask patients, family, and friends about mental health. Recent studies indicate that over time, stigma returns and students show hesitancy to utilize the MHFA training in patient care simulations. This research investigates pharmacy student mental health stigma and factors related to pharmacy student intentions utilize MHFA skills in personal, classroom and clinical settings, following MHFA training.

Method: Semi-structured, key informant interviews were conducted during Fall 2025 with student pharmacists in the third professional year who had participated in MHFA training two years earlier. The interview script was designed to gather students' experiences utilizing MHFA skills since participating in training. Interviews were conducted by an experienced MHFA trainer faculty member who did not train the study participants. Interviews were conducted via zoom, recorded, and transcribed. Deductive qualitative coding procedures were utilized to analyze student experiences with Ajzen's Theory of Planned Behavior applied as the theoretical framework.

Results: Ten student interviews were completed, and three main themes were identified. Attitudinal determinants included a desire to maintain emotional distance from patients and some stigmatic mental health beliefs. Themes contained within the Subjective Norm domain were the perceived care expectations of the classroom or pharmacy practice site, the culture, and the student's perceived role in the provision of mental health care. The final determinant, Perceived Behavioral Control, included perceptions of the practice site (how busy or throughput focused it was), lack of emphasis on mental health in class based structured simulations, and a perceived lack of mental health training for preceptors.

Conclusion: Students are greatly influenced by the culture of the classroom, practice site and preceptors' willingness to engage in mental health conversations. Although students report high levels of willingness to engage in mental health conversations with patients, implementation is inhibited by several factors, including personal discomfort, perceptions

about pharmacy culture and workflow, and preceptor modeling. Increasing simulated practice in having these conversations in non-ideal environments, adding instructional modules about boundary setting and de-escalation may help with student hesitation in addition to spending more time clarifying how a pharmacist with (or without) MHFA training is a critical part of the healthcare team providing support for patients and colleagues who may be experiencing mental health challenges.

The LEAP Collaborative: A multi-institution model to advance access, engagement, and belonging in pharmacy education

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Background: Pharmacy education institutions globally are navigating an increasingly volatile, uncertain, complex and ambiguous (VUCA) environment shaped by evolving workforce demands, persistent health inequities, regulatory shifts and resource constraints. These pressures challenge institutions to sustain inclusive learning environments while maintaining workforce pipelines and pathways capable of serving diverse populations. Across many pharmacy schools, faculty and staff stress, diminishing resources, declining student engagement, and fragmented institutional initiatives undermine recruitment, retention, and sustainability of programmes designed to strengthen access and belonging. These challenges underscore the need for approaches that move beyond isolated institutional initiatives toward coordinated, collaborative strategies capable of driving systemic change to support a diverse and responsive pharmacy workforce. The collaborative brings together schools of pharmacy to exchange best practices, identify common challenges and co-develop strategies that strengthen institutional culture, advance student success and deepen community engagement in pharmacy education. This session will present the LEAP Collaborative as a case study example of multi-institution collaboration in pharmacy education and guide participants in applying the framework to build coalitions, within and beyond the walls of their institutions, identify priorities and draft strategic actions that strengthen access, engagement and belonging in ways that fit their local school community needs and broader contexts.

Method: In Spring 2025, the collaborative conducted an environmental scan across member institutions to reassess its strategic direction in response to evolving institutional and regulatory environments affecting pharmacy education. Participating institutions completed a structured survey examining institutional structures supporting engagement, access, and belonging initiatives, strategic priorities, emerging challenges, and opportunities for collaboration across institutions. Findings from the environmental scan informed the repositioning of the collaborative and development of the LEAP framework.

Results: Eight member schools representing diverse institutional contexts completed the environmental scan. Findings identified shared priorities. Thematic areas with the strongest signals across institutions included strengthening inclusive learning environments, advancing health equity and access, enhancing the visibility of initiatives as mission-critical and improving coordination of institutional efforts. Survey results were presented to institutional leaders and informed the development of the LEAP Framework and its strategic themes. The LEAP collaborative model is organised around three strategic focus areas: Visibility, Voice, and Vision, which guide ongoing coalition building, shared learning and strategic planning. These findings informed the development of a structured collaborative framework designed to support coordinated efforts across pharmacy education institutions.

Conclusion: The LEAP Framework provides a structured approach for institutions seeking to advance access, engagement and belonging initiatives in response to changing internal and external realities. Through an inclusive strategic planning process aligned with local, national and global priorities, the collaborative model enables institutions to exchange best practices, identify common challenges, and develop context-specific action plans. This framework emphasises adaptability, coalition building and strategic alignment, making it applicable across diverse pharmacy education contexts, including geographic regions, organisational structures, missions, and resource levels. This session introduces the Leading Engagement and Access in Pharmacy (LEAP) framework, offering a transferable model to support institutional alignment with professional standards and collaborative action across pharmacy education.

A local university's evaluation of outcomes-based and ladderized bs pharmacy program: pioneering the future of Philippine pharmacy education

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Background: In 2012, a university in the National Capital Region launched its Bachelor of Science in Pharmacy Program (BSPP), integrating an Associate degree and enhancements in administration, management, marketing, and entrepreneurship. Anchored on the outcomes-based education (OBE) framework, the program has undergone amendments in 2018 and 2022, resulting in a ladderized curriculum with progressive exit points: associate, diploma, and bachelor's degree. Over 13 years, continuous feedback has demonstrated the model's effectiveness and relevance,

possibly serving as a reference for the proposed national implementation of the ladderized BSPP in 2026, aligned with the Pharmacy Roadmap Project 2030. Given limited studies on OBE and ladderized BSPP outcomes in Philippine universities, this research also addresses that gap.

Method: The Institute's studies employed both quantitative and qualitative approaches, using a sequential mixed-method design, or a quantitative method supported by qualitative data with non-random methods-purposive and convenience sampling. Quantitative data were analyzed using descriptive and inferential statistics, while thematic analysis was applied to the qualitative data. Objective data sources from regulatory, accreditation bodies, and institutional exit survey results served as critical inputs that reinforced the Institute's research findings.

Results: Based on students, alumni, faculty, and industry partners' perspectives, regulatory, exit interviews for graduating students, and accrediting body's report, and the licensure examination performance track record from 2016 to 2024, the BSPP of the local university has fulfilled its expected program learning outcomes (PLOs) and has been contributing to the sustainable advancement for education and workforce. To further strengthen this mandate, a strategic plan for 2026-2030 is proposed in accordance with the planning matrix output of this study. This focuses on five (5) critical areas: sustaining program excellence and board performance; advancing faculty and academic delivery systems; Enhancing research, innovation, and community impact, strengthening professionalism and student development, and reinforcing institutional quality assurance and global benchmarking.

Conclusion: This innovative model OBE and ladderized curriculum, aligns with the Philippine Pharmacy Roadmap 2030, which now proposes a national rollout of a ladderized pharmacy education curriculum. The university's experience offers valuable insights for pharmacy schools seeking to adopt transformative, sustainable, and practice-ready curricular frameworks that advance educational equity and workforce readiness.

A therapeutic agent alleviates diabetic cardiomyopathy by remodeling the circRNA-mediated NMT2–FSP1–PLIN3 axis to restore lipid defense

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Background: Diabetic cardiomyopathy (DCM) is propagated by lipotoxicity and ferroptosis, yet intrinsic cardioprotective mechanisms that counteract these stresses remain poorly defined. Ferroptosis suppressor protein 1 (FSP1) operates independently of GPX4, but its role and regulation in the heart are unknown. N-myristoyltransferase 2 (NMT2) catalyzes protein myristoylation, a modification crucial for membrane localization. We hypothesized that FSP1 requires NMT2-dependent spatial licensing to execute a Localization-Enabled Lipid Defense (LELD) at lipid droplets (LDs), and that this axis is disrupted in DCM.

Method: DCM was established in C57BL/6J mice. Cardiac function, LD dynamics, and ferroptosis markers (lipid peroxidation, Ptgs2 expression, GPX4/FTH1 levels) were assessed following cardiomyocyte-specific FSP1 or NMT2 manipulation using AAV9 vectors. Proteomics and co-immunoprecipitation identified FSP1 interactors. Myristoylation assays and genetic epistasis defined pathway hierarchy. A novel circular RNA (circRNA) co-delivery system for FSP1 and NMT2 was evaluated for therapeutic restoration.

Results: FSP1 expression was markedly downregulated in diabetic myocardium and HG+PA-challenged cardiomyocytes. FSP1 deficiency provoked significant lipid droplet accumulation, accompanied by elevated lipid peroxidation: myocardial MDA increased, 4HNE immunofluorescence intensified, and Ptgs2 mRNA elevated. Prussian Blue staining revealed diffuse ferric iron deposition, and mitochondrial fractions exhibited loss of GPX4 and FTH1. Functionally, FSP1 knockdown exacerbated contractile dysfunction: EF% and FS% decreased, and myocardial fibrosis area increased. Conversely, FSP1 restoration via AAV9-cTnT-FSP1 rescued cardiac function, with EF%, FS% increased, and E/A ratio normalized. Fibrosis area was reduced, and TEM demonstrated preservation of mitochondrial ultrastructure with organized cristae. FSP1 overexpression reduced LD burden, attenuated lipid peroxidation, and restored GPX4 and FTH1. NAD^+/NADH ratio and CoQ10 levels, both depleted in DCM hearts, were normalized with FSP1 restoration, independent of systemic glycaemia. Mechanistically, proteomic analysis identified PLIN3 as a key FSP1 interactor. HG+PA stress upregulated PLIN3 protein without altering mRNA, indicating post-translational regulation. FSP1 overexpression reduced PLIN3 protein, while FSP1 silencing further increased PLIN3. PLIN3 overexpression alone exacerbated lipotoxicity, increasing LDs, MDA, and ROS while impairing mitochondrial membrane potential (JC-1 red/green ratio). Critically, PLIN3 overexpression completely abolished FSP1-mediated protection, establishing PLIN3 as a downstream effector. Upstream, mass spectrometry identified NMT2 as an FSP1-binding partner, with co-IP confirming their interaction. NMT2 expression was reduced in diabetic hearts. NMT2 silencing disrupted FSP1 localization and eliminated its protective effects, with cell viability remaining at knockdown levels, lipid peroxidation unabated, and mitochondrial membrane potential collapsed, even with FSP1 overexpression. circFSP1-NMT2 treatment achieved sustained cardiac co-expression, significantly improving EF% and FS%, reducing fibrosis, and attenuating LD accumulation and ferroptotic markers.

Conclusion: This study unveils FSP1 as a central cardioprotective effector in DCM, governed by a previously unrecognized NMT2–FSP1–PLIN3 axis that integrates LD biology with ferroptosis regulation. FSP1 activity is contingent upon NMT2-mediated spatial licensing for its localization to LDs, where it suppresses PLIN3 to limit lipid peroxidation. Circular RNA-mediated co-delivery of both the effector (FSP1) and its spatial licensor (NMT2) represents a mechanistically refined and translatable strategy to re-establish cardiac resilience against lipotoxic ferroptosis in metabolic disease.

One-step synthesis and oriented immobilization of Strep-Tag II

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Background: The precise orientation and stable conformation of immobilised membrane receptors are critical for accurate drug screening and ligand–protein affinity analysis. Conventional approaches for the recombination, purification, and immobilisation of these receptors are often time-consuming and labour-intensive, and typically offer poor control over their spatial orientation on chromatographic stationary phases. This study addresses these limitations by developing a novel one-step synthesis and oriented-immobilisation membrane-receptor affinity chromatography (oSOMAC) method, targeting specific domains of membrane receptors for high-throughput screening.

Method: The oSOMAC platform integrates a cell-free protein synthesis (CFPS) system with functionalised monolithic columns. The platelet-derived growth factor receptor β (PDGFRβ) was fused with a Strep-tag II affinity peptide via CFPS, concurrently with the batch preparation of Strep–Tactin-modified poly (Glycidyl methacrylate-co-poly(ethylene glycol) diacrylate, GMA-co-PEGDA) monolithic columns. This design leverages the strong, non-covalent interaction between Strep-tag II and Strep–Tactin to enable the simultaneous purification and oriented immobilisation of the synthesised receptor directly onto the monolith in a single step. The CFPS process, supplemented with membrane scaffold protein D1 (MSP1D1) nanodiscs to maintain protein native conformation, allows for rapid protein expression within 1–2 hours, independent of living cells. By engineering the location of the Strep-tag II within the receptor construct, the orientation of PDGFRβ on the column—exposing either its extracellular or intracellular domain—could be flexibly controlled.

Results: The successful synthesis of nanodisc-embedded PDGFRβ and its oriented immobilisation on monolithic columns were confirmed by western blot, fluorescence imaging, scanning electron microscopy, and energy-dispersive X-ray spectroscopy. Frontal affinity chromatography (FAC) analysis validated the activity and domain-specificity of the prepared columns. Using the intracellular domain-exposed PDGFRβ column, three potential ligands—tanshinone IIA (Tan IIA), hydroxytanshinone IIA, and dehydrotanshinone IIA—were successfully screened from a Salvia miltiorrhiza extract. Subsequent FAC determination yielded a dissociation constant (KD) of 9.7 μM for Tan IIA binding to PDGFRβ, which was further supported by molecular docking simulations identifying key interactions within the receptor's intracellular kinase domain. Pharmacological assays in transforming growth factor-β (TGF-β)-stimulated hepatic stellate cells (HSCs) demonstrated that Tan IIA attenuated HSC activation and downregulated the phosphorylation of PDGFRβ and its downstream signalling effectors in a dose-dependent manner, confirming its functional antagonism via the intracellular domain.

Conclusion: The novel oSOMAC method provides an efficient and versatile platform for the rapid synthesis, oriented immobilisation, and functional exploitation of membrane receptors. It combines the speed and flexibility of CFPS with the robust performance of monolithic chromatography to enable precise, domain-targeted drug screening and affinity analysis. The successful identification and validation of Tan IIA as a PDGFRβ intracellular domain inhibitor highlights the practical utility of this approach. The developed oSOMAC strategy offers a broadly applicable framework for accelerating drug discovery and biomolecular interaction studies against other membrane receptor targets.

Mutant Srsf2P95H synergizes with oncogenic Nras to upregulate EBP50 network and promote AML

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Background: Chronic myelomonocytic leukaemia (CMML) is a clinically prevalent haematological malignancy, predominantly affecting elderly patients. A significant proportion of CMML cases undergo clinical progression to secondary acute myeloid leukaemia (AML), which confers a very poor prognosis. Activating mutations in NRAS are recognised oncogenic drivers. The group's prior research established that the Nras G12D/+mutation can initiate a CMML-like disease in murine models. Mutations in the splicing factor gene SRSF2, particularly the P95H variant, occur in approximately 47% of CMML patients and are associated with adverse outcomes. Preliminary data suggest a synergistic effect between SRSF2 P95H/+ and Nras G12D/+ in promoting the acute transformation of CMML to AML. RNA-sequencing analysis has identified a significant upregulation of the EBP50 (NHERF1) gene network in the

context of this synergistic mutational background. Notably, a novel class of anti-tumour agent, 4-amino-2-trifluoromethyl-phenyl retinate (ATPR), has been shown to exhibit therapeutic effects by targeting the EBP50 protein.

Method: To investigate the mechanistic synergy, a novel compound mutant mouse model was generated by crossing SRSF P95H/+ mice with Nras G12D/+mice. Leukaemic progression was monitored through serial peripheral blood analysis, histological examination of bone marrow and spleen, and comprehensive immunophenotyping by flow cytometry to characterise disease burden and lineage. Transcriptomic profiling via RNA-sequencing was performed on leukaemic cells from different genotypes to identify differentially expressed genes and dysregulated pathways. Genetic and pharmacological perturbations were employed to validate the functional role of the EBP50 network. The therapeutic efficacy of ATPR was assessed in vivo in the established AML model, evaluating its impact on survival, disease burden, and molecular targets.

Results: Mice harbouring both SRSF P95H/+ and Nras G12D/+ mutations exhibited a dramatically accelerated and fully penetrant AML transformation compared to mice with either mutation alone, confirming a potent synergy. RNA-sequencing analysis revealed a specific and significant upregulation of the EBP50-centric gene network in these double-mutant leukaemias. Functional studies demonstrated that this network is critical for sustaining the proliferation and survival of the leukaemic cells. Crucially, pharmacological intervention with ATPR, which targets the EBP50 protein complex, effectively delayed AML progression in vivo. Treatment with ATPR resulted in reduced leukaemic burden, extended survival of the double-mutant mice, and was associated with downregulation of the EBP50 network activity.

Conclusion: This study delineates a novel pathogenic mechanism wherein mutant SRSF2 cooperates with oncogenic NRAS to drive the aggressive transformation of CMML to AML, mediated through the upregulation of the EBP50 signalling network. These findings position the EBP50 network as a critical signalling hub and a vulnerable therapeutic target in this high-risk leukaemic subset. Furthermore, the demonstration that the novel agent ATPR can exert therapeutic effects by targeting this pathway provides a compelling preclinical rationale for a targeted therapeutic strategy. This work identifies a potential treatment avenue for CMML patients with SRSF2 and NRAS co-mutations who are at high risk of progression to secondary AML.

Mini-mentorships expand offerings for training health professionals

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Background: How can academic programs provide the opportunity for our students and new practitioners in health care to learn from experts with limited time to mentor? This project looked at mini-mentorship opportunities accepted by industry experts who were willing to contribute to student and new professional training, but who don't have time to be a traditional mentor. This project conflated information from two different programs, each offering mini-mentoring in a different way. The programs evaluated have high student satisfaction scores and the authors believe they have potential to be replicated. The project goal was two-fold, to describe the opinions of professionals asked to serve as mini-mentors in two programs focused on health care students and new professionals and to explain the planning necessary to make the process work.

Method: Using a survey with open ended questions, the mini-mentors were asked to report their satisfaction with the programs. Areas of satisfaction, areas of challenge, and time commitment were the topics of the surveys. Weekly mentors from the 10,310 kilometers – 6,406 miles LiveWell Initiative project, and the interview mentors from a pharmacy curricular advocacy elective were surveyed to assess their perceptions of limited time commitment mentoring. The responses were then compared by 3 authors using topic matching to allow for the presentation of perceived benefits and challenges in mini-mentoring. Any disagreement in categorizing was decided by a 4th author.

Results: Forty-one mini-mentors were surveyed with twenty responding (48.8%) Time coordination between the mini-mentor, and the program was the most noted issue (19 of 20 respondents). The comments noted appreciation for flexibility and making the mini-mentoring fit busy schedules. 7 respondents acknowledged that these programs allow them to avoid "lecturing to people who are polite, but uninterested," or similar reflections. The responding mentors expressed frustration with technology failures, as the primary challenge. Comments and concerns focusing on student requests and responses were split between those who were positive about program rules prohibiting asking for employment or financing and those who had concerns about mentees asking for opportunities to participate in poorly defined research or requesting suggestions with limited or no parameters. Program coordinators estimated 5 planning hours before the start of the courses with 1.5 to 2 hours per week while the programs were running. Each program coordinator also reported spending over 10 hours per year on evaluation and quality improvement activities.

Conclusion: With planning by the program sponsor / coordinator, even the busiest experts can offer mentoring with limited time constraints. The mini-mentors got satisfaction from participating and felt as if they were contributing without feeling overwhelmed by time commitment.

Knowledge about implementation science and perceptions about its curriculum content by pharmacy and medical students in selected universities in Southwest, Nigeria

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Background: Implementation science (IS) plays a crucial role in bridging the gap between research findings and practical application in healthcare. The knowledge-practice gap in health care refers to the gap between scientific knowledge and its application in routine healthcare practice. Evidence shows that proving a clinical innovation is effective does not ensure routine use. Studies show that getting clinical innovations into practice takes 17–20 years with less than 50% of these innovations making it into general use. Healthcare (HC) professionals (who were HC students prior) play a pivotal role in the adoption and implementation of clinical innovations. However, the level of knowledge and awareness about implementation science among healthcare students in Nigeria remains unclear. The study assessed the implementation science knowledge and perceptions about curriculum content by final-year pharmacy and medical students in tertiary institutions (healthcare students) in Southwest (SW) Nigeria.

Method: A cross-sectional survey was conducted among final-year pharmacy and medical students from five tertiary institutions in SW, Nigeria. The minimum sample size was calculated to be 384. A semi-structured questionnaire administered virtually though A Google docs link via WhatsApp platforms of the students was used to collect data about students' demographics, their knowledge about, and curriculum content about implementation science. Data analysis was carried out using SPSS, with descriptive statistics, and chi-square tests were performed to explore relationships between variables at significant level set at <0.05. Ethical approval was obtained from the Health Research Ethics Committee of Lagos University Teaching Hospital (LUTH), Idi-Araba, Lagos, Nigeria.

Results: The result shows that more than half of the respondents were female (57.0%), of the Yoruba tribe (70.6%) and practiced Christianity (76.3%). Mean age of the respondents was 24.1±2.2 years with majority within the 23–27-year age group (80.7%). Most of the respondents had not heard of the term implementation science (86.2%), did not know what it meant (94%), nor had they encountered it in their coursework (96.1%) or participated in research projects involving it (98.7%). More than three-quarters of respondents could not accurately choose the correct knowledge statements about implementation science or its benefits thus confirming overall poor knowledge about implementation science (92%). Majority of respondents indicated that specific courses in implementation science were not included in their current curriculum (92.4%). Of those that indicated they had it in their curriculum, 79.4% of them felt the content was inadequate. In addition, 43.3% of respondents rated the effectiveness of the current curriculum in teaching implementation science as fair with more than half of them saying that it was not integrated with their other subjects (64.7%). About 69% rated the quality of instruction related to implementation science as poor to fair. There was no statistically significant association between the variables (demographic and knowledge) and the type of healthcare student surveyed in the study.

Conclusion: The study highlighted the urgent need to integrate implementation science into pharmacy and medical students' curriculum in tertiary institutions. Addressing this educational gap is essential for preparing future healthcare professionals to effectively translate research into practice.

Patients are essential teachers: Experiences platforming patient educators for cultural humility training at two US health professionals programs

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Background: Healthcare professionals who practice cultural humility improve patient outcomes. Cultural sensitivity is a required component of interprofessional and pharmacy education standards in the United States. However, traditional didactic approaches to cultural humility training risk over-generalizing and stereotyping patient groups. Providing a platform for patients to teach their shared experiences to pharmacy and other healthcare professional students may improve cultural humility knowledge, attitudes, and skills. Patient educators may also experience tangible benefits. The primary purpose of this initiative is to determine if a patient-lead educational initiative improved student knowledge, attitudes, and skills related to cultural humility.

The secondary purpose is to characterize patient educator experiences within the program.

Method: Two US pharmacy schools implemented an interprofessional patients-as-teachers activity over four years. Students attended a patient panel on cultural humility, then worked in interprofessional teams to apply their learning to a complex patient case. Students completed pre- and post-surveys including Likert-scale and open-ended questions to assess learning. Patient panelists completed post-surveys on their training and experiences.

Results: Sixteen patient educators and over 800 interprofessional students completed the educational activity. Compared to pre-surveys, post-survey measures of cultural humility improved across all questions. Qualitative analysis of open-ended questions revealed key learning themes including the importance of acknowledging implicit bias, effective communication, avoiding assumptions, and familiarity with resources for specific patient populations. Patient educators reported feeling they made meaningful contributions to student learning, forged new relationships with other patients and faculty, and learned new information during the activity.

Conclusion: Patients are powerful teachers of cultural humility for pharmacy and other health professions students. Educators must cultivate safe spaces for patients to share their lived experiences. Future studies should explore the impact of patient educators on other healthcare topics.

A decade of global research on pharmacy education and practice (2015-2025): Bibliometric insights and trends

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Background: Research in pharmacy education and practice is of major importance, as it generates the evidence needed to make informed decisions and optimise the profession. This research has expanded rapidly with time, but growth may not translate into cumulative, decision-ready evidence. This research aims to map global pharmacy education and practice research (2015–2025) and identify priority gaps for future work.

Method: A bibliometric analysis with term/keyword co-occurrence mapping was conducted on PubMed and Scopus databases, describing time trends and geographic patterns, with stratification by education vs practice. Tables and figures were generated from the study's bibliometric dataset using VOSviewer and Excel, while statistical analysis was conducted using SPSS version 30.0.

Results: Publications increased from 341 (2015) to 1,010 (2025). Practice outputs exceeded education annually (≈54–64%). Output rose sharply in 2020–2021, dipped in 2022, and peaked in 2025. Geographic representation was uneven, with a large "Global/not country-specific" share (50.2%) and concentration of high-income settings in North America (14.1%) and Europe (10.0%). Education terms emphasised learners, perceptions, short-term outcomes, simulation, and COVID-19-era adaptation. Practice terms centered on pharmacist roles/services linked to patient outcomes, alongside uptake determinants (barriers/facilitators) and intervention/outcome evaluation. Methodologically, narrative reviews, cross-sectional, and case studies were mainly found, with gaps in tool validation and high-quality studies that strengthen evidence-based decision-making.

Conclusion: The next phase of pharmacy education and practice research should prioritise more robust designs for durability and real-world effectiveness, decision-useful evidence synthesis (systematic reviews and meta-analyses), outcome standardization (including standardized core outcome sets), and rigorous development/validation of measurement tools and competency frameworks. It should also implement routine reporting of context variables to improve transferability, especially across resource-diverse settings. Emerging priorities, including artificial intelligence-enabled tools, emergency readiness, and sustainability-oriented services, warrant more rigorous and governance-aware evaluation, focused on safety, equity, workflow impact, and measurable outcomes.

The academician's role in practice advancement: Practice–academia partnerships

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Background: Pharmacy practice globally is undergoing rapid transformation, driven by expanded scopes of practice, pharmacist diagnosis and prescribing, and standard-of-care regulatory models. These shifts require a workforce that is clinically competent, appropriately trained, and able to demonstrate readiness for advanced practice. Academic institutions are uniquely positioned to support this transformation by serving as neutral conveners and infrastructure partners across education, training, research, and regulation. The objective of this project is to describe an integrated, academia-led framework that advances pharmacy practice through coordinated education, post-degree training, research, and stakeholder engagement.

Method: This descriptive report outlines a multi-component approach developed through sustained practice–academia partnerships. Core elements include: (1) curricular changes including physical examination, diagnosis, therapeutic decision-making, prescribing guidance, and regulatory literacy; (2) post-degree training, including PGY1 residencies, fellowships, and structured continuing education; (3) support for practice innovation through protocol development and demonstration projects, and (4) research projects supported by grant writing, evaluation, and dissemination. The approach also incorporates academia's role in educating policymakers and regulators and functioning as a neutral practice convener to support profession-wide initiatives, and service implementation.

Results: Academic pharmacists contributed to practice advancement through multiple interconnected roles. Outcomes include improved alignment between educational outcomes and practice expectations, strengthened collaboration among academic institutions, professional organisations, and practice sites, and enhanced credibility with regulators and other stakeholders. In teaching, curricular changes were implemented to better align with evolving scopes of practice, complemented by development and support of post-degree training pathways, including PGY1 residency and fellowship programmes. Academicians also led continuing education initiatives focused on physical examination skills, therapeutic updates with prescribing guidance, and education related to changes in pharmacy law, including independent practitioner frameworks. In the research domain, academicians supported practice advancement by developing assessment rubrics, leading protocol development, and assisting with grant writing to support demonstration projects and service implementation. Evaluation and dissemination activities included onsite training, outcomes assessment, and sharing of successful practice models. Beyond discrete projects, academic pharmacists frequently served as neutral conveners, bringing together stakeholders across practice settings, professional organisations, and health systems. Academicians also engaged in education of lawmakers and regulators by providing evidence of pharmacist training, competency, and outcomes to support scope of practice expansion.

Conclusion: Academicians play a critical role in enabling sustainable pharmacy practice advancement. By integrating teaching, post-degree training, research, and regulatory engagement, academic institutions can support workforce readiness, public trust, and policy-aligned practice transformation. This scalable approach is applicable across diverse healthcare and regulatory environments and offers a replicable approach for advancing the pharmacy profession internationally.

An evaluation of cultural safety education in a pharmacy curriculum through constructive alignment mapping

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Background: Cultural safety is a vital component of healthcare education, particularly in countries with colonial histories such as Australia. Ensuring that cultural safety is meaningfully embedded and assessed within health professional programs is essential for improving health outcomes for First Nation Australians. Therefore, the aim of this study was to evaluate how cultural safety is represented in a Pharmacy education curriculum.

Method: A qualitative curriculum mapping approach was used to identify cultural safety elements in curriculum documents. First, the Aboriginal and Torres Strait Islander health curriculum framework was used to determine if unit-level learning outcomes referenced cultural safety. Second, the concept of constructive alignment was used to determine if cultural safety learning outcomes were constructively aligned with learning activities and assessments. Third, verbs similar to Bloom's taxonomy was used to identify the cognitive level of cultural safety elements.

Results: Seven units of study were mapped. One unit demonstrated aligned cultural safety elements, however, six did not. Assessments of cultural safety learning outcomes were largely absent with learning activities typically confined to single events at novice level. When assessments did occur, they were predominantly of a lower cognitive order through multiple choice or short answer questions formats.

Conclusion: Despite national standards, cultural safety appears to be inconsistently embedded and poorly assessed. Further curriculum development is necessary to achieve constructive alignment and accountability.

Preparing pharmacists for expanded clinical roles: implementation of a continuing education program on ENT physical examination

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Background: Recent legislative changes in the province of Quebec, Canada, have strengthened the role of community pharmacists as frontline healthcare professionals responsible for assessing patient health in relation to prescribing and managing medications. Because advanced physical examination skills beyond vital signs monitoring were not previously integrated into the PharmD curriculum, practicing pharmacists require foundational training in this area. This project follows a literature review and focus group with community pharmacists and clinical faculty, which identified the ENT (ear-nose-throat) system as a priority area for physical examination training. The objective was to design and implement a continuing education (CE) program aimed at enhancing pharmacists' competencies in the clinical evaluation and management of patients presenting with signs and symptoms related to common ENT conditions.

Method: The CE program covered the evaluation and management of patients with otitis media, otitis externa, pharyngitis and sinusitis. The program's objectives and content were created by an expert committee composed of pharmacists, clinical professors and a nurse practitioner, with scientific review completed by a family physician and a pediatric pharmacist. A satisfaction questionnaire was designed and distributed to participants following the activity. Implementation variables were analyzed using a mixed-methods approach to assess the feasibility, acceptability, appropriateness, adoption and maintenance of the program. Quantitative data from questionnaires were analyzed using descriptive statistics, while qualitative responses and findings were examined through thematic analysis.

Results: The CE program consists of a full-day (7-hour) in-person training. The first component is a 3-hour interactive lecture, followed by four 1-hour hands-on sessions in a skills laboratory: (1) otoscope handling, (2) case-based scenario on otitis media, (3) case-based scenario on pharyngitis, and (4) case-based scenario on sinusitis. All sessions integrate structured practice of physical examination techniques. The training was designed over a three-month period using existing infrastructure from the Faculty of Pharmacy, and training materials were selected and acquired through unrestricted educational grants from pharmaceutical partners. Recruiting instructors proved somewhat challenging due to limited availability. Preliminary survey results indicate high acceptability: over 80% of participants were satisfied with the program, felt confident applying the skills in practice, and judged the instructors as competent and the training as well organized and of sufficient duration. Adoption was rapid as about 600 pharmacists completed the training from January to May 2026, with full registrations at most sessions. Monthly sessions are planned for Fall 2026, with subsequent integration into the PharmD curriculum.

Conclusion: A comprehensive CE program on ENT physical examination was successfully developed and delivered to community pharmacists, who reported high satisfaction and confidence in applying the skills learnt to their practice. The strong interest expressed by participants highlights pharmacists' readiness to prepare for an expanded scope of practice. Further evaluations—including assessments of confidence levels, competency acquisition, and facilitators and barriers to integrating physical examination into routine pharmacy practice—are underway to better understand the training program's impact.

Prescription for leadership: Embedding leadership development in pharmacy education

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Background: The expanding scope of pharmacy practice requires pharmacists to function not only as medication experts but also as leaders within healthcare systems. However, leadership competencies—such as strategic thinking, team management, and professional advocacy—remain underrepresented in many pharmacy curricula.

Objective: To evaluate the impact of a structured leadership development program integrated into undergraduate pharmacy education on students' leadership competencies.

Method: A longitudinal educational intervention was implemented with third-year pharmacy students at a university-based pharmacy program. The curriculum included interactive workshops, team-based projects, mentorship with practicing pharmacy leaders, and reflective leadership portfolios. Core competency domains assessed were communication, collaborative decision-making, ethical leadership, and change management. Outcomes were measured using validated leadership assessment scales and reflective evaluations conducted pre- and post-intervention.

Results: Students demonstrated significant improvement in leadership self-efficacy ($p < 0.01$), as well as teamwork and communication skills ($p < 0.05$). There was also a marked increase in confidence related to initiating professional and organizational change. Qualitative reflections highlighted enhanced awareness of pharmacists' leadership roles across healthcare policy, clinical practice, and community settings, along with improved ability to manage complex scenarios involving negotiation and advocacy.

Conclusion: The integration of structured leadership training within pharmacy education is essential for preparing graduates to meet evolving professional demands. Early development of leadership competencies enables pharmacists to actively contribute to healthcare innovation, interprofessional collaboration, and system-level transformation. Sustained implementation will require institutional commitment and expanded experiential learning opportunities. Keywords: leadership education, pharmacy students, professional development, healthcare leadership, pharmacy curriculum

Exploring the feasibility of implementing entrustable professional activities in workplace-based training: Insights from pharmacy educators

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Background: Competency-based education has increasingly shaped pharmacy training by emphasising measurable readiness for professional practice rather than time-based progression. Entrustable professional activities (EPAs) are task-oriented units of professional work that integrate knowledge, skills, and professional judgement, and are designed to be performed independently upon entry to practice. The development of pharmacy EPAs has provided a structured framework to support assessment in workplace-based training. However, the feasibility of adapting and implementing EPAs across diverse regulatory and practice environments remains influenced by contextual, organisational, and supervisory factors. Understanding stakeholder perspectives is essential to ensure that EPAs are effectively integrated into training while remaining adaptable to evolving professional expectations. This study aimed to explore the feasibility of adapting and implementing pharmacy EPAs within workplace-based training settings and to identify perceived facilitators and barriers to their integration.

Method: A qualitative exploratory study design was employed using focus group interviews. Pharmacy faculty, experienced workplace-based pharmacy educators, and practising pharmacists representing academic, hospital, and community pharmacy sectors were purposively recruited to ensure broad representation across practice settings. Participants were invited to discuss the feasibility of incorporating 15 EPAs reflecting entry-level pharmacy practice into workplace-based training. Interview questions were derived from the validated Quality of Entrustable Professional Activities (QUEPA) rubric to explore clarity, observability, generalisability, and contextual suitability of the EPAs. Participants were also asked to identify perceived facilitators and barriers to implementation. Five focus groups were conducted between October and November 2023. Interviews were audio-recorded, transcribed verbatim, and analysed thematically using a hybrid deductive and inductive approach to identify recurring patterns and themes.

Results: A total of 24 participants contributed across five focus groups. Four key themes emerged regarding the feasibility of EPA adaptation and implementation. First, participants highlighted the clarity and measurability of entry-level tasks, noting that EPAs provide well-defined, observable activities that align with professional expectations. Second, limitations and restrictions were identified, particularly regulatory constraints and variations in scope of practice across different settings, which may limit the generalisability of certain EPAs. Third, environmental facilitators were recognised, including supportive organisational cultures, diversity of training sites, and supervisor engagement in educational development. Finally, supervisor influence on entrustment decision-making was identified as a critical factor affecting consistency in implementation. Participants emphasised that structured supervisor training and clear guidance on entrustment principles are necessary to minimise variability and strengthen reliability in assessment.

Conclusion: The validated QUEPA rubric provided a systematic framework for examining the integration of EPAs into workplace-based training. Stakeholders recognised the potential of EPAs to enhance curriculum alignment, support trainee development, and contribute to the advancement of pharmacists' scope of practice. However, successful implementation requires contextual adaptation, regulatory awareness, and structured supervisor development. Continuous refinement, stakeholder collaboration, and alignment with evolving healthcare demands are essential to maximise the effectiveness of EPAs as a supportive educational framework.

Development and evaluation of a preceptor training program for experiential pharmacy education in Ghana

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Background: Experiential learning in pharmacy education has become essential as the role of pharmacists continues to evolve globally. The quality of experiential pharmacy education is heavily influenced by the expertise of pharmacy preceptors through teaching and mentoring students in practice settings as they develop their professional knowledge and skills. Preceptor development programmes are critical to ensure preceptors are equipped with the necessary skills for effective preceptorship. However, there is a lack of structured training programmes for pharmacy preceptors across pharmacy schools in Ghana. The aim of this study was to develop, implement, and evaluate a training programme for pharmacy preceptors at University for Development Studies (UDS)-affiliated clinical sites for advanced Pharmacy Practice Experience (APPE).

Method: The ADDIE (Analysis, Design, Development, Implementation, and Evaluation) framework was adopted to guide the development, implementation, and evaluation of a training programme for pharmacy preceptors at the School of Pharmacy and Pharmaceutical Sciences (SOPPS), UDS in Ghana. A 23-item questionnaire was developed to assess the training needs of pharmacy preceptors at the affiliated clinical sites. All fifty pharmacy preceptors affiliated with SOPPS-UDS were invited to participate. The findings of the needs assessment were used by the design team comprising faculty and experienced preceptors to develop a structured training curriculum. The curriculum was delivered at a one-day continuous professional development (CPD)-accredited workshop organised for preceptors with in-person and virtual attendance options. The training was designed as a collaborative workshop based on the principles of andragogy. The format utilised case studies and guided peer discussions to promote active engagement. Acceptability and appropriateness were assessed post-training using a 5-point Likert scale adopted from the Acceptability of Intervention Measure (AIM).

Results: The results of the needs assessment identified the following areas as high priority for training: clarification of preceptor roles (40, 80.0%), effective teaching methods (42, 84.0%), assessment techniques (42, 84.0%), managing challenging students (36, 72.0%), and how to balance clinical work and preceptorship (47, 94.0%). Out of fifty preceptors that participated in the training, 42 (84%) completed the post-training survey. 29 (69.0%) participants were male, 24 (57.1%) had 5-15 years of experience as preceptors and 27 (64.3%) reported that they had never participated in a preceptor training before. Regarding acceptability of the training, majority of participants 'Strongly Agreed' that the training met their approval (34, 81.0%) was appealing (29, 69.0%), met their needs (27, 64.3%), and was satisfactory (32, 76.2%). For the training's appropriateness, majority of participants 'Strongly Agreed' that the information was reasonable (26, 61.9%), suitable (30, 71.4%), that the training fit well with their professional responsibilities (30, 71.4%), and was applicable (28, 66.7%). 35 (83.3%) participants rated the overall program as 'Excellent'.

Conclusion: The needs assessment identified clear priority areas for preceptor development. The overwhelmingly positive overall rating and high acceptability and appropriateness rating underscores the need for and value of structured preceptor training programs. Future research should focus on the long-term impact on student outcomes.

Pharmacy STARS: Expanding choosing wisely Canada's student resource stewardship program

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Background: Influencing healthcare trainees to practice stewardly is a crucial means to reduce inappropriate testing, treatments, and medical procedures as students who train in settings where low-value care is discouraged deliver stewardly care for the rest of their careers. To this end, Choosing Wisely Canada (CWC) launched Students and Trainees Advocating for Resource Stewardship (STARS) in 2015 to empower medical students to lead grassroots initiatives that raise awareness of Choosing Wisely activities, and advocate for integration of content related to resource stewardship into medical school curricula. To date, STARS has successfully engaged over three hundred medical students

across all Canadian medical schools. Considering the complementary responsibilities that pharmacists have in the domain of resource stewardship (antimicrobial stewardship, deprescribing, lab testing, etc.), STARS expanded to include pharmacy students in September 2025, with the intent of training a new generation of pharmacists to "Choose Wisely."

Purpose: To expand STARS to include pharmacy students from all Faculties of Pharmacy in Canada and develop a pharmacy specific program.

Method: Pharmacy STARS runs in parallel to the medical student program during the academic year (September to April). Students start the year by participating in a virtual Fall Leadership Summit to learn more about CWC and their resources and then develop local initiatives under the guidance of a faculty advisor. Examples of initiatives include interprofessional education events, sharing clinical tips on dedicated social media accounts, and the development of local student clubs. Throughout the year students also participate in three virtual roundtables (two being interprofessional) to discuss their work, seek peer support, and facilitate collaboration and learning. A year-end Spring summit enhances learning about leadership, advocacy and communication skills.

Results: CWC liaised with the Association of Faculties of Pharmacy of Canada (AFPC) to identify a Pharmacy lead (RTP), who in turn recruited local faculty advisors from each pharmacy school through the AFPC Planetary Health Special Interest Group. Faculty advisors facilitated student recruitment locally using materials from CWC. Seventeen students from ten (of 11) pharmacy schools were enrolled in STARS in the inaugural cohort. Evaluation of the initial cohort of Pharmacy STARS' will be performed and results will be used to improve program delivery.

Conclusion: The first cohort of the STARS program which included pharmacy students in Canada was a success. Further expansion of the program aims include all Canadian Faculties of Pharmacy and increase student enrolment. This experience can be used as the basis for including pharmacy in STARS in other countries where STARS exists (e.g., USA, Brazil), as well as engaging other health professional training programs such as nursing and dentistry in the future.

Evaluation of an asynchronous interprofessional education simulation on tobacco cessation for health science students: A pilot study

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Background: Traditional in-person interprofessional education (IPE) faces significant logistical challenges within modern healthcare curricula. These obstacles include rising student enrolment, geographical dispersion across multiple campuses, and limited faculty availability to facilitate small-group sessions. While IPE is essential for workforce readiness and the development of collaborative practice, traditional face-to-face models are often unsustainable in resource-constrained or geographically dispersed settings. Tobacco cessation represents a critical area for collaborative intervention, yet students often lack the confidence to provide team-based support. Asynchronous digital formats offer a potential solution for providing a scalable, flexible, and evidence-based alternative to traditional models. This study aimed to develop and evaluate an asynchronous clinical IPE simulation focused on tobacco cessation and to measure its impact on the attitudes and perceived collaborative competencies of pharmacy, medicine, and nursing students.

Method: A 10-day asynchronous pilot activity was implemented within a Learning Management System (LMS). The simulation was designed around six sequential tasks: a pre-activity questionnaire, team introductions via digital discussion boards, an independent review of tobacco cessation treatments using interactive video modules (PlayPosit), a coordinated one-hour team video conference to resolve a complex patient case, and a post-activity evaluation. Participants (n=32) completed a retrospective pre-post survey adapted from the validated Interprofessional Attitudes Scale (IPAS). This scale measured four primary domains: communication and teamwork, shared learning, clinical problem-solving, and self-awareness. Data were analysed using descriptive statistics and the Wilcoxon signed-rank test to measure statistically significant changes in self-reported perceptions and confidence levels.

Results: The activity was successfully completed by 32 students, comprising 21 pharmacy, 10 nursing, and one medical student. A significant majority of participants (90.6%) rated the activity as "very" or "extremely" relevant to their future professional practice, and 81.3% reported high levels of engagement with the asynchronous format. Statistically significant improvements ($p < 0.05$) were observed across all primary IPAS domains. Specifically, the mean score for communication and teamwork increased from 4.06 to 4.53, shared learning rose from 4.16 to 4.55, clinical problem-solving improved from 4.00 to 4.44, and self-awareness

increased from 3.97 to 4.31. Additionally, 90.6% of students reported increased confidence in their clinical ability to support patients interested in quitting tobacco. From an institutional perspective, the asynchronous model significantly reduced faculty burden, requiring only one faculty member for oversight compared to the multiple preceptors typically required for traditional live sessions.

Conclusion: This pilot study demonstrates that asynchronous clinical simulations may be a feasible and effective modality for delivering high-quality IPE. The format successfully improved student attitudes and clinical confidence regarding tobacco cessation while significantly reducing the faculty resources required for implementation. This model offers a scalable and sustainable solution for health science institutions, particularly those in low-resource settings or those facing chronic faculty shortages. Future research should focus on the long-term retention of these collaborative competencies and the scalability of this model to larger, more diverse student cohorts across different clinical topics.

Knowledge, understanding, and application of the pharmacy students in medication reconciliation: The impact of virtual simulation

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Background: Medication reconciliation is an important patient safety process especially through the care transfer process. Pharmacy students need to acquire the skills to detect medication discrepancies but in most cases, the conventional teaching techniques lack sufficient practical exposure. MyDispense is a virtual simulation that provides a risk-free and interactive environment in which these skills can be practised. This was a research to assess how MyDispense influenced the knowledge, confidence and pharmacy students and their use of the principles of medication reconciliation.

Method: The study was pre-post survey study that was carried out with 85 pharmacy students who were initially taught the concepts of medication reconciliation theory. The participants after the lecture worked on the MyDispense simulation which was a simulation of real-life situations. Students were surveyed to evaluate knowledge, confidence, and preparedness following the conclusion of the simulation, which contained Likert-scale questions and qualitative feedback. The survey was responded to by seventy-four students giving a response rate of 87.1. The demographics (age and gender) were gathered.

Results: The age of the participants was mainly 2122 years, 43% of whom were men, and 57% were women. Sixty six per cent had previous experience of hospital visit. The topicality of the subject matter to the learning goals of students was rated high with 44.6 and 41.9% of the respondents scoring 5 and 4 respectively. Only 2.8% rated it poorly (1 or 2). Prior to the session, 43.2% of the students rated their knowledge about medication reconciliation 4 and 32.4% rated 5. After the simulation, 62 percent of them felt that their understanding was 5, and 27 percent with a 4, which is a very high improvement. The confidence in diagnosing medication discrepancies also improved: before the session, 34% had rated 4 and 12% had rated 5; after the session, 34% had rated 5 and 32% had rated 4. The willingness to do reconciliation also improved with 35% at 5 and 34% at 4 after the session as compared to 16% and 27% respectively before the session. Reaction to the question that the simulation helped them understand more was 39 percent who answered in the affirm and 26 percent strongly in the affirm, that 39 percent answered in the affirm and 27 percent strongly in the affirm that the simulation helped them feel more confident in their ability to apply the principles. It is only 2% strongly disapproved of its value.

Conclusion: The MyDispense virtual simulation made a considerable improvement in the knowledge, confidence, and preparedness of pharmacy students to medication reconciliation. Students have found the simulation effective to fill the gap between theory and practice despite some technical difficulties that surfaced in the course of accomplishing the simulation. The paper justifies the concept of using virtual simulations as a teaching aid in pharmacy education to gain clinical skills in reconciling medications.

Bridging theory to practice: A gamified simulation approach to hospital pharmacy readiness

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Background: The transition from academic coursework to clinical hospital practice represents a critical and often stressful milestone for pharmacy students. To better prepare students for this transition, the Faculty of Pharmacy at Université de Montréal developed an immersive simulated environment, the Hospital Environment Discovery Room, designed to replicate a hospital patient room and nursing station. This environment was designed to expose students early to the realities of hospital pharmacy practice prior to their first clinical placement.

Method: The initiative aimed to (1) familiarize second-year Pharm. D. students with the hospital environment, tools, and the pharmacist's role within interprofessional teams; (2) support the development of key clinical competencies, including information gathering, therapeutic reasoning, clinical documentation, and structured care planning; and (3) assess students' perceptions of learning, preparedness, and professional confidence following participation in immersive activities. Two gamified, team-based immersive learning activities were integrated into required second-year Pharm. D. skills lab courses over two academic terms. Students worked in small teams in the Discovery room to navigate through multiple hospital information sources, analyze simulated patient cases, identify medication-related problems, and develop structured pharmaceutical care plans documented using the SOAP format. The pedagogical design was grounded in experiential learning, emphasizing collaborative problem-solving, environmental authenticity, and progressive scaffolding. Activities culminated in structured feedback from practicing hospital pharmacists. The initiative was evaluated using a mixed-methods approach, including an online questionnaire completed by participating students.

Results: A total of 102 students completed the questionnaire (55% response rate). Overall, students reported high satisfaction and strong perceived educational value. More than 90% indicated that the activities enhanced integration of theoretical knowledge and enhanced their preparedness for hospital placement. Students reported improved understanding of hospital workflows, pharmacist responsibilities, and information systems, as well as increased confidence in clinical documentation, therapeutic justification, and teamwork. Team-based learning and the realism of the simulated environment were identified as key strengths. Areas for improvement included clearer instructions, increased time allocation, and enhanced pedagogical support.

Conclusion: This initiative provides evidence that immersive, gamified simulations can effectively support early clinical readiness and competence development in pharmacy education.

Strengthening pharmacy education through international formative peer evaluation

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Background: Ensuring the quality of pharmacy education is a global priority. Within this context, the Conférence Internationale des Facultés de Pharmacie d'Expression Française (CIDPHARMEF), a network of the Agence Universitaire de la Francophonie (AUF), established an Evaluation Commission in 2005 and adopted a policy for the evaluation of pharmacy education programs. This initiative reflects the growing international emphasis on quality assurance and on aligning pharmacy education with evolving healthcare needs and professional standards. This formative evaluation approach aims to strengthen institutional capacity and enhance the quality of pharmacy education through a structured quality improvement process. It fosters stakeholder engagement, promotes a culture of evaluation within faculties of pharmacy, and remains flexible to national regulatory contexts while supporting alignment of pharmacy education with competencies defined by the International Pharmaceutical Federation (FIP).

Method: CIDPHARMEF conducts an international external peer-review evaluation process comprising four stages: a preparatory visit, faculty self-assessment, an external evaluation visit with a formal report, and the development of an institutional action plan. The evaluation framework is based on 25 criteria grouped into seven sections: faculty environment; mission, vision, values, and objectives; leadership, organization and governance; academic programs including professional training; students; continuing education; and resources. The criteria are regularly updated to reflect evolving international standards and to evaluate the relevance and quality of pharmacy programs in relation to national healthcare and pharmaceutical service needs.

Results: To date, 26 French-speaking faculties of pharmacy from Europe, Asia, the Middle East, and Africa have undergone the CIDPHARMEF evaluation and submitted action plans based on the recommendations in the evaluation reports. Four of them have been evaluated twice. Reported actions by the evaluated faculties cover all sections of the evaluation framework and include, for example, developing strategic plans with annual performance indicators, organizing pedagogical discussion sessions, upgrading practical laboratory facilities, implementing preceptor training programs, and organizing career fairs for pharmacy students. These actions illustrate how the evaluation process catalyzes concrete institutional improvements and encourages targeted actions addressing identified needs.

Conclusion: The CIDPHARMEF formative evaluation process contributes to the continuous improvement of pharmacy education and aligns with FIP principles for pharmacy workforce and educational development. By encouraging self-assessment, collaboration, and broad stakeholder engagement, it supports the establishment of a sustainable culture of quality improvement within francophone faculties of pharmacy.

Impact of guided reflection-on-action and continuing professional development on student pharmacist professional identity: A longitudinal study

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Background: The Accreditation Council for Pharmacy Education (ACPE) Standards 2025 emphasize self-awareness as an educational outcome to support the formation of professional identity in Doctor of Pharmacy (PharmD) graduates. Investigators hypothesize that post-experience guided reflection-on-action prompts embedded within a Continuing Professional Development (CPD) document, when used longitudinally, promote the development of professional identity in student pharmacists.

Method: Starting in Fall 2023, the CPD document was implemented as a longitudinal assignment integrated across each semester of the PharmD curriculum. The assignment design is based on the principles of cognitive and constructivist learning theories. Students are required to add goals and reflect on carefully designed reflection-on-action prompts to address semester-specific curricular and co-curricular experiences. Reflective responses are assessed by faculty advisors during the Spring semester of each professional year using a rubric. The rubric, adapted from the American Association of Colleges and Universities – Valid Assessment of Learning in Undergraduate Education rubric (AACU-VALUE), was built within the learning management system. Based on the embedded rubric criteria—Attitude, Values, Self-Awareness, and Professionalism—faculty advisors determine each student's level of development as Beginning, Emerging, or Advanced. Assessment of students using the ACPE standard-aligned rubric is expected to demonstrate measurable growth in professional identity as they progress toward graduation. The study proposal was approved as exempt by the Institutional Review Board.

Results: For Spring 2024, a total of 173 first-year PharmD students completed the reflective exercises embedded within the CPD assignment. Each criterion had a maximum possible score of 3, with a total assignment score of 12. The average score among students was 10.18, with a standard deviation of 2.4.

Conclusion: The educational intervention was created to promote life-long learning, nurture professional identity development through reflection-on-action, and facilitate CPD. Reflection-on-action exercises can be a powerful educational strategy to promote professional identity and CPD among PharmD students.

Embedding SDGs across existing MPharm programmes accelerates education for sustainable development: Adaptations proposed for professional practice and public health curriculum previously co-developed by three universities

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Background: Embedding Education for Sustainable Development (ESD) within professional programmes is prioritised in global, national and institutional strategies, yet competing priorities and demands deter teaching staff from developing curriculum to directly support these strategies. Adaptation of existing curriculum in support of ESD ambitions, especially in competency-based curriculum as is common in MPharm programmes, merits consideration. Targeting adaptation at module level capitalises on module co-ordinator insights regarding their existing teaching practices and has potential to accelerate the pace at which current pharmacist students experience ESD. Explicit signposting of how the Sustainable Development Goals (SDGs) align with and/or could be embedded in existing curriculum is one means of structuring this approach for time-poor staff. This case study examines a Professional Practise and Public Health (PPPH) module delivered in a 5th year Masters in Pharmacy (M.Pharm) programme collaboratively designed, developed and delivered to students in Trinity College Dublin, University College Cork and the Royal College of Surgeons in Ireland. Since January 2020, students complete the module during the first 6 weeks of their 8 months experiential placement. Curriculum includes expert-delivered recorded learning units, a multicomponent video scenario (Measles vaccination), directed readings, and supported discussion Forums and weekly prompts hosted on a nationally managed virtual learning environment. Assessment requirements include that students record a 3 minute video of themselves as if advising the Mother of five-year-old Jack regarding measles booster vaccination.

Method: Grounded in frameworks proposed in Ireland's National Forum for Teaching and Learning 'Embedding SDGs in Curriculum' Digital Badge (2024-2025), the study followed a four-step process. Firstly, module content was reviewed for alignment with specific SDGs according to John Barimo's web-based SDG tool (University College Cork). Module Learning Outcomes were then considered through an SDG lens, including cognitive, social-emotional, and behavioural objectives outlined in UNESCO's recommendations aligned with identified SDGs. Adaptation of module learning outcomes, in the context of UNESCO sustainability competencies, informed review of assessment design. Finally, appropriate modifications to assessment design, including rubrics, were identified.

Results: With minimal guidance on use of available toolkits, SDG3, SDG4 and SDG17 were readily identifiable in existing content. With the exception of anticipatory thinking, UNESCO competencies were generally determined to be developed and evidenced at novice level or higher in the module. Minimal adaptation of two existing learning outcomes, using samples from UNESCO's Cognitive and socio-emotional Learning categories, accommodated the perceived gap. Inclusion of ESD/SDG related scenarios in assessments such as Entrustable Professional Activities (EPAs) and/or OSCE's would provide additional opportunity to evidence MPharm student achievement of the related learning outcomes.

Conclusion: Adaptation of existing MPharm curriculum in pursuit of enabling ESD ambitions evident in Global, National and Higher Education Institutions' strategies can be achieved without major overhaul of curriculum and generally within the scope of existing teaching staff at a module level. Advantages include that existing staff can support ESD ambitions in a timely fashion so that current pharmacist students can benefit before registration, and the higher education community can build on these 'small changes' as opportunities for more widespread curriculum redesign arises.

Evaluating student ability to assess therapeutic exam questions generated by a large language model as a study tool

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Background: Large Language Models (LLMs) are artificial intelligence machine learning models capable of processing information, analyzing data, and generating responses. The purpose of this study is to compare the agreement between four Doctor of Pharmacy students and two College of Pharmacy faculty in their ability to evaluate a set of pharmacotherapeutic questions and answers generated from an LLM.

Method: An LLM was prompted to generate 108 questions and answers from the learning objectives of a second-year pharmacotherapy course. Of the 27 topics, four questions were generated per topic. The students and faculty members then individually determined if each question and answer were correct and useful, utilizing a standardized assessment. Cohen's Kappa was then used to calculate the inter-rater reliability between each evaluator.

Results: There was strong agreement between the two faculty for determining question usefulness [Kappa = 0.8 (95% CI 0.62, 0.98)]. There was moderate agreement between the two faculty for correctness [Kappa = 0.65 (95%CI 0.46, 0.83)]. There was slight to fair agreement between the student and faculty responses for determining question usefulness (all Kappa values less than 0.4) with variable agreement between student and faculty responses for correctness (Kappa values ranging from 0.2 to 0.65).

Conclusion: The use of LLM-generated questions to study for pharmacotherapeutic courses should be used cautiously by PharmD students given challenges in their interpretation of question usefulness and correctness.

Advancing environmentally sustainable pharmacy practice through a design-thinking implementation toolkit

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Background: Pharmacists are well-positioned to enhance environmentally sustainable healthcare. Pharmacies directly contribute to the environmental footprint through energy use, packaging, and waste generation, while their procurement decisions and dispensing practices also influence the environmental impact of medicine production and disposal. Despite increasing expectations and endorsement from consumers, health systems and professional bodies for environmentally sustainable pharmacy practice (ESPP), little is known about how pharmacists view or adopt sustainability practices, or what enables or constrains their integration into routine practice.

Objective: This study investigates community pharmacy staff perspectives on environmental sustainability and the factors influencing the uptake of sustainable practices. It also identifies the key challenges and opportunities to inform the development of a practical toolkit to facilitate environmentally sustainable practice.

Method: A cross-sectional survey was administered to community pharmacy professionals including proprietors, managers, pharmacists, interns, and students to explore perspectives on environmental sustainability using a 20-item tool with multiple choice, Likert and open ended questions. To enrich these findings, thematic analysis of interviews with community pharmacists was conducted following Braun and Clarke's framework. Insights from both phases informed the development of a sustainability toolkit using a five-stage design thinking approach.

Results: Survey results demonstrated a strong professional commitment to environmental sustainability among respondents (n=113), with 80% reporting a sense of responsibility to promote sustainable practice in community pharmacy. However, >75% indicated receiving limited guidance on environmentally sustainable practices, indicating that most pharmacists are operating without clear policies or structured support. Whilst >85% of employee pharmacists, interns and students regarded environmental responsibility as a priority, only 30% of managers and owners did. This gap matters because leadership buy-in is critical for real change. Reported barriers included workload pressures, limited knowledge, and lack of incentives. Nevertheless, pharmacists reported adopting measures including recycling initiatives, reducing paper use, and improving medication-waste management, and identified opportunities to reduce unnecessary medicine use through patient education and lifestyle support. Pharmacy students perceived having limited knowledge and low confidence in sustainable practices, highlighting the need to embed environmental sustainability within pharmacy education. Analysis of interview with pharmacists (n=11) reinforced these findings. The most frequently cited barriers to adopting environmentally sustainable practices were insufficient education and training, lack of time and incentive, and constraints within existing workflows. Participants also highlighted several potential enablers, including access to education and training resources, as well as practical prompts and educational materials. These insights informed the development of a prototype toolkit, comprising a pharmacist checklist and two posters, one guiding pharmacists and one empowering patients and consumers to support environmentally sustainable practice in community pharmacies. The toolkit is being further evaluated by pharmacy stakeholders to assess its practicality and influence.

Conclusion: Environmental Sustainability remains a gap in pharmacy, with limited education, operational constraints and few incentives hindering uptake. Drawing on insights from pharmacy stakeholders, this study developed a practical toolkit to support the integration of sustainability into everyday community pharmacy workflows.

Pharmacogenomics in pharmacy: Educational preparedness and practice perspectives

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Background: Pharmacogenomics (PGx) is central to personalised medicine, with pharmacists expected to play a key role in its implementation. However, limited confidence and insufficient training continue to hinder practice readiness. This study examined pharmacy learners' and practitioners' readiness for PGx, focusing on perceptions, educational gaps, and implementation challenges.

Method: A Sequential Exploratory Mixed Methods Design was used. Phase 1 involved semi-structured Zoom interviews with nine pharmacists from various practice sessions: community, hospital, academia, and industry. Interviews explored perceived importance of PGx in practice and whether current curricula prepare graduates adequately. Interviews were recorded and thematically analysed in NVivo. Phase 2 was an electronic survey distributed to hospital and community pharmacists, pharmacy educators, interns, and students. The survey examined perceived knowledge, confidence and skills, importance in practice, exposure and learning preferences, and open-ended reflections. Quantitative data were analysed in Excel, while qualitative responses were thematically analysed in NVivo. This sequential design enabled in depth exploration of pharmacists' experiences (Phase 1) followed by broader quantification of perceptions across the stakeholders (Phase 2).

Results: Pharmacist interviews (n=9) highlighted broad agreement that PGx offers significant clinical value particularly in specialised areas such as oncology, mental health, and transplantation by reducing trial and error prescribing, preventing toxicity, and supporting first-time right therapy. However, uptake remains limited by low awareness and confidence, unclear access pathways, inconsistent service availability, cost considerations, and a lack of pharmacist-led model. Key implementation barriers included time constraints, limited education, insufficient resources and guidelines, staff training challenges, low patient awareness/demand and financial barriers such as reimbursement and testing costs. Among the 74 survey respondents, PGx knowledge and confidence were generally low (<2/5). However, attitudes were positive overall, with 75% rating the need and importance of PGx in practice as neutral to positive. Respondents expressed strong willingness to improve their practical knowledge and 80% supported the PGx integrated pharmacy curriculum. Confidence was highest among those with workplace PGx exposure and hospital clinical environments suggesting experiential training may be more effective than coursework alone. Familiarity strongly correlated with confidence, and perceived usefulness correlated with perceived importance.

Conclusion: Pharmacists recognise the growing clinical importance of PGx but lack the confidence, training, and structural support needed for routine practice. Although enthusiasm for PGx education is strong amongst practitioners and students, gaps in awareness, infrastructure, workflow integration, and remuneration continue to limit implementation. A coordinated PGx education strategy spanning undergraduate curricula and continuing professional development is urgently needed. Targeted, practice focused training supported by clearer curriculum signposting, hands on exposure, and accessible resources may strengthen competence and confidence across the

profession. Addressing system level factors such as reimbursement, access pathways, and implementation tools will be critical to enabling pharmacist led PGx services and realising the benefits of personalised medicine in routine care.

Look closer: Using Visual thinking strategies to enhance leadership knowledge and skills in PharmD students

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Background: Visual Thinking Strategies (VTS) is a discussion-based classroom activity that uses carefully selected images, along with specific facilitator instructions, to help students see beyond their initial observations, and articulate their response to peers. VTS provides a framework to support student pharmacists in developing critical thinking, communication and teamwork skills, along with important clinical skills such as observation and reasoning. These skills are necessary for effective leadership, making VTS a potentially powerful tool for student leadership development. This activity was paired with an Intention/Reflection (I/R) activity to capture the experiences and outcomes of PharmD students engaged in a leadership programme. The I/R practice is an easy-to-use instructional technique which asks students to explore and identify in writing their intended learning outcomes, and why those are important to them, before the activity begins. After the learning activity, students are asked to reflect on whether or not they achieved their learning outcomes, and what they might do differently in the future so they are able to have a more meaningful experience.

Method: A retrospective qualitative study was conducted for second- and third-year Doctor of Pharmacy (PharmD) students (n=19) in leadership courses during the 2025-2026 academic year. Students participated in two VTS sessions using two images each time during their leadership classes. I/R questions were completed before and after each VTS session. After the second session, an additional question explored students' views on VTS facilitation and its application to everyday situations. Responses to this question were analysed thematically.

Results: The sessions were well received by all students, with most students providing at least one viewpoint on each image. The specific facilitation process of VTS and applying it as a leader to everyday situations was analysed. Six main themes emerged: Structure and Guidance for Thinking, Creating a Safe and Inclusive Environment, Encouraging Active Listening and Respect, Expanding Perspectives, and Understanding and Preventing Assumptions and Improving Decision-Making. These results are consistent with previous research, and also provide a more nuanced examination of how VTS can help students develop specific subdomains of leadership knowledge and skills. One student noted: "The "Rules" help create a respectful and inclusive environment where everyone feels comfortable sharing their thoughts without fear of being corrected or told they're "wrong". As a leader, applying these into everyday situations promotes trust, encourages participation, and leads to more thoughtful collaboration in team settings."

Conclusion: The findings suggest that VTS is acceptable to students and encourages evidence-based thinking, active listening, and openness to accepting multiple perspectives. As a leader, applying the VTS facilitation process can encourage participation, build trust, and lead to more effective collaboration and decision-making.

Building leadership skills in pharmacy students through global connectionspos

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Background: Health professions education increasingly emphasises preparing globally minded leaders who can collaborate across cultural and healthcare system boundaries. As pharmacy practice becomes more globally interconnected, opportunities for students to engage with peers from different countries can broaden their understanding of professional roles, leadership, and healthcare delivery. These experiences also support the development of important competencies such as communication, networking, and cultural awareness. Experiential learning initiatives that facilitate dialogue among international peers provide a valuable avenue for cultivating these competencies. Such experiences may also encourage students to critically reflect on their own professional identity and leadership growth The Global Leadership Connection (GLC) was designed to connect pharmacy students with international peers for semi-structured discussions about leadership and professional development. This study examined student reflections following participation in the GLC to identify what aspects of the experience were most influential for their learning and professional growth.

Method: Third and fourth year Doctor of Pharmacy (PharmD) students in the United States (US) who were engaged in a leadership programme participated in a Global Leadership Connection (GLC) activity – two, one-hour semi-structured Zoom discussions on leadership topics – with undergraduate pharmacy students in Australia (AUS), total student participation n=31. The discussions occurred in March and

September 2025. The fourth year PharmD students were given guidance to act as group leads: scheduling the meetings and facilitating discussions. Required pre-meeting work included reading an article on the topic to be discussed, and a response to several questions designed to stimulate critical thinking. All leadership students were required to complete the Intention/Reflection practice (I/R) before and after, along with a journal designed to stimulate additional reflective thinking, and ways to approach future experiences.

Results: The total number of GLC leadership student participants was 21. Six of the leadership students participated in March during their third year, and September during their fourth year, therefore, 27 student leadership reflections were analysed and coded for thematic purposes. Overall six themes emerged: Global Perspective and Cultural Exchange, Cross-Cultural Communication and Interpersonal Skills, Networking and Relationship Building, Leadership Development and Self-Reflection, Skill Development Through Practice, and Appreciation of the Global Pharmacy Profession. One student shared: “These conversations provided practical insights that will shape how I approach leadership in my own professional journey. Ultimately, this experience strengthened both my confidence and my ability to foster connections that transcend disciplinary and cultural boundaries—skills that will be invaluable as I continue to grow as a leader.”

Conclusion: Overall, the findings suggest student reflections demonstrated a shift in perspective regarding the value of global collaboration in healthcare, recognising that leadership and professional growth extend beyond local or national contexts, and structured international peer engagement can be an effective approach to supporting leadership development and cultural competence in pharmacy education. Integrating similar global connection experiences into leadership or professional development curricula may help prepare future pharmacists to collaborate effectively in an increasingly interconnected healthcare environment. Additionally, serving as facilitators also allowed students to practise leadership and communication skills in real-time, further reinforcing authentic experiential learning.

Revitalising pharmacy intern rotations: Implementing AI-generated conversational audio in a flipped classroom model

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Background: The frequent turnover of pharmacy interns presents a substantial pedagogical challenge in clinical settings, inherently imposing a repetitive teaching burden on preceptors. In outpatient pharmacies, scheduling traditional face-to-face orientation sessions during peak operational hours is impractical. Previous educational interventions, such as transitioning to self-directed study using static presentation slides, demonstrated limited efficacy. When relying solely on text-heavy materials, trainees frequently struggle to contextualise complex clinical workflows, resulting in diminished learner engagement. The flipped classroom model offers a compelling alternative, promoting asynchronous foundational learning prior to synchronous practical application. This study aimed to evaluate the effectiveness of a flipped classroom framework utilising artificial intelligence (AI)-generated conversational audio. Powered by large language model technology, this intervention sought to assess its impact on interns' learning satisfaction and preceptors' teaching efficiency.

Method: An educational intervention was designed for pharmacy interns rotating through an outpatient pharmacy. The core training curriculum for three critical stations—dispensing, prescription verification, and medication distribution—was transformed into multimedia learning modules. Existing text-based training slides were processed using a large language model application (Google NotebookLM). This technology generated engaging, dual-speaker conversational audio tracks designed to simulate professional dialogue. These AI-generated audio files were subsequently synchronised with the original visual slides to create video modules. Interns reviewed these multimedia materials asynchronously before their clinical rotations. Following this self-directed preparation, clinical preceptors led focused question-and-answer sessions. To evaluate the intervention's effectiveness, synchronous instruction time was recorded. Additionally, trainee satisfaction and the perceived reduction in preceptor workload were assessed using a standard five-point Likert scale.

Results: Data were collected from a cohort comprising 34 pharmacy interns and three clinical preceptors. The implementation of the AI-enhanced flipped classroom model significantly improved overall instructional efficiency. Synchronous instructional time per intern group decreased from an average of 30 minutes to 12.5 minutes. This

quantifiable shift represents a 58% reduction in the repetitive teaching workload shouldered by preceptors. Furthermore, interns reported exceptionally high satisfaction regarding the educational approach, achieving an overall mean score of 4.85 out of 5. Interns noted that the conversational audio format significantly enhanced the comprehension of complex workflows when compared to traditional reading assignments. Concurrently, preceptors reported a maximum reduction in teaching-related pressure, reflected in a mean score of 5 out of 5. Preceptors also observed that interns asked more practical questions during the synchronous sessions (mean score of 4.67 out of 5), indicating enhanced pre-rotation preparation and a deeper understanding of the material.

Conclusion: Integrating AI-generated conversational audio into a flipped classroom model is a highly effective strategy for pharmacy education. This innovative approach successfully transforms passive reading assignments into dynamic, active listening experiences. As a result, it enhances trainee engagement and comprehension. Furthermore, it optimises clinical efficiency by reducing the repetitive teaching burden on preceptors during peak operational hours.

Integrating systems thinking into pharmacy education: A card-based simulation for clinical decision-making

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Background: In the face of increasingly complex healthcare environments, pharmacists must evolve from pharmacotherapy experts into strategic partners who actively drive interprofessional decision-making to ensure optimal patient outcomes. However, structured opportunities for pharmacy interns to engage with system-level constraints—such as drug shortages and financial pressures—remain limited prior to clinical placement. This gap highlights the need for innovative educational strategies to foster systems thinking and clarify professional roles in a safe, pre-clinical environment. By simulating real-world clinical trade-offs, educators can better prepare students for the multifaceted challenges of modern practice, ultimately fostering a more resilient and adaptable pharmacy workforce. This study aims to develop, implement, and evaluate a pharmacist-led, card-based simulation to model hospital medication-use systems and enhance interns' confidence in systems thinking and decision-making.

Method: A structured simulation module was implemented with 12 pharmacy interns during institutional training at a tertiary teaching hospital. Participants were assigned rotating roles—including Physician, Pharmacist, Inventory Manager, and Hospital Administrator—and engaged in three progressive rounds: ideal therapeutic planning, drug shortage scenarios, and institutional financial constraints. Binary decision-making event cards required teams to evaluate and select therapeutic alternatives under significant time pressure, mimicking the high-stakes hospital environment. A simplified token system visually represented patient health outcomes and budget impact, effectively optimising the cognitive load while prioritising interprofessional discussion and negotiation. Evaluation employed comprehensive pre- and post-session questionnaires using a 5-point Likert scale assessing systems thinking, clarity of the pharmacist's professional role, and confidence in decision-making under resource constraints. Qualitative feedback was collected to explore the interns' learning experiences and sense of professional identity.

Results: All 12 interns completed the assessment. Quantitative analysis revealed a statistically notable and consistent improvement across all evaluated domains. Mean systems thinking scores increased from 3.2±0.5 to 4.0±0.6. Perceived clarity of the pharmacist's role within a multidisciplinary team improved from 3.5±0.6 to 4.3±0.5, while confidence in articulating therapeutic recommendations under resource constraints increased from 3.3±0.7 to 4.1±0.6. Eighty-three per cent of participants agreed or strongly agreed that the simulation significantly enhanced their understanding of institutional influences on clinical decisions. Qualitative feedback indicated an enhanced understanding of interprofessional collaboration and the challenge of balancing individual patient needs with system-level constraints.

Conclusion: This card-based simulation successfully enhanced interns' systems thinking, professional role clarity, and decision-making confidence. By modelling real-world constraints in a structured and psychologically safe environment, the module offers a scalable and adaptable approach to integrating systems-oriented learning into the pharmacy curriculum. This bridging of the gap between theoretical knowledge and contextual clinical practice is essential for preparing future pharmacists to navigate complex healthcare systems effectively. Future efforts will focus on expanding the sample size for longitudinal analysis to evaluate the sustained impact of this simulation on interns' subsequent clinical performance and professional resilience during their actual hospital rotations.

Understanding student pharmacists' views on deprescribing: A systematic literature review of qualitative research

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Background: The growing prevalence of individuals living with multiple chronic conditions in the United States of America (USA) highlights the necessity of effective and patient-centred medication management. Among the strategies to optimize medication use, deprescribing has emerged as a critical process. Deprescribing refers to the careful, supervised reduction or discontinuation of medications that may no longer be beneficial or may cause harm. Deprescribing is a responsibility often undertaken by healthcare professionals such as pharmacists in collaboration with providers. As the importance of deprescribing gains recognition, Doctor of Pharmacy (PharmD) programs in the USA have begun to incorporate instruction on this topic to varying extents. Despite this, there remains a gap in the literature regarding student pharmacists' perception of their role in the deprescribing process. This study aims to address this gap by conducting a systematic literature review of qualitative research exploring student pharmacists' perspectives on deprescribing within the USA.

Method: An extensive literature search was conducted in July 2024 using MEDLINE (PubMed), Scopus (Elsevier), and Embase (Elsevier) databases. The search strategy was developed collaboratively by an experienced team of pharmacy researchers and a health sciences librarian. The search included keywords, Medical Subject Headings (MeSH), and/or Emtree subject headings related to pill burden, cessation, deprescribing, and qualitative research. Studies were included if they used qualitative methodologies, were conducted in the USA and involved student pharmacists. Data extraction and quality checking was performed by four reviewers with any discrepancies resolved through discussion. The quality of the included studies was assessed using the COREQ tool. The systematic review was conducted in accordance with PRISMA guidelines.

Results: A total of 4410 unique records were identified and screened. After applying the inclusion and exclusion criteria, 46 records were fully reviewed and three were ultimately included. These three qualitative studies employed focus groups and utilized the Theory of Planned Behaviour as the theoretical framework. Across the studies, 26 student pharmacists enrolled at three different colleges of pharmacy in the USA were included. These articles described student pharmacist perspectives on deprescribing and provided curriculum enhancement recommendations aimed at empowering the next generation of pharmacists to explore deprescribing among their patients. Students proposed that their deprescribing education should be strengthened through practical experiences, including simulation-based learning, curriculum integration, and clinical rotation opportunities focused explicitly on deprescribing.

Conclusion: Student pharmacists play a vital role in advancing the pharmacy profession. Their insights and recommendations for improving pharmacy education on deprescribing are invaluable and should be actively integrated by pharmacy educators to better equip future pharmacists for advanced practice. Moving forward, future research should explore and evaluate curricula enhancements implemented due to these qualitative findings, thereby deepening our understanding of the pharmacist's evolving role in deprescribing and fostering continual growth in pharmacy education.

Evaluating listener engagement and educational impact of an Australian pharmacy podcast

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Background: Pharmacists in Australia must complete at least 40 continuing education points annually. Traditional learning methods include conferences, workshops, lectures, workplace education and journal reading. Podcasts offer an alternative; allowing pharmacists to access education flexibly and on-demand. The Purple Pen Podcast was established in 2016 by a group of Australian pharmacists. It provides education using long-form interviews. Although initially aimed at hospital pharmacists, its audience has expanded to include community pharmacists, students and other health professionals. Episode topics are drawn from the hosts' clinical experience, current medical evidence, contemporary issues in pharmacy practice and listener suggestions. The podcast is independent and does not accept sponsorship or from the pharmaceutical industry or professional organisations. Across 10 years, 186 episodes have been released and downloaded more than 324,000 times, averaging over 1700 listeners per episode. As a volunteer-run project, the listenership are the primary stakeholder group. Periodic surveys enable the team to understand listener needs and support ongoing improvement.

Objective: The purpose of this study was to evaluate the characteristics, listening habits and educational needs of listeners of the Purple Pen Podcast, and to identify areas for future development.

Method: A survey was delivered using a Google Form and promoted through the social media channels of the podcast and its hosts and mentioned in the podcast itself. The survey remained open for one month (February 2026). A target of 200 responses was set based on previous survey (2018) and industry benchmarks for response rates. Participants were asked to provide information on their demographics and practice settings. Questions explored listening habits, perceived usefulness of material and preferred content. Free text fields captured suggestions for future topics, positive aspects of the show and areas for improvement. Qualitative themes were identified using Microsoft Copilot, and results were supplemented with podcast analytics from the hosting platform.

Results: There were 184 responses, representing approximately 11 % of the estimated audience. Most respondents were practising pharmacists, with 34.24% working in hospital practice, 33.15% in community practice and 13.0% identifying as pharmacy students. A total of 91.3% respondents rated the podcast “Useful” or “Very Useful”, and 82.1% reported applying something from the podcast in their practice or personal life. Respondents consistently praised the hosts, expert guests and the relevance of content. 35% of respondents provided improvement suggestions. The most frequent was improved consistency of audio volume and mixing. Additional suggestions included shorter episodes, increased frequency and supplementary content such as summaries or links. Future content interest was highest for topics relating to artificial intelligence, women’s health, antimicrobial stewardship and diabetes. Popular episodes based on download data aligned with these themes.

Conclusion: Podcasting is a viable and accessible medium for pharmacist education. The Purple Pen Podcast has maintained strong engagement and growth over 10 years and provides practical, contemporary content that listeners report applying in practice. Enhancements for consideration include improved audio processes, piloting short “Clinical Pearl” episodes of 12 to 15 minutes, adding chapter markers and providing one page episode summaries with links to support efficient navigation and learning.

The accreditation council for pharmacy education continuing professional development Accreditation pathway: International alignment, evolving United States regulatory models, and early adoption data

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Background: Pharmacists in numerous countries are required to demonstrate continuing competence as a condition of licensure renewal. Countries including Ireland, Canada, Australia, New Zealand, Portugal, and Japan have adopted continuing professional development (CPD) as the primary mechanism for this demonstration. CPD moves beyond passive accumulation of continuing education contact hours toward a structured, self-directed cycle of reflection, planning, learning, application, and evaluation. In the United States, continuing pharmacy education (CPE) has historically dominated relicensure requirements. However, evolving regulatory models and expanding pharmacist scope of practice are creating conditions in which CPD is increasingly relevant as an alternative framework. The Accreditation Council for Pharmacy Education (ACPE) CPD accreditation pathway, which started in January 2024, provides a formal mechanism for this transition. A description of the current state of CPD accreditation in the United States and its alignment with emerging regulatory models has not been previously reported. The purpose of this work is to describe the ACPE CPD accreditation pathway, characterise its alignment with international CPD frameworks and evolving United States regulatory models, and report early programme adoption data.

Method: A descriptive analysis of the ACPE CPD accreditation pathway was conducted, including review of programme policies, provider data, and cycle activity and unit records. Alignment between the ACPE CPD pathway and the International Pharmaceutical Federation (FIP) CPD framework was assessed through comparison of definitional and structural elements. The standard-of-care regulatory models adopted in Iowa and Idaho were examined as examples of United States regulatory evolution consistent with a CPD approach. Idaho has removed specific legislatively-prescribed CPE requirements in favour of practice-based competency demonstration aligned with individual scope of practice.

Results: The FIP defines CPD as the responsibility of individual pharmacists for systematic maintenance, development, and broadening of knowledge, skills, and attitudes to ensure continuing competence as a professional throughout their careers. ACPE defines CPD as a self-directed, ongoing, systematic, and outcomes-focused approach to lifelong learning that is applied into practice. Both definitions share a commitment to outcomes-focused, practice-relevant

learning that extends beyond passive CPE participation. Four CPD providers are currently accredited under the ACPE CPD pathway, with over 100 cycle activities completed and more than 200 CPD units awarded. The standard-of-care models adopted in Iowa and Idaho are structurally consonant with the CPD cycle, shifting relicensure requirements toward competency demonstration rather than prescriptive topic mandates. Interest in the ACPE CPD accreditation pathway has grown among providers and regulators seeking flexible, outcomes-focused mechanisms for relicensure and competency demonstration.

Conclusion: Between its establishment and 2025, the ACPE CPD accreditation pathway has demonstrated early and meaningful uptake, with four accredited providers, over 100 completed cycle activities, and more than 200 CPD units awarded. Emerging standard-of-care regulatory models in Iowa and Idaho reflect growing alignment between United States pharmacy regulation and the CPD approach long established in international pharmacy systems. Continued expansion of CPD accreditation and its recognition by state boards of pharmacy as a relicensure mechanism would position the United States pharmacy profession in closer alignment with global standards for lifelong learning and competency demonstration.

Mapping ACPE standards 2025 to competency-based pharmacy education: A construct-level crosswalk of alignment, facilitators, and barriers

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Background: The Accreditation Council for Pharmacy Education (ACPE) Standards 2025, effective July 2025, consolidated 25 prior accreditation standards into seven domains and grounding educational outcomes in the Curricular Outcomes and Entrustable Professional Activities (COEPA) framework. The American Association of Colleges of Pharmacy (AACP) Competency-Based Pharmacy Education (CBPE) Task Force (2021–2026) concurrently produced systematic evidence base defining CBPE as an outcomes-based curricular model grounded in an organized framework of competencies necessary for pharmacists to meet healthcare and societal needs; a definition consistent with the International Pharmaceutical Federation's (FIP) needs-based education model and Global Competency Framework. Whether Standards 2025 structurally supports or constrains the core constructs of CBPE has not been systematically examined at the key-element level.

Method: Eight CBPE constructs were synthesized by the authors from the existing competency-based education (CBE) literature: reviews of competency-based education (CBE) definitions across health professions, programmatic assessment theory, entrustment and Entrustable Professional Activity (EPA) frameworks, analyses of CBE implementation challenges, AACP CBPE Task Force documents, and the FIP CBE Implementation Handbook. The eight constructs synthesized were as follows: explicitly stated competencies aligned with societal needs; assessment systems generating authentic competency evidence; learner progression governed by demonstrated mastery; systematic feedback mechanisms supporting continuous improvement; programmatic assessment triangulating multiple data sources; authentic and workplace-based assessment contexts; trained assessors capable of entrustment-referenced judgement; and explicit curriculum and assessment mapping to competency outcomes. Each construct was mapped to Standards 2025 domains at the key-element level through structured narrative review. Facilitators and barriers were identified by triangulating accreditation language against the AACP Task Force publication series and a structured review of CBE strengths and barriers across health professions literature.

Results: Standards 2025 provides direct structural support for five of the eight constructs and partial support for three. Standard 2: Curriculum, through COEPA grounding and a mandatory curriculum mapping requirement, directly operationalizes constructs related to explicitly stated competencies and curriculum-to-outcome mapping. Standard 7: Assessment, elevated to a discrete standalone standard in the 2025 revision, operationalizes constructs related to authentic assessment systems, systematic feedback, and programmatic triangulation of competency evidence. Standard 3: Experiential Learning provides structural support for authentic workplace-based assessment and trained assessors, though without mandating the preceptor development infrastructure those constructs require. The most consequential structural and implementation gaps between Standards 2025 and CBE constructs reside in time-based constraints, which are influenced by regulatory and licensing requirements, and assessment fidelity for faculty and preceptor evaluation of competency that practice-level CBPE requires.

Conclusion: Standards 2025 represents a meaningful structural advance toward CBPE, but accreditation language alone cannot close the gap between structural support and practice-level fidelity. The pharmacy education community now has three complementary layers of infrastructure in place: Standards 2025 as an accreditation floor, the AACP Task Force recommendations as a national implementation agenda, and FIP frameworks as an international validation architecture. Translating this infrastructure into genuine CBPE will require coordinated national investment in validated assessment tools, faculty and preceptor development, changes within institutional culture, and continued collaboration to align CBPE with regulatory and licensing requirements.

Health literacy as an essential clinical competency in pharmacy education: A pilot study among undergraduate students

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Background: Health literacy is a key determinant of health outcomes, medication safety, treatment adherence, and effective communication between patients and healthcare professionals. It refers to individuals' ability to access, understand, evaluate, and use health information to make appropriate health decisions. In modern healthcare systems, patients are increasingly exposed to complex therapeutic regimens and large amounts of digital health information, which may be difficult to interpret without adequate health literacy skills. Limited health literacy has been associated with medication errors, poor adherence, and suboptimal clinical outcomes. Pharmacists, as highly accessible healthcare professionals, play an essential role in supporting patients' understanding of medicines and health-related information through counseling and patient education. Consequently, the development of health literacy competencies among pharmacy students is an important component of patient-centered pharmaceutical care. Despite its recognized importance, health literacy is not always systematically integrated into pharmacy curricula, and evidence regarding pharmacy students' preparedness to address health literacy challenges remains limited.

Objective: This pilot study aimed to examine health literacy as a clinical competency within pharmacy education and to evaluate undergraduate pharmacy students' awareness, self-perceived competencies, and professional attitudes related to health literacy and patient education.

Method: A cross-sectional survey was conducted among undergraduate pharmacy students at the Faculty of Medicine Osijek, Study of Pharmacy, Josip Juraj Strossmayer University of Osijek, Croatia. A total of 70 students participated in the study, including first-year (n = 37), second-year (n = 14), and third-year students (n = 19). Data were collected using a structured 14-item questionnaire designed to assess key dimensions of health literacy competence in pharmacy practice on a five-point Likert scale. Descriptive statistical analyses were performed to summarize students' responses. Principal component analysis with parallel analysis and Varimax rotation was conducted to explore the underlying structure of health literacy-related competencies.

Results: Students demonstrated a high level of awareness regarding the importance of health literacy in clinical practice. High confidence was reported in understanding healthcare instructions (mean = 4.43), and students strongly agreed that health literacy is an essential element of professional pharmacy practice (mean = 4.81). The perceived level of professional responsibility in patient education was also high (mean = 4.61). However, students reported only moderate confidence in evaluating health information available online (mean = 3.40). Interpreting medication leaflets was identified as particularly challenging (mean = 2.37), suggesting potential gaps in functional health literacy skills related to understanding pharmaceutical information. Principal component analysis identified a dominant component, labeled Overall Health Literacy Orientation, explaining 25.6% of the variance. Additional exploratory components suggested subdomains related to functional and critical health literacy skills and professional responsibility, together accounting for approximately 46% of the total variance.

Conclusion: Pharmacy students demonstrated strong awareness of the importance of health literacy and recognized their professional responsibility in patient education. Moderate confidence in evaluating digital health information and difficulties in interpreting medication leaflets highlight areas where curricular strengthening may be beneficial. These findings support the systematic integration of health literacy training into pharmacy curricula, particularly focusing on critical appraisal of health information and patient-centered communication skills.

Assessing cutaneous sensory effects of topical anaesthetics using quantitative sensory testing: An exploratory pilot study with EMLA and Tapin

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Background: Topical anaesthetics are commonly used to attenuate cutaneous pain in clinical and everyday settings, yet their modality-specific sensory effects remain incompletely delineated. Quantitative sensory testing (QST) enables systematic evaluation of somatosensory function and may provide a structured approach to characterising local anaesthetic effects. However, the feasibility of simplified and time-efficient QST protocols suitable for exploratory pharmacological studies requires further evaluation. The aim of this exploratory pilot study was to characterise and compare pain- and touch-related sensory changes following topical application of EMLA and Tapin, and to assess the feasibility of an adapted QST protocol for small-scale experimental research.

Method: Seven healthy volunteers (3 males, 4 females; aged 20-29 years) participated in a single-session, single-blind, within-subject study. Three sites on the volar forearm were randomly assigned to receive EMLA, Tapin, or a placebo.

Quantitative sensory testing was performed before and 60 minutes after application, assessing mechanical pain threshold, mechanical pain intensity, static and dynamic tactile detection, and perceived numbness. Feasibility outcomes included protocol completion, tolerability, data integrity, and total session duration. Exploratory statistical analyses were conducted using non-parametric methods.

Results: Both active formulations resulted in marked reductions in mechanically evoked pain intensity compared with placebo, with no consistent difference between EMLA and Tapin. Mechanical pain thresholds showed variable, non-significant increases following active treatments. Measures of tactile detection remained unchanged across conditions, while subjective numbness increased at sites treated with active creams. All participants completed the protocol, no data were lost, and the total testing time was approximately 110 minutes per session.

Conclusion: This pilot study demonstrates that adapted QST protocols can feasibly capture local sensory changes induced by topical anaesthetics in healthy volunteers. The findings suggest preferential modulation of nociceptive responses, with relative preservation of tactile sensitivity, and no systematic sensory differences between EMLA and Tapin under the conditions tested. The results provide methodological guidance for future QST-based pharmacological studies and support further research using larger samples and expanded sensory testing to refine sensitivity and translational relevance.

Development of a digital mentoring platform model for pharmacy students

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Background: Competency-based standards and the expanding spectrum of professional roles for pharmacy graduates highlight a persistent gap between formally declared learning outcomes and real trajectories of early-career development. Mentoring is considered a key mechanism for reducing this gap, yet in most educational settings it remains intuitive and weakly formalised. In Russia, this issue has become more salient in the light of Federal Law No. 424-FZ (17.11.2025), which introduces mandatory mentoring for medical graduates entering clinical practice, while leaving pharmaceutical graduates without a clearly defined mentoring framework. This underscores the need to formalise mentor–mentee alignment at the level of competencies and to design sociological instruments to explore expectations, motivations and perceived competency needs among pharmacy students and potential mentors. Aim. To theoretically substantiate and conceptualise a digital model for managing mentoring in pharmaceutical education based on the alignment of mentor and student competencies, introducing the Competency Congruence Coefficient (CCC) as the core of algorithms for matching and supporting mentoring relationships.

Method: The proposed conceptualisation draws upon international research on competency-based education and mentoring in pharmacy and health professions, as well as on corporate digital mentoring and talent-marketplace platforms that implement algorithmic, skills-based matching of mentors and mentees. In large enterprises, AI-enabled mentoring platforms and internal talent marketplaces use structured digital profiles, skills taxonomies and compatibility scores to match employees with mentors, projects and development opportunities based on their competency profiles, goals and preferences, while retaining human oversight over final matching decisions. The model must meet the requirements of the nationally regulated list of competencies that pharmacy graduates are expected to demonstrate in accordance with the professional standard “Pharmacist” and Federal State Educational Standards, which creates a need for valid instruments to measure the degree of competence formation in students and early-career pharmacists.

Results: A structured competency model for mentor and student profiles was developed based on the Federal State Educational Standard, encompassing universal, general professional and professional competencies. The CCC is defined as a quantitative measure of congruence between the mentor’s competency profile and the student’s competency deficits and goals, allowing estimation of the “learning capacity” of a given mentor–mentee pair. In line with corporate AI-powered mentoring platforms, the model assumes the construction of digital profiles for mentors and students based on self-assessment, expert review and objective educational data, the calculation of a compatibility score across multiple dimensions. A digital mentoring management model is described in which CCC is used at key stages: automated mentor–mentee matching, design of individual mentoring plans, monitoring of competency development dynamics and analytical support for decisions on mentor pool development, curriculum adjustment and targeted mentor training.

Conclusion: Embedding the Competency Congruence Coefficient into a digital mentoring management system operationalises the competency-based approach in pharmaceutical education and transforms mentoring from an optional practice into a tool for targeted competency development. The conceptual model is consistent with current trends in competency-based education and mentoring and reflects the emerging Russian regulatory context of mandatory mentoring in healthcare, providing a foundation for specialised digital mentoring platforms in the pharmaceutical sector.

Development of electronic medical records for education and introduction into pre-clinical clerkship training

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Background: Japanese pharmacies are required to maintain medical records for each patient to manage medications. This regulation has become established and is increasingly digitised, enabling multiple pharmacists to share information and provide accurate medication instructions. Meanwhile, fifth-year pharmacy students are required to utilise medical records to confirm patient information, provide medication instructions, and record new information during their clinical clerkship at pharmacies. Pharmaceutical universities currently provide education on pharmaceutical management that incorporates medical records, but effective learning method have not yet been established. Specialised electronic medical records (EMR) for educational purposes are necessary to improve pharmaceutical management capabilities and reduce the burden on faculty. Therefore, we developed EMR software and integrated it into our curriculum.

Method: The EMR software for education that includes general functions of medical records, as well as functions for viewing and submitting assignments and a whiteboard for small group discussions (SGD). We deployed the educational EMR in diverse case studies, including medical records exercise classes (1.5 hours, 3 hours), a drug therapy review using SGD (4.5 hours for 4 days), and a home medical care review using SGD (6 hours). Subsequently, a 1.5-hour exercise was conducted for third and fourth-year pharmacy students, in which students provided answers for a simulated shingles case using the software. The percentage of students who were able to refer to the medical records that should have been extracted from the exercise scenario was tallied and compared with the chi-squared test.

Results: With this software, we covered all exercises previously completed on paper, and the time required was reduced. In a 1.5-hour exercise using a simulated case in January 2024, the fourth-year students (n = 95) mentioned 14 of the 33 evaluation items significantly more than the third-year students (n = 87), showing a notable difference in the items related to Assessment (24% vs. 14%, $P < 0.001$) and Observation Plan (48% vs. 24%, $P < 0.001$). In particular, the fourth-year students showed higher scores for approaches that considered the patient profile and referenced future treatment plans, whereas awareness of concomitant medications was comparably low in both groups.

Conclusion: Paperless procedures were promoted across all exercises, and implementation was simplified compared to our previous study, in which we used a commercially available EMR. Here, interactive active learning could be conducted within the one-class framework (1.5 hours) by a single teacher, and student work could be collected quickly in .csv format. As a result, the skills students acquired over a period of study can be monitored, and the instructor can identify learning content that requires reinforcement, which can be useful for planning future teaching.

Cultural and structural humility in pharmacy education

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Background: The role of pharmacists in healthcare has expanded dramatically over the last two decades, improving community access to public health services like vaccinations, medication management, and point-of-care testing. As pharmacies provide more comprehensive care, educational programs must equip graduates to serve diverse communities equitably. This requires teaching cultural humility, the ability to recognize personal cultural limitations and learn from patients, and structural humility, the effort to understand and address systemic gaps in care. Recent literature reveals that pharmacists and other health professionals often lack adequate cultural competency. This deficiency likely originates from a lack of direct instruction during didactic training. Consequently, accreditation standards mandate incorporating these concepts into core pharmacy curricula. Despite these requirements, the integration of cultural and structural humility remains inconsistent and fragmented. This project describes the procedures, challenges, and outcomes of purposeful educational innovation designed to embed diversity, equity, inclusion, and accessibility principles, curriculum-wide, to promote health equity.

Method: A dedicated consultant team drove the integration of diversity, equity, inclusion, and accessibility principles across a newly designed pharmacy curriculum. The curriculum utilized a Whole Task Learning approach to bridge foundational science and clinical practice. The team employed a Backward Design framework to establish a developmental trajectory focused on building workforce capability. Primary interventions included creating a longitudinal summative assessment, systematically reviewing syllabi and central patient cases, and facilitating voluntary professional development for instructors. Furthermore, the team incorporated the Intercultural Development Inventory to assess student progress longitudinally and build awareness of inclusive practices.

Results: The consultant model achieved four core milestones: a comprehensive summary assessment, aligned syllabi and cases, structured instructor development, and a defined curriculum trajectory. The implementation required an iterative approach that prioritized agility to respond to local educational needs. Reviews successfully embedded culturally responsive language and diverse patient characteristics into learning materials. However, the process exposed distinct challenges. Instructors demonstrated varying levels of comfort with the material, despite their clinical expertise, necessitating individualized support. Additionally, traditional academic reward systems failed to adequately recognize these pedagogical contributions, posing a barrier to sustained faculty engagement. Competing priorities constantly threatened to marginalize these initiatives without dedicated advocacy. One successful product of this process has been the implementation of a cultural and structural humility learning repository throughout the curriculum. During each semester, students have the opportunity to reflect on times in their didactic teaching, work experiences, and professional development where cultural and structural humility is integrated and how it contributes to their growth as future healthcare professionals. The result of this is building culturally competent healthcare professionals who are able to adequately serve patients in varying communities.

Conclusion: Meaningful integration of structural and cultural humility demands persistent advocacy, comprehensive frameworks, and robust accountability. Moving beyond piecemeal modifications requires sustained institutional commitment and targeted faculty support. This consultant model provides a practical strategy for health professions schools to systematically embed these principles. Ultimately, prioritizing these concepts in education reshapes healthcare delivery by producing practitioners equipped to address disparities, collaborate for equity, and provide patient-centered care within resilient health systems.

Preparing for advanced career pathways: Factors associated with industry fellowship attainment among doctor of pharmacy graduates

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Background: Pharmacy graduates increasingly pursue diverse professional pathways beyond traditional clinical practice, including positions within the pharmaceutical industry. These roles contribute to areas such as medical affairs, regulatory affairs, clinical development, market access, and health economics and outcomes research. Pharmaceutical industry fellowships are competitive postgraduate training programmes designed to prepare pharmacists for these specialised roles. As interest in these programmes grows, pharmacy schools are increasingly expected to support students pursuing diverse career pathways. However, limited evidence exists regarding which early professional competencies and educational experiences may be associated with successful attainment of industry fellowships. Identifying these factors may help inform admissions processes, curricular strategies, and career mentorship within pharmacy education. This study aimed to examine factors associated with pharmaceutical industry fellowship attainment among Doctor of Pharmacy (PharmD) graduates.

Method: Building on prior analysis of pharmaceutical industry placement trends among PharmD graduates, this study examined factors associated with entry into competitive pharmaceutical industry fellowships. Data collected during the PharmD admissions process, approximately four years prior to fellowship application, included academic performance indicators and structured assessments of communication skills. Academic achievement in the PharmD programme was measured using cumulative grade point average (GPA), and experiential training patterns were assessed based on the type and order of Advanced Pharmacy Practice Experiences (APPEs) completed during the final year. Data were analysed using the Artificial Intelligence - Success in Pharmacy School (AI-SiPS) framework implemented on the Konstanz Information Miner (KNIME) Analytics Platform. Decision tree modelling was used to identify relationships of fellowship attainment with admissions characteristics, experiential training patterns, and postgraduate outcomes.

Results: Data were analysed for 60 students from the PharmD classes of 2024 and 2025 who applied for pharmaceutical industry fellowships. Among these applicants, 34 (56.7%) successfully secured fellowship positions. Decision tree analysis identified communication ratings during the admissions process as the primary variable associated with fellowship attainment. Students with high communication ratings (top 50%) were more likely to obtain fellowships than those with lower ratings (72.3% [26/36] vs. 33.3% [8/24]). PharmD grade point average (GPA) emerged as a secondary variable associated with fellowship attainment. Students with a GPA ≥3.5 had higher fellowship success rates than those with a GPA <3.5 (67.6% [23/34] vs. 42.3% [11/26]). Differences were also observed in experiential training patterns. Among all students in the PharmD classes of 2024 and 2025, those who completed an early industry-focused APPE rotation were more likely to apply (78.3% [18/23] vs. 42.0% [29/69]) and ultimately obtain a fellowship (66.7% [12/18] vs. 51.7% [15/29]).

Conclusion: Communication skills assessed during the admissions process were strongly associated with pharmaceutical industry fellowship attainment, highlighting the importance of early professional skills assessment in relation to competitive postgraduate outcomes. Differences in experiential rotation patterns were observed among fellowship recipients, although there is a need to better understand how experiential training may relate to

preparation for industry fellowships. By strengthening professional communication training and experiential learning strategies, pharmacy programmes can better equip graduates for emerging roles in the pharmaceutical industry and related sectors.

Implementation of an electronic portfolio to support reflective learning and reliable professional activities in pharmaceutical and medical education: Design and preliminary evaluation

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Background: In health professions education, students' professional development is based on the gradual acquisition of professional, reflective and interpersonal skills. Educational tools must therefore allow this progression to be documented while promoting reflective practice. Within competency-based education, electronic portfolios are increasingly being used to support reflective learning, longitudinal monitoring of skills and assessment of professional development. They also provide a framework for tracking Entrustable Professional Activities (EPAs) within training. Objectives This project aims to design and implement a similar longitudinal electronic portfolio for pharmacy and medical students and to evaluate its initial use in supporting reflective practice, competency documentation and workplace-based assessment of EPAs during training throughout the master's programme.

Method: The e-portfolio was developed using the open-source Karuta platform and integrated into the master's programmes in pharmacy and medicine at the University of Liège. An institutional template was designed to harmonise pedagogical expectations while allowing adaptation to the specific requirements of each programme. The system integrates reflective writing, documentation of practical and clinical experiences, competency-based evidence, and EPAs tracking. Evaluation indicators include platform usage data, the number validated EPAs, the completion of reflective sections and user feedback collected through questionnaires.

Results: The electronic portfolio is structured around key sections reflecting students' learning trajectories: profile presentation, reflective narratives, placements, competency development, entrustable professional activities, personal projects and learning resources. A structural feature of the system is the management of role-based access rights. Governance and confidentiality were ensured through a matrix defining read and edit permissions for students, trainers and programme coordinators. A key innovation of the system is the integration of workplace-based EPA validation directly in professional environments. EPAs performed during placements are selected by students from a predefined list and confirmed by supervisors through a QR-code-based confirmation system. This mechanism allows supervisors to validate activities in real time in authentic clinical contexts. Each confirmation generates a time-stamped digital record associated with the validator's identity, the clinical placement and the type of activity performed. A delegation mechanism allows supervisors to assign day-to-day observation and confirmation responsibilities when appropriate, facilitating integration into routine supervision practices. The reflective section provides guiding questions addressing entry into the programme, undergraduate training, placement experiences and emerging professional identity. The system is currently implemented with approximately 135 students (50 medical students and 85 pharmacy students). Early indicators show regular platform use, progressive documentation of EPAs and active engagement in reflective sections. Supervisors also reported improved visibility of students' professional activities and learning progression.

Conclusion: This longitudinal electronic portfolio provides a structured and traceable record of professional learning, combining reflective practice, competency documentation and workplace-based assessment of EPAs. The integration of real-time validation of EPAs represents an innovative approach to linking portfolio use with authentic clinical supervision. This system improves the visibility of students' learning trajectories for both learners and supervisors and highlights the potential of open-source e-portfolio platforms to strengthen competency-based education and workplace-based assessment in health professions training.

Analysis of interprofessional education in internationally-accredited professional pharmacy degree programs

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Background: Expectations for pharmacist competency related to interprofessional collaboration are included in the FIP Global Competency Framework (GbCF). New pharmacy professionals (within 1-2 years of licensure) can use the GbCF to identify professional development needs to support development of advanced practice capabilities. To date, the Accreditation Council for Pharmacy Education (ACPE) has not systematically reviewed interprofessional education (IPE) within pharmacy programs which hold ACPE International-Accreditation status.

Method: Programs evaluated for initial International-Accreditation between January 1, 2017, and January 31, 2026, were included in the analysis. For each, the competency-based program outcomes that graduates must achieve related to IPE were reviewed in comparison to the expectations outlined in the FIP GbCF including: 1) respect and acknowledge the expertise, roles and responsibilities of colleagues and other health professionals; 2) participate, collaborate, advise in therapeutic decision-making, and use appropriate referral in a multi-disciplinary team; 3) engage in collaborative practice, research and service provision to optimize patient health outcomes; 4) engage in relationship-building with health professionals allowing conflict resolution, teamwork, communication, and consultation; and 5) demonstrate mutual respect and adopt shared values of the workplace and toward patient care. A search was performed of the Self-Study Report (SSR) and Evaluation Team Report (ETRs) for all programs for reference to graduate competencies regarding interprofessional collaboration using the expectations in the GbCF. SSRs and/or ETRs with interprofessional collaboration competencies were included and statements related to IPE were extracted into a data collection sheet for characterization and qualitative analysis.

Results: Pharmacy programs at a total of 41 institutions across 11 countries were evaluated for initial ACPE International Accreditation during the identified timeframe and included in the analysis. Expected competencies of graduates were reviewed for any competencies related to interprofessional collaboration. This analysis revealed that 22 programs included competencies related to the ability of graduates to collaborate as a member of a healthcare team. Competencies for four programs focused on the ability to communicate with other healthcare professionals. Eight programs focused on the ability to demonstrate mutual respect for other health care professionals but did not include expectations that graduates be able to work as a member of an interprofessional team. The competencies for seven programs did not include a reference related to the ability to work with other health care professionals as a part of a team. Interprofessional education activities within the curricula primarily involved routine activities in practical training courses while few programs had introduced formalized interprofessional education activities in the didactic curriculum.

Conclusion: While the majority of programs included a competency regarding the ability to collaborate or communicate as a member of the evaluation team, the programs did not address the full scope of IPE competencies expected of new pharmacy professionals. In addition, further development of IPE within the curriculum is essential to support development of the competencies. Continuing professional development programs may be needed to support the development of IPE competencies for new pharmacists in the workforce. Expectations that programs incorporate IPE opportunities, as available, have been included in Quality Criteria 2026.

Outcomes-based evaluation of pharmacy curriculum in selected private higher education institutions: A mixed methods study

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Background: The Bachelor of Science in Pharmacy curriculum is periodically updated every two years to ensure pharmacy education remains aligned with evolving professional and industry expectations. This study evaluates the 2021 Bachelor of Science in Pharmacy curriculum in the Philippines by examining the achievement of program and learning outcomes specified by Commission on Higher Education (CHED) and Philippine Association of Colleges of Pharmacy (PACOP). In addition, it identifies implementation enablers and challenges reported by students, faculty, and academic administrators and solicits industry partners' perspectives on learner competencies and practice readiness.

Method: A sequential mixed-methods design was used. First, students completed a questionnaire rating the extent to which program and learning outcomes were attainable. Next, one-on-one interviews were conducted with students, faculty, academic administrators, and industry partners to deepen and contextualize the survey findings. Quantitative results were summarized using descriptive statistics, while qualitative responses were analyzed thematically. Findings were integrated using a side-by-side joint display and interpreted by examining expansion across datasets.

Results: The quantitative findings indicated that students generally met or exceeded the expected performance levels across all program outcomes (POs). The majority of students demonstrated a high level of attainability across all POs, with percentages ranging from 65.8% to 80.1%. The PO5 had the highest proportion of students in the high attainability category (80.1%), followed by PO2 (72.5%) and PO1 (70.7%). In contrast, PO3 showed the lowest percentage of students with high attainability (65.8%). Qualitative findings revealed themes related to curriculum facilitators and barriers, practice readiness, and targeted recommendations for curriculum improvement. Integration of the quantitative and qualitative data showed five main findings: (1) professionalism and ethical practice through experiential learning; (2) patient-centered care and practice readiness; (3) research and evidence-based competence; (4) pharmacy operations, management, and regulatory preparedness; and (5) communication and interpersonal competence.

Conclusion: Overall, the mixed-methods findings indicate that the curriculum supports development of core competencies for pharmacy practice. Nonetheless, targeted improvements are needed in immunization-related training, research writing, regulatory affairs, pharmacoeconomics,

institutional policy orientation, and interprofessional experiential learning to keep the program responsive to current industry expectations. Keywords: Curriculum review, BS Pharmacy, program outcomes, student perspective, faculty perspective, industry partners feedback

Emerging cell, gene and RNA therapies in Dutch pharmacy education: Needs assessment for future pharmacists' competencies

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Background: Cell, gene and RNA therapies represent new classes of medicinal products that are increasingly reaching the market. Cell, gene and RNA therapies offer new treatment possibilities, but also introduce challenges in development, regulation and clinical use. As the legally recognized experts in medicines, Dutch pharmacists must be prepared to understand and manage these innovative therapies used by patients. This study identifies the competencies newly graduated Dutch pharmacists should acquire during their graduate education to ensure they are practice-ready.

Method: A qualitative approach was used for this needs assessment based on 20 semi-structured interviews. The interviewees consisted of professionals with relevant expertise across the drug lifecycle, such as regulation, hospital pharmacy, academic research, drug development, policy, education, and patient experience. Analysis of the interviews was carried out using a systematic but pragmatic approach: after conducting and transcribing the interviews, common terms and overarching themes were derived from three transcripts. This list of terms served as a coding framework for the entire dataset. Any additional terms from the other transcripts were added to the list. Subsequently, frequency of appearance was determined for each term.

Results: The retrieved terms were organized in three main themes: roles, knowledge and skills. Interviewees indicated that newly graduated pharmacists must understand the basics of what cell, gene and RNA therapies are, how they differ from conventional medicines, and what specific considerations are involved in their production, quality, safety, and use. They emphasized that, because of the rapid evolution of science and regulations, focus should lie on broader principle-based knowledge and the ability to place new therapies in a broader clinical and societal context and less on detailed product knowledge. This also includes awareness of societal and ethical questions regarding access, affordability and uncertainty about long-term effects and explicit attention to patient communication. In addition, respondents consistently emphasized that specific focuses may vary depending on the intended practice setting, e.g., detailed knowledge regarding quality and GMP frameworks was considered only relevant for a smaller group with specialist career aspirations in industry and hospital pharmacy. However, they agreed that all newly graduated pharmacists should be able to recognize these therapies, clearly communicate their specific considerations and know when and where to seek specialist input.

Conclusion: Experts agreed that graduate pharmacy education for all newly graduated pharmacists should focus on principle-based knowledge concerning cell, gene and RNA therapies and the ability to place these therapies in a broader clinical and societal context. Our findings provide a foundation for curriculum (re)design in pharmacy programs to address the complexities of these emerging therapies. Distinguishing between what should be included in the core curriculum for all pharmacy students and what can be offered through electives or postgraduate education ensures that all graduates are prepared for these emerging therapies while allowing space for deeper specialization aligned with different professional roles.

Defining complexity of pharmacist's patient care tasks in primary care

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Background: As pharmacist scope evolves to meet societal needs, so has the complexity of pharmacists' care tasks which has implications for pharmacy education. To date the complexity of pharmacist care within primary care delivery has not been well characterized. Understanding care task complexity is important to identify potential gaps and opportunities for entry-level practice and continuing professional education. The aim of this study was to explore pharmacists' perceptions of care task complexity for full scope and develop a preliminary framework for complexity of pharmacists' care tasks in primary care.

Method: This qualitative study used an interpretive description approach. Pharmacists working in rural and urban community pharmacies and community pharmacy primary care clinics (CPPCCs) in Nova Scotia were recruited by purposive sampling. Semi-structured one-on-one virtual interviews gathered perceptions of common and complex care tasks encountered, factors influencing complexity, how expertise was developed for care tasks, and perceived gaps in expertise at entry level to practice. Interviews were

transcribed, inductively coded independently by two team members using an iterative codebook, and analyzed to identify themes. Interview themes were mapped onto an existing case-leveling framework which was adapted to develop a preliminary framework for complexity of pharmacists' primary care tasks.

Results: Twenty-one pharmacists were interviewed. Most participants identified as female (86%), 38% worked in community pharmacies, and 61% in CPPPCCs. Four descriptive themes were identified: common care tasks, complex care tasks and contributing factors, expertise development, and entry level knowledge and skills gaps. Common care tasks were described as straightforward, requiring limited time and guided by algorithms, such as early Lyme disease, urinary tract infections, strep throat, and immunizations. Factors increasing task complexity related to the patient (e.g., co-morbidities), care task (e.g., uncertainty), pharmacist (e.g., knowledge), healthcare system (e.g., service navigation), and pharmacy workflow (e.g., limited time). Examples of complex tasks included managing drug shortages, contraception consultations, and mental health conditions. Expertise was developed through experience, peer support, practice tools such as algorithms and formal training. Reported entry level gaps included chronic disease management, interpreting lab tests, and physical assessment skills for diagnosis. The preliminary framework defines six categories for routine and complex care tasks: patient care task, patient case, clinical knowledge, drug therapy problems, workflow impact, and healthcare system influences.

Conclusion: Participants reported that common patient conditions and situations related to care tasks that were straightforward and aligned with existing pharmacy workflow. Increases in task complexity—whether due to patient factors, clinical uncertainty, limited familiarity, or system level challenges—often required additional time, access to appointment based care within the pharmacy workflow, or referral. These findings highlight the need to examine how pharmacy workflow can better support the management of complex care tasks. Opportunities that supported pharmacists in developing expertise for care tasks for full scope included both informal and formal resources. Identified entry level skills gaps suggest the need to explore whether structured transition to practice programs are needed for new graduates. The preliminary framework developed helps characterize the complexity of patient care tasks and will guide future educational and curriculum design efforts.

Critical events influencing pharmacy student professional identity formation in advanced pharmacy practice experiences

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Background: Professional identity formation (PIF) is a process by which individuals come to understand and internalize the knowledge, skills, values and behaviours of their chosen profession. PIF is precipitated by experiences that transform an individual's understanding and impact their performance in a professional role. While experiential education is central to PIF, little is known about the critical events that shape pharmacy student PIF during advanced pharmacy practice experiences (APPEs) in the final year of entry level pharmacy undergraduate curriculum. The objective of this study was to identify key critical events that influence PIF during APPEs and how these events support or challenge PIF.

Method: This qualitative study used a critical event narrative inquiry approach. One-on-one semi structured interviews were conducted with pharmacy students from three universities in two countries following their completion of community or hospital based direct patient care APPEs. Interviews were coded and analyzed using narrative analysis. After the inductive analysis, self-authorship theory (SAT) and self-determination theory (SDT) were applied to further elucidate the PIF processes in participants' narrative plotlines. A conceptual model was developed to illustrate the key processes and influences shaping pharmacy student's PIF during these critical events.

Results: Twenty-two students described 35 critical events involving patient or provider interactions, internal cognitive processes (e.g. making decisions), or observations of preceptors. Many entered APPEs with preconceptions and limited views about the pharmacist's role (e.g. dispensing-focused, minimal interprofessional collaboration). Critical events disrupted these assumptions and reshaped understandings of pharmacist role elements, including patient-centered care, interprofessional collaboration, professional autonomy and responsibility, clinical decision making, safeguarding medications, and continuous learning. Students developed more nuanced understandings and clearer insights into how to enact these role elements. Participant narratives reflected varying SAT phases that influenced the critical events they shared. Students whose narratives reflected early SAT phases discussed observing role models and early independent tasks that enabled a new understanding of the pharmacist role and their vision for future practice. Later-phase students took on greater independence and complex responsibilities, actively enacting their emerging professional identities, and developing confidence in their skills and professional values. SDT further highlighted the role of autonomy, competence, and

relatedness during critical events, which enhanced students' motivation and internalization of their identity. Overall, students reported increased confidence, competence, agency, and internalized professional values which informed their PIF and vision of their future practice.

Conclusion: Critical events during APPEs played an important role in shaping pharmacy students' professional identities by challenging early assumptions, supporting movement toward self-authorship, and strengthening motivation, confidence, identity and clarity in their intended career paths. Examination of critical events in experiential education can help educators: understand the trajectory of student PIF, identify professional misconceptions and dissonance, support the transformation of perceptions of role elements and reinforce motivators (e.g. relatedness) that support identity internalization.

Developing professional competencies in pharmaceutical distribution auditing

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Background: Pharmaceutical distribution auditing is a critical mechanism for safeguarding medicines supply chains in line with Good Distribution Practice (GDP), identifying operational risks, and supporting corrective and preventive measures that contribute to continued improvement. Regulatory authorities form an important part of this ecosystem, working alongside stakeholders and industry to ultimately serve patients. In this context, the Malta Medicines Authority (MMA) undertakes initiatives aimed at strengthening professional competence, which is essential to ensuring robust oversight as pharmaceutical distribution networks continue to evolve. Accordingly, this initiative sought to strengthen pharmaceutical distribution auditing by building on academic training and providing an applied perspective, equipping professionals with the knowledge, skills, and competencies required to support the integrity and performance of medicines supply chains.

Method: The MMA Academy for Patient Centred Excellence and Innovation in Regulatory Sciences, licensed as a Further and Higher Education Institution, developed a programme leading to an Award in Pharmaceutical Distribution Auditing, accredited by the Malta Further and Higher Education Authority as Level 6 on the Malta/European Qualifications Framework. The course was delivered in October 2025 and comprised 50 learning hours (2 ECTS), including 22 hours of face-to-face content led by subject-matter experts. Topics addressed include auditing principles, GDP requirements, risk-based planning, documentation and data integrity, corrective and preventive action plans, regulatory inspection preparedness, quality systems and management of outsourced activities. Programme effectiveness was evaluated through a post-course electronic evaluation tool consisting of a 5-point Likert scale. Data collected was analysed to evaluate participants' feedback.

Results: Nineteen local and international participants, practicing in private or public sectors, successfully completed the programme (N=19). Evaluation responses (n=16) demonstrated consistently positive feedback across all aspects assessed. Most respondents (70%) assigned the highest overall rating to the course, whilst all participants agreed that the course met their expectations and indicated that they would recommend it to colleagues. Feedback highlighted the quality and organisation of the course, the expertise and engagement of the speakers and the interactive learning environment as key strengths. The structured content and practical focus were perceived as particularly valuable in supporting the application of GDP principles in professional practice.

Conclusion: Outcomes indicate that this educational intervention was highly valued by participants and effective in supporting the intended learning objectives related to pharmaceutical distribution auditing. By facilitating knowledge exchange and strengthening professional competencies in pharmaceutical distribution auditing, the programme contributes to capacity-building by translating participants' academic learning into practical competencies. Continued development and expansion of such targeted initiatives shall further support preparedness in increasingly complex healthcare and regulatory environments.

Beyond the traditional classroom: Mixed-methods evaluation of an experiential respiratory learning initiative in pharmacy education

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Background: Experiential learning in pharmacy education is most valuable when it targets authentic, practice-critical tasks and demonstrates measurable learning gains. Pharmacists are expected to teach inhaler technique, yet published evidence shows gaps in pharmacists' inhaler

technique knowledge and skills, supporting the need for structured training during initial education. To strengthen students' readiness for respiratory practice, we implemented an experiential learning initiative integrating device mastery (inhaler "bags" and simulation-based technique training) and an annual respiratory clinical conference (expert talks, interactive workshops, simulation, and gamification). The aim of this research was to evaluate the initiative's impact on (1) student performance in respiratory module assessment(s), (2) short-term clinical knowledge, and (3) learner educational experience and confidence in inhaler technique teaching.

Method: A mixed-methods programme evaluation was undertaken across three cohorts pre-implementation and three cohorts post-implementation. Because some respiratory module assessment content and format changed across the study period, and the module underwent a transformation post-implementation, assessment analysis focused on the coursework assessment that remained broadly comparable across all six years. Coursework outcomes were compared using grade-band distributions and attainment thresholds (≥60% and the first-class mark band) (chi-square tests; odds ratios with 95% confidence intervals). Immediate conference learning was assessed using a pre/post questionnaire adapted from the Bristol Chronic Obstructive Pulmonary Disease Knowledge Questionnaire (a validated chronic obstructive pulmonary disease knowledge instrument); paired responses (n=34) were analysed using a paired t-test and effect size (Cohen's d; standardised mean difference). Learner perceptions were collected using a five-point Likert evaluation (single post-implementation cohort; n=55) and summarised as median and interquartile range.

Results: Coursework showed a significant upward shift towards higher achievement post-implementation (chi-square (4) =44.58, p<0.001). The proportion of students achieving ≥60% increased from 58.9% (272/462) to 74.2% (316/426) (odds ratio 2.01, 95% confidence interval 1.51–2.67; p<0.001), and first-class (≥70%) mark band increased from 21.6% to 39.7% (odds ratio 2.38, 95% confidence interval 1.77–3.20; p<0.001). Conference knowledge scores increased immediately by 5.9 percentage points (paired t-test, p<0.001; Cohen's d 0.62), with the largest gains observed in non-pharmacological treatments and antimicrobial stewardship domains. Students reported positive impacts from device bags/training on device knowledge (median=5, interquartile range=1), ability to educate patients on inhaler technique (median=4, interquartile range=1), and overall educational experience (median=5, interquartile range=1).

Conclusion: Beyond the traditional classroom, device-based simulation plus conference-enabled learning was associated with improved respiratory knowledge and markedly stronger performance in the coursework assessment, with students reporting high educational value. These results reinforce experiential learning approaches that develop practice-relevant device mastery and clinically informed reasoning as a powerful strategy for deeper learning in pharmacy education.

International pharmacy student dialogue: A structured online cross-cultural learning experience

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Background: This cross cultural event aimed to give pharmacy students meaningful exposure to another country's healthcare system. Cohorts from Nirma University in Ahmedabad, India, and Binghamton University School of Pharmacy and Pharmaceutical Sciences (BUSOPPS) in New York met virtually to discuss healthcare and pharmacy topics. While global healthcare systems are taught in class, this activity provided direct peer to peer dialogue to deepen cultural understanding. Students were intentionally not given background information about the partner school to encourage authentic conversation. Each group researched a healthcare topic from their home country beforehand, using it as a foundation for discussion during the live session.

Method: Students were arranged in mixed groups with two to three participants from each institution. Before the event, each of the 12 groups received different topics and guiding questions which they initially discussed within their own institution. Topics covered clinical care, healthcare system structure, government roles, and pharmacists responsibilities. During the live event, students met in their cross university groups for approximately 30 minutes to collaborate on the assigned topic. Afterward, participants completed a survey that included ten Likert scale items, three open ended reflection questions, and an overall assessment of the activity.

Results: A total of 22 Nirma University students and 35 BUSOPPS students participated and completed the survey. All students were in the 4th or 5th year of a six-year Doctor of Pharmacy program. Most participants identified English as their primary language (39) followed by Gujarati (14). Overall, 95% agreed the event was a valuable learning experience though only 74% felt they could apply what they learned to future academic or professional settings. Most agreed (93%) that they were able to communicate their ideas during the event and 84% felt language differences were addressed appropriately. The most meaningful part of the event according to participants was direct interaction with students from another culture coupled with the opportunity to compare healthcare systems. Students noted shared similarities such as counseling strategies and challenges in rural and urban healthcare. They also highlighted differences including prescribing authority, immunization administration rights for pharmacists and the scope of a clinical pharmacist. Barriers identified by the participants included limited time, communication techniques and online platform coordination.

Conclusion: Students from both universities responded positively to the event. Survey responses showed that students valued the opportunity to work with peers from another country and gained valuable insights into similarities and differences between healthcare systems, professional roles, and approaches to patient care. The online format, although familiar to participants, still introduced barriers to communication. Future improvements include an increase in the frequency and duration of the student interactions. Additionally, integration of structured collaboration and joint discussion on research papers and case studies could produce further meaningful insights to the similarities and differences in the health care system and pharmacy practice across different countries.

A virtual learning collaborative to educate pharmacists and aid in long-term, self-sustaining implementation of pharmacogenomics in practice

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Background: With expanding evidence and professional guideline endorsements, the importance of pharmacogenetic (PGx)-guided medication management has gained international recognition. Despite such interest, widespread implementation remains limited. On-site PGx specialists are a key, but rare, resource for integrating PGx into clinical practice. Additionally, lack of PGx expertise is a commonly cited barrier to implementation. To bridge this knowledge gap, a PGx-centered educational program was developed within the University of Florida (UF) Health System. Using a virtual, collaborative approach, pharmacists with little-to-no experience in PGx engaged in conversations about ordering, interpreting, and appropriately utilizing PGx test results. Following this experience, participants will be able to independently expand PGx integration in their practice site.

Method: An invitation for participation was sent to inpatient, outpatient, ambulatory care and academic pharmacists in the UF Health system. A pre-program survey was distributed to gauge baseline knowledge, experience, and goals regarding PGx testing. Six one-hour virtual sessions were facilitated by three PGx-trained pharmacists on a bi-weekly basis. The structure of each session varied according to content, but an interactive, discussion-based, case-focused environment was consistently maintained. Optional personal genotyping, via a saliva DNA collection kit, was offered at no cost to participants and used as an aid for learning and facilitating discussion during the program. Upon completion, a second survey was distributed to gauge post-program knowledge and perspectives about PGx testing. Participants who completed the program also received "Ask me about PGx!" badge holders to facilitate conversations about PGx with their peers.

Results: Twenty pharmacists enrolled in the program; 19 completed the program, 18 completed the pre-program survey, and 8 completed the post-program survey. Of the 19 participants, 17 opted for personal genotyping. Clinical areas seen by participants included cardiology (n=8), gastrointestinal (n=8), oncology (n=8), pain (n=8), psychiatry (n=7), and transplant (n=7). Prior to the program, 67% of pharmacists reported being somewhat uncomfortable or very uncomfortable interpreting PGx reports; after the program, 100% of respondents reported being somewhat comfortable or very comfortable interpreting reports. Understanding how PGx can benefit specific patients was ranked as the most important goal by participants prior to the program. However, following completion, navigating online PGx resources and recognizing patients who may or may not benefit from PGx testing were also acknowledged as their most useful learning outcomes.

Conclusion: Pharmacists from a variety of clinical specialty areas participated in this unique program at UF Health. The virtual and collaborative learning method was an accessible way to provide working pharmacists with the opportunity to discuss PGx topics not encountered in their day-to-day practice with their peers and PGx specialists. Over six sessions, participants improved their knowledge and comfort levels with interpreting PGx tests, navigating PGx guidelines, and applying PGx to patient care. Case-based discussions, with the option for personal genotyping, enabled engaging, high-level learning. This collaborative method may serve as the framework for larger scale, interdisciplinary programs to expand PGx training beyond the classroom and expose participants to experiences that may allow them to serve as their clinical practice site's resource for implementing PGx services.

From classroom to campus: Pharmacy students engaging the wider university community on medicines' environmental impact

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Background: During the first cycle of pharmacy studies at the University of Liège, students are introduced to sustainability

issues in healthcare through lectures, workshops, and an online course. In the master's program, those choosing an internship in pharmacy practice research (n=6-10) deepen this knowledge through a group sustainability project that also serves as a team-building activity. To support students in carrying out their project, the teaching staff sought the assistance of the Green Office, an internal university structure that provides methodological guidance, resources, and expertise in sustainable project management. In autumn 2024, the project consisted in developing a brochure on the environmental impact of pharmaceuticals.

Objective: The first objective of this educational initiative was to engage students in deepening their knowledge of the environmental impact of pharmaceuticals and in translating this knowledge into a plain-language awareness-raising brochure for the university community, offering guidance for more eco-responsible medication use. A secondary objective was to extend the reach of the brochure beyond the Faculty by supporting its dissemination across the broader university community.

Method: Following an initial awareness session on the United Nations Sustainable Development Goals delivered by the Green Office, students worked with four pharmacy faculty members to reflect on links between health, pharmaceuticals, and the environment. A two-month period was allocated for developing the brochure. Between collective brainstorming sessions, students worked autonomously to conduct a literature review and refine key messages. The Green Office provided examples of brochures on other sustainability themes to guide the design. Artificial intelligence tools were used to support graphic design and layout. The scientific content was validated by academic pharmacy staff, while the Green Office ensured proofreading, final layout, and publication.

Results: The project resulted in a tri-fold, double-sided awareness-raising brochure addressing the environmental impact of pharmaceuticals and promoting more eco-responsible medication use. An initial print run of 200 copies was produced, followed by a second edition one year later due to sustained demand. The brochure was distributed during a 90-minute awareness activity held in the student cafeteria near the Faculties of Social and Human Sciences, as part of the Green Office's annual Climate Fortnight ("Quinzaine du Climat"). During this event, pharmacy students in white laboratory coats approached cafeteria visitors by asking whether they knew that expired or unused medicines should not be disposed of in household waste. Additional dissemination occurred during the graduation ceremony, enabling wide reach across the university community. The subsequent cohort also distributed the brochure at the following year's event, and future cohorts will build on this work in designing their own sustainability projects.

Conclusion: This initiative illustrates how sustained exposure to sustainability challenges throughout the curriculum, combined with a final project-based component, enables students to integrate the topic into their future professional role. By creating and disseminating an awareness brochure, students deepened their understanding of the environmental impact of pharmaceuticals while transferring this knowledge to a broad audience, including individuals with no background in health sciences. Iterative continuation of the project across cohorts reinforces student engagement over the years.

Expanding knowledge of resource-limited settings pilot: Integrating an inter-institutional virtual collaboration

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Background: Cultural and structural humility are essential components of healthcare delivery. Pharmacy students frequently receive classroom-based instruction on social determinants of health (SDOH) and cultural competence; however, opportunities to apply these concepts in real-world settings remain limited. Experiential training in underserved clinical environments may enhance students' understanding of systemic barriers affecting patient care. Inter-institutional educational collaborations are lacking in the literature but may further broaden student perspectives by exposing learners to diverse healthcare systems and patient populations outside of a silo. This study evaluates whether a virtual inter-institutional collaboration between pharmacy students completing experiential rotations in underserved settings improves student perceptions of cultural humility, structural competence, and preparedness to care for diverse patient populations.

Method: A mixed-methods study was conducted among fourth-year pharmacy students participating in Advanced Pharmacy Practice Experiences (APPEs) at two schools of pharmacy. Students participated in 4 weekly, 2-hour virtual collaborative sessions. Sessions included discussion of healthcare systems, patient case presentations, simulation exercises addressing SDOH, and reflections on patient care experiences. IRB approval was obtained at each institution. Students completed pre- and post-rotation surveys derived from validated instruments, Clinical Cultural Competency Questionnaire and the Residency Training in Cross-Cultural Care Survey, assessing exposure, attitudes toward cultural issues, and perceived competence in caring for patients from diverse backgrounds. Survey responses completed thus far were analyzed using descriptive statistics.

Results: A total of 7 students completed the pilot study: three students from the University of Pittsburgh and four from the University of North Texas Health Science Center. Seventy-one percent had prior work experience in community pharmacy settings, and 57% of students reported prior experiential

learning with exposure to underserved populations such as low income, uninsured, previously incarcerated, or homeless. At baseline, students reported limited knowledge from their P1–P3 didactic years with regards to the use of medical interpreters, working with diverse healthcare teams, and identification of patient mistrust toward the healthcare system. Following the rotation, the most improvement was observed in students' ability to negotiate care plans with patients and work with diverse patients and healthcare teams. At baseline, 71.4% of students rated themselves as "Somewhat competent" and 28.6% as "Neither competent nor incompetent" in working with patients from cultures different than their own. Post-rotation, 42.8% of students rated themselves as "very competent" while 42.8% of students rated themselves as "somewhat competent". The lack of increase in perception in some students potentially reflects increased critical self-awareness rather than a true decline in skill. Post-rotation, students reported exposure to a wide range of patient populations during their APPE experience including Hispanic/Latino, individuals experiencing homelessness, patients with substance use disorders, and patients from multiple cultural/religious backgrounds.

Conclusion: This pilot suggests that inter-institutional experiential collaborations may enhance exposure to diverse patient populations and improve perceptions of preparedness for culturally responsive care. Virtual collaborative learning during experiential training may represent a scalable model for integrating cultural and structural humility into pharmacy education.

Pharmacy education and workforce needs in the Arab region: Are we training too few or too many?

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Background: Pharmacy education in the Arab world has expanded rapidly over the past two decades, driven by shifts toward patient-centered care and increasing interest in international accreditation. Despite this growth, limited research has described the structure of pharmacy programs in the region—including degree duration, accreditation status, and institutional characteristics—or examined whether the number of pharmacy graduates aligns with national workforce needs.

Objective: This study provides an updated overview of pharmacy education across the 22 Arab League countries. It examines institutional demographics (public vs. private, undergraduate vs. graduate programs), accreditation status, and the availability of PharmD programs. It also explores workforce indicators, including pharmacist supply, distribution, and employment sectors, to assess how educational capacity aligns with healthcare system needs.

Method: A comprehensive list of pharmacy institutions and programs was compiled using data from the International Pharmaceutical Federation (FIP), official Ministry of Higher Education websites, and manual searches of individual pharmacy school websites. Extracted variables included institution type, degrees offered, presence of undergraduate or postgraduate PharmD programs, program duration, language of instruction, accreditation status, and estimated numbers of entry-to-practice graduates. Student-to-population ratios were compared with estimated pharmacist workforce needs to evaluate alignment between educational output and workforce capacity.

Results: A total of 232 pharmacy programs were identified across the region. Egypt hosts the largest number (47 programs, 20.3%), followed by Saudi Arabia (29 programs, 12.5%). The Bachelor of Pharmacy remains the predominant entry-level degree (140 programs, 60%), although many institutions have transitioned to PharmD programs to meet the demand for clinically trained pharmacists. Forty-eight programs (20.7%) hold international accreditation from the Accreditation Council for Pharmacy Education (ACPE) or the Canadian Council for Accreditation of Pharmacy Programs (CCAPP). Program duration varies: 163 programs (70.3%) span 5 years, 98 (42.2%) extend to 6 years, and 10 (4.3%) offer 4-year degrees. Annual graduate numbers range widely—from 31 to 17,750 per country—with graduate rates per 10,000 population ranging from 0.03 to 2.9. A moderate correlation was observed between pharmacists per capita and graduates per capita (Pearson r = 0.52, 95% CI 0.09–0.79), indicating partial misalignment between educational output and workforce density. Countries such as Jordan, Lebanon, and Syria have high pharmacist densities but differing graduate rates, suggesting variable long-term workforce sustainability. Nations with low graduate numbers may face challenges replacing retiring pharmacists or meeting rising healthcare demands, while those with high graduate rates may be preparing for future needs—or risking oversupply and unemployment. Libya and Egypt, for example, show high graduate output but only moderate workforce density, indicating potential for expansion or risk of saturation.

Conclusion: Although pharmacy education in the Arab region has expanded substantially, gaps persist between educational capacity and workforce needs. Strengthening workforce planning—including determining optimal graduate numbers—is essential to ensure alignment between pharmacy education and healthcare system demands. Future research should incorporate perspectives from graduates, educators, employers, and policymakers to guide more coordinated and sustainable workforce development.

Understanding PharmD experiential placements in underserved regions: Pharmacy student barriers and hospital pharmacists' perceptions of precepting

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Background: The University of Waterloo School of Pharmacy in Ontario, Canada, is seeking to expand the number of PharmD experiential placements in Indigenous, northern, rural, and remote (INRR) areas, since these communities experience significant inequalities in access to health care. Experiential placements include both paid co-op placements and unpaid clinical rotations. Two main barriers are 1) motivating students to complete INRR placements, and 2) recruiting hospital pharmacist preceptors. Each year, approximately 60% of INRR co-op positions go unfilled, and the University struggles to recruit hospital pharmacist preceptors to expand INRR rotations.

Objective: 1) Identify and describe the perceived barriers and facilitators that influence pharmacy students' willingness to pursue experiential placements and future practice in INRR communities, and 2) Characterize hospital pharmacists' attitudes and perceptions toward the experience of precepting PharmD students

Method: Part 1: Three cohorts of pharmacy students at the University of Waterloo were surveyed using Qualtrics. Free-text sections were coded qualitatively, and proportional odds models were used. Part 2: Focus groups will be conducted with hospital pharmacists in May 2026. Sessions will focus on topics such as how precepting affects workflow and time management, and strategies to recruit and retain hospital preceptors.

Results: A total of 108 responses were collected. Response rate was 28.9%. Interest in completing an INRR placement versus not completing one was approximately evenly split. Main facilitators for completing an INRR placement were higher hourly wage, financial assistance from the university, and pre-arranged housing/rent paid by employer. Facilitators for future work in INRR region after graduation included higher pay, financial incentive (e.g. signing bonus, etc.), work-life balance, and student debt forgiveness programs. Barriers included living far away from family and living in a more isolated location. Of 14 participants that indicated that they have completed an INRR co-op, 11 plan to complete another INRR co-op and plan to complete fourth-year rotations in an INRR community, and one was unsure. The remaining two participants indicated that they completed a remote co-op and are not interested in future INRR co-ops or INRR rotations; although we intended "remote" to refer to a remote, isolated, community, we suspect this might have been misunderstood to mean a placement that involved remote or online work. Full statistical analysis has not yet been completed. Focus groups will be conducted in May 2026.

Conclusion: Half of pharmacy students surveyed were open to completing placements in underserved areas. However, in order to meet the health care need in these areas, employers, universities, and governments must implement strategies to effectively recruit and retain pharmacists. Full survey results and results of focus groups will be available mid-2026.

Utilization of artificial intelligence and its relationship to academic performance in a general medicine therapeutics course

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Background: The use of artificial intelligence (AI) in higher education has experienced a rapid surge in recent years, but it is unclear how student pharmacists in Doctor of Pharmacy (PharmD) programs utilize it for coursework. This study aims to survey 2nd year Doctor of Pharmacy students about their artificial intelligence utilization habits in a general medicine therapeutics course in order to identify relationships with academic performance in the class. The objective of our study is to identify how student pharmacists utilize artificial intelligence to study for a therapeutics course. The study also aims to trend student course performance with artificial intelligence utilization. Results of this study can inform pharmacy school administrators about how to effectively incorporate artificial intelligence learning objectives into pharmacy curriculum coursework.

Method: Students in the general medicine therapeutics course were asked to complete a voluntary survey with no bearing on their course grades at the end of the course after their final examinations. The survey asks questions about their utilization of artificial intelligence in the general medicine therapeutics course. Survey results were then trended with students' final grades in the course to identify any patterns in performance and artificial intelligence utilization.

Results: A total of 26 students completed the survey. The majority of respondents reported using artificial intelligence in the course (73.1%), while 26.9% reported no use. Among the 23 valid respondents, grade distribution was as follows: A (43.5%), A− (21.7%), B (17.4%), B+ (13.0%), and B− (4.3%). 3 responses were not included in the data analysis due to survey entry error. AI use varied across grade categories. Among students earning an A, 80.0% reported using AI, while 20.0% did not. All students earning an A− (100%) reported AI

use. Similarly, 75.0% of students with a B grade reported AI use, compared to 25.0% who did not. All students earning a B+ (100.0%) reported no AI use. The single respondent with a B− grade reported AI use (100.0%). When examining the distribution of AI users overall, a large proportion of AI users were concentrated among higher-performing students. Of all students who reported using AI, the majority were in the A and A− categories, while non-users were more heavily represented in the B+ group. Students reported using AI for diagnostic reasoning, therapeutic decision-making, clinical guideline synthesis, and calculations.

Conclusion: Higher-performing students were more likely to report AI use. Most respondents (73.1%) reported using AI but most qualitative comments suggest a cautious approach with the understanding of the limitations of AI. Results also suggest that AI does not replace learning of material but rather supplements clinical reasoning and skills. There is no clear grade advantage when utilizing AI, but the method of AI use likely determines its effectiveness.

Hacking the culture of precepting: Co-creating an approach to grow preceptor engagement

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Background: Within Alberta Health Services (AHS), Pharmacy Services, each zone leadership team focuses on fostering a positive culture of precepting at sites, and meeting capacity needs of student placement requests in the annual call for offer. Edmonton Zone set, in their strategic plan, objectives to elevate their zone as a "rotation destination" for pharmacist students and engagement of preceptors. A need was identified to address the challenges in growing the culture of precepting and increasing preceptor engagement. This included building a deeper understanding of the value proposition; identifying key attractors and benefits; exploring assumptions and biases; and developing solutions that resonate. Goals of this initiative were: 1. Developing a shared understanding of critical elements that enable a positive culture of precepting; 2. Co-creating proposed solutions with leaders, staff and faculty members, and students; 3. Defining elements that would attract and encourage pharmacists to participate in precepting; and 4. Develop low fidelity prototypes and direction for an improved experience for students and preceptors.

Method: Pharmacy engaged with the AHS Design Lab to host a design thinking intensive to improve the experiential education experience through diverse collaboration and rapid ideation. Forty pharmacy students, preceptors, managers, faculty and clinical practice leaders came together for a full day to collaboratively examine the current precepting model. Using a structured, hackathon-style approach, centered on empathy, definition, ideation, and prototyping, participants uncovered key insights and developed actionable ideas.

Results: This process supported creative ideation to develop seven prototypes. After the event, the core working group evaluated prototypes based on specific criteria and prioritization frameworks. Three prototypes were consolidated into a comprehensive initiative aimed at enhancing the orientation experience from both student and preceptor perspectives. The second ambitious initiative centers on mitigating preceptor burnout. An implementation roadmap was developed with short-, medium- and long-term actions and next steps.

Conclusion: Enhancing preceptor engagement, understanding and addressing preceptor burnout is integral to fostering a culture of precepting at placement sites. Applying design thinking principles by using a structured, hackathon-style approach-centered on empathy, definition, ideation, and prototyping- participants (pharmacy students, preceptors, managers, faculty and clinical practice leaders) uncovered key insights and developed actionable ideas which informed an action plan road map to strengthen future preceptorship experiences.

Supporting preceptors and students on experiential education placements during a natural disaster

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Background: Natural disasters are increasing across Canada and can impact experiential education (ExEd). In Alberta, pharmacy student placements are matched 6-12 months in advance and occur across the province, including areas at risk of natural disasters such as wildfires. Due to the unpredictability of a natural disaster, it is important to understand the impacts and needs of pharmacy preceptors and students. This informs the ExEd and site leadership teams to collaboratively design an approach to best support

preceptors and students when faced with this situation. Goals of this study were: 1. To understand the experiences of Alberta students and preceptors during a natural disaster and emergency response to identify supports and strategies required to address the challenges and needs. 2. To describe the approaches developed to help prepare and support students before/during and after an emergency response and the communications plan developed for preceptors, students and sites.

Method: A qualitative phenomenology approach was used to capture preceptors' and students' experiences on placements impacted by Alberta wildfires. Data was analyzed from two sequential studies – a focus group study of preceptors followed by a second focus group study of students. Inductive thematic analysis using open coding, and a Line-of-Argument synthesis was used for analysis.

Results: Four pharmacy students and four preceptors participated, and the following major themes emerged: workplace and placement impacts, communication, well-being, support, and recommendations. The Line-of-Argument synthesis indicates that both students and preceptors would benefit most from strategies that reduce uncertainty and enhance agency. Both groups identified frequent and transparent communication, involvement in decision-making, and proactive planning for improvement, and highlighted the value of social support. It highlights the importance of implementing supports that decrease feelings of uncertainty during a natural disaster.

Conclusion: Results were shared with the ExEd team and site leadership teams for consideration of action items, and the following has been implemented: Emergency Response Student Placement Communication plan, and Student Emergency Action Plan. Sharing of well being supports and transparency to students of placement options and supports were areas identified for improvement. This inductive qualitative research sets the foundation for how to conduct experiential education in the context of natural disasters. Understanding the experiences of those who were impacted by evacuations, evacuation alerts, and receiving evacuees is vital in understanding how to support preceptors and students in safe and quality learning experiences. This study identified key themes including placement quality and well-being of students and preceptors during the wildfires, as well as exploring communication, and providing tangible recommendations for the future.

Impact of early exposure to acute care practice settings of pharmacy students in the PharmD program

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Background: Early exposure to practice environments socializes pharmacy students to professional roles. This study describes PharmD student perspectives before and after a hospital site visit. Pharmacist facilitator and manager perspectives regarding the design, learning objectives, and operational aspects of delivery were explored.

Method: Second year students completed a 90-120 minute structured hospital visit in small groups during the Fall 2025 term. Objectives, activities, and a facilitator guide, were designed by faculty, with input from pharmacy managers and facilitators. Students were surveyed before and after the visit, and attended a live debrief. Facilitator (n=15) feedback was collected through a survey and debriefs. Managers (n=5) also participated in the debriefs. Surveys included open-ended and closed questions using five-point Likert scales. Open ended responses were thematically analyzed. Surveys were pre-tested prior to distribution. The Wilcoxon signed rank test was used to compare pre-and-post responses.

Results: A total of 122 student survey responses were analyzed (62.3% had no prior hospital exposure). The overall visit experience was rated as very good or excellent by 89.3% of respondents. There were improvements in comfort with describing the pharmacist, technician, and assistant roles as well as placement activities for future hospital rotations with median scores increasing by 1-2 points ($p<0.001$ for all 5 comparisons). After the visit, words chosen to describe feelings of hospital practice included: curious, excited, and nervous. Most students (74.6%) reported their perceptions changed post-visit, viewing hospital pharmacy as more collaborative and clinical. During the debrief, students reported that seeing hospital pharmacy practice increased connection with hospital-situated skills lab activities. Facilitator feedback identified logistical considerations for sustainability (e.g., 4 students/group being optimal and the facilitator guide being very useful). Overall, facilitators enjoyed leading these visits, with 93.3% rating the experience as very good or excellent. Manager engagement led to successful implementation.

Conclusion: Structured hospital site visits early in the PharmD program increased student comfort with describing the role of pharmacists, pharmacy technicians and assistants, and allowed students to see this dynamic practice environment. The visits were well received by both students and facilitators.

Integrating planetary health into pharmacy education: A competency framework

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Background: Climate change presents both immediate and long-term risks to human health, yet planetary health is not currently a mandatory component of the Canadian pharmacy curriculum. This study aimed to develop a shared understanding among Canadian pharmacy educators of key topics related to planetary health and establish core competencies to support the integration of planetary health into the pharmacy curriculum nationwide.

Method: A qualitative consensus-building study using the Nominal Group Technique (NGT) was conducted through four virtual focus groups across two rounds. Data from focus groups was analysed using conventional content analysis with an inductive category development approach, and ideas were organized into categories to identify key concepts. Participants included pharmacy educators from ten of the eleven Canadian pharmacy schools, with pharmacy student participation and consultation with an Indigenous pharmacy representative.

Results: Four key categories were identified for planetary health competencies in pharmacy education: (1) planetary health as a complex, relational, and multidimensional concept; (2) pharmacists as stewards and clinical actors in planetary health; (3) leadership, advocacy, and navigating system-level change; and (4) embedding equity, Indigenous knowledge, and social accountability. These categories guided the development of five core competencies to support the integration of planetary health into pharmacy curricula.

Conclusion: The competencies developed offer a national framework for integrating planetary health into pharmacy curricula. They establish essential knowledge, skills, and values, support alignment across institutions, and prepare future pharmacists to incorporate planetary health principles into clinical decision-making and patient care.

Mobilizing and advancing pharmacy leadership in emergencies (MAPLE): A tabletop simulation workshop

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Background: Pharmacists are on the frontlines in their communities when a disaster strikes and need to be prepared to undertake disaster response roles to lead through a crisis. Yet pharmacy curricular focus in this area has not been well-established to prepare future pharmacists to undertake this responsibility. In response to the increasing prevalence of extreme weather events across Canada due to climate change, personal experiences responding to emergencies in clinical practice, and a recognition of the need to prepare pharmacy students for their future in increasingly unstable healthcare systems and environments, the MAPLE Collective was formed. This collective of pharmacy educators is focused on increasing disaster and emergency preparedness training for students who will become frontline health care professionals through development of evidence-informed exercises, integration of simulation-based learning, and creation of adaptable teaching resources that can be implemented in pharmacy programs across Canada.

Objective: To develop an interactive functional exercise, a disaster preparedness workshop, providing a protected learning environment for pharmacy students to practice responding to unfolding and unknown disaster situations. The evolving scenario centres on a wildfire but an all-hazard principle is applied throughout to ensure learnings from this workshop can be universally applied to all emergencies including, but not limited to, extreme weather events, power outages, cyber-attacks and others.

Method: This hands-on disaster response workshop was designed for senior level Doctor of Pharmacy (PharmD) students to introduce the principles of emergency preparedness as it relates to pharmacy practice. Development was a collaboration across four Canadian pharmacy schools - Memorial University, University of

Waterloo, University of Alberta, and University of British Columbia, who met weekly for four months in 2025 to create and test the functional exercise. The workshop series included an introductory seminar to provide foundational knowledge of pharmacists' roles in disaster health management (mitigation, preparedness, response, and recovery) emergency response, the functional exercise, and a facilitated debrief.

Results: Across Canada 325 PharmD students have participated in the functional exercise. The scenario begins as a typical day in a rural community pharmacy practice with the pharmacy team needing to prioritize the day's work. A wildfire evacuation order nearby sees an additional influx of evacuees with health needs at the pharmacy. Then a power outage disrupts access to pharmacy computers, refrigeration, and telecommunications. Students work in small groups to collectively decide on their approach as a pharmacy team in managing various tasks and new developments that arise. Formal evaluation is underway but the workshop has received overwhelming positive feedback, with one student noting it "highlighted what it takes to control your practice under pressure…and opened my eyes to the additional considerations pharmacists must account for during extreme environmental conditions".

Conclusion: MAPLE Collective is novel in its pan-Canadian creation and the use of a functional exercise to train PharmD students for leading communities through a disaster response. This work aligns with the Sendai Framework to build resilient healthcare systems that include primary and community sectors. The functional exercise will be rolled out to other Canadian pharmacy schools.

From bytes to better care: An innovative experiential education model for future-ready pharmacists

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Background: Experiential training in pharmacy curricula has been primarily focused on strengthening student pharmacist's clinical and direct patient interaction skills. However, future-ready pharmacists also require knowledge and skills to manage large data sets and clinical decision digital dashboards. To support this development, opportunities were established to partner early year students with an international medication safety team for a novel experiential training program that integrated data analysis, data driven decision-making, interprofessional collaboration, and international engagement.

Method: The College of Pharmacy developed a summer international fellowship for engagement (SIFE) for early-year students in partnership with a leading NHS teaching hospital in London. Two faculty and a senior pharmacy team lead led this 10-week remote experience focused on medication safety. Activities included: comprehensive literature reviews, data analysis skill development, analysis of several large-scale health-system datasets (to identify medication safety trends impacting oncology and cardiology care) and interaction with hospital-wide, interprofessional teams. After completing the fellowship, SIFE students participate in a two semester didactic course dedicated to critical reflection of research processes, translation of research skills into the profession, and scholarly output planning.

Results: The SIFE experience introduced a second-year pharmacy student to international health systems, interprofessional collaboration, and digital dashboard data. Skills developed included advanced data analysis, strategic use of digital dashboards, interprofessional communication, oral and poster presentation development and time management. A total of four medication safety projects were completed resulting in five professional posters, two platform presentations, and three manuscripts for local, national, and international conferences. Data-driven insights from projects were shared with the hospital-wide Medication Safety Team which ensured alignment with organizational priorities and policy implementation. Project data informed hospital protocol revisions, including missed dose documentation, allergy incident reporting, daily rounding procedures, and cancer treatment workflows. The developed SIFE framework and demonstrated program success supports continuation with additional cohorts to address medication safety needs within the partner institution.

Conclusion: This experiential model demonstrates the value of engaging early-year pharmacy students in large-scale data analysis to drive policy change within global health systems. Integrating such opportunities into pharmacy education fosters practice readiness, leadership development, and the ability to translate data into actionable improvements—key competencies for the evolving healthcare landscape.

Pharm.D. program renewal at Université de Montréal

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Background: In 2007, the Faculty of Pharmacy implemented the first entry-level Doctor of Pharmacy (Pharm.D.) program in Canada. Almost 20 years after, a major revision of the Pharm.D. program has been initiated in response to rapid and sustained changes in pharmacy practice, diversification of

professional contexts, workload imbalance within the existing curriculum, and evolving student needs. The goal of this initiative is to refocus training on first-line pharmaceutical care, realign the program with a competency-based framework, and promote coherent pedagogical practices and equitable learning conditions.

Method: The optimization process was supported by governmental funding and guided by a governance structure comprising a management committee and an a joint optimization committee (professors, students and other community members), with support from the Université de Montréal pedagogical centre. A scientific documentation search was conducted. An iterative cycle of consultations of other pharmacy schools nationally and internationally, students, pharmacists, staff and other stakeholders was performed. Faculty members were progressively engaged in the process beginning in Fall 2025. Core documents—such as the competency framework, developmental levels, and redesigned program structure—were developed to anchor the revision process. Main guiding principles include: pedagogical and curricular coherence, progression of learning, essential content and balanced workload distribution throughout the program, involvement of stakeholders, collaboration, exchange, and interaction among teaching staff, flexibility with personalized learning trajectories

Results: The redesigned Pharm.D. maintains its four year, 164-credit format but introduces a block based structure, earlier immersion into professional roles, and a coherent progression of learning across five core competencies focused on primary care. First year courses will include more pharmacotherapy elements. Topics will be taught in a spiralling complexity over the first three years of the program. Enhancements include expanded skills laboratory credits (17 vs. 16), extended experiential practice duration (48 vs. 40 weeks), increased integration activities, and a greater emphasis on professional identity formation and reflective practice. One of the experience practice rotations will be done in a workplace environment. Personalized learning pathways are strengthened through additional elective courses, extended elective internship, and a planned double degree option. A revised competency based evaluation model using a pass or fail grading system will govern skills laboratories, internships, and integrative seminars, covering approximately 43% of the program.

Conclusion: The optimization of the Pharm.D. program represents a comprehensive modernization effort aimed at preparing pharmacists capable of delivering first-line, patient-centred pharmaceutical care while adapting to emerging societal needs. The revised curriculum strengthens competency development, enhances program coherence, and improves student support through flexible pathways and balanced workloads. Upcoming phases include institutional and governmental approval, faculty training, and broad communication with the academic community. Competency-based course syllabi are being developed. Full implementation is targeted for Fall 2027.

Evaluating pharmacy resident research presentations using generative artificial intelligence

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Background: Presentations are essential for pharmacy trainees' professional development, requiring them to communicate complex information effectively. Traditionally, feedback is provided by clinical preceptors or faculty, but challenges such as evaluator fatigue, subjectivity, and time constraints can lead to inconsistent feedback quality. Through its ability to process language, generate human-like text, and follow structured evaluation criteria, Generative Artificial Intelligence (GenAI) offers a promising opportunity to deliver immediate, standardized feedback. However, its ability to assess clinically relevant and context-dependent elements of real-world practice remains uncertain. Rigorous validation against expert human evaluation and learners' perceptions of feedback quality are necessary for GenAI to serve as a successful pedagogical tool.

Objective: To evaluate the accuracy and perceived value of GenAI in assessing pharmacy resident research presentations relative to human evaluators and determine its potential as a supplementary tool in pharmacy education.

Method: Residents presenting their research at the UNC Eshelman School of Pharmacy 2025 Research in Education and Practice Symposium were evaluated by human evaluators and a GenAI tool using a 40-point rubric. After receiving both human and GenAI feedback, residents completed a survey on their perceptions of feedback clarity, usefulness, appropriateness, specificity, and strengths. Normality was assessed using the Shapiro-Wilk test. Paired t-tests and the Wilcoxon signed-rank test were applied to compare mean total scores and analyze ordinal data from two quantitative items, respectively. Categorical data from three quantitative items were analyzed using the Exact Multinomial test. A significance threshold of $p < 0.05$ was applied to all analyses. Interrater reliability between GenAI and human evaluators was assessed using Cohen's Kappa and percent agreement. Qualitative responses underwent thematic content analysis with dual-coder review.

Results: Sixteen residents participated in the study. GenAI assigned significantly higher mean total scores than human evaluators (39.20 vs 37.60; $p = 0.048$), and despite an average percent agreement of 68.3%, Cohen's Kappa revealed poor to slight agreement across most rubric items ($\kappa = -.296$ to $.333$), indicating GenAI did not reliably replicate human grading patterns. All residents completed the post-evaluation perceptions survey (100%). For improving presentation skills, most participants (56%) preferred the human evaluators'

feedback, while 6% preferred GenAI, and 38% rated both equally useful (p = 0.034). Human feedback was rated significantly more useful for identifying areas of improvement (3.75 vs 2.94; p = 0.014), while GenAI feedback was rated significantly clearer (3.88 vs 3.56; p = 0.037). Qualitative responses revealed that GenAI feedback is viewed as more thorough, easy-to-read, and consistently aligned with rubric components, while human feedback is valued for its focus on impact, innovation, and real-world relevance.

Conclusion: GenAI holds promise as a supplementary assessment tool, providing clear and rubric-aligned feedback for research presentations. In its current stage, GenAI addresses the more objective aspects of the feedback process, whereas human evaluators focus on the real-world application and context that residents find valuable for their growth. Integrating GenAI within a hybrid feedback model may strengthen both the efficiency and depth of feedback in pharmacy training, shaping the development of the next generation of pharmacy leaders.

The role of pharmacy education in developing pharmacist researchers: Lessons learned from around the world

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Background: Pharmacy education plays a pivotal role in shaping the future of healthcare by training pharmacists to manage medication therapy, ensure patient safety, and improve health outcomes. The role of pharmacists has evolved over the years from dispensers of medications to healthcare providers who optimize medication use, independently prescribe, administer vaccinations, manage chronic diseases, and collaborate with providers and patients on treatment plans. Increasingly, pharmacists are contributing to research across pharmacy practice, health service delivery, pharmacy education, and health policy. However, in general, pharmacists are less active in research than their counterparts in other health care professions, especially their medical colleagues. Furthermore, pharmacists' role in research as well as their contributions are not occurring uniformly across the globe nor at the same pace. Mostly, pharmacy schools are currently training pharmacists to read and apply research in their practices, such as using appropriate clinical guidelines, rather than generating new knowledge.

Objective: The goal of this project was to understand and disseminate information on how different countries are shaping the future of pharmacy education to develop pharmacists as clinicians and researchers, an area of increasing importance for improving patient and health system outcomes.

Method: The International Journal of Pharmacy Practice (IJPP) issued a call for manuscripts in October 2024 describing patient education and pharmacy practice worldwide, with a focus on developing pharmacist researchers. The theme titled "Role of pharmacy education and pharmacy practice in developing pharmacists as researchers" included the specific questions: "How should pharmacy education evolve over the next decade to ensure pharmacists are trained as both clinicians and researchers? Are there initiatives in place to develop research skills in the current workforce?" The manuscript sections that addressed these questions were extracted for a content analysis to identify emerging themes for the project.

Results: IJPP accepted ten manuscripts by March 15, 2026. The emerging themes were: 1) legislative and curricular reform to incorporate research into curriculum and practice, 2) use of continuing education, and mentoring to incorporate research into practice, 3) developing community pharmacies as research hubs, 4) developing a clinician-researcher professional identity for pharmacists and developing a clear clinician-research career pathway, 5) using interprofessional education and practice to cultivate research capabilities and capacity building, 6) using specific educational pedagogies to teach research in pharmacy curriculum, 7) rewarding pharmacists who are engaging in research, both participating and producing research, 8) partnerships between academic institutions and healthcare facilities to design collaborative research and training both nationally and globally, 9) research funding and institutional support, and 10) establish national pharmacy research strategies and initiatives.

Conclusion: The authors, in general, have supported the notion of training pharmacists as researchers and developing a research culture in the pharmacy profession. While developing all practicing pharmacists as independent researchers is not feasible, developing them as pharmacist-researchers, who understand the processes of research and contribute to and produce research, is important and realistic.

Pharmacy education around the globe

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Background: Pharmacists are essential healthcare professionals who manage medication therapy, ensure patient safety, and improve health outcomes. Beyond dispensing medication, they provide counseling, administer vaccinations, manage chronic diseases, and collaborate with providers on treatment plans. Their role spans community pharmacies, hospitals, and clinical settings. Pharmacy education plays a pivotal role in shaping the future of healthcare by training pharmacists to fulfill the roles outlined above. A 2019 study reported that there were 1,839 pharmacy colleges worldwide. Although pharmacists are trained in different countries through different modalities, the goal still remains the same: patient safety and improved health outcomes. The purpose of this project is to compare and contrast pharmacy education worldwide.

Method: The International Journal of Pharmacy Practice (IJPP) issued a call for manuscripts in October 2024, inviting submissions describing pharmacy education and practice worldwide, with a focus on the development of pharmacists as both clinicians and researchers. A documentary analysis of the ten manuscripts that were accepted by March 15, 2026, was undertaken to provide a comparative description of key curriculum characteristics. Reported characteristics include degree granted (doctoral or bachelor's), program duration, entry practice-level requirements, program focus (clinical, research, or basic sciences), accrediting agencies and requirements, and the pharmacy careers and scope of practice for which student pharmacists are prepared.

Results: The example below for the United States of America illustrates the data that have been abstracted from these countries, extracted into a spreadsheet, and summarised. Data from all ten countries will be presented in visual format for comparison. Country: USA Degree granted:PharmD Program Duration: 4 years (plus 2 years pre-pharmacy) Entry-level practitioner requirements: Individual state board-licensed through a national licensing examination Program focus: 1st two years of basic sciences, followed by two years of clinical sciences Clinical Rotations needed: Yes Postgraduate Options: PGY1 – general expertise and PGY2 therapy specific expertise Accreditation agencies: ACPE Pharmacy careers often chosen: Community pharmacy, followed by clinical pharmacy and industry Entry-level scope of practice: Mainly dispensing and counseling, limited CDTM, and prescribing

Conclusion: As global pharmacy education and practice become increasingly relevant and sought after, a repository of this information can be useful to pharmacy educators. This can allow for international collaboration (student and faculty exchange programs), support mutual recognition agreements, identify global norms, and provide a roadmap for curriculum updates. The results of this study will provide a comprehensive, comparative foundation for improving pharmacy education worldwide and thus strengthening the profession.

The importance of practice in pharmaceutical education: impact of an immersive curriculum on engagement and clinical care

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Background: Contemporary pharmaceutical education requires a paradigm shift, transitioning from a drug-centred model to a patient-centred approach. Recent scientific literature confirms that passive learning is insufficient to meet current clinical competency requirements. This necessitates disruptive curricular structures where practical immersion serves as the backbone of both the syllabus and the overall course. Within this context, a pharmacy degree featuring a personalised curriculum developed by P15 Educação stands out. This model proposes an immersive framework where over 50% of the credit hours are dedicated to practice. Conducted in laboratories and authentic workplace settings from the initial semesters, this approach aims to foster critical thinking and student engagement. The literature suggests that the contextualised "learning by doing" methodology employed by P15 Educação bridges the gap between academia and the professional market, thereby increasing the student's perception of value.

Method: This study comprises a descriptive analysis linked to a case study, grounded in: Educational Management Indicators: An evaluation of satisfaction, performance, and attrition data from a Pharmacy course using the P15 Educação practical methodology, compared against the average attrition rates of traditional pharmacy courses in Brazil. Literature Review: An analysis of national and international literature (2021–2026) regarding active methodologies and pharmaceutical education focused on immersive practice.

Results: Data from the curriculum personalised by P15 Educação demonstrate a direct correlation between the practical workload and excellent outcomes regarding engagement, satisfaction, academic performance, and retention: Engagement and Satisfaction: The course achieved a satisfaction score (CPA) of 94 points, significantly exceeding the market average of 69. Practical evaluations received a top

score of 94. Performance: There was a 13.6% increase in performance during structured visits, with an academic average of 8.1 points. Impact on Attrition: The P15 Educação model presents an attrition rate of only 10.5%, compared to the national average of 36% for in-person courses.

Conclusion: The immersive curriculum developed and applied by P15 Educação (>50% practice) has demonstrated success in undergraduate pharmacy education and better prepared students for clinical patient scenarios. The data prove that this model strengthens the student's emotional connection to the profession and provides the market with pharmacists possessing essential clinical knowledge for excellence in community pharmacy care. However, further studies are required to determine long-term outcomes, including diverse nationalities and other healthcare disciplines. Presently, it is concluded that a practice-based curriculum drives engagement and performance while reducing attrition.

Preceptor and student perceptions of advanced pharmacy practice experience (APPE) readiness: Informing course development

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Background: Competency-based pharmacy curricula require that APPE readiness courses reflect the knowledge, skills, and attitudes (KSAs) most essential to practice-site success. The purpose of this study was to identify gaps between preceptor-perceived importance and student self-reported confidence in APPE-readiness KSAs, and to use those findings to guide targeted course development.

Method: A cross-sectional survey study was conducted following curriculum revision. Separate survey instruments were administered to IPPE and APPE preceptors and to professional year 3 (P3) and year 4 (P4) students. Preceptors rated the importance of defined KSA domains using a 4-point Likert scale; students rated their confidence in the same domains. Select-all-that-apply items identified specific areas requiring additional preparation. Descriptive statistics summarized response distributions, and comparative analysis identified discrepancies between preceptor-rated importance and student-reported confidence across KSA domains. Gap findings were applied directly to course content allocation decisions.

Results: Sixty-nine preceptors (35.2 % response rate) and 68 students (48.8% response rate) completed surveys. Preceptors consistently rated communication and professional soft skills as among the most important KSA domains for APPE readiness. Students reported the lowest confidence in these same domains, representing the most pronounced gap identified across all competency areas. These findings directly informed course revisions, with approximately 30% of course content allocated to communication and professional skill development.

Conclusion: Systematic collection of stakeholder perceptions from preceptors and students revealed a meaningful and actionable gap in APPE preparation. Communication and professional soft skills emerged as both the highest-priority and lowest-confidence domain, a finding with implications beyond a single institution. Pharmacy programs engaged in competency-based curriculum redesign should consider structured preceptor-student gap analyses as a replicable, evidence-informed strategy for prioritizing APPE readiness course content.

The study of pharmacy in Košice provides extraordinary insight and education in veterinary medicines

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Background: Within the accredited study program Pharmacy, the University of Veterinary Medicine and Pharmacy in Košice offers students the opportunity to acquire in-depth knowledge in the field of veterinary medicines through the compulsory course Veterinary Pharmacology. The study program is organized in cooperation with the University Pharmacy and the University Veterinary Hospital. The University Veterinary Hospital, with its comprehensive organizational structure—including the Small Animal Clinic, Clinic of Birds, Exotic and Wild Animals, Clinic of Horses, Clinic of Ruminants, and Clinic of Swine—represents an important center for the university's clinical activities and educational process. This highly specialized facility is unique in Slovakia and is equipped with advanced technologies, including a special laminar box for the preparation of medicines for oncology patients, which significantly contributes to improving the quality of teaching.

Method: During lectures and practical exercises in the compulsory course Veterinary Pharmacology, students receive extended information on the specifics of animal therapy in clinical practice. Practical experience in the preparation and dispensing of medicines is obtained at the University Veterinary Hospital, and during compulsory pharmaceutical practice lasting one month and five months at the University Pharmacy. The assortment of dispensed medicines and veterinary medicinal products depends on a veterinary prescription.

Results: The teaching process emphasizes the most significant differences between human and veterinary

pharmacology. The course focuses on the specific aspects of veterinary pharmacology, including veterinary prescribing practices, anti-infective agents important in veterinary medicine (antimicrobials and antiparasitic drugs), and drugs affecting various organ systems such as the nervous, respiratory, cardiovascular, digestive, and genitourinary systems, as well as drugs influencing metabolism. Special attention is given to species variability among animals, differences in pharmaceutical dosage forms and routes of administration, the pharmacological effects of drugs with indication restrictions, and measures aimed at eliminating potential negative impacts on consumers of animal products.

Conclusion: Students become familiar with the active substances of individual pharmacotherapeutic groups used in veterinary clinical practice. After completing the course, students possess the necessary knowledge for the proper dispensing of medicines containing drugs intended for animals. The integration of theoretical education with practical training significantly enhances students' understanding of species-specific pharmacotherapy and the safe use of veterinary medicines. This interdisciplinary approach contributes to the preparation of pharmacy graduates who are capable of cooperating effectively with veterinarians and providing professional pharmaceutical care in the field of veterinary medicine.

Effects of anxiety and depression symptoms on low versus high stress levels in US pharmacy schools during the COVID-19 pandemic

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Background: The COVID-19 pandemic elicited substantial changes ensuing marked stress in the US pharmacy academia. However, little is known about the effects of anxiety and depression symptoms on stress levels during the pandemic within pharmacy academia. The purpose of the study was to evaluate the effects of anxiety and depressive symptoms related to the pandemic on employees' stress levels among the 139 US pharmacy schools.

Method: A cross-sectional, web-based survey was administered to the US pharmacy school employees from August 11-31, 2020, using the following validated questionnaires: Perceived Stress Scale (PSS), Generalized Anxiety Disorder-7 (GAD-7), Patient Health Questionnaire-2 (PHQ-2, to screen for depressive symptoms), and Grit-S. Participants with total PSS scores of 0 to 13 were considered to have low stress, whereas those with 27 to 40 PSS scores were considered to have high stress levels. Scores from these scales were compared between low and high stress levels using Mann-Whitney U tests. The proportion of participants with low vs. high stress levels was compared across sub-categories of anxiety and depression scales using $\chi 2$ tests. A multiple logistic regression analysis examined whether scores on GAD-7, PHQ-2, Grit-S, age, school type (private vs. public), and program type (four- vs. three-year) predicted participants' low vs. high stress levels. $P<0.05$ was considered statistically significant. The SPSS software (version 28) was utilized for all analyses.

Results: A total of 960 participants (761 faculty, 199 administrators; 17.3% response rate) from 139 US pharmacy schools completed the survey. Median scores of GAD-7 and PHQ-2 were significantly higher, whereas Grit-S scores were significantly lower, in participants with high stress levels compared to those with low stress levels (13 vs 1, 2 vs 0, and 3.6 vs 4.0, respectively; Mann-Whitney $U > 6394$, $P < .000001$). The proportions of participants with severe anxiety and depressive symptoms were significantly greater among participants with high stress levels than among participants with low stress levels (30% vs 0%, 41.1% vs 1.2%, respectively; $\chi 2 > 103.1$, $P < .000001$). The multiple logistic regression model explained 89.4% of the variance and significantly predicted low vs. high stress levels ($p<0.001$). Every unit increase in GAD-7 and PHQ-2 scores significantly increased the odds of participants having high stress by 2.09 and 2.98 times, respectively. No other variable significantly predicted low vs. high stress levels in the regression model.

Conclusion: The findings from this study indicate that anxiety and depression symptoms were associated with high stress levels in US pharmacy schools during the pandemic. Future studies should evaluate whether the relationship of anxiety and depressive symptoms with stress levels persists after the pandemic, and determine whether anxiety and depression symptoms management strategies could help cope with stress in the pharmacy academia.

Overview of breastfeeding education in pharmacy universities worldwide in relation to the learning outcomes of UNICEF UK's Baby Friendly Initiative for pharmacy students

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Background: During the first 6 months of life, exclusive breastfeeding is the safest and most accessible method of feeding for infants. Globally, in 2025, 37 countries have exclusive breastfeeding rates for the first six months below 30%, while only seven countries have exclusive breastfeeding rates above or equal to 70%. To support breastfeeding, mothers need guidance and support, particularly from healthcare professionals. A pharmacy can be a place for breastfeeding support and pharmacist can play a key role in breastfeeding success. To guarantee well-formed pharmacists on breastfeeding, UNICEF UK published in 2017 a guidance document for pharmacy students. After studying the state of breastfeeding education in French pharmacy schools in light of UNICEF UK recommendations, the situation was assessed in other pharmacy schools around the world.

Objective: The aim of this study is to compare breastfeeding learning program in pharmacy faculties worldwide with UNICEF UK standards recommended for pharmacy students.

Method: First, a study was conducted to compile a comprehensive list of all pharmacy schools in a given region. For each school, a lecturer specializing in infant nutrition was identified and sent a survey on breastfeeding education in relation to UNICEF guidelines. The extracted results were analysed with excel and Prism softwares.

Results: Regarding the various topics present in UNICEF UK's recommendations: For the first topic, the constituents of human milk and the protective functions of breast milk are taught in most pharmacy schools, whereas the role of human milk and breastfeeding in public health is covered much less. The same results were found for topic 2, except for the part concerning the use of formula milk and evidence-based information on this subject. In topic 3, most subjects were not covered.

Conclusion: As observed in our previous study concerning French pharmacy schools, heterogeneity between pharmacy faculties learning programmes worldwide has been identified. It was further determined that certain subjects are either inadequately or not at all addressed in the majority of pharmacy student programmes. This finding indicated the necessity for a Delphi group constitution to achieve harmonisation and facilitate the production of a syllabus for a breastfeeding learning programme wordwise.

Choosing global learning: Understanding student motivations for international pharmacy practice experiences

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Background: International Advanced Pharmacy Practice Experiences (APPEs) offer pharmacy students exposure to various healthcare systems and cultural contexts. This kind of experiential learning opportunity is a strategy that allows students to engage with diverse patient populations and to openly explore different healthcare delivery models. Understanding students' motivations for participating in these rotations may enhance program development and global pharmacy education initiatives and will help institutions design a meaningful international training opportunities for the students. The objective of this research was to explore and compare pharmacy students' motivations for participating in international APPEs and how these experiences would align with their personal development and career goals across multiple host countries.

Method: A qualitative study using inductive thematic analysis was conducted on open-ended survey responses from pharmacy students applying to international APPE sites over four application cycles (2022-2025). Responses to two questions, motivation for participation and perceived impact on personal and professional development, were analyzed. Responses were coded at the semantic level, and themes were generated inductively, refined through iterative review, and grouped into broader themes by country. Theme frequencies were calculated to describe distribution patterns.

Results: A total of 311 responses per question across four application cycles were analyzed. Application responses were distributed across three locations: London (n=148), Kenya (n=125), and Colombia (n=38). Individuals choosing London were largely driven by goals related to career progression, advanced clinical training, research and scholarly involvement, and exposure to a healthcare system different from their own. Some applicants also emphasized the opportunity to observe well-established clinical pharmacy

services in addition to multidisciplinary collaboration. In comparison, applicants who chose Kenya were commonly inspired by self-development, engagement with global health, and contributing to the care of vulnerable and underserved populations. Students highlighted the importance of experiencing healthcare delivery within resource-limited settings and gaining more experience in global health awareness. Students applying for an APPE in Colombia frequently expressed interest in improving fluency in the Spanish language to help overcome language barriers to patient care and support equitable access to healthcare. Language immersion was perceived as an important skill for improving communication within diverse patient populations. Across all destinations, enhancing intercultural competence and adapting to new environments that emerged as shared motivations. Applicants also reported that such experiences would strengthen their adaptability as well as professional confidence.

Conclusion: Students' interest in pursuing international APPEs varied by the host country, reflecting many different priorities in professional development, global health engagement, and language-driven healthcare access. These findings have emphasized how various international settings attract students with various educational expectations and distinct career goals. These results strategically design the placement of students for their international pharmacy experiences that will align the site characteristics with the student's own academic and developmental goals.

PharmaLearn-TB: A pharmacist-led microlearning health literacy program to improve adherence and outcomes in tuberculosis care

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Background: India bears a high burden of tuberculosis (TB), with treatment adherence remaining suboptimal despite free therapy under the National TB Elimination Program (NTEP). Low health literacy is a key determinant of poor adherence, leading to treatment interruption, misconceptions about therapy duration, and inadequate recognition of adverse drug reactions. Innovative, literacy-sensitive educational strategies are needed to address these gaps.

Objective: To develop, validate, and implement PharmaLearn-TB, a pharmacist-led microlearning intervention aimed at improving TB-related health literacy and medication adherence among newly diagnosed patients in semi-urban settings.

Method: A structured microlearning module comprising five thematic domains (TB basics, medication adherence, side effects, infection prevention, and nutrition) was developed using adult learning and health literacy principles (September–October 2025). Content validity was established via a modified Delphi process with expert panel review (S-CVI/Ave = 0.90). Reliability of the adapted TB Health Literacy Scale was confirmed through pilot testing (Cronbach's alpha = 0.82). A prospective interventional study was initiated across three TB outpatient centers in Telangana. Between November 2025 and January 2026, 124 patients were screened; 100 eligible participants were enrolled. Baseline TB literacy and adherence were assessed using interviewer-administered tools.

Results: Baseline findings indicated low TB literacy (mean 8.61 ± 3.43; 74% low literacy) and poor adherence (MMAS-8 mean 5.01 ± 1.59; 66% low adherence). The cohort was predominantly socioeconomically vulnerable, with 81% pulmonary TB and notable comorbidities including diabetes (18%) and undernutrition (34%). Pharmacists (n=6) achieved ≥85% competency in intervention delivery. By January 31, 2026, all participants had received the first microlearning session with no attrition.

Conclusion: PharmaLearn-TB represents a validated, scalable, pharmacist-led microlearning approach tailored to low-literacy populations. Ongoing evaluation will determine its effectiveness in improving adherence and treatment outcomes, with potential implications for integration into routine TB care programs.

Make your high school outreach poppin': An educational program for students, by students

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Background: This session describes a pilot outreach program at the University of Colorado Skaggs School of Pharmacy and Pharmaceutical Sciences in which pharmacy students educate and inspire high school students in the Denver, Colorado metropolitan area about the pharmacy profession, its diverse career pathways, and the role of pharmacists in healthcare and the community. The Pharmacy Outreach Program (POP!) is a four-lesson, activity-based curriculum delivered by pharmacy students in high school classrooms. The objective of this program is to evaluate the impact of a student-led outreach program on high school students' knowledge and perceptions of pharmacy careers, as well as pharmacy student professional development.

Method: The program was developed and implemented over two academic years at a college of pharmacy. Core

components included structured curriculum development, recruitment and training of pharmacy student instructors, and partnerships with local high schools. Programming was delivered on-site in high school classrooms to reduce access barriers. Evaluation included pre- and post-intervention surveys assessing students' knowledge of pharmacy careers, understanding of pharmacists' roles, and interest in health professions. Pharmacy student instructors completed reflective evaluations to assess professional growth, feasibility, and sustainability. Implementation processes and challenges were documented.

Results: Pre- and post-survey findings demonstrated increased knowledge of pharmacy career pathways and improved understanding of the pharmacist's role in healthcare by over 37% on average. High school participants reported greater awareness of educational requirements and career opportunities. Pharmacy student instructors reported enhanced communication skills, leadership development, and strengthened professional identity. The near-peer delivery model was identified as a key strength in promoting engagement and relatability. Logistical coordination and workload management were noted as implementation challenges.

Conclusion: A student-led, classroom-based outreach model is a feasible and adaptable strategy to expand early exposure to pharmacy careers, particularly for students who may face barriers to accessing higher education environments. Delivering programming within high schools increases accessibility while leveraging near-peer relatability to enhance engagement. Simultaneously, the model supports pharmacy student development as educators, mentors, and professional ambassadors. This approach represents a scalable strategy for strengthening the future pharmacy workforce pipeline.

Artificial intelligence readiness in PharmD curricula: A comparative curriculum analysis of South and Southeast Asia and North America

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Background: Artificial intelligence (AI) is increasingly changing healthcare systems through its applications in drug discovery, clinical decision support, pharmacovigilance, and personalised medicine. As healthcare delivery becomes gradually data-driven, the proficiencies required of healthcare professionals are also changing. Since pharmacists are anticipated to engage with digital health technologies, infer healthcare data, and apply AI-supported tools in medication management and clinical decision-making. Therefore, pharmacy education must adapt to prepare graduates for these evolving roles. The extent to which AI-related competencies are integrated into the Doctor of Pharmacy (PharmD) curricula remains unclear. It is particularly relevant in heavily populated regions such as South and Southeast Asia, where healthcare demands are high and constantly increasing and the pharmacy staff plays a vital role in refining medication use and patient effects. The present level of AI integration within pharmacy curricula is therefore crucial in order to identify educational gaps and guiding future curriculum transformations. To address this gap, the present study conducts a comparative curriculum analysis of PharmD programmes to evaluate the level of AI integration within pharmacy education across South and Southeast Asia and to compare these findings with selected programmes in North America.

Method: A comparative curriculum analysis utilizing curriculum mapping approach will be capitalized to evaluate publicly available PharmD curricula from approximately twenty universities from India, Bangladesh, Pakistan, Sri Lanka, Malaysia, Thailand, Indonesia, and the Philippines alongside selected universities in the North American region. Curricula will be reviewed systematically to mark clear or inherent insertion of AI, machine learning (ML), digital health (DH), health informatics (HI), and healthcare data analytics within courses and programme structures. A structured AI Readiness Framework will be used to assess the degree of AI integration within each curriculum that will evaluate different indicators, like the presence of dedicated AI-related courses, DH or HI modules, combination of AI-related topics within current subjects, possibilities for AI-oriented research activities, and exposure to pharmacy practice related digital healthcare tools. Scoring will be based on these indicators to generate a comparative assessment of AI readiness through the selected regions.

Results: Initial analysis suggests that while several North American pharmacy programmes have begun integrating elements of DH and HI into their curricula, explicit instruction focused specifically on AI remains relatively limited. In contrast, most PharmD programmes across South and Southeast Asia show marginal or no structured inclusion of AI-related competencies within their official curricula. The findings show a visible difference in their level of readiness to address emerging digital healthcare technologies and also highlights the need for greater attention to AI literacy and DH training within pharmacy education, especially in high population regions having rapid growth in healthcare demand.

Conclusion: The findings highlight an important gap in preparing pharmacy graduates for the evolving digital healthcare environment. Integrating AI literacy into PharmD curricula through foundational instruction and targeted incorporation within core pharmacy subjects is critical to prepare pharmacists for data-driven healthcare systems and improved medication outcomes.

Developing a FIP global pharmacist prescribing competency framework: Scoping review to Delphi

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Background: Pharmacist prescribing is expanding globally, yet existing prescribing competency standards are fragmented and inconsistent across countries and practice settings. This may compromise training quality and assessment. A global framework is warranted to align expectations, support competency-based education, and quality assurance. This project contributes to delivery of the FIP Brisbane Calls to Action and aligns with the FIP Hub priority project 'Advancing pharmacy practice: Developing a global prescribing competency framework'. This project aims to develop a global competency framework for pharmacist prescribing to support the development and alignment of prescribing competency frameworks worldwide. It also seeks to harmonise expectations across countries and income settings.

Method: The project uses a mixed method approach, embedding 4 phases: (1) a scoping review, (2) a stakeholder workshop, (3) a quantitative and qualitative content analysis, (4) an e-Delphi study. In the initial phase, a scoping review was undertaken to identify and map existing pharmacist prescribing competency frameworks globally, in accordance with Joanna Briggs Institute guidance and reported in line with the PRISMA-ScR checklist. The protocol is registered with the Open Science Framework (https://osf.io/4qdv7). In parallel, stakeholder engagement workshops were conducted with international pharmacy practitioners, educators, professional organisations, and regulators to explore practices, needs, gaps, and priorities for a global prescribing competency framework. Next, an initial draft framework will be developed through content analysis of identified frameworks and synthesis of stakeholder findings. The draft will be iteratively refined using a multi-round e-Delphi process with an international expert panel representing different regions, practice settings, and income levels. In each round, panellists will rate the relevance, clarity, and applicability of proposed competency domains and indicators using questionnaires until consensus is reached. The framework will be launched with supporting implementation resources co-developed with stakeholders.

Results: The team completed first two phases. The scoping review identified ten frameworks spanning Australia, Canada, Ireland, New Zealand, Saudi Arabia, South Africa, Switzerland, Thailand, the United Kingdom, and an international framework. Four frameworks were categorised as independent prescribing, two as collaborative prescribing, and four as responding to symptoms. Across all frameworks, there was a shared core of competencies around structured clinical assessment, safe medicine selection, medicines optimisation, patient-centred communication, safety-netting, interprofessional collaboration, legal and ethical practice, and continuing professional development. Independent prescribing frameworks added explicit expectations for diagnostic skills, end-to-end prescribing (initiation, modification, and discontinuation of therapy), monitoring plans, and governance. Three stakeholder engagement workshops were undertaken to cover different time zones. In total, 39 individuals participated from 19 countries over 3 workshops. Diverse scopes of prescribing practices, key barriers and challenges to address for advancing the role of pharmacists with prescribing were discussed.

Conclusion: This project demonstrates a clear need for a global competency framework for pharmacist prescribing and has produced early findings from a scoping review of existing frameworks, and international stakeholder sessions. Next steps include a content analysis and e-Delphi study before a final framework can be launched with accompanying guidance for implementation.

Education without borders: An online international pharmacy program to grow partnerships and improve accessibility

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Background: International education plays a critical role in preparing a globally competent pharmacy workforce by enhancing professional, academic, and cultural competencies. However, participation in study abroad programs is limited by financial, logistical, and personal barriers, particularly for students in low- and middle-income countries (LMICs). The University of Southern California Mann School of Pharmacy and Pharmaceutical Sciences (USC Mann)

has a longstanding in-person month-long International Student Summer Program (ISSP) that features integration across pharmacy disciplines and project-based teamwork. During the COVID-19 pandemic, the program transitioned to online delivery. Following resumption of in-person activities in 2022, it became evident that the online program enhanced participation from LMICs. Partners also conveyed a desire for continued virtual opportunities. Benefiting from established global partnerships, a well-defined curriculum, and online teaching experience, an International Student Winter Program (ISWP) was developed to reproduce the features of the ISSP in an online setting.

Method: Four ISWPs have been conducted annually from 2023 to 2026 for international pharmacy undergraduates. Each program spanned seven days and included ~15 hours of synchronous online instruction delivered from 19:00–22:00 Pacific Time to accommodate global time zones. The program mirrored core ISSP elements: focus areas, interdisciplinary team projects, and group facilitation by USC course assistants (PharmD/MS students). Participants selected a focus area (clinical pharmacy, pharmaceutical sciences, or regulatory sciences) and were assigned to multinational, interdisciplinary teams. Daily focus area instruction was followed by group project work. Projects were streamlined compared to the ISSP, but final group presentations were retained. Pre-post assessments of ten program objectives (POs) were collected. Each student ranked the POs from 10 (most important) to 1 (least important) using a forced-ranking scale.

Results: ISWP 2023-2026 enrolled 35–46 participants from 10–15 universities and 6-8 countries annually, with a total of 164 participants. Representation from LMICs was 54.3% (89/164) in ISWP 2023-2026 compared to 11.9% (41/344) in ISSP 2022-2025. Pre- and post-program surveys identified the perceived importance and achievement of POs, respectively. Before the ISWP, students did not expect to work with colleagues from other countries (PO5) and ranked this PO lower than in the ISSP (4.8 vs. 6.4). However, the post-program achievement of PO5 was similar in the two programs (6.8 ISWP vs 6.2 ISSP). The low pre-program perception of the importance of improving communication skills within a team (PO7) increased after both programs (ISWP 4.5 to 6.2, vs. ISSP 4.7 to 6.1). However, the integration across pharmacy disciplines (PO4) was lower post-program for the ISWP (4.8 ISWP vs. 5.8 ISSP).

Conclusion: The ISWP was developed in response to pandemic-related constraints, but has evolved into a sustainable and valuable component of USC Mann's international education strategy. The program enhances accessibility to global learning, strengthens international partnerships, and provides engagement opportunities without requiring travel. The ISWP maintains the interdisciplinary, team-based learning of the ISSP, showing that this can be translated into a virtual format. The integration of virtual and in-person global education pathways creates a more resilient and inclusive international strategy.

Shaping tomorrow's pharmacists: Development and evolution of a telemedicine elective for P1-P3 pharmacy students

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Background: Telehealth has become a vital component of modern patient care, yet pharmacy education has lagged in preparing students for virtual practice. Despite this growing demand, dedicated telemedicine coursework remains rare in pharmacy curricula.

Objective: This study evaluated the impact of a fully online telehealth elective on students' knowledge and perceived readiness to deliver virtual patient care. We hypothesized that students would demonstrate significant improvement in self-reported telehealth competency after completing the course.

Method: Since 2013, a fully online, 2-credit asynchronous elective was designed to introduce pharmacy students to telehealth and highlight its expanding role in healthcare. As pharmacy practice evolves, the course emphasizes preparing future pharmacists in a co-curricular setting to create opportunities and deliver patient care across virtual platforms. The course builds foundational knowledge of telehealth systems and develops competencies in communication, professionalism, teamwork, leadership, technology, and health systems management. Learning goals include distinguishing telehealth-related terminology, understanding legal and ethical issues, examining economic considerations and service development, exploring telemedicine use across medical specialties, and identifying pharmacists' roles in virtual care. Students also learn communication strategies for remote patient encounters and consider research and educational innovations within telehealth. Learning activities include case-based exercises, interviews with telehealth professionals, independent study, group work, and reflective assignments. The elective is organized into seven modules covering introductory concepts, patient and provider perspectives, telemedicine in correctional settings, clinic requirements, hands-on counseling via telehealth, legal and reimbursement considerations, and evaluation of emerging telemedicine companies. Assessments include discussion posts, a medication reconciliation activity, and a multi-step group project in which students research a telehealth company, develop presentation materials, conduct interviews, and record a final presentation.

Results: Now, in its thirteenth year, more than 200 pharmacy students engaged in this elective (Maximum student admission per year ranged between 10 and 18 students). An optional pre- and post-survey was administered beginning in

2024 to assess perceptions of telehealth. Of 43 participants in the pre-survey group, 72% (n=31) were women, 70%(n=30) were 20-25 years old, and 49%(n=21) were P2 students enrolled in the class. All students reported possession of a smartphone with 98%(n=42) using a video chat service and 49% reporting increased use since the COVID-19 pandemic. Prior to starting the class, 79%(n=34) reported feeling somewhat/not knowledgeable at all on the topic of telemedicine while 77%(n=33) reported at least one concern with telemedicine utilization. 51%(n=22) felt the quality of telemedicine was not as good as in-person care and 42%(n=18) felt conducting a telemedicine medication interview might/would be challenging to communicate with patients. Of 18 participants in the post-survey group, 94%(n=17) reported feeling knowledgeable/very knowledgeable while 6%(n=1) felt somewhat knowledgeable on the topic of telemedicine. The proportion of highly knowledgeable respondents increased from 9/43 (21%) pre-course to 17/18 (94%) post-course ($p < 0.000001$).

Conclusion: To our knowledge, this is the only pharmacy elective focused exclusively on telehealth service delivery. The course provides a comprehensive introduction to virtual care, equipping students with practical skills, interdisciplinary perspectives, and confidence in navigating the evolving telehealth landscape. A significant improvement in perceived telehealth knowledge was observed following course completion.

From classroom to asynchronous learning: The development and evolution of an infectious diseases elective

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Background: Pharmacists play a critical role in the prevention, identification, and management of infectious diseases, yet many students have limited opportunities for advanced, case based training within the traditional curriculum.

Method: A case based infectious diseases elective was developed at the University of Illinois Chicago/Rockford, Retzky College of Pharmacy in Spring 2013 to provide third year pharmacy students with advanced training in infectious disease management. The course was initially delivered in person, with students assigned to groups to research, develop, and teach didactic content under faculty mentorship, while faculty facilitated discussions of real clinical cases. In 2020, the course transitioned to synchronous online delivery, and in 2024 it was converted to a fully asynchronous format in response to student feedback and growing demand for flexible learning options. In its current form, this fully asynchronous online elective advances pharmacy students' clinical understanding of infectious diseases and their ability to make evidence based therapeutic recommendations. The course focuses on developing core patient centered care skills through case based learning and independent study. Students learn to interpret signs and symptoms using physical exam and laboratory data, explain anti infective mechanisms of action, and select organism specific antimicrobial therapy. They apply clinical guidelines, primary literature, pharmacology, and PK/PD principles to recommend individualized antimicrobial regimens. Additional objectives include educating patients and caregivers on medication use, adverse effects, and drug interactions; identifying relevant laboratory monitoring strategies and therapeutic drug monitoring to ensure treatment safety and effectiveness. Instructional methods consisted of reviewing online lectures, podcasts, and assigned readings, followed by completing topic-specific assignments for each module. Assessment is based on module assignments—including multiple-choice questions, journal article critiques, case worksheets, and discussion posts—and a semester long individual project where each student chooses an emerging or global infectious disease (i.e. Candida auris, Chagas, Chikungunya, Measles, etc.). For the final project, students develop a one page informational handout on an infectious diseases topic and present their work in a recorded video. Peer evaluations of student presentations further enhance engagement and reinforce learning objectives. Course content is delivered through eight modules covering foundational microbiology, antimicrobial resistance, tuberculosis and atypical pathogens, fungal and mold infections, infections in immunocompromised hosts, and sexually transmitted infection treatment and prevention.

Results: Two hundred and eighty-nine third-year pharmacy students have taken this course since its inception. Student evaluations across both campuses remained positive at each iteration of the course, with all evaluations ranking 4 or higher on a 5-point scale each time the course was offered (n=11). The elective was not offered in 2022 and 2023 due to low enrollment, as it conflicted with four other electives at the same time. Based on this, an asynchronous model was created.

Conclusion: This infectious diseases elective provided nearly 300 pharmacy students with advanced training in anti-infective therapy, evidence based decision making, and exposure to global infectious diseases. Strong evaluations across all iterations reinforce the course's clinical value. Transitioning to an asynchronous format improved accessibility. Overall, the elective remains a practical and adaptable model for preparing pharmacy students to manage complex infectious disease cases.

Chat, where should I go? Evaluating artificial intelligence for identifying global health education opportunities in US PharmD programs

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Background: Recent updates reflected in the 2022 Curricular Outcomes and Entrustable Professional Activities (COEPA) and the 2025 American Council for Pharmacy Education (ACPE) standards highlight a focus on cultural competence and health equity in PharmD curriculums in the United States (US). One effort that could support programs' achievement of these standards is implementing immersive global health education opportunities. Previous literature estimated that international advanced practice pharmacy experiences (APPE) were available in approximately 50 schools. However, this information has not been updated in 10 years. More recently, the opening of new pharmacy schools, changing international relationships, and the global COVID-19 pandemic drastically changed the ability to and perspectives towards travel. The rise of artificial intelligence (AI) and its efficiency in searching through vast data offers a possible alternative to information gathering when survey-based investigations are impacted by low response rates. This study's objective is to compare the accuracy of information generated by three AI models (Gemini©, ChatGPT©, and Claude©) regarding US PharmD programs, with a specific focus on the availability of international global health education opportunities.

Method: A cross-sectional descriptive study of 141 US PharmD programs utilizing three common AI programs: Gemini©, ChatGPT©, and Claude©. Each AI program was provided with the same initial prompt, followed by clarification prompts as needed to extract information regarding the programs' characteristics (establishment year, program information, student demographics, tuition, NAPLEX pass rates), the existence of global health programs, and international travel options such as international APPE rotations or short-term trips. A descriptive comparison between the programs was conducted with the assistance of two undergraduate researchers. Manual verification is ongoing, with independent review by two investigators to confirm accuracy. This study was determined to be non-human subjects research.

Results: Descriptive comparison of AI-generated responses across programs was conducted. Foundational program characteristics were first evaluated as a reference point to assess baseline accuracy across platforms. ChatGPT© and Claude© provided identical responses for program establishment year, while Gemini© differed approximately 30% of the time. When evaluating the primary outcome of interest, availability of international travel opportunities, greater variability was observed. Overall, Gemini© reported international travel opportunities in 96%, ChatGPT© in 98%, and Claude© in 70% of PharmD programs. Ongoing manual verification will further characterize accuracy and is expected to be completed in July 2026.

Conclusion: AI-generated information regarding PharmD programs demonstrates notable variability, particularly in identifying global health and international travel opportunities. These findings underscore the need for improved transparency and accuracy in publicly available program information. This study represents an initial phase of a broader investigation aimed at validating AI-generated data, improving accessibility of program specific global health opportunities, and fostering greater visibility across pharmacy education. Future work will support collaboration between institutions, recruitment of students, and enhance students' ability to identify and engage in global health experiences. Prospective students looking for their ideal PharmD program may be able utilize these AI platforms and this study's findings to identify travel-related opportunities during pharmacy training.

Artificial intelligence in de novo drug discovery: A rapid review of recent advances

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Background: Discovering new medicines remains slow and costly, with high attrition before clinical use. Artificial intelligence (AI) promises to shorten hit finding and design cycles, yet clinicians and pharmacists need a clear, practice focused synthesis. In particular, there is a growing need to translate computational advances into clinically relevant knowledge that supports decision making, safety evaluation, and therapeutic optimisation in everyday pharmacy practice.

Objective: The presented studies focus on the role of AI driven de novo design and to identify implications for pharmacy practice and training. We explore whether the

technology has moved beyond simulation to validated leads that pharmacists could assess, interpret, and potentially integrate into clinical and industrial workflows.

Method: Data was obtained by searching the PubMed data base. The findings are presented with descriptive statistics.

Results: In these studies, generative networks and transformer-based models were shown to rapidly produce virtual libraries of potential drug molecules within days. The overall drug discovery process, including synthesis and initial in vivo validation, was significantly accelerated, with timelines reduced to less than one year. The findings also indicate that modern algorithms can prioritise compounds with simpler and more feasible synthesis pathways, which is highly relevant for pharmaceutical manufacturing. However, predictive accuracy for absorption and toxicity remains moderate, highlighting the importance of pharmacist expertise in evaluating pharmacokinetics and safety (ADMET). Overall, their results demonstrate a reduction in drug design time of approximately 50–70%. Despite these advances, no evidence of integration with pharmacy practice, hospital data systems, or implementation strategies was identified. Additionally, variability in model performance across datasets suggests the need for standardised validation approaches and highlights challenges in reproducibility, transparency, and real world applicability of AI generated candidates.

Conclusion: Generative AI is producing real world chemical leads faster than traditional methods, yet integration into pharmacy practice and education lags behind. Next steps include pilot collaborations using hospital compound archives and embedding AI case studies into pharmacy curricula. This review supports a wider strategy to position pharmacy at the interface of computational discovery and patient care. Furthermore, strengthening interdisciplinary collaboration between pharmacists, data scientists, and medicinal chemists will be essential to ensure safe and effective implementation. Developing regulatory frameworks and practical guidelines could additionally facilitate the responsible adoption of AI tools in real world healthcare settings.

Training the digital pharmacist: Student perspectives on AI-enhanced skills labs and drug information

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Background: As digital health transforms patient care globally, pharmacy education must prepare graduates not only to navigate health technologies, but to lead digital healthcare initiatives. In the United States, this preparation is now embedded in accreditation standards yet practical, evidence-based models for integrating digital health into pharmacy curricula remain limited. This study describes a sequenced curricular approach and evaluates its impact on student knowledge and professional identity.

Method: First-year PharmD students received foundational instruction in health technology during a first trimester course covering four core domains: digital health, digital therapeutics, artificial intelligence, and ethical considerations in digital care. In the subsequent trimester, students participated in a hands-on "digital lab" embedded within their Skills course, where they evaluated five digital health devices for clinical utility and impact on patient outcomes. To assess the intervention, students completed pre- and post-surveys measuring knowledge and perspectives, supplemented by narrative reflections analyzed using thematic analysis.

Results: Statistically significant improvements were observed across all knowledge domains. Overall digital health knowledge increased from 49% to 61% (P=0.018), and the ability to differentiate core digital health concepts improved markedly from 15% to 80% (P<0.01), including AI applications in healthcare. Perceived competency in the safe and ethical use of digital care rose from 62% to 83% (P<0.01). Thematic analysis of student reflections identified three emergent themes: deepened appreciation for digital health's impact on clinical outcomes, expanded understanding of the pharmacist's role in patient counseling and data interpretation, and critical awareness of real-world barriers including cost, insurance coverage, and data privacy.

Conclusion: This sequenced, experiential model demonstrates a replicable approach to integrating digital health and artificial intelligence into pharmacy education. The intervention produced meaningful gains in knowledge, ethical reasoning, and professional readiness, with students expressing strong interest in digital health careers. These findings have implications for pharmacy programs globally seeking to produce practice-ready graduates for an increasingly technology-driven healthcare landscape.

Four years of OSCEs at Lille Faculty of Pharmacy: Implementation, development, and outlook in the context of the reform of community pharmacy education in France

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Background: Community pharmacy practice in France has undergone a significant transformation. Pharmacists now have broader clinical responsibilities, including prescribing and administering vaccines, conducting medication reviews and counselling patients. In response to these changes, the Lille Faculty of Pharmacy adopted a competency-based curriculum in 2020, structured around four core competency domains. As part of the pedagogical alignment of the community pharmacy curriculum, Objective Structured Clinical Examinations (OSCE) were introduced in 2022 as summative assessments for 6th-year community pharmacy students. This work aims to present a four-year longitudinal experience of OSCE implementation at Lille Faculty of Pharmacy, to report iterative improvements across editions, and to inform the broader adoption of competency-based assessment in French pharmacy education.

Method: OSCEs were conducted annually from 2022 to 2025 as summative examinations at the end of the first semester of the 6th year (community pharmacy track). Each edition comprised 8 stations (6 interactive with standardised participants, 2 non-interactive) covering four competency domains: dispensing medicines, patient-centred care, pharmacy management and legislation, and public health. Student performance was recorded digitally using criterion-referenced checklists. Equity factors were applied when inter-jury variability was identified. Anonymous post-examination surveys assessed student perceptions regarding relevance, alignment with training, and stress levels. Key iterative changes included: scheduling OSCEs after the first community pharmacy internship, intensifying evaluator training, and involving 5th-year students in developing assessment grids to improve pedagogical transparency.

Results: Over four editions, a total of 521 sixth-year community pharmacy students were assessed (105 in 2022, 149 in 2023, 125 in 2024, and 142 in 2025). Pass rates remained relatively stable: 63.8% (2022), 46.3% (2023), 54.4% (2024), and 51.4% (2025), reflecting the reliability and rigor of the assessment rather than a decline in student performance. Stations assessing patient counselling and medication management consistently showed lower scores, whilst interprofessional communication and vaccine administration stations performed better. Post-examination surveys indicated high levels of satisfaction, with 84% of respondents rating the OSCEs as fair and clinically relevant.

Conclusion: Four consecutive years of OSCE at the Lille Faculty of Pharmacy have demonstrated the feasibility and relevance of competency-based assessment in community pharmacy training. Progressive iterative refinements have improved educational alignment, reduced assessor variability and enhanced student preparedness. This longitudinal experience provides robust evidence in favor of integrating OSCE into the forthcoming national curriculum reform in community pharmacy, thereby contributing to the broader transformation of pharmacy education in France.

Serious games at Lille Faculty of Pharmacy: Four complementary tools for competency-based education across diverse pharmacy domains

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Background: Pharmacy education must equip students with the complex professional knowledge and competencies that go beyond traditional didactic teaching. Since 2014, the GIVRE group (Groupe pour l'Innovation, la Valorisation et la Réflexion sur les Enseignements), a multidisciplinary collective of teacher-researchers at the Faculty of Pharmacy in Lille, has developed a portfolio of serious games targeting various pharmacy-related competencies. These immersive tools promote active learning, self-assessment and the

development of professional skills. This paper evaluates the design and contribution of four GIVRE serious games to competency-based education across curricula.

Method: All games were developed in-house using the open-source Scenari Opale platform, ensuring full pedagogical and editorial control without external dependencies. (1) E-Caducée (2014): a video game simulating dispensing scenarios in community pharmacies, featuring progressive difficulty levels (beginner/intermediate/expert), gamification mechanics (badges, experience bars, boss battles), and built-in learning analytics. Containing approximately 100 dispensing and over-the-counter request scenarios, it supports 5th- and 6th-year students enrolled in the community pharmacy programme throughout their clinical training. It has been deployed in other French pharmacy schools (Bordeaux, Nantes). (2) SIMbiose (2019): an interprofessional serious game with interactive progressive case studies to explore all aspects of biological analysis (prescription, analytical technique, interpretation), jointly developed by the Faculties of Medicine and Pharmacy in Lille for fifth-year pharmacy students preparing for a hospital career. (3) Safe Travel (2019): a board and online game modelled on Trivial Pursuit®, delivering multidisciplinary travel medicine counselling training for fifth-year pharmacy students, with planned French and English extensions to medical students and healthcare professionals via a partnership with Pasteur Institute of Lille (International vaccination center). (4) KeepControl (2023): a serious game set in a pharmaceutical company's quality control laboratory, where the player takes on the role of an intern performing quality control of raw materials and finished dosage forms. Structured into 3 seasons (hygiene and safety; titrimetric methods; spectrophotometric methods), each comprising multiple episodes of increasing difficulty, this tool is positioned between theoretical and practical teaching sessions to foster student autonomy and reinforce theoretical knowledge. Each tool was evaluated through student satisfaction surveys, knowledge assessments, and/or learning analytics.

Results: Evaluation data are currently available for E-Caducée, which has reached over 1,200 students since 2014. Learning analytics have enabled fine-grained tracking of skill acquisition across professional scenarios, supporting iterative improvements to the game's content. SIMbiose, Safe Travel, and KeepCONTROL are in active use within their respective curricula; formal evaluation of learning outcomes is ongoing and will be reported in future work.

Conclusion: The GIVRE experience demonstrates that serious games can be effectively designed and deployed across diverse pharmacy competency domains, from community pharmacy practice to laboratory science, travel medicine, and interprofessional collaboration. The diversity of formats (video game, board game, online platform) and the use of learning analytics reflect the versatility of game-based learning. Beyond their pedagogical relevance, these tools are particularly well suited to a new generation of learners who are accustomed to digital environments and expect interactive, engaging educational experiences. They provide transferable models for integrating active, technology-enhanced pedagogy into pharmacy curricula worldwide.

Evaluating the relationship between objective structured clinical examination performance and advanced pharmacy practice experience performance evaluations among student pharmacists in a cohort study

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Background: Doctor of Pharmacy students must demonstrate competence in clinical and people-centred care skills before transitioning from didactic coursework to advanced practice clinical rotations. Objective Structured Clinical Examinations (OSCEs) are standardized tools to assess clinical skill competencies through the use of verbal stations such as patient case presentation and patient counseling. Students must pass OSCEs before progressing to Advanced Pharmacy Practice Experience (APPE) rotations. Prior studies have looked for a link between OSCE and APPE performance; however, data comparing OSCE outcomes to predict APPE performance, as measured by Entrustable Professional Activity (EPA) subtask ratings provided by practice site preceptors, remains unestablished. This study aims to evaluate the relationship between OSCE success and clinical entrustability ratings, hypothesizing that students who pass the OSCE on their first attempt will achieve higher APPE EPA ratings.

Method: This retrospective cohort study at the USC Alfred E. Mann School of Pharmacy included students from the Class of 2026 who passed the OSCE and began APPEs on schedule between March and September 2025. Participants were categorized into two groups: those passing the OSCE on the first attempt and those requiring multiple attempts. The primary endpoint was the percentage of EPA subtask ratings of Reactive Supervision (RS) or higher, in an acute, ambulatory and community setting, as determined by preceptors using a standardized five-level entrustment scale. For students to achieve a rating of "Reactive supervision", they must receive an EPA subtask rating of greater than 2. The secondary endpoint compared the number of students achieving 100% EPA ratings at or above reactive supervision per rotation setting (acute, ambulatory, community). Statistical analysis utilized chi-square and t-tests on de-identified data to quantify results.

Results: An analysis of 354 APPE evaluations was conducted across 182 students. Of the 354 APPE evaluations, 159 were

from students who passed the OSCE on the first attempt and 195 evaluations were from students who passed the OSCE on the second or later attempts. There was no statistically significant difference in the primary endpoint between first attempt pass and second attempt or later pass (78.6% vs. 70.2%, p=0.07). There was a statistically significant difference observed in the Acute Care settings between the two groups (p=0.02). No statistically significant differences were observed in Ambulatory (p=0.63) or Community (p=0.54) settings.

Conclusion: Initial OSCE pass attempt did not determine overall APPE readiness. Students who required more than one attempt to pass the OSCE showed no difference in clinical performance in the four APPE blocks compared to students who passed the OSCE on the first attempt. Although early OSCE performance failed to predict success in ambulatory care and community practice, secondary analysis revealed students passing on their first attempt achieved significantly higher EPA ratings in acute care. This may suggest the high pressure OSCE structure better mimics acute care settings, which require rapid clinical reasoning and pharmacotherapy recall compared to outpatient settings. Future research may be needed to assess the relationship between specific OSCE stations and APPE rotations.

A descriptive analysis of curricular and structural changes and observed trends in student pharmacists' performance in objective structured clinical examinations

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Background: Objective structured clinical examinations (OSCEs) assess pharmacy students' readiness for advanced pharmacy practice experiences (APPEs) by evaluating clinical skills, communication, problem-solving, and clinical judgment in people-centred care across multiple stations. OSCEs increase in complexity across the curriculum, as formative in the first year (P1) to high-stakes in year 3 (P3). These summative assessments are required for APPE progression. Despite minimal structural changes, P3 first-attempt pass rates have declined in recent years. In response, curricular and structural interventions were implemented to improve student preparedness. This study describes these interventions and evaluates aggregate P2 and P3 first-attempt OSCE outcomes for the PharmD Classes of 2026 and 2027.

Method: A retrospective, quasi-experimental study compared PharmD cohorts (Class of 2026 [pre-intervention] and Class of 2027 [post-intervention]) following curricular and OSCE redesigns aligned with APPE expectations. P2 OSCE changes included removal of the skills lab and conversion of the patient presentation to a timed patient workup and presentation. P3 OSCE revisions included elimination of the written exam, addition of a structured oral examination, and transition to a fully oral format. The P3 schedule was also modified by moving the first attempt earlier and delaying the retake. Didactic enhancements included increased synchronous instruction, drug knowledge quizzes, pharmacy calculations assignments, and restructuring of case conferences to emphasize real-time patient workup. The APPE Gateway course incorporated mock OSCEs and redistributed written exam content. Additional skills-based interventions included medication counseling workshops, blood pressure training, and structured patient presentation practice with feedback. Aggregate first-attempt pass rates for P2 and P3 OSCE stations were compared between cohorts. Stations were graded pass/fail using standardized rubrics by trained evaluators, with institutional review to ensure consistency.

Results: In the P2 OSCE, both cohorts achieved 100% first-attempt pass rates in the skills lab (2026 only). Patient presentation pass rates were higher in 2026 (90%, n=167) than 2027 (48%, n=132), while patient interview performance was similar (75% vs. 76%). Medication device counseling pass rates were 86% (2026) and 52% (2027). Written assessment pass rates were lower overall (41% vs. 25%). In the P3 OSCE, patient presentation pass rates were comparable (47% for 2026, n=177; 44% for 2027, n=133). Medication device counseling pass rates were 79% and 74%, respectively. The written station (2026 only) had a 40% pass rate, while the oral examination introduced in 2027 had a 26% pass rate.

Conclusion: Despite expanded practice opportunities, declines in P2 performance suggest that early curricular changes may initially challenge learners. However, comparable P3 outcomes across cohorts and improved medication device counseling in the Class of 2027 support the value of longitudinal skill development. These findings suggest that aligning curricula with advanced assessments may temporarily impact performance but ultimately supports competency attainment over time.

Implementation of an observational feedback tool to enhance simulation based education in a Doctor of Pharmacy program

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Background: High quality simulation-based education (SBE) supports the development of professional and clinical skills in pharmacy learners and aligns with the "shows how" level of Miller's clinical competency framework. Evidence-based approaches to simulation, including the NHET Sim six phases

of simulation and the INACSL Healthcare Simulation Standards of Best Practice™, provide structured methods for designing and delivering effective SBE activities. A review of SBE within our Doctor of Pharmacy program highlighted opportunities to strengthen the consistency, quality and educational value of feedback provided during simulated patient encounters. To address this, we introduced an observational feedback tool to support structured, constructive, and standardised feedback for students. This project aims to (1) implement an observational feedback tool within SBE activities across the Doctor of Pharmacy program, and (2) explore student and tutor perceptions of the tool's usefulness, clarity, and practicality.

Method: Current SBE activities were critically reviewed using the NHET Sim framework and INACSL standards to identify gaps and areas for enhancement. An observational feedback tool was subsequently developed and incorporated into Semester 1, 2026 SBE sessions. Students (years 1 and 2) and clinical tutors will be invited to complete questionnaires collecting qualitative and quantitative data on the usability and perceived value of the tool. Data collection is currently underway, with analysis planned for June 2026.

Results: As this study is in progress, results will be available by June 2026. Full findings will be reported in the final poster.

Evaluating a bilateral mentorship fellowship to strengthen global pharmacy leadership in antimicrobial stewardship

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Background: Antimicrobial resistance (AMR) is a major global health threat requiring strong leadership to implement effective antimicrobial stewardship (AMS). Pharmacists are central to AMS delivery; however, structured leadership development opportunities that enable global collaboration remain limited. The UK–Africa Leadership Fellowship in Antimicrobial Stewardship (UK-ALF-A), delivered by the Commonwealth Pharmacists Association (CPA), was established to strengthen pharmacists' leadership capacity through a bilateral model combining training, dual mentorship, and work-based quality improvement (QI) projects across the UK and seven sub-Saharan African countries.

Objective: To evaluate the impact of the UK-ALF-A Fellowship on leadership development, AMS practice, and organisational capacity, and to assess the effectiveness and sustainability of its dual-mentorship model.

Method: A mixed-methods programme evaluation was conducted over a 12-month fellowship cycle. Quantitative evaluation included pre- and post-programme self-assessments and 360° feedback from senior colleagues, mapped against the International Pharmaceutical Federation Global Advanced Development Framework (FIP-GADF). Feedback and impact data were collected through structured exit surveys and semi-structured interviews with fellows and mentors. Programme documentation (e.g. QI project reports, fellowship records) was analysed to assess individual and organisational impact, as well as the effectiveness of the dual-mentorship model. Reflective accounts from alumni mentors, who received formal mentor training, were also analysed to explore the role of alumni in sustaining the fellowship network.

Results: All 40 fellows completed the programme (100% completion), delivering 40 documented AMS QI projects. Quantitative findings showed measurable improvements in leadership and communication skills, as well as confidence in expressing own views and opinions. The programme facilitated 80 mentorship pairings and engaged over 30 alumni mentors, supporting a growing community of practice. Qualitative findings demonstrated consistent leadership development across contexts, with particularly strong transformational impact reported by fellows who described increased confidence, self-awareness, and professional identity as leaders. Participants reported improved delegation, communication, and ability to influence multidisciplinary teams, alongside greater engagement in AMS activities such as ward rounds, guideline implementation, and stewardship advocacy. More experienced participants noted less benefit from foundational AMS content but valued leadership and QI components. Organisational impact included strengthened AMS governance, improved prescribing practices, enhanced multidisciplinary collaboration, and implementation of practical tools such as audits and guidelines. In some settings, impact extended beyond institutions to community and system-level initiatives. Mentorship was a key enabler, with mentors providing essential contextual support and strategic guidance. However, variability in mentor matching and availability was noted, alongside a preference for more flexible, needs-based engagement. Common challenges reported by fellows included balancing clinical workload with programme demands, time constraints, and occasional connectivity issues affecting virtual participation.

Conclusion: The UK-ALF-A Fellowship demonstrates that a structured, bilateral mentorship model can deliver meaningful leadership development and strengthen AMS capacity across diverse health systems. The programme's impact is particularly pronounced in resource-limited settings, where it supports both individual transformation and organisational change. Future iterations should continue to adopt tailored content, flexible mentorship approaches, and strengthened peer support to enhance scalability. This model offers a sustainable approach to developing pharmacist leaders capable of translating global AMR priorities into locally driven action.

Mapping AI readiness competencies across a pharmacy curriculum

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Background: To assess the breadth and depth of artificial intelligence (AI) readiness competency integration across a pharmacy school curriculum, identify gaps, and inform strategic planning for AY 2026-2027.

Method: A cross-sectional curriculum mapping study was conducted at a single institution. Faculty completed a survey assessing presence and depth of AI content across four dimensions: D1 (Understanding AI and Data), D2 (Critical Thinking and Judgment), D3 (Ethical and Responsible Use), and D4 (Human Creativity and Augmentation). Coverage was assessed at two levels: AI Literacy (foundational) and AI Fluency (applied) and rated by integration depth (minimal, moderate, substantial). Faculty also reported hands-on activities, assessment methods, interest in expansion, barriers, and support needs. Responses were mapped descriptively across the curriculum.

Results: Twenty-four faculty representing 19 courses responded. Thirteen courses (68%) reported AI content in at least one dimension; six courses — predominantly within the professional PharmD sequence — reported none. D3 (Ethical Use) was the least consistently integrated dimension. Substantial integration was reported in three courses; hands-on AI activities were required in six. Most faculty (79%) expressed moderate or strong interest in expanding AI content. Top barriers included lack of curriculum time, insufficient training, and limited teaching resources. Sample assignments/activities and discipline-specific workshops were the most frequently requested supports. AI readiness was rated very important or critical by 88% of respondents.

Conclusion: Significant AI readiness gaps exist, particularly within the professional PharmD sequence and across ethical dimensions. Faculty interest in expansion is high but support infrastructure is needed. These findings provide an evidence base for intentional, coordinated AI curriculum development aligned with ACPE Standards 2025 expectations for technology-ready graduates.

Developing sports pharmacy education at the University of Bath: Implementation of a short course and student confidence survey

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Background: Sports pharmacy is an emerging discipline concerned with optimising athlete health, ensuring clean sport, and addressing public health challenges associated with image and performance enhancing drugs (IPEDs). The University of Bath, recognised internationally for excellence in pharmacy, performance sport, and sports and exercise medicine, recently launched a Sports Pharmacy Short Course to address the growing need for pharmacist competencies in this field. Despite increasing interest globally, little sports pharmacy education exists in the UK, highlighting a gap this initiative seeks to explore and address.

Objective: The aim of this work is to describe the development of the University of Bath's Sports Pharmacy Short Course and to evaluate learner confidence and interest in further study by conducting a survey of pharmacists and pharmacy students before and after course completion.

Method: A four hour online, non credit bearing e learning module was developed collaboratively with multiprofessional contributors from UK Anti Doping, sports physicians, sports pharmacists, physiotherapists, sports medicine lecturers, athlete representatives, and the UK Sports Institute. Course content includes: the role of sports pharmacists and athlete support personnel; clean sport; public health and IPEDs; case studies; and interactive knowledge assessments, concluding in an invitation to take part in a survey. The survey measures baseline and post-course confidence in sports pharmacy concepts, and interest in pursuing further study in this clinical area.

Results: Data collection for the survey is currently in progress. Preliminary descriptive results will explore changes in learners' understanding of sports pharmacy, perceived preparedness to support athletes safely within regulatory frameworks, and appetite for expanded training opportunities. These findings will inform future direction of sports pharmacy related postgraduate education at Bath, including potential development of credit bearing MSc units.

Conclusion: The Sports Pharmacy Short Course represents a novel interdepartmental educational initiative addressing a rapidly developing practice area. The ongoing evaluation will provide valuable insight into learner needs, guide refinement of course design, and support strategic planning for expanded sports pharmacy education. This work contributes to growing global efforts to strengthen pharmacists' roles in athlete health, clean sport, and public health.

Pharmacy Connect: Responding to global health threats through digital health literacy and pharmacy education on substandard and falsified medicines

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Background: The way patients access medicines and healthcare advice is evolving, driven by telehealth, e-prescribing, and online medicine purchasing, yet pharmacy education remains oriented towards traditional, brick-and-mortar models of practice. The International Pharmaceutical Federation has identified digital health literacy as a global workforce priority, yet significant gaps persist in its integration into pharmacy curricula and clinical practice. An estimated 96% of online pharmacies globally operate illegally, posing a direct risk of exposure to substandard and falsified (SF) medicines (Mackey & Nayyar, 2017; Oriakhi et al., 2024). Despite this, advising patients on the risks of online medicine purchasing remains absent from routine pharmacy practice (Zaprutko et al., 2025). Pharmacy Connect has three concurrent aims: (i) a global needs assessment of digital health literacy linked to SF among pharmacy educators and practitioners across knowledge, confidence, and curriculum integration, identifying barriers to embedding digital health and SF medicines in education and CPD; (ii) a participatory workshop with pharmacy educators and practitioners to adapt existing consultation frameworks with digital health literacy domains including explicit prompts for online medicine purchasing enquiry and regulated pharmacy verification during medicines review; (iii) using identified gaps to inform co-design of digital health micro-modules, co-developed by UCL and SingHealth.

Method: A cross-sectional online survey distributed globally comprised 21 items covering demographics, teaching confidence in digital health (AI, telepharmacy, data governance), curriculum integration, SF medicines awareness, digital tool potential, interest in a global educator network, and collaboration barriers. Quantitative data were analysed descriptively; free-text responses underwent thematic analysis. Concurrently, a Singapore workshop used structured discussion and consensus to co-develop draft digital health consultation domains and pharmacist prompts.

Results: 113 respondents completed the survey across 5 WHO regions (South-East Asia 44%, Europe 26%), predominantly academic lecturers (44%) and hospital pharmacists (21%), 71% with over 11 years experience. Digital health literacy was consistently low: teaching confidence of 2.60/5 for AI, 2.76/5 for telepharmacy, 2.81/5 for data governance; only 13% reported full curriculum integration. Key barriers: limited educator training (57%), curriculum overload (43%), digital infrastructure (41%). SF medicines awareness was moderate (3.00/5); 63% reported no or limited coverage despite 63% seeing considerable potential for digital tools in SF detection. Seven collaboration barriers: time and workload, technology gaps, language differences, structural barriers, knowledge gaps, regulatory variation, and low engagement. Visions of a digitally enabled pharmacy produced five themes: AI-assisted error prevention; integrated data; expanded patient access; human-centred pharmacist augmentation; and planetary health. The Pharmacy Connect workshop produced draft consultation domains and prompts to develop new digitally enhanced consultation models.

Conclusion: Pharmacy Connect has surfaced a significant gap between contemporary patient behaviour and the digital health literacy of the pharmacy workforce. These findings are relevant to educators, curriculum developers, practitioners, and policymakers globally. Pharmacy curricula remain oriented towards traditional models; existing gold standard consultation frameworks have yet to be adapted for digitally-mediated care. Identified gaps have informed the micro-module co-design through UCL and SingHealth. The appetite for a global educator network across all WHO regions presents a timely opportunity to develop future-facing, digitally-informed training at scale.

Evaluation of industry fellowship opportunities for international pharmacy students in the United States

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Background: International students enrolled in a Doctor of Pharmacy (PharmD) programme within the United States (U.S.) represent an important and growing segment of the pharmacy workforce. Despite completing their training within the country, these students often encounter legal and regulatory challenges when pursuing post-graduate training to further their professional aspirations. Industry fellowship positions serve as a key pathway into pharmaceutical careers such as medical affairs, regulatory sciences, and clinical development. Many fellowship programmes restrict eligibility based on citizenship status, limiting access for otherwise well-qualified graduates. While some research has examined the factors influencing residency training accessibility for U.S.-trained international PharmD students, no studies have evaluated fellowship programme accessibility. This study aims to describe industry programme characteristics relating to U.S.-trained international PharmD students.

Method: A 15-item survey was distributed to industry fellowship programme directors across the U.S. to collect information on programme characteristics, prior experience with international applicants, and current eligibility policies. The survey was administered using Microsoft Forms and disseminated via email to industry fellowship programme

directors. Prospective subjects and programme contact information were collected through publicly available sources including the Fellowship Catalogue within the Industry Pharmacists Organization website and available programme brochures. An initial email invitation was sent to prospective participants, followed by two reminder emails to maximise response rates. Survey responses were collected over a four-week period. Survey items assessed perceived barriers, including visa sponsorship requirements, institutional policies, administrative burden, and organisational constraints. A 5-point Likert scale was used to evaluate factors influencing programme level selection decisions, including preparedness for fellowship roles, communication and teamwork abilities, and the influence of work authorisation on selection decisions. Responses were analysed using descriptive statistics to identify common barriers and trends in programme level decision-making.

Results: Data collection in progress. Anticipated completion April 2026.

Conclusion: Data collection in progress. Anticipated completion April 2026.

Persistence experiences of black student in pharmacy schools in the United States

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Background: The underrepresentation of Black students in pharmacy education remains a persistent concern despite national calls to diversify the healthcare workforce. While prior research has largely focused on workforce disparities and outcomes, there is a notable gap in understanding the lived experiences that influence persistence among Black students in Doctor of Pharmacy programmes. This study seeks to examine those experiences through an anti-deficit lens, centring strengths, resilience, and agency rather than deficits. Grounded in Tinto's Longitudinal Model of Doctoral Persistence, this work explores how individual, institutional, and external factors shape the persistence of Black students navigating pharmacy education in the United States.

Method: This study employs a qualitative phenomenological approach to explore the lived experiences of Black pharmacy students. Participants were recruited from a public, multi-campus school of pharmacy and included students in their third and fourth professional years (P3 and P4). Data were collected through semi-structured interviews using an open-ended protocol informed by Tinto's framework. The analysis focused on identifying themes related to individual attributes, institutional experiences, and external influences on persistence. Trustworthiness was established through intentional alignment with qualitative rigor, including careful interpretation of participant narratives and thematic analysis.

Results: Findings suggest that persistence is a dynamic and multifactorial process shaped by both affirming and challenging experiences. Participants described the importance of early exposure and encouragement to pursue pharmacy, as well as the influence of faith, personal motivation, and a commitment to "prove them wrong" in environments where they often felt marginalised. Institutional factors, including limited faculty diversity, microaggressions, and perceptions of a "chilly" climate, negatively impacted students' sense of belonging. However, persistence was strengthened through meaningful relationships with peers, mentors, and culturally affirming organisations. Participants also demonstrated agency by navigating barriers through adaptive strategies such as code-switching, intentional community-building, and selective engagement. These findings reinforce the importance of academic and social integration and highlight belonging as a critical mediator of persistence.

Conclusion: This study contributes to the limited body of pharmacy-specific literature by centring the lived experiences of Black students and emphasising strengths-based narratives of persistence. The findings underscore the need for schools of pharmacy to move beyond recruitment efforts and intentionally design inclusive environments that support retention and success. Implications include enhancing faculty diversity, fostering culturally responsive support systems, and creating structures that promote belonging and meaningful engagement. Advancing these efforts is essential to improving persistence outcomes and building a more diverse and equitable healthcare workforce.

Academic freedom under fire: Navigating censorship, anti-DEI movements, and faculty agency in pharmacy education

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Background: Academic freedom remains a foundational principle within higher education, underpinning the ability of faculty to teach, research, and engage in public discourse without undue interference. Within pharmacy education, this principle is particularly critical given the profession's intersection with public health, health equity, and evolving societal needs. Recent developments in the United States signal a shifting landscape in which legislative actions, institutional policies, and sociopolitical pressures have increasingly targeted diversity, equity, and inclusion (DEI) initiatives. These efforts, often framed within broader anti-DEI or anti "race and gender ideology" movements, raise

important questions about censorship, curricular autonomy, and the professional obligations of pharmacy faculty. This work reintroduces academic freedom through a global lens while situating current U.S. developments within international discourse.

Method: This conceptual analysis seeks to present a synthesises recent legal cases, policy developments, and institutional responses related to academic freedom in U.S. higher education, with particular attention to health professions education. Illustrative cases involving student speech, faculty expression, and institutional governance were reviewed alongside emerging legislative trends restricting DEI programming and training. Comparative insights from other higher education systems, including the United Kingdom and Australia, were incorporated to contextualise differences in legal protections and institutional autonomy.

Results: Findings are through experience serving on an Academic Freedom Council and indicate that academic freedom in U.S. pharmacy education is increasingly negotiated within a complex interplay of First Amendment protections, institutional policies, and external political influences. Recent cases demonstrate tensions between professionalism standards and protected speech, as well as heightened scrutiny of faculty engagement in DEI-related teaching and scholarship. Legislative actions in several U.S. states have restricted or eliminated DEI offices, training programmes, and funding streams, contributing to a chilling effect on faculty discourse and curricular innovation. In contrast, other national contexts maintain varying degrees of statutory protection for academic expression, though similar concerns regarding self-censorship and political influence are emerging globally.

Conclusion: As pharmacy educators prepare future practitioners to address complex health disparities and serve diverse populations, safeguarding academic freedom is both a professional and ethical imperative. This work highlights the need for increased awareness, advocacy, and policy engagement among faculty worldwide. By equipping educators with a clearer understanding of their rights and constraints, the global pharmacy education community can better navigate current challenges while upholding the integrity, inclusivity, and social responsibility of the profession.

Before it's real, It's GENRx: A qualitative exploration of learner experiences and perspectives on using generative AI–enhanced role-playing in pharmacy education and training

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Background: The role of generative artificial intelligence (genAI) in pharmacy education is poorly defined in current literature despite many potential applications. Existing evidence shows that North American pharmacy learners demonstrate a high level of awareness and openness to genAI implementation into pharmacy curricula; however, little evidence exists to outline its role in the development of learners' skills, specifically in the context of role-playing in clinical scenarios. GENRx (Generative AI-Enhanced Role-Playing for Pharmacy Education and Physical Examination) is a platform that leverages genAI to create patient personas and simulate role-play scenarios for pharmacy learners, providing them with structured opportunities to practice virtual patient interactions and strengthen their clinical and communication skills. This study aimed to examine pharmacy learners' experiences and perspectives on using GENRx as a supplementary tool in pharmacy education.

Method: A qualitative study was launched in November 2025. Entry-to-practice Doctor of Pharmacy students across all four years of the programme at the University of British Columbia were invited to participate via a private student Facebook group. Participants first interacted with an osteoarthritis patient case on the GENRx platform, after which they signed up for a follow-up one-on-one semi-structured Zoom interview. Interviews were audio-recorded and transcribed verbatim. Content and thematic analysis was performed by three study team members with the support of NVivo software to organise the data, identify patterns, and develop descriptive themes. Analysis was iterative with regular team discussions to refine coding and enhance rigour.

Results: Ten pharmacy learners from years 2 to 4 were interviewed. Learners' prior experiences with using genAI in pharmacy education mostly included enhancing their individual learning by elucidating lecture content and producing practice materials, with limited in-class experiences. Some participants appreciated GENRx's authenticity to real patient interactions and allowing them to practice in a low-stakes and self-paced format. Conversely, participants voiced navigation challenges and having text as the sole mode of interaction. Overall, participants welcomed including GENRx as an optional and extra practice opportunity in skills labs, lectures, and case-based learning to hone their pharmacy skills (i.e., information gathering and communication) and prepare them for the Pharmacy Examining Board of Canada licensing exams (i.e., OSCE).

However, participants were opposed to integrating GENRx into their assessments, citing concerns about inconsistent experiences and equity in evaluation. Although some participants valued the authenticity of the platform, learners unanimously agreed that GENRx could not replace in-person collaborative learning and preceptor-guided clinical training.

Conclusion: GENRx shows the potential to be a formative learning tool supplementing existing learning methods in pharmacy education. Learners cited it as a bridge between the classroom and real-life practice while reaffirming the value of the human component as the main part of their pharmacy training. Future areas for improvement, as participants suggested, include a voice feature as an additional mode of interaction with the platform and a streamlined split-screen interface to improve navigation. Further research is also needed to explore the impact of the platform on learner competency, including its effect on knowledge acquisition and skill development.

Advancing clinical assessment competencies in pharmacy through a longitudinal training model

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Background: Expanding scopes of practice are increasing expectations to perform physical and mental assessments in primary care. However, these competencies are often absent from initial training, and continuing education remains fragmented, limiting integration into practice. There is a need for structured, practice-aligned training models that support progressive competency development and integration into patient care.

Objective: This initiative aimed to design and implement a longitudinal, competency-based training model to support pharmacists in developing and integrating physical and mental assessment skills. It also aimed to examine early learner-reported outcomes.

Method: A three-phase, longitudinal training model was implemented through a university-based continuing professional development unit. Phase 1 addressed foundational knowledge. Phase 2 focused on applied skill development through workshops and simulations. Phase 3 supported advanced clinical application across body systems in practice. Training content included core clinical assessment skills relevant to community pharmacy practice, including vital signs, musculoskeletal screening (e.g., Ottawa rules), ENT assessment (otoscopy), dermatological evaluation, and specimen collection. Content selection was informed by practices in other jurisdictions and interprofessional consultations, using criteria of clinical impact, frequency of use in practice, feasibility, and complexity. The initiative was developed with input from pharmacists, physicians, and nurses to ensure relevance, and alignment with clinical needs. The model combined asynchronous learning, interactive and experiential activities, and structured reflection. The educational design was informed by competency-based education, experiential learning, and scaffolding principles, supporting progressive learning, learner engagement, and transfer of knowledge into practice.

Results: Between March 2025 and March 2026, 610 pharmacists completed Phase 1 and 457 participated in Phase 2. Phase 3 was initiated in targeted clinical areas, with 21 participants in dermatology modules (December 2025) and 48 in otolaryngology modules (November 2025). Additional advanced modules in pneumology and mental health are being developed in response to identified practice needs. Learner-reported outcomes demonstrated a strong perceived impact on practice. The proportion of participants reporting a high or very high impact reached 82.7% in Phase 1 and 96.6% in Phase 2. Similar results were observed in Phase 3, with 94.7% in otolaryngology and 87.5% in dermatology modules. Participants also reported increased confidence, improved structuring of clinical encounters, and greater readiness to integrate assessment into practice. They also reported improved ability to identify red flags, support triage and decision-making, and engage in interprofessional collaboration. The model was iteratively refined based on participant feedback, contributing to improved alignment with clinical realities and workflow constraints.

Conclusion: A structured, longitudinal training model can effectively support the development and integration of clinical assessment competencies in pharmacy practice. Early results demonstrate strong uptake, high perceived impact on practice, and alignment with evolving professional roles. Findings suggest that this model enhances pharmacists' capacity to contribute to patient assessment, triage, and clinical decision-making in primary care settings. It provides a scalable framework for programs aiming to strengthen workforce readiness, support expanded clinical roles, and bridge gaps between competency expectations and training.

Developing a pharmacy preceptor training program in Kenya: A multi-phase collaborative model to strengthen experiential pharmacy education

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Background: As pharmacy practice in Kenya shifts toward patient-centered and clinically oriented services, the need for consistent, high-quality experiential training has become increasingly important. However, preceptors' experiences and students' preparation across Kenya vary widely. This leads to inconsistent student learning experiences and challenges with assessment, feedback, and integration into clinical practice. To address these gaps, Maseno University School of Pharmacy, in collaboration with three U.S. schools of pharmacy, developed a structured, competency-based preceptor training program.

Objective: The program provides a robust preceptor training program that leverages innovative activities and simulations to enhance pharmacists' skills and knowledge in Kenya, ultimately improving patient care and aligning with global standards

Method: A three-phase model was implemented: •Phase 1: A baseline Qualtrics survey designed to collect demographic data, prior precepting experience, self-assessed strengths, and professional development needs. •Phase 2: A 15-20 hour asynchronous home study curriculum is under development with a focus on defining clinical pharmacy, providing foundations of the pharmacist-patient care process, discussing preceptor roles, designing activities that can measure learned outcomes, providing communication and feedback strategies, reviewing assessment methodologies, how to design an experiential syllabus, and management of challenging learner scenarios, including conflict-resolution. •Phase 3: A full-day hybrid live session is planned, which includes workshops, breakout mentoring, syllabus refinement, case-based discussions, and simulation-based assessments using scenario-based evaluation activities.

Results: Learning outcomes included the ability to: 1.Develop an individualized preceptor development plan. 2.Develop learning objectives for student rotations/attachments. 3.Map activities to objectives. 4.Apply effective formative and summative assessment strategies. 5.Provide constructive feedback; and 6.Manage challenging learner situations. Program evaluations will occur through surveys (reaction), embedded quizzes and assignments (learning), and simulation-based assessments (behavior). Preceptors produced individualized development plans, rotation-specific syllabi, and learner evaluation tools. A post-program survey and planned longitudinal follow-up aim to measure real-world application in practice settings.

Conclusion: This initiative represents a distinct, structured preceptor development program in Kenya. By combining asynchronous foundational instruction with simulation-based assessment, the program enhances Kenyan pharmacists' capacity to serve as effective preceptors and supports the standardization of experiential education across practice sites. It is expected that the model will be replicable across Kenya and potentially in other countries seeking to build preceptor training infrastructure in emerging clinical pharmacy settings.

Evaluation of mock trial project as a self-directed learning and assessment strategy over five years

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Background: Mock trials have been implemented in a variety of learning environments such as law schools and health professions education. As a self-directed learning strategy, they have been continuously implemented in certain pharmacy institutions in the United States over the years. In the past decade, mock trials were adapted to virtual format during the COVID-19 Pandemic and evolved into the mock trial national competition at the American Association of Colleges of Pharmacy (AACP) Annual Meetings since 2022.

Objective: To evaluate the continuous implementation of the mock trial project as a self-directed learning and assessment strategy at a pharmacy program in the U.S. over five years (2021-2025).

Method: A mock trial project was developed and implemented as the final exam in the "Public Health for Pharmacists" required course for all first professional year students in the Doctor of Pharmacy program. The learning objective is to debate the pros and cons of a controversial issue in a courtroom-style format. As a collaborative learning experience, students first were divided into teams and then were asked to research a controversial health-related issue, formulate their team's stance with evidence-based arguments, and present before a panel of faculty-judges and student-jurors. Grading of mock trials included evaluation from judge (50% of the project grade), juror (20%), and peer (30%). Separate evaluation forms were created for judges,

jurors and student-peers on Google Forms. The links to each type of evaluation forms were emailed to the respective parties before the mock trials, so faculty-judges and student-jurors could submit their responses online immediately after the mock trials. Students also completed a peer-evaluation for every team member in their groups. The mean of overall scores provided by all judges, jurors, and peers respectively were calculated and presented as percentages. These analyses were conducted for each position (petitioners or respondents) in each trial topic.

Results: A total of 156 first-year pharmacy students participated in mock trials from 2021 to 2025. Among the 10 different mock trials across five years, around 2-6 faculty-judges and 12-15 student-jurors served in the panel for each trial. Faculty-judge evaluation scores during the five years ranged mostly from 87% and 97%. The student-juror evaluation scores mostly ranged from 82% to 98%. Unusually in 2025, all four trial groups received 100% in their student-juror scores. Positive peer-evaluation was found for each student group across five years. Between 2021 and 2023, the class average of peer evaluations was all above 92%. In 2024 and 2025, all students received 100% in their peer evaluation scores. These findings suggested the potential impact of a new curriculum and additional team project on pharmacotherapy debate prior to the mock trials.

Conclusion: This mock trial project as a self-directed learning and assessment activity has continued in one program, including transition from the old to new curriculum, over five years. Thus, it can be adopted or adapted by other programs with different curricula. Additionally or alternatively, pharmacy programs can use mock trials as a co-curricular activity or part of a student organization activity.

Cultivating a leadership culture: Empowering students and organization leaders for effective collaboration and impact

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Background: The University of Maryland Eastern Shore School of Pharmacy (UMES-SOP) delivers a three-year accelerated Doctor of Pharmacy (PharmD) program in which student pharmacists engage in thirteen professional organizations. These organizations foster leadership, professional development, and community engagement. However, despite leadership competencies being embedded within the curriculum, structured and standardized leadership training for student organization leaders had not been formally implemented. In alignment with the Curricular Outcomes and Entrustable Professional Activities 2022 (COEPA Domain 2.9) and Accreditation Council for Pharmacy Education (ACPE) Standards 2025, there is a need to intentionally develop leadership skills that support teamwork and shared goal achievement for pharmacy student organizations.

Objective: To describe guidance and tools on the implementation of a required leadership development and evaluation of pharmacy student organizations, aligned with their respective disciplines and integrated into continuous quality improvement efforts.

Method: A mandatory leadership development program was implemented for all student organization leaders. Faculty facilitators delivered workshops focused on leadership styles, self-awareness, and team effectiveness. A validated "Readiness for Change" self-assessment tool was administered to promote reflection. Students were also asked to use an assessment tool to evaluate their student organization. Participation was tracked by the Office of Student Affairs, and a post-training survey was distributed via Microsoft Forms to evaluate outcomes. Data were analyzed using descriptive statistics.

Results: Two workshops—"Organizations, Groups, and Teams: What Skills and Abilities Do I Need to Be Effective" and "Leadership and Advocacy in Pharmacy"—were conducted. Survey results demonstrated strong positive perceptions across all domains. Approximately 91% of participants agreed or strongly agreed that the training improved communication and teamwork skills, 100% reported enhanced ethical decision-making, and 91% noted increased self-awareness in leadership development. Overall findings indicate high levels of engagement and perceived value of structured leadership training.

Conclusion: The implementation of a required leadership development initiative effectively addressed gaps in leadership preparedness among student organization leaders. The program enhanced key competencies including communication, collaboration, ethical decision-making, and self-awareness. These findings support the expansion of structured leadership training across health professions programs to strengthen student-led organizations and promote sustainable leadership development.

More than competence: Psychosocial transformation in student pharmacists through substance-related care simulation

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Background: Pharmacists are among the most accessible healthcare professionals globally, yet pharmacy education inadequately prepares graduates to provide person-centred substance-related care. This perpetuates a cycle where undertrained practitioners deliver stigmatising care, reinforcing barriers for people who use substances. While educational interventions show promise in improving knowledge and confidence, few have examined how simulation-based curricula transform student attitudes at a deeper psychosocial level, or identified the mechanisms through which such transformation occurs.

Objective: To evaluate the psychosocial impact of a novel, semester-long substance-related care curriculum on final-year Master of Pharmacy students, examining transformation of attitudes, confidence, and stigma using mixed methods, and to identify learning mechanisms underlying observed changes.

Method: A semester-long curriculum comprising an introductory workshop, accredited digital modules, and a 12-case simulation series was delivered to N=70 final-year pharmacy students at the University of Sydney, Australia. Cases spanned opioid agonist therapy, depot buprenorphine, naloxone, tobacco cessation, alcohol dependence, and harm reduction, with group debriefing after each simulation. Psychosocial outcomes were measured using a validated readiness scale administered pre- and post-intervention. Qualitative data analysis used Framework Analysis informed by Mezirow's Transformative Learning Theory.

Results: Significant improvements were observed in both attitude (median change +0.63/6, $z=5.15$, $p<0.001$) and confidence (median change +0.95/6, $z=5.16$, $p<0.001$) composite scores, with 35 of 36 participants improving in both domains. Lower baseline scores predicted greater improvement (attitude $R^2=0.40$; confidence $R^2=0.53$, both $p<0.001$). Framework Analysis across 37 cases and 15 themes identified multiple distinct transformation pathways: deep stigma transformation, revelation of unconscious bias among self-identified progressive students, and fear reduction through knowledge. Notably, a prejudice-complexity nexus emerged: students who addressed their biases reported clinical encounters becoming simpler despite acquiring more complex clinical knowledge, suggesting that prejudice generates false cognitive complexity through hypervigilance and moral evaluation. Language emerged as simultaneously a mechanism for and marker of transformation, with communication skills serving dual diagnostic and therapeutic functions. A minority demonstrated incomplete transformation, with personal experience functioning as a barrier to attitude change. Nearly half the cohort (n=32) also achieved depot buprenorphine administration credentials, believed to be the first such outcome within pharmacy education internationally.

Conclusion: Simulation-based substance care education can produce measurable and meaningful transformation in student pharmacist perspectives and readiness, though transformation follows multiple pathways contingent on starting position. The finding that reducing prejudice simplifies rather than complicates clinical care has implications extending beyond pharmacy education to other stigmatised health conditions. Future research should test the prejudice-complexity paradox in broader populations and incorporate people with lived experience as simulated patients.

Sixty years of evolution in university education in hospital pharmacy

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Background: For more than six decades, the Faculty of Pharmacy at Université Laval has been training pharmacists for hospital practice in order to meet the growing needs of health care services related to pharmacotherapeutic management. This abstract aims to present the key stages in the evolution of this training programme designed for pharmacists working in health care institutions.

Method: As part of the Faculty's centenary celebrations, information on the development of hospital pharmacy education was gathered from faculty archives and from the book Histoire de la Faculté de pharmacie de l'Université Laval.

Results: Since 1924, pharmacy education primarily focused on preparing community pharmacists. In 1962, a certificate in hospital pharmacy, centred on injectable solutions, was introduced. It became a postgraduate certificate in 1980 and, subsequently, a diploma in 1989. In 1992, the programme was transformed into a master's degree in clinical pharmacy—the first of its kind in both Québec and Canada. Since 1996, the residency programme has been accredited by the Canadian Council on Hospital Pharmacy Residency. Renamed the "Master's Degree in Advanced Pharmacotherapy" in 2013, the programme was further

enhanced in 2017: it now comprises sixty credits and is based on a competency driven model delivered across thirteen residency sites throughout Québec. Under Québec's Bill 67, pharmacists holding a Master's Degree in Advanced Pharmacotherapy will be authorised to exercise their full scope of advanced clinical competencies, thereby contributing to more consistent, accessible, and expert-level pharmaceutical care across the province's health-care institutions. In addition, Université Laval has developed a Professional Third-Cycle Diploma in Specialised Pharmaceutical Care (post-Master) programme specifically designed to support advanced specialisation in pharmaceutical practice and to prepare pharmacists for highly specialised clinical roles within the health-care system.

Conclusion: By continually evolving to align with the highest standards, this programme plays a pivotal role in preparing pharmacists in health care institutions to meet the increasingly complex challenges of contemporary pharmaceutical practice.

Professional identity formation in pharmacy in the era of artificial intelligence

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Background: Professional identity formation (PIF)—the developmental process through which practitioners come to think, act, and feel as pharmacists has historically been shaped by experiential learning, participation in communities of practice, and socialisation in professional culture. The rapid integration of artificial intelligence (AI) in educational, clinical and operational pharmacy settings represents a system-level disruption to these established pathways. However, there is limited guidance on how to navigate this transition intentionally and constructively. This white paper aims to examine and synthesise current evidence on how AI is transforming core pharmacy roles and competencies; identify challenges to traditional PIF pathways arising from AI adoption; and propose actionable, globally relevant recommendations for educators, regulators, employers, and individual practitioners.

Method: A collaborative narrative review synthesis was conducted by the Research and Scholarship Working Group of FIP's Academic Pharmacy Section. Authors drew on peer-reviewed and grey literature, professional framework documents, and consensus-based discussions. Five key thematic domains are discussed: the conceptual foundations of PIF, the evolving AI landscape in healthcare and pharmacy, the impact of AI on core pharmacy roles, challenges to traditional PIF pathways, and opportunities to develop an enhanced professional identity.

Results: AI is more likely to augment rather than replace pharmacist roles, redistributing cognitive effort toward higher-order clinical, consultative, supervisory, and governance functions. However, the risks of deskilling, automation bias and ethical dissonance, particularly when AI outputs conflict with professional judgements or reflect dataset biases, present substantive threats to identity coherence. Four professional roles emerged: the AI-augmented clinician, the translator and integrator of AI outputs, the ethical guardian and data steward, and the co-designer and validator of AI systems in pharmacy. Global inequities in AI access, implementation and governance, particularly in low- and middle-income settings, further compound these challenges. The pharmacy curricula should embed AI literacy, data ethics, and critical appraisals as core competencies, supported by simulation-based pedagogy and faculty development. Professional bodies should update competency frameworks to integrate emerging AI-related professional identities. At the same time, health systems should redesign workflows that cultivate continuous digital upskilling alongside ethical vigilance. A coordinated global response is required to ensure that AI enhances the patient-centred, ethically grounded identity that defines the pharmacy profession.

Conclusion: The profession must not respond to AI defensively but instead deepen the human-centred values that define pharmacy practice that algorithms cannot replicate, namely empathy, ethical stewardship, and relational expertise. This white paper provides a global framework to support those elements in PIF.

Generative artificial intelligence and professional identity among pharmacy students: A Multinational cross-sectional study

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Background: The integration of generative artificial intelligence (GenAI) tools into higher education is transforming how pharmacy students acquire knowledge and cultivate professional competencies. Professional identity formation (PI)—an essential transition in pharmacy education in which students internalise the values, ethics, and attributes of a pharmacist—may be uniquely affected by their engagement with GenAI technologies. However, a notable gap exists in the literature concerning whether GenAI serves as an enabler of future-ready clinical roles or as a disruptor of perceived professional autonomy, expertise, and ethical responsibility. This study seeks to investigate the relationship between the use and acceptance of GenAI tools and the formation of professional identity among pharmacy students across various countries.

Method: A multinational, cross-sectional survey study is being coordinated by the Global PharmEd Optimise Research (GPOR) Network, with Ulster University (Coleraine, UK) serving as the coordinating centre and collaborators across twelve countries. The survey instrument is structured into five sections: Section A covers Demographics and AI Experience (8 items); Section B focuses on the Use of GenAI Tools (Core Acceptance Factors) with 10 items measured on a 5-point Likert scale; Section C utilizes the validated Macleod Clark Professional Identity Scale (MCPIS-9), which consists of 9 items assessing professional identity (PI); Section D comprises the AI-Professional Role Perception (15 items), and lastly, there is a qualitative open-ended question. The instrument underwent expert content validation before a pilot study. In March 2026, a pilot study was conducted to assess clarity, feasibility, and internal reliability. Cronbach's alpha was calculated for all scales. Following refinements based on the pilot, the full survey is currently being distributed to undergraduate pharmacy students (Years 1–6) across participating GPOR institutions via a secure, GDPR-compliant platform.

Results: A panel of ten international experts validated the survey content. The pilot study (n=44; completion rate: 75%) confirmed the instrument's feasibility and acceptability. The AI Acceptance Scale demonstrated good internal consistency (Cronbach's $\alpha = 0.796$; 10 items). The AI–Professional Role Perception Scale also demonstrated acceptable reliability (Cronbach's $\alpha = 0.759$; 15 items). Pilot descriptive results indicated that students mostly held positive attitudes toward GenAI and reported strong professional identities. Qualitative themes identified included AI as a learning support tool, AI as a clinical decision support tool, the importance of human judgement, the balanced use of AI, and the evolving role of the pharmacist.

Conclusion: The pilot study confirmed that the survey instrument is feasible, acceptable, and sufficiently reliable for full-scale deployment. The results from the comprehensive multinational study are expected to establish the first large-scale, cross-national evidence base regarding the relationship between GenAI adoption and the formation of pharmacy professional identity. These findings will have major effects on pharmacy curricula, AI literacy education, and the preparation of future pharmacists to navigate an increasingly technology-integrated practice environment effectively.

Improving pharmacy learners' understanding of equality, diversity, inclusion and health inequality: evaluation of a teaching session using pre- and post-session surveys

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Background: Pharmacists have an important role in addressing health inequalities through inclusive practice, cultural competence, and awareness of policy frameworks that support equitable healthcare delivery. However, pharmacy learners may have variable baseline understanding of equality, diversity and inclusion concepts, particularly intersectionality and national or regional policy drivers. Evaluating educational interventions that aim to strengthen this understanding is important to ensure future pharmacists are equipped to contribute to reducing health inequalities.

Objective: The objective of this evaluation was to assess the impact of a new 90-minute workshop on pharmacy learners' self-reported understanding of equality, equity, diversity, inclusion, intersectionality, health inequality, and relevant Wales-based policy frameworks. A secondary aim was to explore changes in learners' confidence in identifying ways they could reduce health inequalities in their future professional roles.

Method: A pre-session survey (n=24) and post-session survey (n=16) were completed anonymously by undergraduate pharmacy students attending an equality, diversity and inclusion teaching session. The surveys included Likert-scale statements assessing understanding of key concepts, alongside a yes/no/unsure item assessing understanding of the role of Health Education and Improvement Wales in supporting an equitable and diverse healthcare workforce. The post-session survey also included open-ended questions

exploring key learning points, intended actions, and suggestions for session improvement. Quantitative data were analysed and free-text responses were reviewed to identify recurring themes.

Results: Prior to the session, high levels of agreement were reported for understanding of equality and health inequality (both 95.8%), with slightly lower agreement for equity (83.3%), diversity (87.5%) and inclusion (87.5%). In contrast, baseline agreement was substantially lower for intersectionality (33.3%), the Anti-racist Wales Action Plan (12.5%) and Welsh Language Standards (29.2%). Agreement that participants understood ways to contribute to reducing health inequalities was 58.3%. Understanding of the role of Health Education and Improvement Wales was reported as "yes" by 37.5% of respondents, with 54.2% unsure. Following the session, 100% of respondents selected agree or strongly agree for all Likert-scale items, including those relating to intersectionality and policy frameworks. Understanding of the role of Health Education and Improvement Wales increased to 100% "yes". Free-text responses indicated increased awareness of inclusive practice, recognising protected characteristics, a desire to do further learning in the area and adopting a more holistic approach to patient consultations. Requests for more interactive activities were the most common suggestion for improvement.

Conclusion: This evaluation demonstrates that a single teaching session can significantly improve pharmacy learners' self-reported understanding of equality, diversity and inclusion concepts, particularly in areas where baseline knowledge was limited. While findings are limited by sample size and reliance on self-reported outcomes, the results support the value of structured equality, diversity and inclusion education within pharmacy training. Future work could incorporate matched pre- and post-session responses, objective knowledge measures, and longitudinal follow-up to assess sustained impact on professional practice.

Mapping general pharmaceutical council initial education training standards to LGBT+ learning outcomes

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Background: Royal Pharmaceutical Society (RPS) has an inclusive intersectional inclusion and diversity network called Action, Belonging, Culture and Diversity (ABCD), the group is open to everyone working in Pharmacy, who would like to further progress on raising awareness and embedding inclusion and diversity within the profession. Including embedding inclusion and diversity principles within Pharmacist undergraduate education. Following a ABCD meeting in February 2023, a clear gap was identified within Pharmacy undergraduate education about LGBT teaching. Members in the group, mostly academics working in a range of Schools of Pharmacy expressed a concern and frustration about the type of case studies and examples that are used to teach LGBT topics. These tend to end up relying on stereotypes focusing on sexual health or HIV. Pharmacy Declares had recently published their resource mapping environmental sustainability across the General Pharmaceutical Council (GPhC) learning outcomes for the initial training and education of pharmacists which has been endorsed by The Pharmacy Schools Council UK . This has been used as a blueprint for the LGBT mapping.

Objective: A group of pharmacists with varying experience from academia and practice has been formed to help map the GPhC Initial Education Training Standards (IETs) to LGBT learning outcomes. The experience and expertise from members of the group has been utilised in producing a resource.
The aim of the resource is to provide clarity and guidance for Schools of Pharmacy teaching staff and faculty on how LGBT topics can be taught at an undergraduate level across. The resource will be presented at Pharmacy Schools Council, to get their endorsement and will be available as an open access on the Royal Pharmaceutical Society website.

Method: The working group was facilitated and chaired by the RPS, thirteen pharmacists both academic pharmacists and practice pharmacists have been meeting regularly to work through the each of the initial education training standards, to map across to LGBT learning outcomes. Through this work examples of case studies and resources have also been mapped to each of the IETs

Results: A resource has been developed which will be used by Schools of Pharmacy to provide ideas of how LGBT topics will be taught and embedded through out the pharmacy undergraduate course, building on knowledge each year as the students progress through the 4 years. Limitations Throughout discussions, one of the challenges that has been highlighted is the resource is one part of education delivery. The mapping document is helpful for faculty members who are comfortable in teaching this topic area. Through anecdotal experience, members of the group have worked with colleagues who struggle with how these learning outcomes can be embedded into teaching materials including OSCEs and workshops.

Conclusion: The learning outcomes resource is a start and a helpful resource which will provide ideas to teaching faculties to avoid stereotypes when teaching LGBT topics within Pharmacy Undergraduate courses. To maximise the benefits of the resource, future work will include developing a teaching toolkit and producing additional resources with learning outcomes mapped to other protected characteristics.

Pharmacy education during war: The Lebanese American University experience

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Lebanon experienced the perfect storm over the last seven years with due to economic, pandemic, political and social challenges and more recently two wars. All sectors of society including higher education has been affected. At the Lebanese American University school of pharmacy, a contingency plan has been put in place to ensure the uninterrupted delivery of pharmacy education while prioritizing the safety of all students, faculty, staff and preceptors. In this presentation we will discuss the multi-level academic approach which was adopted based on the severity of the crisis and the level of campus accessibility including provisions for fully online delivery, limited access to campus, and situations where internet connectivity is compromised. Assessments and alternative assessments administration as well as labs, OSCES and simulation activities will be presented. We will also address students and preceptors on experiential training. Wellbeing of faculty, staff and students' efforts will be highlighted as well as the efforts of faculty and students service to those most affected by the wars. Efforts to maintain accreditation standards will be discussed. Overall, the range of possible scenarios to deliver a flexible and adaptive approach to pharmacy education, balancing the needs of quality learning with the realities of crisis management will be emphasized.

Transforming mode/(s) of creating/improving awareness of pharmacists' work: The critical roles of training in communication with design to facilitate academic and practice enhancement

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Background: As AI is integrated across pharmacy practice/education, the leadership/members of the AcPS Collaboration and Communication Working Group (CCWG) implemented training for the AcPS and FIP to foster creativity, use communication channels, and enhance self-efficacy in creating or implementing resources using tools such as Canva. The project's overall goal was to amplify the reach and impact of academic pharmacy initiatives and global health. The CCWG identified a need to equip members with the skills to design resources and to enhance self-efficacy for developing educational, awareness-based content that aligns with the section's priorities and work. An initiative was implemented to create content for 'World Health Days' and to showcase academic leaders, FIP awardees, Fellows, and active members with a 'Meet an Academic' series. The Canva training team then planned to introduce and enhance this skill development for other executive committees, working groups, and AcPS members, enabling the creation of flyers, information brochures, pamphlets, standees, leaflets, and other resources for sharing via newsletters, social media, and other channels. This initiative also integrates insights from the Advocacy, Policy, and Global Influence Working Group (APGI) and facilitates coordination of communication training, builds member capacity for strategic dissemination, and enhances visibility of academic contributions across global networks.

Method: The CCWG developed a structured training series designed to create academic, workforce, health, and related materials for both professional and public audiences. Training content emphasized design principles, message framing, and alignment with global health themes. A plan was developed to deliver a series of basic training sessions, followed by mentorship in creating initial posts, and continued support to help recognize pharmacists' roles during World Health Days. Ongoing collaboration with the APGIWGs ensures strategic coherence and is being developed to highlight key advocacy and policy initiatives. A parallel effort established the framework and content calendar for World Health Day posts, providing templates and coordination strategies to unify global messaging across platforms.

Results: A standard operating procedure (SOP) was developed to ensure consistency of training content/outcomes. A guide was developed outlining the requirements for interested individuals to join a Canva training session, including creating an account, and training video links were shared. In case individuals faced challenges, one-to-one support was provided. Three training sessions on basics in Canva have been held (June, August, November 2025) for AcPS ExCo, working groups, and members, after ad hoc training sessions for the CCWG and membership working groups led to an increase in members developing in-house creatives from 2 to 8-10. 2 more are still practising and gaining this skill. Results have led the core design/training team to plan more sessions in 2026, focused on specific deliverables within Canva and on integrating novel design approaches within and beyond Canva.

Conclusion: Canva design training developed/enhanced new skills, increased participation, and enabled eye-catching in-house designs to share the academic pharmacy vision on global health care, academic roles, and AcPS initiatives, engagement, and opportunities. Future training will integrate novel design approaches with Canva, with a vision of accessibility for all FIP members.

Transforming awareness: The important role of aligned coordination between communication and advocacy/policy initiatives in education

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Background: Advocacy and communication are pivotal to advancing and expanding pharmacists' roles in academia and practice. By influencing policy, education, and regulatory frameworks, advocacy enables pharmacists to meet evolving healthcare needs, while effective communication ensures these efforts are visible and sustainable. Developing practical resources such as templates, toolkits, and shared resources empowers educators and practitioners to replicate and scale impactful models of role expansion. Sharing pharmacist narratives and innovative services strengthens professional identity, fosters stakeholder buy-in, and catalyzes broader system change. Integrating advocacy, communication, and resource development creates a multiplier effect that sustains the advancement of the pharmacy profession.

Method: The AcPS APGI and CCWG jointly implemented a structured approach. Intentional collaborative efforts ensured strategic priority alignment, advancing FIP goals and advocacy through toolkits, templates, training, and timelines. Resources were jointly accessible to enhance consistency and speed of information dissemination. Enhanced visibility and active membership participation were achieved. Member feedback informed ongoing coordination and refinement of collaboration. Objectives included: To enhance Coordination between the Communication and Collaboration (CCWG) and Advocacy/Policy/Global Influence (APGI) Working Groups to align priorities and ensure consistent messaging supporting pharmacy advancement; To improve resource accessibility by using coordinated resources to readily share events and impactful strategies; To facilitate collaborative development of initiatives: Facilitate joint creation of advocacy and communication timelines and planning aligned with section goals and the FIP development goals; To enhance capacity building/member engagement in activities through strategic communication of opportunities, focused on advocacy and policy navigation, which, in turn, may increase membership.

Results: The shared documents created consistency and enhanced professional appearance and communication. A total of 11 templates were created for a change management toolkit. Shared drives were used to share webinars, speakers, emails, research, other templates, and to establish a joint timeline. A total of 7 webinars were hosted. A total of 25 spotlights on influential leaders furthered members' active engagement.

Conclusion: This collaboration between the AcPS, APGI, and the CCWI demonstrated the impact of strategic coordination on strengthening capacity, visibility, and member engagement. Joint initiatives yielded substantial outputs, including tools, highlights, and shared resources. Integrating advocacy, policy, and communication strategies fostered sustained participation and collective momentum.

Integrating artificial intelligence into pharmacy education and workforce development: Research, policy, ethics, and global best practices

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Background: Artificial Intelligence (AI) is rapidly transforming healthcare education, professional training, and workforce expectations. Schools of pharmacy, professional bodies, & regulators are navigating AI integration while preserving professional identity, academic integrity, & patient safety. Despite growing interest, understanding best practices remains challenging due to the rapid pace of technological advancement & global variation in adoption and regulation. Academic pharmacy needs open-sharing of best practices in AI use, including policies/procedures, research, & impacts on learners & institutions. This information can support the development of ethical frameworks aligned with practice & guide CPD & workforce training across diverse cultural contexts. A need exists to align research, policy development, quality assurance, & ethical guidance to ensure that AI strengthens pharmacy education & professional roles. Limited publications describe the use of AI in pharmacy education. This session addresses this gap by bringing together educators, researchers, policy leaders, and students to examine emerging evidence, share best practices, & co-develop frameworks that support high-quality, ethical, globally relevant AI integration. This session aims to generate a real-time, global understanding of implementation of AI policies in academic pharmacy & health professions education to inform the development of practical templates to support institutional adoption, monitoring, and quality assurance by comparing AI implementation practices in academic pharmacy worldwide; Identifying best practices or operational models for AI integration in teaching, assessment, & experiential education; Examining oversight mechanisms supporting AI use; Recognize factors impacting institutions in academic pharmacy worldwide.

Method: This moderated, interactive session uses digital engagement tools (e.g., Poll Everywhere, Mentimeter, Padlet) to collect real-time data on AI use, policies, & best practices in teaching, assessment, & faculty development. Building on prior webinars, the session shifts focus from

policy development to implementation and benchmarking. Data will be used to generate a global snapshot of current practices & regional comparisons, visualized in real time through word clouds & polling results. Attendees will also contribute asynchronously via Padlet throughout the Congress, sharing implementation successes, unintended consequences, safeguards, & concerns to inform future resource development.

Results: Preliminary examples of AI policies & utilization across global regions will be presented. Additional findings will be generated & presented in real time through participant engagement, producing a global snapshot of current practices. Results will be displayed and discussed during the session, allowing participants to compare practices, identify gaps, & explore emerging trends. Practical templates and worksheets will be provided to support continued dialogue, implementation, & collaborative research beyond the Congress.

Conclusion: Effective AI integration in pharmacy education requires competency-based approaches supported by clear policies & faculty training. These efforts are essential to ensure safe, accountable, & patient-centered practice while preserving independent clinical reasoning and professional identity. Real-time insights from this session will highlight both areas of global alignment & critical gaps, reinforcing the need for collaboration, research, & guidance on policy/curricular development.

Meeting people where they are at: Evaluating an interprofessional event to address misinformation

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Background: At the University of Toronto, twelve health and social care professions participate in a hybrid, integrated longitudinal interprofessional education (IPE) curriculum. Each profession requires its learners to complete a set number of IPE activities including student-selected electives. The IPE curriculum is aligned with collaborative competencies and grounded in evidence-informed education design principles, including meaningful variation and productive struggle, which are known to lead to adaptive expertise and critically reflective practice. One essential and timely topic is the impact of misinformation on health. Because misinformation affects every profession, benefits from collaborative responses, and necessitates adaptive expertise and critical reflection, it was selected as the focus of a new IPE elective. A two-part learning activity titled “Meeting People Where They Are At” was designed to help future health and social care professionals recognize, understand, and respond to people who hold misinformation. The activity spanned two hours over two evenings spaced two weeks apart. In Part 1, students worked in interprofessional groups, engaged in icebreakers, shared experiences related to misinformation, and received brief targeted instruction. Groups selected one of several misinformation cases and collaborated between sessions to prepare a short presentation. In Part 2, students presented their cases, responded to questions from peers and faculty, and participated in a structured debrief. The activity was delivered twice in 2025 (May and November).

Method: Within the broader curriculum, ongoing research and evaluation (REB#46675) examine design elements, pedagogical foundations, participants’ experiences, and the practical effectiveness of individual IPE activities. This pragmatic implementation study evaluated the design and educational impact of the IPE misinformation elective. Data sources included designer reflections, student evaluations, and observational notes collected by trained research note-takers. Quantitative data were summarized descriptively, while qualitative data underwent latent content analysis to align findings with theories underlying interprofessional education, pedagogy, and misinformation. Team discussions supported synthesis and interpretation.

Results: Across both offerings, 37 students participated (12 in May; 23 in November), with 26 providing evaluations. Students rated overall session quality highly (mean 4.57/5), noting strengthened mutual respect and perceived preparedness for future practice. Students' presentations were in varied formats including SWOT analyses, role plays, and arts-based approaches. Three design modifications were implemented between the Spring and Fall iterations: enhanced reflective activities in Part 1, an expanded set of case options, and a structured peer feedback worksheet for Part 2. Researcher observations from Session 2 showed evidence of adaptive expertise, including productive struggle and critical reflection. Students in both sessions identified challenges coordinating group work between Parts 1 and 2, which was discussed as an expected and intentionally surfaced aspect of team-disagreement processing, in alignment with Canadian national collaborative competency framework.

Conclusion: This interprofessional learning activity was well received and supported students' development of adaptive expertise for addressing misinformation while simultaneously offering practical experience in collaboration. Meaningful variation across cases, opportunities for productive struggle, and intentional reflection contributed to potential applicability to future practice. Future directions include scaling resources and capacity to offer the activity more broadly.

Continuing education and training for community pharmacist: A six-year retrospective analysis of Turkish Pharmacists' Association Pharmacy Academia experience

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Background: The Turkish Pharmacists' Association (TPA) established the Pharmacy Academia to promote continuing education and training for pharmacists in 2002. The TPA Pharmacy Academia organises training programmes according to the demands of each Pharmacy Chamber and develops resources, including books, and translations of documents from the International Pharmaceutical Federation (FIP) into Turkish. The TPA Pharmacy Academia is also responsible for selecting the winners of the annual awards among academic and professional candidates, and for publishing the Turkish Journal of Pharmaceutical Science (the official journal of the TPA, which is indexed in PubMed and the Clarivate Emerging Sources Citation index). The TPA Pharmacy Academia consists of academicians from pharmacy faculties and community pharmacists who are also TPA board members. This study aimed to evaluate the participation and satisfaction of participants in continuing education and training led by the TPA Pharmacy Academia between 2019 and 2025.

Method: This retrospective analysis included all training programmes (online or in-person) held by the TPA Pharmacy Academia between 2019 and 2025 based on demands by Pharmacy Chambers (n = 59). Attendees' demographic data were anonymously collected from the electronic records of the Turkish Pharmacists' Association. Participation satisfaction was collected from the records of each training programme by evaluating anonymous evaluation forms.

Results: A total of 2,160 participants attended 59 training programmes (20 online and 39 in person) organised by the TPA Pharmacy Academia and held in 25 Pharmacist Chambers out of a total of 59. The programmes covered 22 subjects, including 17 clinical pharmacy topics and five non-clinical topics related to personal development or community pharmacy management. Of these participants, 34% attended online training, while 66% attended in-person training. Most of these participants (89%) attended clinical pharmacy training. Of the 1,445 participants who attended at least one training programme over six years (missing data = 118), the median age was 42 years and 65% were female. The median age of participants attending programmes on non-clinical topics was significantly higher than that of participants attending programmes on clinical pharmacy (46.6 vs 43.5 years, respectively; $p < 0.05$). There was no significant difference between the two groups in terms of sex ($p > 0.05$). There were significant differences between the groups in terms of sex when attending online or in-person training programmes ($p < 0.05$), and no significant difference in age ($p > 0.05$). The satisfaction rate was high (greater than 90%) for most training programmes.

Conclusion: In line with the International Pharmaceutical Federation's (FIP) development goals (#9), future studies could focus on increasing the number of in-person and online continuing education and training opportunities, after assessing the needs of each pharmacy chamber and evaluating the impact of these training programmes on pharmacists' daily practice. The TPA Pharmacy Academia will develop strategies for the certification or credentialing of these programmes.

The virtual continuing education and training platform for pharmacists: Experience of Turkish Pharmacists' Association

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Background: This study aimed to identify the content of the virtual platform established by the Turkish Pharmacists' Association (TPA) to promote continuing education and training of Turkish pharmacists and the demographics of its participants over a period of six years.

Method: The virtual platform called 'TEBEŞİR' (http://ebs.teb.org.tr/eczaci/) was established in 2019. The name TEBEŞİR was derived from TEB (the Turkish abbreviation of TPA), meaning 'chalk'. Its slogan is "The chalk is now in your possession". As an alternative to accessing the website, TEBEŞİR is available to download on smartphones and tablets from Google Play and the Apple Store. Pilot testing of TEBEŞİR was conducted in 2019 as part of the virtual training of 80 community pharmacists, who also participated in the Erasmus+ KA2 Strategic Partnership Programme (2017-1-TR01-KA204-045938). This project aimed to evaluate

outcomes of community pharmacist-led pharmaceutical care services to promote medication adherence in older adults. The TPA launched the TEBEŞİR platform for use by all Turkish pharmacists at the beginning of the Coronavirus (COVID-19) pandemic. The content of the virtual platform was retrospectively evaluated over a period of six years. Participants' demographic data were anonymously collected from the electronic records of the TPA.

Results: At the end of six years, TEBEŞİR consisted of many sections: education and training modules led by TPA Pharmacy Academia, a self-evaluation test (including ten randomly selected questions from a pool of 195), patient education resources (including ten videos on the use of various inhalers and blood pressure measurement and 32 brochures) and General Data Protection Regulation (GDPR) training materials. There were also books and Turkish translations of publications from the International Pharmaceutical Federation (FIP). In the education and training modules, there were 40 continuing professional education sessions, eight records of FIP digital webinars with Turkish subtitles, and two personal development training sessions. Five live-streaming question-and-answer sessions were held. Currently, there are 12,178 TEBEŞİR users (9,757 pharmacists and 2,421 pharmacy students). Over six years, a total of 2,758 pharmacists (not including pharmacy students) completed at least one continuing professional development session. The median age was 36 years (25th–75th percentiles: 29–47) and 67% were female. Of these, 76% preferred to access TEBEŞİR via its website. The satisfaction rate was high (median 4.6–4.7 out of 5).

Conclusion: In line with the International Pharmaceutical Federation's (FIP) development goals (#9), future studies could focus on creating new TEBEŞİR content by assessing the needs and preferences of Turkish pharmacists, with the aim of increasing the number of pharmacists using this virtual platform.

Building the advanced clinical pharmacy workforce: Designing, accrediting and delivering an innovative MSc for NHS practice

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Background: Increasing complexity in patient care within the UK National Health Service (NHS) requires pharmacists to practice at an advanced level across clinical, leadership, education and research domains. In response, the University of Bath developed an Advanced Clinical Pharmacy Practice MSc aligned with the four pillars of advanced practice defined by NHS England (formerly Health Education England). The programme aims to support workforce transformation and enable pharmacists to achieve recognised advanced practitioner status which affords recognition and increased career opportunities by merit of a digital badge. Independent Prescribing (IP) is a required component to achieve ACP status in the UK.

Method: A modular, flexible MSc was designed for working professionals. Three new 11-week units were developed: Leadership in Health, Supporting Education and Training in Healthcare Contexts, and Research Methods, each mapped to the advanced practice pillars. A pilot specialist route in Critical Care Pharmacy was also introduced alongside the ACP MSc to address workforce needs in high-acuity settings. Interdisciplinary collaboration informed development, including partnership with the University of Bath School of Management to co-design leadership content. A blended learning approach was adopted in response to post-pandemic educational shifts, incorporating online delivery to enhance accessibility. Innovative engagement strategies included development of a podcast series ("Pharmacy in the Bathtub") to support diverse learning styles alongside online courses. The programme underwent formal accreditation through NHS England Workforce, Training and Education Directorate, enabling graduates to evidence capabilities and pursue the Advanced Clinical Practice (ACP) digital badge.

Results: Early implementation demonstrates sustained uptake across units: UnitCohort DateStudent Numbers EducationJune 202411 EducationJune 202513 LeadershipApril 202519 LeadershipJan 202613 ResearchJune 20259 ResearchApril 2026TBC Initial feedback indicates high levels of engagement, particularly with flexible delivery, interdisciplinary teaching, and innovative digital content. Enrolment trends suggest ongoing demand. A formal evaluation is pending and we were able to take lessons learned to inform the development of an international MSc (Clinical Pharmacy and Pharmacotherapy) which launched in 2026.

Conclusion: This MSc represents a scalable, accredited model for advancing clinical pharmacy practice. By embedding the four pillars of advanced practice and integrating flexible, digitally enhanced delivery, the programme supports pharmacists in achieving recognised advanced practice status and contributes to NHS workforce transformation.

The impact of advanced pharmacy practice experiences (APPEs) on professional identity formation (PIF) in student pharmacists

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Background: Limited data is available to determine factors that impact student pharmacist professional identity formation. Two studies indicated that professional identity is high upon admission to pharmacy school, but little change was seen after being in school at 12 and 24 months. These studies were done at schools outside the US with limited practice experiences as part of the curriculum. We assessed the effect of APPEs on professional identity formation in student pharmacists.

Objective: The purpose of this study is to determine the impact of advanced pharmacy practice experiences (APPEs) on final year student pharmacist professional identity formation (PIF).

Method: Final year student pharmacists in a consortium of US pharmacy schools were asked to participate in the study activities and provide informed consent. Students could choose not to participate in the study at any time. Two class cohorts (Class of 2024, Class of 2025) were surveyed at the beginning of the APPE year and again at the end of the APPE year. The study was approved by institutional review boards at the respective universities. Participants completed the survey using a validated tool to measure PIF (Macleod Clark Professional Identity Scale (MCPIS)). The survey consists of nine statements; student pharmacists indicated their level of agreement with each statement using a 5-point Likert scale (1= strongly disagree to 5= strongly agree). Six statements are worded positively, and three statements are worded negatively. The survey was administered online using Qualtrics (Version [2023/April]). On the last survey, students were asked to answer one additional question describing an experience that impacted their PIF that occurred during their APPE year. Data was collected by each school, coded, and paired to compare pre- and post-survey responses for each cohort of students. De-identified data were combined to complete statistical analysis using Wilcoxon signed-rank test and descriptive statistics.

Results: Twelve schools of pharmacy participated in the survey. There were 85 pre-survey responses and 77 post-survey responses with 23 paired responses for the Class of 2024. There were 159 pre-survey responses and 66 post-survey responses with 22 paired responses for the Class of 2025. The average student age was 25 (+ 3.16 SD) years old; 69% were female and 31% were male. Most students were Caucasian (58%) and Asian/Pacific Islander (26%). Most students had a bachelor's degree (67%) while 13% had no prior degree. Most students had work experience in community or hospital (96%) settings. Only 4% of students had no work experience. Most students (82%) participated in pharmacy organizations while 18% did not. Thirty-two percent of students had a pharmacy mentor. Four questions had non-significant results, and five questions had significant results, suggesting a positive impact of APPE on PIF.

Conclusion: We found that APPEs contributed to a stronger sense of professional identity. Schools may want to foster PIF in the APPE year including preceptor development. Stronger PIF may help with resiliency and burn-out prevention. We plan to review data from our final cohort, the Class of 2026.

Passport to practice: Designing a short study abroad course

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Background: The Short Study Abroad elective was developed to integrate global learning into pharmacy education by enhancing students' cultural humility, global awareness, and understanding of international pharmacy practice. The objective of this initiative was to design a scalable model that prepares students for culturally responsive, globally engaged professional practice.

Method: The course employs a three phase structure consisting of pre-departure preparation, a two-week immersive in-country experience, and post-program reflection. Pre-departure activities include asynchronous modules, assigned readings, and virtual discussions that focus on cultural competence and global health systems. During the in-country component, students engage with practitioners, educators, and regulators through guided site visits, collaborative discussions, and structured comparisons of international pharmacy roles and health systems. Post-program assessment incorporates reflective digital journaling and digital storytelling to evaluate students' growth in professionalism, adaptability, and communication. Course outcomes were mapped to Accreditation Council for Pharmacy Education (ACPE) Standards 3 and 4, and the 2022 American Association of Colleges of Pharmacy (AACP) Curricular Outcomes and Entrustable Professional Activities (COEPA).

Results: Student reflections indicate increased cultural awareness, improved confidence in cross-cultural communication, and a deeper understanding of global health care systems. Faculty report that the modular design supports consistency, scalability, and meaningful

engagement across all phases. Collaborations with international partners were strengthened through student-led presentations and structured communication.

Conclusion: The Short Study Abroad elective represents a feasible, adaptable model for embedding global learning within pharmacy curricula. Its hybrid design, reflective assessment approach, and alignment with national competencies support cultural humility and professional identity formation. The framework is transferable to institutions with varying resources, offering a replicable strategy for expanding global and intercultural learning opportunities.

PharmaCalcTutor: An adaptive agentic AI Tutoring platform for pharmaceutical calculations

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Background: Pharmacy calculations are an essential aspect of pharmacy practice but remain a barrier for many students to become licensed pharmacists. The purpose of our work is to develop an adaptive agentic AI platform to support student learning of pharmaceutical calculations across the curriculum.

Method: PharmaCalcTutor is an adaptive tutoring platform designed to support pharmaceutical calculations preparation across the curriculum. The platform is designed for learners spanning all years of the curriculum; it delivers cumulative instruction in dosing, infusion rates, pharmacokinetics, biostatistics, renal adjustment, dilution, concentration, and related pharmacotherapeutics. Its guiding educational aim is to provide repeated, scaffolded, structured, and learner-responsive quantitative practice while preserving curricular alignment and mathematical reliability. The platform is grounded in a cognitive apprenticeship framework in which students are supported through staged problem solving, guided explanation, and progressively reduced scaffolding. Each learning encounter may draw on coordinated instructional roles that help deconstruct the problem, identify relevant strategy, perform calculations, detect common traps, explain underlying reasoning, and validate the final answer. This structure allows the platform to move beyond question delivery alone toward a more coached and reflective learning experience. A central feature of the platform is its cumulative and adaptive practice model. In static mode, learners receive course appropriate problem sets that expand by curricular level from foundational content to progressively broader cumulative coverage. In adaptive mode, the platform also generates fresh problem variants while preserving the same mathematical structure and learning objectives. This approach enables broad practice opportunities without relying only on repetition. The adaptive layer monitors performance patterns such as recurrent weakness, support dependence, and recent topic difficulty, then adjusts the balance of reinforcement, remediation, and challenge. Additional pedagogical features extend the instructional design. A multi-level hint sequence supports graduated assistance, whereas a review mode removes hints and dialogue support to strengthen retrieval and independent problem solving. A pharmacotherapeutics component complements the calculation curriculum by connecting quantitative tasks to clinical judgement and decision making. Faculty-facing controls allow instructors to monitor readiness, adjust engagement parameters, review baseline performance, and identify students who may require intervention.

Results: PharmaCalcTutor illustrates how adaptive tutoring, cumulative curricular design, and structured scaffolding can be combined into a coherent educational platform for pharmacy learners. It supplements faculty-led instruction by offering individualized practice, consistent feedback, and actionable learner data. Key faculty members have reviewed and endorsed implementation of the platform across the curriculum.

Conclusion: PharmaCalcTutor represents a move from static drill software toward a scalable adaptive tutoring platform capable of delivering individualized, faculty-visible pharmaceutical calculations for practice readiness at curricular scale.

AI in pharmacy education: Improving medicinal chemistry learning through ai-assisted case-based studies

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Background: Student pharmacists tend to perceive medicinal chemistry as challenging, as the subject places substantial emphasis on drug chemical structures, mechanisms of action, and detailed structure–activity relationship (SAR) analyses. Patient-based case studies were integrated throughout the required medicinal chemistry course in the Doctor of Pharmacy (PharmD) program to make the content more clinically relevant. Two of the three case studies required students to use artificial intelligence (AI) tools. This component was included to assess students' awareness of AI literacy, including their ability to construct effective AI prompts and evaluate the accuracy of AI-generated information. This study also aimed to determine whether AI-assisted case studies improved pharmacy students'

understanding of medicinal chemistry and overall conceptual development.

Method: Second-trimester students in the PharmD program were enrolled in a required three-credit medicinal chemistry course. Students completed three case studies in teams of five to six members: the first case study without AI assistance, while the other two required students to use generative AI tools. For each case study, students answered three questions related to (1) identifying the therapeutic problem, (2) performing SAR analysis of the therapeutic alternatives provided, and (3) selecting an appropriate therapeutic option from the available drugs in the case scenario. During the AI-assisted case studies, the students constructed and refined AI prompts and were directed to critically evaluate AI-generated responses using evidence-based drug information resources. Pre- and post-intervention surveys using a five-point Likert scale measured students' confidence in and perceptions of AI use in medicinal chemistry learning.

Results: The confidence level of student pharmacists in applying medicinal chemistry concepts to patient cases significantly increased ($p < 0.05$) after completing the two AI-assisted activities. Comments gathered during focus group discussions supported this increase in confidence. Students identified fact-checking and verifying AI-generated information using evidence-based resources as the main contributors to improved learning and concept development. Students also reported greater confidence in identifying incomplete or incorrect information generated by AI tools.

Conclusion: The findings indicate that AI-assisted case studies supported medicinal chemistry learning among student pharmacists. The activities helped students recognize that generative AI can aid in analyzing complex medicinal chemistry topics, provided they possess adequate subject knowledge to critically evaluate the accuracy of AI-generated information.

Pharmacy degrees at the current faculty of chemistry 1920 – 1940

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Background: During the 15th century, the Spanish Crown created the Royal Tribunal of the Protomedicato, which regulated medical practitioners and supervised public health, including the preparation and distribution of medicines. Later, in 1780, a plan was proposed to divide this institution into three specialized courts—Protosurgeon, Protomedicato, and Protopharmacist—though it was never implemented in New Spain. Another effort in 1804 to separate pharmacy from medical oversight was also unsuccessful due to resistance from the Protomedicato. Significant changes began in the 19th century. In 1831, the Medical Faculty of the Federal District was established to examine and certify health professionals. Two years later, with the abolition of the Pontifical University and the enactment of the Law for the Organization of Public Instruction, the Faculty of Medical Sciences was founded, and the profession of pharmacist received formal recognition—distinguishing academically trained pharmacists from empirically trained apothecaries. Further professionalization followed: in 1893, the National School of Medicine reformed the pharmacy curriculum by incorporating chemistry to widen career opportunities. The founding of the National University in 1910 led to the creation of the Pharmaceutical Chemistry degree program in 1917.

Method: The study was conducted through an extensive review of primary documentary sources. Researchers examined UNAM's institutional yearbooks and thesis repository for the years 1920–1945, a key period in the academic development and professionalization of chemistry in Mexico. Additional professional licenses were also reviewed. The collected information was then organized and classified by gender and by the number of degrees awarded, when such data were available.

Results: The UNAM thesis repository shows that in 1923, 18 degrees for Authorized Responsible Pharmacists—equivalent to the pharmacist title—were issued. The Pharmaceutical Chemistry program began in the School of Medicine in 1917, and by 1919, pharmacy education was moved to the School of Chemical Sciences and Industries (later the Faculty of Chemistry and Pharmacy). There, several professional programs were offered, including Chemical Engineering, Chemistry, Pharmaceutical Chemistry, Pharmacy, Petroleum Chemistry, Metallurgy and Assay, along with training for Pharmacy Assistants.
The 1926 Health Code required that anyone practicing medicine or pharmacy present a professional degree for registration, with UNAM titles recognized for this purpose. Because pharmacies were not required to employ pharmacists, the profession sought new work opportunities, encouraged by legal gaps and expanding scientific fields. In 1937, UNAM introduced the four year Pharmaceutical Chemist Biologist (QFB) program.
Between 1924 and 1945, UNAM registered 13,325 degrees, 22.65% of which were awarded to women. The 1936 Law of Chambers of Commerce and Industry merged commercial and industrial sectors, but it did not clarify why pharmacies were categorized as businesses rather than specialized health establishments. From 1920 to 1945, the Faculty of Chemistry granted 969 degrees; 50.87% were in Pharmacy related fields, and 60.64% of these degrees went to women.

Conclusion: Since its origins, the Faculty of Chemistry has consistently maintained strong enrollment in Pharmacy, Pharmaceutical Chemistry, and now Pharmaceutical Chemist Biologist —once representing 50.87% of all degrees, with women comprising 60.64% of graduates in these fields.

Historical record of professional licenses in the pharmaceutical sciences area at the faculty of chemistry - UNAM

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Background: As a consequence of the Regulatory Law of Article 5 of the Constitution and the Regulatory Law for the Practice of Professions in Mexico City, both published in 1945, the General Directorate of Professions (DGP) was established in Mexico on May 26, 1945, to regulate professional practice nationwide. Its creation responded to the need for an agency to control and validate professional credentials and establish regulations for the practice of the various professions in the country. Over time, its format and issuance procedure have evolved, moving from physical forms with photographs to an electronic professional license since October 2018, which simplifies the process and eliminates the need for physical printing. From 1946 to 2022, the DGP issued 17,555 professional licenses in the field of Pharmaceutical Sciences to the National Autonomous University of Mexico (UNAM).

Method: The General Directorate of Pharmacy (DGP) was asked, through the Pharmacy Advisory Council, to provide the historical records of professional licenses in the field of Pharmaceutical Sciences.
The information was cleaned and classified by year of issuance and by the name of the academic degree issued on the professional license. The license types were classified according to their issuance format: Physical Professional License, which is the traditional paper version of the document, with a handwritten signature and photograph. The first generation was from 1946 to 1999; this was the first physical format of the professional license. The second generation was from 1999 to 2015, and the third generation from 2015 to 2018. The fourth generation, from 2018 to the present, is the electronic Professional License, which is the digital version that can be downloaded from the government platform. It is electronically signed and contains a QR code, although it does not include a photograph. This version has made the process and obtaining of the document faster and simpler.

Results: During the period from 1946 to 2022, 17,555 professional licenses were issued by UNAM in the Pharmaceutical Sciences Area, 91.5% in physical format and 8.5% in digital format. The first generation of licenses comprised 45.7%, the second generation 37.3%, the third generation 8.5%, and the fourth generation 8.5%. It is important to note that digital professional licenses began to be issued on October 1, 2018. From 1946 to 2022, 101 professional licenses were issued at the technical level, one for Pharmacy Assistant, and 100 for Pharmacist. At the Bachelor's level, 17,063 licenses were issued for Pharmaceutical Chemist Biologist, 36 licenses for Pharmaceutical Chemist, 43 licenses for Pharmaceutical Chemist Biologist, 156 licenses for Pharmaceutical Chemist Biologist, 152 licenses for Pharmacy, and 4 licenses for Pharmaceutical Chemical Engineering Biologist. The first professional license issued in 1946 was to Emma Guillermina Balboa Maldonado, license number 78.

Conclusion: The professional license is a means used by the State to regulate the practice of professionals in the field of Pharmaceutical Sciences to guarantee the quality of the services they offer to society. It is mandatory for those who wish to practice the profession regulated by law in Mexico.

Building toward APPE Entry: A three-session scaffolded mock preceptor rounds series in a competency-driven curriculum

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Background: To evaluate the impact of a scaffolded mock preceptor rounds series on third-year pharmacy students' (P3) clinical reasoning, presentation skills, and APPE readiness across three sessions of progressively increasing patient complexity.

Method: P3 students completed three integrated patient workup and mock preceptor presentation sessions spanning the APPE Readiness, Concepts in Practice and Integrated Learning Lab courses to prepare students for EPAs at APPE entry. Prior to each session, students independently worked up four EHRGo patient cases of escalating complexity (5–8, 8–12, and >15 medications) representing hospital, ambulatory care, and long-term care settings. Students presented one case in groups with a preceptor using JCPP-formatted presentations (5–7 minutes), while serving as active observers and discussants for the remaining three cases. Data were collected via structured written reflections after Sessions 1 and 2 and a 25-item 4-point Likert-scale survey after Session 3.

Results: Survey results demonstrated strong self-reported growth, with the highest-rated items reflecting clinical skill improvement (mean 3.55 ± 0.6), increased confidence (3.51 ± 0.5), and peer learning value (3.42 ± 0.6). Lowest-rated items were preparation adequacy for >15-medication patients (2.63 ± 0.7) and confidence in managing APPE-level complexity (2.78 ± 0.7). Most students endorsed self-doubt about belonging in clinical settings (3.06 ± 0.7), indicative of the imposter phenomenon. Qualitative analysis revealed a developmental arc from disorganized, exhaustive preparation toward systematic, patient-centered clinical reasoning, with persistent gaps in on-the-spot questioning,

information selectivity under time pressure, and unfamiliar disease state management.

Conclusion: Embedding a progressive mock preceptor rounds series within a competency-driven curriculum using simulated EHR patients effectively builds pharmacy clinical presentation skills and self-efficacy while generating programmatic assessment data to identify and address gaps in APPE readiness.

Synergistic effects of sorafenib combined with gemcitabine in HepG2 cells and transplanted liver cancer in nude mice

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Background: Hepatocellular carcinoma (HCC) remains a leading cause of cancer-related mortality worldwide, largely due to intrinsic drug resistance and limited effective therapeutic options. Sorafenib, a multikinase inhibitor targeting the Raf/MEK/ERK pathway and angiogenesis, is a standard of care for advanced HCC; however, its modest efficacy as monotherapy underscores the urgent need for novel combination strategies. Gemcitabine, a nucleoside analogue, has demonstrated preclinical antitumor activity in HCC models. Combining sorafenib with gemcitabine may yield potent antineoplastic effects through complementary mechanisms. This study aimed to investigate the combined efficacy of sorafenib and gemcitabine in HCC and explore the underlying mechanisms involving the ERK signaling pathway and angiogenesis.

Method: Human hepatoma HepG2 cells were treated with varying concentrations of sorafenib (1.5–6 μmol/L) and gemcitabine (5–20 μmol/L) alone and in combination. Cell proliferation inhibition was assessed using the MTT assay at 24, 48, 72, and 96 hours. Drug interaction was quantitatively evaluated using the q-value formula ($q=EAB/(EA+EB-EA\times EB)$, where $q>1.15$ indicates synergism. Protein expressions of total ERK and phosphorylated ERK (pERK) were detected via Western blotting. For in vivo evaluation, a subcutaneous HepG2 xenograft model was established in immunodeficient NOD/SCID mice. Tumor-bearing mice were randomized to receive vehicle control, sorafenib (40 mg/kg), gemcitabine (100 mg/kg), or the combination via daily intraperitoneal injection for 20 days. Tumor volumes were monitored, and vascular endothelial growth factor (VEGF) expression in excised tumor tissues was evaluated by immunohistochemistry.

Results: The combination of sorafenib and gemcitabine significantly enhanced HepG2 cell proliferation inhibition compared to either monotherapy, peaking at 72 hours. The drug interaction was highly synergistic across all time points at the optimal combination of 3 μmol/L sorafenib and 10 μmol/L gemcitabine ($q>1.15$). Western blot analysis revealed a marked reduction in pERK expression in the combination group compared to monotherapies, while total ERK levels remained unchanged, indicating profound blockade of the ERK signaling pathway. In vivo, the combination therapy significantly reduced tumor volumes compared to the control and monotherapy groups ($p < 0.01$). Furthermore, immunohistochemical analysis demonstrated a drastic downregulation of VEGF expression in the dual-therapy cohort, indicating superior suppression of tumor angiogenesis.

Conclusion: The combination of sorafenib and gemcitabine exhibits synergistic antitumor effects in both HepG2 cells and xenograft models, accompanied by inhibition of the ERK pathway and reduced angiogenesis. These findings suggest that this combination represents a promising novel therapeutic strategy for hepatocellular carcinoma, potentially targeting both tumor proliferation and angiogenesis. Further studies are warranted to elucidate the precise molecular mechanisms and to support clinical translation.

Preceptor development utilizing the Whole Brain® Thinking model: Building practice ready international experiential learning sites

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Background: High-quality international Advanced Pharmacy Practice Experiences (I-APPEs) depend not only on student preparation but also on host site preceptor readiness. Cultural norms, communication styles, and clinical workflow differences can hinder effective supervision if preceptors and learners lack a shared framework for understanding thinking and communication preferences. To intentionally prepare preceptors and strengthen site readiness, the University I-APPE team implemented a structured preceptor development programme using the Herrmann Brain Dominance Inventory® (HBDI), the same training provided to I-APPE students. The goal was to cultivate cognitive diversity awareness, shared language, and coaching strategies that support belonging and performance.

Method: All hospital preceptors completed the HBDI, a 116-item assessment producing quadrant scores: Blue (analytical, quantitative), Green (organised, sequential), Red (interpersonal, feelings based), and Yellow (holistic, intuitive). Preceptors received individualised profiles and participated in on-site preceptor development workshops led by University

faculty. Sessions included: (1) interpreting HBDI profiles to tailor supervision, feedback, and entrustment; (2) mapping common student behaviours to quadrant strengths and gaps; (3) practising feedback scripts and expectation setting aligned to quadrant preferences; and (4) applying the model to culturally responsive communication and conflict de escalation during I-APPEs.

Results: From 2024–2025, 58 preceptors completed the HBDI and debriefing. Preference distributions emphasised Green (n = 42; average = 75) and Blue (n = 42; average = 74), followed by Red (n = 31; average = 68) and Yellow (n = 22; average = 63). Under pressure, average preferences shifted upward for Green (average = 78), Red (average = 76), and Blue (average = 76), with a decrease in Yellow (average = 48). The most common profile score was 1–1–2–2 (n = 19), reflecting dominant Blue and Green preferences. These insights informed preceptor strategies to: (a) scaffold expectations for structure oriented supervisors; (b) intentionally integrate rapport building for lower Red profiles; and (c) preserve exploratory learning in low Yellow contexts.

Conclusion: A preceptor centred readiness strategy using HBDI produced a shared coaching language and actionable supervision tactics aligned to cognitive preferences. This strategy can build practice ready international sites that deliver reliable, high value experiential education.

University of Illinois Chicago Retzky College of Pharmacy Summer International Program: Contemporary clinical pharmacy practice and education

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Background: The University of Illinois at Chicago (UIC) Retzky College of Pharmacy (RCOP) has been collaborating with institutions around the world for over 40 years to advance pharmacy practice and education. Partnerships have included sharing experiences for curriculum transformation, clinical practice development and faculty training, pathways for entry into the UIC COP Pharm.D. program, residency programs, and fellowships, and offering extended patient care shadowing experiences in inpatient and outpatient clinical pharmacy practice sites at the University of Illinois Hospital and Health Sciences System (UI-Health). Collaborative degree programs with the University of Hong Kong and University of Malta are also in place. These efforts to provide skills enhancement and curricula transformation are aimed to educate the next generation of pharmacists and advance pharmacy practice back in their own countries.

Method: In 2013, faculty from UIC RCOP developed a short-term, classroom-based summer curriculum for international pharmacy students, pharmacists, and faculty members from Hong Kong and Taiwan to foster interest in clinical education and practice. The 4-week "Contemporary Clinical Pharmacy Practice and Education" program provides a comprehensive overview of clinical pharmacy practice and education opportunities in the United States. Conducted annually in July, the program features more than 30 UIC RCOP faculty members, each an expert in their clinical area. Topics range from common disease states in various inpatient and ambulatory settings, clinical skills development, innovative clinical pharmacy practice models, leadership and career pathways, and patient case-based teaching. Sessions integrate didactic and hands-on skills laboratories and case-based teaching to facilitate the learning experience. UIC PharmD students are utilized as student ambassadors and help give the students a near-peer experience. There is no course credit provided by UIC for attending the summer program. A formal course evaluation is conducted at the conclusion of the program each year to assess participant experience and inform continuous improvement.

Results: The course has been offered 10 times, and there have been 509 total participants. The program participants expanded from 2 regions and 4 institutions in the first year to 13 different countries/regions and 28 different institutions throughout Asia and Europe. Based on consistently high (ave. >4.2/5 every year) annual evaluations, the program has been successful in providing international participants an opportunity to learn about clinical pharmacy practice and to experience pharmacy education in the United States. Participants find the didactic lectures and practical skills sessions beneficial in shaping their future academic pursuit in clinical pharmacy and related areas, and are grateful for the opportunity to learn about potential skills and activities that can be utilized when they return back home. They also enjoy the opportunity to network and build collaborations with students from other countries.

Conclusion: Results show this program is successful in providing international participants an opportunity to learn about clinical pharmacy practice and to experience pharmacy education in the United States. We look forward to continuing to collaborate with our international partners in providing these experiences to many students, pharmacists, and faculty members in future years.

Digital footprints and professionalism: Analyzing the impact of social media behavior on the professional development of pharmacy undergraduates

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Background: The rapid evolution of digital communication has transformed traditional medical professionalism into "e-professionalism," a distinct paradigm that requires pharmacy undergraduates to intentionally manage their digital footprints. As digital natives, students frequently navigate social media platforms, yet many succumb to the "online disinhibition effect," where perceived anonymity or physical distance leads to behaviors that conflict with professional ethical standards.

Objective: This analysis examines the multifaceted impact of social media behavior on professional development, highlighting its role as both a career risk and a strategic tool for advancement.

Method: A Comprehensive literature review was carried out across “PubMed” and “Google Scholar” using search terms like “E- Professionalism”, “Pharmacy Undergraduates” and “Digital Footprint”. All relevant articles published up until 2025 were extracted to identify prevailing trends in professional risks, residency selection impacts, and educational strategies for digital literacy.

Results: Evidence shows that while over 90% of student pharmacists engage daily on social platforms, their usage is primarily personal, often leading to blurred professional boundaries. The stakes of this digital presence are high; approximately 48% of residency program directors report that an applicant’s social media content has directly influenced selection decisions. While lapses—such as patient confidentiality breaches or unprofessional imagery—can result in severe disciplinary action, recent legal precedents which can bring the evolving tension between student free speech and institutional professional requirements.

Conclusion: The findings advocate for a shift in pharmacy education toward longitudinal, integrated curricula that foster "digital agency". By strategically utilizing platforms like LinkedIn for professional branding and Twitter for clinical engagement, students can transform their online presence into a career asset. Preparing future pharmacists for a technology-driven landscape requires institutional commitment to digital literacy as a core clinical competency.

Digital transformation experience in Argentina

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Background: The Argentinian Pharmaceutical Confederation(COFA) operates through a process known as “Call for professional certification/recertification”, in which pharmacists certify professionally to demonstrate they are up-to-date with their knowledge, and they ensure high-quality benefits to the users of the different health systems. This process is voluntary, free and it has a five-year validation. If it is the first time, they have to accumulate 50 points to obtain the certification. It takes place only in March and September, and they have to recertificate always in the same month to respect the certification`s continuity. If pharmacists comply with the specified time, allow them to collect fewer points than the previous time. In some Argentinian provinces, pharmacists obtain a salary increase by getting this certification/recertification. Before 2022, this process involved gathering the pharmacists' printed documentation, which was submitted in person to their pharmaceutical colleges, and then forwarded to CoFA by post. CoFA summoned the National Certification Committee's members, who are a group of qualified pharmacists from different provinces, that evaluate this documentation to grant or withhold authorisation. The National Certification Committee(CNC) came in person to Buenos Aires city and finished the process. It was a tedious, long, expensive process, and when the pandemic arrived, the pharmacists couldn't achieve the certification within the normal period. After the pandemic, CoFA needed to change the in-person process to a completely virtual one. The objective of this work is to show the transformation of the printed documented process into a virtual one to eliminate costs, improve efficiency, facilitate pharmacists' access to the process and implement environmentally friendly practices. This change was possible by evaluating an online platform that enables pharmacists to upload their documentation and allows the CNC to vote on it. Besides, the certification's rule book was used to automatise both parts of the process.

Method: A descriptive study was conducted based on the review of the professional certification and recertification printed process. Thereafter, the pandemic restrictions, which included the impossibility of the CNC travelling to Buenos Aires and the difficulty of pharmaceutical colleges sending printed documentation, a digital management system was designed and implemented. This system allows uploading online documentation, academic background and conducting the evaluation online.

Results: After implementing the online certification, CoFA recognised that the new process has improved in different aspects: reducing the time in which pharmacists take to upload the documentation, accelerating their access to the

platform and process, and eliminating printed documentation costs. The CNC benefits from access to the platform and the evaluation of the documentation remotely. Besides, the most significant benefit is being environmentally friendly by applying this virtual process.

Conclusion: In conclusion, the virtual process is a great achievement in several positive aspects: the platform enables pharmacists to upload their documentation and waive associated costs, while the CNC is facilitated to cast votes remotely. Another positive change is that CoFA continues to work on several environmentally friendly proposals,reducing paper usage, aligning with more responsible institutional practices. In addition, CoFA continues to encourage more pharmacists to obtain this certification /recertification.

Impact of an iterative interprofessional dementia design thinking activity on systems thinking and empathy

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Background: Health professions students are expected to function within complex care systems, however, traditional instruction often emphasizes discrete tasks rather than systems-level thinking. Design thinking may address this gap, particularly in contexts requiring integration of clinical, ethical, and operational considerations. Grounded in the stages of empathizing, defining, ideating, prototyping, and testing, design thinking offers a structured framework for approaching complex problems. However, limited literature describes how students' thinking evolves through iterative design and feedback. Dementia care provides a relevant context to examine this, given the need to balance safety, autonomy, and multidisciplinary needs.

Objective: To evaluate the impact of an iterative, design-based interprofessional education (IPE) activity on team-generated design submissions and overall attitudes regarding systems thinking, empathy, interprofessional roles, and real-world constraints.

Method: A mixed-methods study was conducted following a 4-hour virtual IPE experience delivered via Zoom. A total of 492 students from nine health professions were organized into 46 teams (10–11 students per team). Prior to the session, students completed a design thinking survey and reviewed asynchronous content on dementia care and professional roles. The live session included a 45-minute lecture on interprofessional collaboration and design thinking, followed by introduction to the Hogeweyk Dementia Village model including an interview with the Director of the village. Teams were tasked with designing a dementia care model incorporating concepts such as safety, healthcare services, physical amenities, and mental well-being. Teams presented their proposals to peer teams, received structured feedback, and revised their designs accordingly. Following the activity, students completed a post-survey and a reflection on their top three takeaways. Original proposals and revision documents were analyzed as paired data across domains including systems design, financial planning, interprofessional role integration, and ethical reasoning. Changes were analyzed using exact McNemar tests for paired categorical data. Paired pre-post survey analysis was conducted for matched students (n=362, 73.5% response rate) using the Wilcoxon signed-rank test. Post-activity reflections (n=435, 88% response rate) were analyzed thematically.

Results: Structured systems design increased from 34/46 teams (73.9%) in original proposals to 40/46 (87.0%) in final proposals (p=0.031). Inclusion of financial planning increased from 45/46 (97.8%) to 46/46 (100.0%), while interprofessional role integration increased from 32/46 (69.6%) to 34/46 (73.9%) and explicit autonomy and safety framing from 44/46 (95.7%) to 45/46 (97.8%). Paired pre–post survey analysis demonstrated statistically significant improvements across all matched items ($p<0.05$), with the largest gains observed in empathy and perspective-taking and in design-based problem solving (all $p<0.001$; $r\approx0.80$–0.85). Smaller but significant improvements were observed in interprofessional attitudes, which were high at baseline. Qualitative analysis of 435 reflections showed that 65.7% of students referenced interprofessional collaboration, 43.0% described increased empathy, 17.0% noted improved role clarity, and 15.4% highlighted the value of iteration and feedback.

Conclusion: This design-based IPE activity promoted measurable improvements in systems-level reasoning and incorporation of real-world constraints. While many foundational concepts were present in initial proposals, peer feedback and revision enhanced organization, integration, and feasibility. This approach represents a practical model for advancing systems thinking in health professions education.

Teaching market access and reimbursement through stakeholder negotiation: A simulation-based approach in interdisciplinary graduate education

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Background: The global expansion of high-cost advanced therapies, including gene and cell therapies, has intensified the need for healthcare professionals to engage in market

access, reimbursement, and value-based contracting decisions that directly affect patient access and health system sustainability. These decisions require navigating clinical uncertainty, long-term outcome risk, affordability constraints, and competing stakeholder incentives. Effective market access decision-making increasingly occurs within interdisciplinary teams that bridge science, practice, and policy. This abstract describes the design, implementation, and baseline evaluation of a stakeholder negotiation simulation embedded in an interdisciplinary graduate curriculum.

Method: The negotiation simulation was implemented within a graduate-level Market Access and Reimbursement course enrolling master's students from diverse academic and professional backgrounds, including pharmacy, life sciences, public health, business, and related disciplines. Students were assigned to represent stakeholder perspectives (manufacturer, payer, provider/health system, or patient advocacy organisation) and tasked with negotiating a value-based reimbursement agreement for a hypothetical, one-time gene therapy for a rare disease. The scenario intentionally incorporated strong early efficacy, limited long-term durability data, high upfront cost, and substantial budget impact to reflect real-world challenges in balancing innovation, affordability, and access. Student preparation centred on a structured Stakeholder Negotiation Dossier requiring critical appraisal of clinical evidence, assessment of economic and budget impact considerations, explicit definition of stakeholder-specific value, selection of measurable outcomes for performance-based contracts, and articulation of negotiation strategies and constraints. The exercise culminated in live, multi-party negotiations. Evaluation employed a paired pre-/post-simulation survey, comprising 23 items across five competency domains: Confidence and Professional Readiness, Evidence-based Decision-making, Value-based Contracting Knowledge and Skills, Systems Thinking and Stakeholder Perspective, and Communication and Interdisciplinary Skills. Items were measured using five-point Likert scales, supplemented by nine post-simulation open-ended reflections. This abstract reports baseline results, with post-simulation change analysis to be presented at FIP 2026.

Results: Pre-simulation responses were obtained from 38 - 46 students, depending on item. Baseline scores indicated moderate self-reported preparedness across domains, with means ranging from 2.71 to 3.96. Lower baseline scores were observed in negotiation-specific and value-based contracting competencies, including confidence negotiating with stakeholders with competing incentives (2.71), making decisions with incomplete long-term data (2.74), understanding barriers to implementing value-based contracts (2.91), engaging in value-based reimbursement conversations (2.92), and identifying appropriate outcomes for performance-based contracts (3.02). Moderate baseline scores were observed for systems-level thinking beyond individual negotiations (3.00), identifying evidence limitations (3.09), integrating clinical and economic evidence (3.13), and explaining healthcare value to different audiences (3.16). The highest baseline score was observed for engaging with viewpoints that differ from one's own (3.96). Overall, these findings suggest that while students entered the simulation with a general openness to diverse perspectives and moderate foundational knowledge, they demonstrated gaps in applied negotiation and value-based contracting competencies that the simulation is designed to address.

Conclusion: This stakeholder-based negotiation simulation represents an innovative, interdisciplinary approach to teaching market access and reimbursement that bridges pharmaceutical science, professional practice, and education. Findings demonstrate measurable competency gaps in applied negotiation, contracting design and decision-making under uncertainty at baseline, supporting the need for structured experiential training.

Implementing and Evaluating Intraprofessional Pharmacy Day: Findings From the First Large Scale Multi Institution IntraProfessional Education Event

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Background: As pharmacy practice evolves across Canada, the need for structured intraprofessional education (IntraPE) between pharmacists and pharmacy technicians has become increasingly critical. Despite accreditation requirements, sustainable and mandatory IntraPE opportunities remain limited. Building on previous small scale pilots, a large scale provincial initiative was developed to strengthen role clarity, communication, and collaboration within the pharmacy team. The purpose of this project was to design, implement, and evaluate the first province wide, full day IntraPE seminar engaging both pharmacy (PharmD) and pharmacy technician students. The seminar aimed to deepen understanding of intraprofessional roles, build trust within collaborative decision making, and promote appreciation for team based pharmacy practice.

Method: On March 11, 2026, a mandatory full day IntraPE seminar was delivered in partnership with 14 colleges and universities, involving 716 students across PharmD and pharmacy technician programs. The seminar included team based activities, case based decision making, facilitated role clarification discussions, and large group debriefs designed to integrate learning province wide. Evaluation tools included an adapted SPICE R2 survey and a modified W(e)Learn Interprofessional Program Assessment.

Results: This year's SPICE R2 findings demonstrated measurable growth in students' understanding of intraprofessional collaboration, with average pre and post scores of 41/50 and 45/50, respectively - indicating meaningful improvement. Students' perceptions, measured using the modified W(e)Learn tool, showed strong endorsement of the seminar, with approximately 92% agreeing or strongly agreeing that the experience promoted learning.

Conclusion: The 2026 event marks a significant milestone in advancing intraprofessional learning within pharmacy education in Ontario. Students reported expanded understanding of pharmacy technicians' scope of practice, acknowledged intraprofessional knowledge gaps, and expressed strong support for mandatory IntraPE within curricula. The success of this inaugural full day, large scale event provides a solid foundation for continued province wide initiatives aimed at strengthening collaborative practice and enhancing patient centered pharmacy care.

Performative Wellness? Pharmacy Students' Perceptions of Mental Health Discourses and Supports in Professional Education

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Background: Mental health concerns among university students have increased significantly in recent years, particularly within demanding healthcare professional programs such as pharmacy. Pharmacy students often face intense academic workloads, competitive learning environments, and financial pressures while simultaneously preparing for professional roles that carry significant responsibility and emotional labour. In response, many universities have expanded institutional mental health initiatives and support services. However, research consistently reports low utilization of available mental health resources among healthcare professional students, suggesting a disconnect between institutional strategies and student needs. Limited research has explored how pharmacy students themselves conceptualize mental health and interpret institutional mental health messaging and supports. Understanding these perspectives is essential for developing approaches that meaningfully support student well-being.

Objective: This study aimed to explore pharmacy students' conceptualizations of mental health and wellness, examine how peer, academic, and institutional cultures shape these understandings, and investigate how these perceptions influence engagement with university mental health services.

Method: A qualitative study design was employed. Semi-structured interviews were conducted with 25 PharmD students at the University of Toronto. The interview guide explored students' understandings of mental health, experiences within academic and peer cultures, perceptions of institutional mental health services, help-seeking behaviours, and recommendations for improvement. Interviews were conducted virtually, lasted 30–60 minutes, and were transcribed and de-identified. Data were analyzed using reflexive thematic analysis following Braun and Clarke (2006). Analysis was facilitated using NVivo 15.

Results: Four interrelated themes were identified. First, students described institutional mental health communication as performative, characterized by wellness messaging that appeared supportive but felt disconnected from students' lived experiences within the program. Second, institutional policies and administrative procedures were perceived as contradictory to wellness messaging. Students reported that policies related to missed assessments or attendance created barriers for those experiencing mental health challenges. Third, students described the structure and intensity of the curriculum as contributing to unnecessary stress, with some academic expectations perceived as misaligned with the competencies required for practice. Finally, students reported that professional role expectations encountered during experiential and practice settings negatively affected their mental health and shaped their developing professional identities. Across these themes, students identified opportunities for improvement, including increased transparency in policies, curriculum adjustments, and greater alignment between institutional messaging and structural practices.

Conclusion: These findings highlight tensions between institutional mental health initiatives and the structural conditions within professional education programs. Addressing student mental health requires not only expanded services but also institutional and curricular changes that align policies, culture, and professional expectations with wellness commitments. Incorporating student perspectives into program design may support more authentic and effective approaches to mental health and well-being in pharmacy education.

medication and patient safety literacy among early-career pharmacists: a pre–post educational intervention and participants' evaluation

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Background: Unsafe medication practices and medication errors are leading causes of avoidable harm and injury in the healthcare system globally, with medication-related harm representing up to 50% of all preventable reported patient safety incidents and harm in medical care. According to the World Health Organisation (WHO), 1 in 20 patients experience medication-related harm. One fourth of these harms are life-threatening. Medication errors account for an estimated US$42 billion in annual global healthcare costs. African and South-East Asian regions have the highest prevalence rate of preventable medication-related harm globally. In Nigeria, there is a widespread prevalence of medication error (over 47%). Pharmacists are medication experts and an integral part of the healthcare team. Early-career pharmacists are a major population of the pharmacy workforce in Nigeria. Early-career pharmacists play a critical role in promoting medication safety; however, gaps in medication safety knowledge and competencies persist. This project aimed to reduce medication-related harm by training early-career pharmacists in Nigeria. It also evaluated the participants' perceptions of the training.

Method: An educational intervention was conducted using a structured training curriculum. The training curriculum covered patient safety and just culture, medicine use pathway, types of medication errors, high-alert medications, polypharmacy, de-prescribing tools, transition of care, pharmacovigilance, adverse drug reporting, pharmaceutical regulatory affairs, medication reconciliation and medication review. The curriculum is aligned with the World Health Organisation (WHO) Patient Safety Curriculum Guide, Multi-professional Edition, and the WHO Medication Without Harm Challenge. It incorporated class discussions among participants, presentations and take-home tasks. Early-career pharmacists underwent 8 weeks of training per cohort. Two cohorts (cohort 1 and cohort 2) were completed independently. A pre–post study design of a 56-item questionnaire was used to assess knowledge with questions derived from the course content. Additionally, an anonymous course evaluation was conducted using a Likert-scale questionnaire to assess participants' perceptions of the course.

Results: A total of 51 participants were enrolled (Cohort 1: n = 26; Cohort 2: n = 25). Cohort 1 participants showed an increase in mean scores from pre-test (M=0.66) to post-test (M=0.75), a difference of 0.09. Although this improvement was not statistically significant, t(8) = -2.19, p = .060, there was a moderate-to-large effect size (Cohen's d = -0.73), suggesting a meaningful knowledge improvement. Cohort 2 participants showed significant improvement from pre-test (M=0.68) to post-test M=0.76), t(8)=-3.12, p=.014, with a large effect size (Cohen's d = -1.04), indicating a substantial increase in knowledge. Course evaluation results for both cohorts were highly positive. In Cohort 1, participants rated the course content as highly relevant to pharmacy practice (mean = 4.73/5), and class interaction was also positively rated (Mean = 4.40/5). Similarly, Cohort 2 reported very high ratings, with course relevance to practice scoring a mean of 4.82/5, and class interaction rated at 4.64/5. All respondents (100%) in both cohorts indicated that the content was easy to understand and expressed willingness to recommend the course to other early-career pharmacists.

Conclusion: The intervention effectively improved medication safety literacy, empowering early-career pharmacists to reduce medication-related harm and enhance patient outcomes.

Strengthening pharmacy workforce development through academic capacity and quality assurance: Evidence from the Eastern Mediterranean Region

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Background: A competent pharmacy workforce is essential for improving access to medicines and strengthening healthcare systems. Pharmacy workforce intelligence aims to ensure the availability and quality of pharmacists through effective education, workforce planning, and policy development. Academic capacity and quality assurance in pharmacy education are key components for producing competent graduates who can meet evolving healthcare needs. However, evidence on the status of academic capacity and quality assurance in pharmacy education across the Eastern Mediterranean Region remains limited.

Objective: This study aimed to assess the status of academic capacity and quality assurance mechanisms in pharmacy education programmes in the Eastern Mediterranean Region using the International Pharmaceutical Federation (FIP) Development Goals as an evaluation framework.

Method: An explanatory sequential mixed-methods design was employed. In the quantitative phase, a validated questionnaire was distributed to pharmacy education leaders from pharmacy programmes offering Bachelor of Pharmacy

or Doctor of Pharmacy degrees across the region. Of 112 eligible pharmacy programmes, 61 participated in the survey (response rate 55%). In the qualitative phase, semi-structured interviews were conducted with 14 pharmacy education leaders to explore perspectives on academic capacity and quality assurance in greater depth. Quantitative data were analysed using descriptive and inferential statistics, while qualitative data were analysed thematically.

Results: Most pharmacy programmes reported implementing key quality assurance mechanisms, including student–teacher ratio standards (70%), periodic accreditation processes (82%), adoption of global quality assurance standards (67%), and stakeholder engagement in curriculum development. However, several gaps were identified. Only about half of the programmes reported planning student enrolment based on workforce needs (51%), and fewer programmes provided structured capacity-building programmes for teacher-practitioners (47%). Qualitative findings highlighted the importance of workforce-informed enrolment planning, faculty development, stronger stakeholder collaboration, and improved data systems for monitoring graduate outcomes.

Conclusion: While several quality assurance and academic capacity mechanisms are implemented in pharmacy education programmes in the Eastern Mediterranean Region, important gaps remain. Strengthening workforce intelligence systems, investing in faculty development, and stakeholder engagement may enhance pharmacy education and better align training with healthcare system needs. These improvements can contribute to developing a competent pharmacy workforce capable of supporting patient-centred care and resilient health systems.

Evaluating experiential learning in pharmacy education: A review of an academic elective in Ghana over a decade

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Background: Experiential learning, encompassing academic electives, plays a pivotal role in developing competent pharmacy professionals. The Faculty of Pharmacy and Pharmaceutical Sciences at Kwame Nkrumah University of Science and Technology (KNUST), Ghana, offers a three-week credit-bearing academic elective for fifth-year pharmacy students. Although this programme holds considerable potential to bridge the gap between theoretical knowledge and practical skills, no systematic evaluation of its structure, benefits, and challenges has been conducted to date. This study presents the first systematic evaluation of the elective programme, assessing its impact on student learning outcomes and informing future curriculum reforms. In doing so, it addresses a critical evidence gap that has long hindered curriculum development and the alignment of pharmacy education with national standards and evolving health system needs.

Method: This study employed a primary data design, drawing on records from all 539 fifth-year pharmacy students who participated in the elective programme between 2017 and 2025 across various sub-departments. To complement quantitative data, written reflective reports submitted by a subset of 200 students immediately upon completion of the elective were reviewed to gather qualitative feedback. Participants were selected through convenience sampling, based on the availability of completed reports. Quantitative data pertaining to student participation and reported benefits and challenges were analysed descriptively using SPSS. Qualitative data extracted from the student reports were subjected to thematic analysis to identify recurring themes and recommendations for programme improvement.

Results: Participation in the elective programme increased substantially over the study period, with the 2025 cohort alone accounting for 40% of total enrolment. The majority of students (93.1%) selected placements within pharmacy-

related sub-departments. Overall, 77.2% of students reported significant benefits from the programme, with the development of academic and research skills emerging as the most frequently cited advantage. Conversely, 44.7% of students identified challenges, of which time constraints were the most commonly reported. From 2021 onwards, a notable trend of placement diversification emerged, characterised by an increasing proportion of students opting for non-traditional, non-pharmacy disciplines. Analysis of student feedback revealed three consistently recommended reforms: an extension of the programme duration, the integration of structured research workshops into the curriculum, and the establishment of a formal mentorship framework.

Conclusion: This study presents the first systematic evaluation of the academic elective programme, confirming its value in fostering research skills among fifth-year pharmacy students while identifying critical areas for improvement. The findings provide a robust evidence base for curriculum reform, specifically supporting extended programme duration, the incorporation of mandatory research skills training, and the establishment of structured mentorship. These enhancements are considered essential for maximising the programme's educational impact, aligning the curriculum more effectively with national pharmacy competency standards, and strengthening its broader contribution to Ghana's health system. Future research should incorporate prospective evaluation of implemented reforms to assess their long-term influence on graduate outcomes and career trajectories.

Experiential Entrepreneurship Training in Drug and Medical Technology Development: Outcomes from the Life Sciences Entrepreneurship Development Program

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Background: The translation of scientific discoveries into health products requires competencies beyond traditional academic training, including commercialization, financing, and strategic development. At the same time, most biomedical PhD graduates now transition to industry rather than academia, highlighting a growing misalignment between conventional training pathways and workforce realities. This shift underscores the need for scientists to develop translational and commercial competencies, while non-scientific stakeholders must better understand the scientific and regulatory complexities of life sciences innovation. The Life Sciences Entrepreneurship Development Program (LSEDP), established in 2018 through a collaboration between Université de Montréal and Concordia University and co-designed with Montréal InVivo—a life sciences and health technologies cluster that brings together key stakeholders to support innovation and economic development—addresses this need through a structured professional development program. It is designed to be undertaken part-time, allowing participants to remain engaged in employment or academic research. The program targets individuals with advanced degrees in science or business, or equivalent experience, seeking to launch ventures, join startups, or advance within the LSHT sector.

Method: A longitudinal descriptive study was conducted on 129 graduates (2018–2025). Graduate trajectories were reconstructed using publicly available professional data (LinkedIn) and institutional records, allowing characterization of outcomes up to 7 years after graduation. Outcomes included workforce entry, career distribution across the drug development continuum, and startup creation in the life science and health technology sector. Participants were predominantly highly trained: PhD in progress (30%), postdoctoral fellows (21%), completed PhD (8%), master's (8%), undergraduate (6%), MBA (2%), clinicians (2%), and professors (2%). Backgrounds included research (67%), engineering (14%), and business (11%), spanning life sciences (59%), business (23%), and engineering (17%). The LSEDP spans 20 training days over 10 months, delivered as monthly two-day sessions. It includes interactive modules, case-based learning, and engagement with industry professionals, in partnership with stakeholders in oncology and medical technologies (IRICoR and the TransMedTech Institute). Participants work on real startup projects and complete individual capstone projects culminating in venture capital pitch presentations.

Results: The proportion of participants who founded a startup increased from 9% at program entry to 20% following completion, representing more than a twofold increase. Career trajectories shifted toward industry roles. Initially, 76% of participants were from academia; following completion, more than half transitioned to industry positions, including biotechnology (14%), contract research organizations (11%), medical technology (9%), pharmaceutical companies (4%), and business development or venture capital firms (2%). Participants from industry (24%) were distributed across similar sectors. Qualitative feedback through systematic surveys consistently highlighted the value of experiential learning and direct engagement with industry experts, with real-world projects perceived as highly relevant and immediately applicable, while also fostering meaningful professional networking opportunities.

Conclusion: The LSEDP represents a structured professional development model addressing gaps between academic training and workforce requirements in the life sciences sector. Its experiential approach and strong industry integration are associated with measurable outcomes in startup creation and career transitions. This model offers a transferable framework to strengthen innovation capacity and workforce readiness in drug and medical technology development.

Trait migration in pharmacy students following structured leadership development: A longitudinal leadership enneagram analysis

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Background: Most leadership development programmes evaluate learning through knowledge acquisition, reflective assignments, or self-reported confidence. Fewer studies assess whether underlying leadership traits themselves change over time. The Leadership Enneagram provides a structured framework to evaluate trait activation and maturity across nine leadership orientations. Prior use of the Leadership Enneagram in established professionals demonstrates minimal longitudinal change, suggesting that core leadership patterns are relatively stable once fully formed. In contrast, students in professional programmes are still forming their leadership identities and may therefore be more developmentally malleable. Understanding whether structured training can influence trait migration in this population may fill an important gap in leadership education research. Our goal was to examine changes in dominant leadership traits and maturity profiles among pharmacy students between programme entry (2023–2024) and post-training assessment (2026). We hypothesised that students would demonstrate measurable trait redistribution, particularly towards stronger executive and initiative-oriented profiles.

Method: A longitudinal matched-cohort design was employed. Twenty students who completed both baseline and follow-up Leadership Enneagram assessments were included. Raw trait scores, baseline top two traits, and Average Maturity Ratio (AMR) were analysed descriptively. Trait migration was evaluated by identifying increases or decreases in dominant trait activation, with particular focus on Driver (assertiveness), Entertainer (social expressiveness), Perfectionist (standards orientation), Thinker (analysis), and Arbitrator (mediation). Cohort mean AMR values were compared across time points.

Results: At baseline, dominant traits were primarily Entertainer (12/20), Disciple (10/20), Perfectionist (9/20), and Arbitrator (8/20), reflecting socially confident and performance-oriented profiles. Following training, 15/20 students (75%) increased their Driver scores, and Driver emerged as a top three trait in 10 students. Entertainer scores decreased in 11/20 (55%), and Perfectionist decreased in 9/20 (45%). Seven students demonstrated AMR increases ≥0.05 (largest +0.15), while six showed decreases ≥0.05; cohort mean AMR shifted modestly (≈0.20 to ≈0.17). Overall, 17/20 students increased at least one authority- or execution-focused trait (Driver or Thinker).

Conclusion: Unlike findings in established professionals, this student cohort demonstrated measurable leadership trait migration following structured development. The predominant shift was towards increased decisiveness and ownership behaviours, with reduced emphasis on socially expressive or image-driven traits. These findings suggest that professional students represent a malleable developmental window in which leadership identity can meaningfully evolve. Future research should explore long-term stability of these changes and their relationship to clinical and organisational performance.

Adapting a one health escape room for multi-country interprofessional global health education

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Background: The World Health Organization defines One Health as an integrated approach that seeks to sustainably balance and optimise the health of people, animals, and ecosystems. At the University of Kentucky, One Health concepts are incorporated in a course, Interprofessional Teamwork in Global Health. This course brings together students to prepare them for short-term experiences in global health in Ecuador and Kenya. To reinforce One Health principles and promote interprofessional problem solving, a virtual escape room activity was developed to simulate real-world global health challenges. The activity was first implemented in 2025 for Ecuador and subsequently adapted in 2026 to support students preparing for global health experiences in both Ecuador and Kenya. The objective of this activity was to enhance understanding of One Health concepts, strengthen teamwork and communication, and promote application of interprofessional decision-making through a gamified learning experience.

Method: A web-based virtual escape room was developed using the Breakout EDU platform. Scenario-based escape rooms were created for Ecuador and Kenya. Students participated in the activity synchronously via Zoom following completion of pre-class materials on One Health principles. Participants worked in interprofessional teams solving a series of seven puzzles within 25 minutes. Participants completed a post-activity survey assessing perceptions of learning outcomes, teamwork, communication, and engagement using Likert-style items. Agreement responses were defined as “agree” or “strongly agree.” Differences in agreement between groups were evaluated using Fisher’s exact tests.

Results: A total of 66 of 74 participants completed the post-activity survey (89.2%). Fifty-five students (83.3%)

successfully escaped within the allotted time. All teams that did not escape were assigned to the Kenya scenario ($p<0.001$). Agreement across survey items was high. Participants reported that the activity helped them understand the interconnectedness of human, animal, and environmental health, apply knowledge of One Health principles to solve challenges, and increased confidence in addressing real-world crises using a One Health approach (93.9%). Students reported strong perceptions of teamwork (98.5%), improved team communication (97.0%), and strong engagement (95.5%). When comparing escape outcomes, agreement levels were high for survey items with the only statistically significant difference observed for the item assessing puzzle engagement and relevance, with higher agreement among participants whose teams successfully escaped compared with those who did not (100% vs 72.7%, $p=0.004$). Comparisons between the Ecuador and Kenya scenarios demonstrated similarly high agreement. Participants completing the Ecuador scenario were more likely to report that the puzzles and scenarios were engaging and relevant to One Health challenges compared with those completing the Kenya scenario (100% vs 81.3%, $p=0.012$).

Conclusion: A virtual escape room provides an engaging and scalable approach for integrating One Health principles into interprofessional global health education. High levels of agreement across learning and teamwork measures suggest that gamified learning can effectively reinforce interprofessional collaboration and application of One Health concepts. Differences in perceived engagement appeared to be associated with escape success rather than scenario content. This model offers a flexible educational strategy that can be adapted to a variety of global health training environments and interprofessional education programmes.

Rapid scoping review to analyze best practices for addressing misinformation in health professions education

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Background: University of Toronto released recommendations for its Faculties to address civil discourse by strengthening educational practices, supporting open dialogue, and evidence informed reasoning. Leslie Dan Faculty of Pharmacy wanted to focus on strong pedagogical designs for managing misinformation. Misinformation is false or inaccurate information which influences public trust and health-seeking behaviours. Strengthening public and professional literacy is an essential safeguard against misinformation, underscoring the need to examine current best practices in teaching this content within health professions education, including the PharmD program. Although misinformation education exists, it is unclear which pedagogical strategies are effective or aligned in pharmacy education. The objective of this project was to analyze existing educational approaches to inform best practices for integration within the PharmD curriculum.

Method: A rapid scoping review was conducted to identify and describe educational interventions addressing misinformation among health professional students. Best practices were not predefined but were identified inductively based on the characteristics of the interventions. The review followed an iterative and systematic process, enabling refinement of the research question and data extraction procedures as familiarity with the literature increased. Searches were performed in Embase® and MEDLINE®, with broad inclusion criteria encompassing studies, commentaries, and reviews focused on education about misinformation in any health profession. Exclusion criteria included articles focused on clinical practice alone or misinformation related to geopolitical topics. Screening and data management were conducted using Covidence®. Two reviewers independently screened and extracted data, with disagreements resolved by the primary author. Data were analyzed using manifest content analysis, applying both deductive and inductive coding to identify themes related to definitions of misinformation, pedagogical strategies, and reported educational outcomes.

Results: Sixty eight articles were identified, of which twelve met criteria for full extraction following removal of duplicates and screening (two duplicates removed, forty four excluded at title/abstract, and ten excluded at full text). The most common reason for full text exclusion was use of populations outside health professions education. Study populations included medical students (n=5), followed by pharmacy learners, nursing learners, and varied (each n=2), and librarians (n=1). Seven articles focused on vaccine hesitancy or COVID 19–related misinformation. Definitions of misinformation were inconsistently provided, particularly when misinformation was embedded within broader vaccine hesitancy discussions. Most educational interventions consisted of isolated learning activities, such as single lectures, videos, or standalone modules. Several articles highlighted interdisciplinary education as a promising approach given the complexity of misinformation. However, many interventions relied on debunking or myth busting frameworks, which do not reflect best practices for fostering civil discourse and therefore did not meet criteria for effective pedagogical strategies.

Conclusion: Addressing misinformation is essential, yet evidence informed educational practices remain limited within pharmacy and broader health professions education. Future curriculum design should incorporate repeated, skills based opportunities for students to evaluate information, engage in respectful dialogue, and apply evidence informed

communication strategies. Next steps include convening an interdisciplinary team to develop or adapt a civil discourse–based framework applicable to common misinformation topics beyond vaccine hesitancy for integration within the PharmD program.

Cross-cultural adaptation and validation of the instrument "FIP tool for institutional readiness in interprofessional education & training"

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Background: Given the increasing complexity of population health needs, it is necessary to strengthen collaborative practice and interprofessional education (IPE). To facilitate the planning, implementation and development of IPE, the International Pharmaceutical Federation (FIP) recently published the FIP IPE Readiness Tool, a global instrument designed for institutional self-assessment (https://doi.org/10.1016/j.xjep.2026.100804). The proposed tool addresses the lack of methods available to assist universities, administrators, professors, and policymakers in assessing their readiness to offer IPE, considering the complexity of the educational landscape. Implementing and sustaining IPE in Brazil remains a challenge, and there was no national tool to assess the capacity of higher education institutions to offer it. This article aims to perform the cross-cultural adaptation and content validation of the FIP Tool For Institutional Readiness In Interprofessional Education & Training into Brazilian Portuguese. Method: The methodological study was conducted in six stages: translation, synthesis, back-translation, expert committee review, pre-testing and submission to the developers. The process involved five translators in the initial phases, a committee of 14 specialists for transcultural equivalence, six experts for content validation and 31 faculty members in the pre-test phase. Results: The adaptation maintained the framework based on educational (micro), institutional (meso), and systemic (macro) levels, highlighting factors and processes affecting a health professional program's ability to effectively provide IPE and Interprofessional Collaboration Practice (IPCP). Semantic and structural adjustments were made to ensure cultural equivalence and adequacy to the Brazilian scenario, including the exclusion of a redundant item, the splitting of specific questions and the refinement of technical terms in the glossary. Content validation achieved an Item-Content Validity Index (I-CVI) of 95.8 for clarity and 91.5 for relevance. In the pre-test, all items exceeded the 80% comprehension index among faculty participants. Conclusion: Following the cross-cultural adaptation and content validation, it can be affirmed that the instrument is culturally adapted and can be applied to the Brazilian Portuguese-speaking population. The instrument proved to be easy to understand and useful for the field, covering the various determinants and processes necessary to properly assess institutional capacity in offering IPE. For better applicability, it is suggested that additional psychometric properties be verified in subsequent studies.

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Student engagement and uptake of generative artificial intelligence (GenAI)-supported feedback in a pharmaceutical sciences courserfrf

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Background: The integration of generative artificial intelligence (GenAI) in pharmacy education is expanding, particularly in the development of teaching materials, in-class activities, and assessment strategies. Educators often emphasize efficiency as a key rationale for utilising GenAI to support assessment and for generating feedback. However, it remains unclear whether GenAI-supported feedback influences how learners engage with and apply feedback. This study assessed the influence of GenAI-supported feedback in a pharmaceutical sciences graduate course.

Method: Students (n=39) were randomly assigned to receive GenAI-supported feedback (n=19) or instructor-only feedback (n=20) on a 4-page writing assignment. GenAI-supported feedback was created using Microsoft Copilot and subsequently revised by the instructor for accuracy and relevance. Both GenAI-supported and instructor-only feedback were formatted consistently, and the use of GenAI use was disclosed where applicable. Independent t-tests were used to compare GenAI-only feedback (i.e. prior to revision) and instructor-only feedback based on the amount of feedback, type of feedback per the assignment rubric (i.e., focus, synthesis, organisation, grammar, sources), use of feedback on a subsequent assignment (i.e., feedback uptake), and time-to-generate feedback. The same comparisons were made following revision of GenAI feedback to examine differences between GenAI-supported and instructor-only feedback. Students who received GenAI-supported feedback were invited to a 30-minute interview to explore their perspectives. Interviews were conducted via Zoom, audio-recorded, transcribed verbatim, and coded deductively by two researchers utilising independent coding followed by consensus building.

Results: Differences were found between GenAI-only feedback and instructor-only feedback for Focus ($p<.001$), Synthesis ($p<.001$), Organisation ($p<.001$), and Grammar ($p=.03$). The instructor utilised 32.7% ± 12.0% of the GenAI feedback in the final feedback provided to students (range 12.5%-52.9%). There were confirmed GenAI hallucinations on 4 (21.1%) assignments. Following revision of GenAI feedback, there were differences between groups for Focus ($p=.04$) and Sources ($p=.03$). Generating GenAI-supported feedback required significantly more time (18.1 ± 5.9 minutes) than instructor-only feedback (12.1 ± 3.4 minutes, $p<.001$). No significant difference was observed between groups in feedback uptake ($p=.38$). Three themes were identified from student interviews (n=5). Engagement, the most common theme, reflected active ways participants incorporated GenAI-supported feedback, with some students "interested in what it was going to say about my writing" while others expressed "a little bit of disappointment." Experience, the second theme, described receptiveness to the feedback. Effectiveness, the third theme, captured how well the feedback facilitated student performance, with students generally appreciating the actionability of the feedback.

Conclusion: GenAI-supported feedback did not improve feedback uptake compared with instructor-only feedback. These findings suggest that while GenAI may shape how learners experience and interact with feedback, its educational value may lie more in augmenting feedback processes than directly enhancing learners' application of feedback to subsequent work. Further research is needed to identify strategies for optimising GenAI-supported feedback, including increasing feedback uptake, improving accuracy, and reducing the time required for instructor review and revision.

Elevating clinical training and emergency interventions using AI-powered extended reality

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Background: Digital health (DH), extended reality (XR), and artificial intelligence (AI) are transforming healthcare delivery; however, pharmacy education has not consistently kept pace, creating a potential digital literacy gap among future pharmacists. The Accreditation Council for Pharmacy Education Standards 2025 identify digital health literacy, informatics, and emerging technologies as core competencies for Doctor of Pharmacy (PharmD) graduates in the United States. Similarly, regulatory frameworks for Artificial Intelligence/Machine Learning-based Software as a Medical Device highlight the expanding clinical role of AI-driven systems. Despite this evolution, structured integration of immersive XR and AI-supported clinical training, particularly for emergency interventions, remains limited in pharmacy curricula. This study evaluated the educational impact of integrating DH, XR, and AI through a dedicated Digital Reality and Artificial Intelligence (DRAI) laboratory.

Method: A curriculum-level innovation was implemented beginning in Autumn 2024, with elective course deployment in Spring 2025 and Spring 2026. The programme integrated virtual reality therapeutics, immersive extended reality simulations, AI-supported conversational agents, medical device training, and generative AI–enabled clinical feedback activities. Pre- and post-surveys were administered to PharmD, graduate, and International Student Summer Programme (ISSP) participants to assess confidence in patient counselling, familiarity with DH, XR and AI, regulatory evaluation skills, and perceived clinical preparedness. Paired t-tests were conducted to evaluate changes in confidence levels. Qualitative feedback was analysed using thematic synthesis to identify patterns in engagement and perceived educational value.

Results: ISSP 2025 included 93 students from nine countries; all attended the VRT seminar, with 37 participating in the DH workshop and 25 in the AI workshop. Of the 92 pre-survey respondents, 53 completed the post-course assessment, including all VR seminar attendees, 13 from the DH workshop, 12 from the AI workshop, and 8 who attended both. The ISSP cohort demonstrated over 72% improvement across all assessed competency areas. Among ISSP 2024 participants (n = 98 from 12 countries), familiarity with AI concepts increased significantly following a single workshop session (4.3 ± 1.9 vs. 6.5 ± 1.3; $p < 0.001$). The PharmD elective cohort demonstrated 100% improvement across all assessed competency areas. Participants reported marked reductions in unfamiliarity with digital health tools, virtual reality therapeutics, and AI applications, alongside increased confidence in recommending digital interventions and evaluating AI-generated medication guidance. Qualitative

findings revealed sustained engagement, voluntary extended practice beyond scheduled sessions, and enhanced motivation to pursue technology-driven clinical innovation. International participants emphasised the accessibility and global applicability of the integrated, hands-on learning model.

Conclusion: Structured integration of AI-powered XR and digital health technologies significantly enhances learner confidence, digital competency, and preparedness for contemporary clinical practice. The DRAI framework demonstrates a scalable, internationally adaptable blueprint for modernising clinical training, with a focus on emergency interventions and high-stakes patient counselling. Embedding immersive simulation and AI-supported feedback within competency-based curricula may serve as a foundational strategy for aligning pharmacy practice with rapidly evolving healthcare technologies.

Evolving pharmacy workforce requirements: A longitudinal comparative analysis of the 2023 and 2025 National Association of Boards of Pharmacy survey of pharmacy law

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Background: Pharmacy workforce regulation in the United States is administered independently by each state board of pharmacy, producing variation in licensure and continuing pharmacy education (CPE) requirements. Emerging public health priorities have driven ongoing advancements in pharmacy practice and amendments to CPE requirements and pharmacy technician credentialling standards. The pace and complexity of these changes have implications for pharmacy practice, licensure, and professional development. A systematic longitudinal analysis of these regulatory changes across all United States jurisdictions has not previously been described. The purpose of this work is to characterise the nature, frequency, and thematic patterns of changes to pharmacist CPE and pharmacy technician regulatory standards across all United States jurisdictions between the 2023 and 2025 National Association of Boards of Pharmacy (NABP) Survey of Pharmacy Law editions, with particular attention to expanding pharmacist and technician roles.

Method: A structured comparative analysis of the 2023 and 2025 NABP Survey of Pharmacy Law was conducted across all 53 jurisdictions (50 states, the District of Columbia, Guam, and Puerto Rico). Pharmacist domains compared included total CPE hours, mandatory topic areas, and renewal cycle structure. Pharmacy technician domains included licensure and certification requirements, mandatory training and accreditation standards, CPE hours, technician-to-pharmacist supervision ratios, criminal history check requirements, and registration fees. Changes were identified using the NABP colour-coding convention, verified by direct comparison of both editions, and categorised as additions, removals, or modifications.

Results: Approximately 30 jurisdictions recorded at least one meaningful regulatory change. For pharmacist CPE, eight jurisdictions made changes: one state increased total required hours and four added mandatory topic areas including opioid use disorder education, implicit bias awareness, sexual harassment prevention, health equity training, and contraception counselling. Two states modified credit carryover policies. These changes correspond with states implementing CPE requirements for enhanced pharmacy services and adopting standard-of-care regulatory models that have removed specific legislatively prescribed CPE requirements. For pharmacy technician licensure and certification, four jurisdictions changed requirements. Supervision ratio changes were the most widespread finding: 12 jurisdictions modified technician-to-pharmacist ratios, with expansions as large as 2:1 to 6:1 across both ambulatory and institutional settings. Following the COVID-19 pandemic, the majority of states permanently adopted technician roles outlined in the Public Readiness and Emergency Preparedness Act, granting technicians the ability to administer vaccinations. Changes in technician supervision, licensure, and certification demonstrate the ongoing evolution of the pharmacy technician as a critical and distinct member of the healthcare team.

Conclusion: Between 2023 and 2025, approximately 30 states enacted or clarified regulatory changes affecting pharmacist and pharmacy technician requirements. Two thematic trends are of particular significance. First, the incorporation of enhanced pharmacy services, health equity, implicit bias, and opioid-specific education into pharmacist CPE signals a broadening of what continuing education is expected to address. Second, the widespread expansion of technician roles and affiliated credentialling requirements reflects the profession's ongoing expansion into direct patient-care services. These changes increase the complexity of regulatory compliance for practitioners and educators. Prospective national monitoring is warranted to inform workforce planning, licensure policy, and pharmacy education programme design.

Gamified simulation to improve pharmacy trainees' competence in ward emergency medication management audits

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Background: Pharmacists routinely conduct ward audits of emergency medications stored on-site for immediate administration in life-threatening situations. These audits ensure compliance with hospital policies on medication storage, accessibility, labelling, and documentation, supporting safe and effective use by nurses in clinical practice. Pharmacy trainees—including interns and early-career clinical pharmacists—often feel unprepared to perform audits due to limited clinical exposure and unfamiliarity with audit procedures. Traditional lecture-based instruction and written standard operating procedures (SOPs) may not adequately prepare trainees for real-world practice. Innovative educational strategies are therefore required to promote experiential learning and enhance trainees' readiness, confidence, and practical skills for independent ward audits. This study aimed to develop and implement a gamified simulation to strengthen pharmacy trainees' competence in ward medication management and audit procedures.

Method: An interactive online gamified simulation was developed based on real workflows in a tertiary teaching hospital's pharmacy department and inpatient wards. The virtual environment recreated key practice settings, including the inpatient pharmacy and nursing stations. The simulation incorporated role-playing characters, scenario-based tasks, and interactive checkpoints to replicate common situations encountered during ward medication audits. Pharmacy trainees navigated the simulated environment to understand institutional policies for emergency medication storage and to identify potential medication management issues. Embedded quizzes reinforced key concepts and assessed knowledge acquisition. The programme was delivered as a self-directed preparatory activity for pharmacy trainees prior to participating in real ward audits. Learning outcomes were evaluated through embedded assessment results and post-training feedback questionnaires.

Results: Between 16 July 2024 and 5 September 2025, 38 pharmacy trainees completed the gamified simulation. All participants successfully navigated the interactive tasks and embedded assessments. Post-training feedback indicated that trainees found the gamified format more engaging and easier to understand than traditional written SOP materials. Participants reported that the simulated scenarios closely reflected real clinical situations encountered during ward audits. The module enhanced trainees' understanding of medication management requirements, audit workflows, and key compliance checkpoints, and increased their confidence in performing ward medication audits independently.

Conclusion: Gamified simulation provides an effective and engaging educational strategy for preparing pharmacy trainees to perform ward medication audits. By offering a safe, practice-oriented learning environment, this approach enhances trainees' knowledge, skills, and confidence while reducing the instructional burden on educators balancing clinical duties and teaching responsibilities. The model can be applied to other areas of clinical pharmacy to further enhance trainees' preparedness, clinical skills, and learning outcomes.

Positive mental health among undergraduate pharmacy students at a rural South African university: Levels and correlates

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Background: Positive mental health (PMH) goes beyond the absence of mental illness and reflects emotional, psychological, social and societal well-being, all of which are critical for students' academic success and future professional functioning. Pharmacy students face unique academic, clinical and contextual stressors that may compromise their PMH, particularly in rural, resource-constrained settings. Despite growing evidence of high psychological morbidity among South African university students, limited data exist on PMH among undergraduate pharmacy students at rural universities. Therefore, this study aimed to assess the levels of PMH among undergraduate pharmacy students at a rural university in South Africa and to examine associations between PMH and socio-demographic, academic, and clinical characteristics.

Method: A quantitative, descriptive cross-sectional study was conducted among all undergraduate pharmacy students registered in 2025 at the University of Limpopo. Total purposive sampling was used; 247 students completed a self-administered questionnaire comprising a socio-demographic and student characteristics section and the multidimensional Positive Mental Health Instrument (PMHI), which measures six domains: general coping, emotional support, spirituality, interpersonal skills, personal growth and autonomy, and global affect. PMH items were rated on 6-point and 5-point Likert scales as per the original instrument. Data were analysed using SPSS v30; descriptive statistics summarised PMH levels, independent t-tests and ANOVA compared mean total and domain scores across subgroups. The significance was set at $p<0.05$.

Results: The sample was predominantly female (62.3%), Black African, and from rural families (83.0%); most students were funded by bursaries (77.7%) and lived in on-campus residences (75.7%). Approximately one-third of participants

had low PMH based on total PMHI scores, indicating suboptimal mental well-being in a substantial proportion of students. Female students had significantly lower mean total PMH scores than males (3.61±0.66 vs 3.78±0.60, p=0.044), with significantly lower scores in the general coping, interpersonal skills, personal growth, and global affect domains. Christian students had significantly higher total PMH and spirituality scores than those reporting other or no religion (p=0.024 and p<0.001, respectively). Students from rural family residences had slightly higher total PMH and interpersonal skills scores than those from urban families, although differences were modest. History of psychiatric illness and current use of psychiatric medication were associated with notably lower global affect scores (p=0.012 and p=0.064, respectively). No significant differences in total PMH were observed by relationship status, funding source, working part-time or repeating a year.

Conclusion: A considerable proportion of undergraduate pharmacy students at this rural South African university experience low positive mental health, with gender, religious affiliation, family residence and psychiatric history emerging as important correlates. These findings underscore the need for pharmacy schools and faculties of health sciences to integrate structured PMH-promoting interventions, including skills-based coping and resilience training, enhanced access to counselling, and initiatives that strengthen social and spiritual support, with specific attention to female students and those with mental health histories. Embedding such interventions within the academic and clinical training environment may improve students' well-being, academic performance and readiness to provide compassionate, patient-centred care.

Enhancing Team Performance and Cognitive Load Through Gaming and Worked-out Modeling in a Pediatric Mass Casualty Escape Room

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Background: Healthcare simulations provide an opportunity to integrate clinical reasoning, teamwork, and decision-making under pressure. Escape rooms have emerged as an innovative simulation modality that combines gamification with experiential learning. However, limited evidence exists regarding how structured pre-brief strategies, such as team-building activities and worked-out modelling (stepwise demonstration of expert problem-solving), influence team dynamics and cognitive load in interprofessional simulations. Cognitive load theory describes three types of load: intrinsic load (IL), germane load (GL), and extraneous load (EL), all of which impact learning efficiency with the aim of optimizing IL, increasing GL and reducing EL. This study aimed to evaluate the effect of worked-out modelling and team-building on observed team dynamics and cognitive load in a paediatric mass casualty escape room.

Method: Final-year Doctor of Pharmacy and Physician Assistant students participated in this study. This was a 4-hour mass casualty escape room simulation consisting of five paediatric-focused stations: diabetic ketoacidosis, asthma exacerbation (high-fidelity mannequin), sepsis (jigsaw puzzle), medication dosing (crossword puzzle), and a code-based vaccine challenge. Participants were randomly assigned to an interprofessional teams consisting of three Physician Assistant students and one pharmacy student. Teams were then assigned to either an intervention or control group. The intervention group completed the color-blind team-building game followed by worked-out modelling prior to the escape room. The control group completed these activities after the escape room. Team dynamics were assessed by trained observers using a structured rubric evaluating domains such as leadership, communication, situational monitoring, and mutual support. Cognitive load was measured using the Cognitive Load Assessment for Simulation (CLAS-Sim), capturing IL, GL, and EL. Quantitative data were analysed using a student t-test.

Results: Teams in the intervention group demonstrated significantly higher performance across several domains of team dynamics. Improvements were observed in organisation at each station (6.03 vs 5.35, p=0.018), assignment of roles and responsibilities (5.97 vs 5.24, p=0.011), and inclusion of patients and families (6.32 vs 4.83, p=0.023). Leadership behaviours were also enhanced, including identification of team goals (6.05 vs 5.47, p=0.028), resource utilisation (6.05 vs 5.50, p=0.050), delegation (6.08 vs 5.59, p=0.040), and modelling of teamwork behaviours (6.26 vs 5.73, p=0.033). Mutual support was also higher, particularly in provision of task-related assistance (6.32 vs 5.88, p=0.047). Cognitive load analysis demonstrated no significant difference in IL (25.47 vs 26.00, p=0.62). The intervention group reported significantly higher GL (20.9 vs 16.8, p<0.01) and significantly lower EL (17.0 vs 20.4, p=0.01). Intervention teams completed more stations on average (2.88 vs 1.71, p=0.052) and showed a trend towards faster completion times (45.6 vs 48.2 minutes, p=0.076). Data from pre/post knowledge quizzes are pending.

Conclusion: Pre-brief strategies incorporating team-building and worked-out modelling improved teamwork and optimized cognitive load in a paediatric mass casualty escape room. These findings suggest that structured instructional design prior to simulation enhances learning efficiency by promoting meaningful cognitive engagement while reducing extraneous burden. Further research is warranted to explore long-term retention and translation to clinical practice.

A low-barrier visual TDM teaching platform: Evaluating impact on trainee competency and clinical outcomes

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Background: Therapeutic Drug Monitoring (TDM) is a challenging core skill in hospital pharmacy, requiring the integration of pharmacokinetic knowledge, patient physiological data, and precise timing. A significant gap often exists between classroom theory and clinical practice. Junior pharmacists frequently struggle to identify key assessment points. A common error is failing to judge whether blood sampling times are correct. If drawn at the wrong time, the drug level is misleading, leading to incorrect dose adjustments and reduced physician trust. Traditional written examinations cannot ensure trainees perform these tasks independently and safely in real-world settings.

Objective: To evaluate a custom-built digital TDM platform developed using Google Apps Script (GAS). The study aimed to enhance trainee competency and improve patient safety, utilising Entrustable Professional Activities (EPAs) to measure educational outcomes and clinical Key Performance Indicators (KPIs) to assess direct impacts on care quality.

Method: This prospective observational study was conducted within a clinical pharmacy training programme at a regional teaching hospital in Taiwan. A web-based TDM platform was developed using GAS, leveraging generative AI coding tools to enable development without advanced programming expertise. The platform features automated calculators, visualised dashboards, and standardised report templates. Ten post-graduate year pharmacist trainees participated. The EPA framework, assessed independently by two senior clinical pharmacists, was used to grade trainee ability from Level 1 (observation) to Level 4 (independent practice). Two clinical KPIs were compared between a six-month pre-implementation period and the initial two-month post-implementation phase: Sampling Time Accuracy (based on total TDM cases) and Physician Acceptance Rate (based on intervention cases). Data were analysed using the Chi-square test.

Results: The platform simplified TDM workflows and improved learning efficiency. Educationally, four trainees achieved EPA Level 4 by rotation completion, demonstrating independent practice capability. The remaining six reached Level 3 (three at 3c, two at 3b, one at 3a), ensuring all met safe practice standards under supervision. Clinically, sampling time accuracy improved significantly from 79.7% (189/237) to 91.7% (77/84) (p=0.021). The platform automatically flagged incorrect sampling times, prompting pharmacists to educate nursing staff immediately. The physician acceptance rate showed an upward trend from 76.0% (79/104) to 86.4% (38/44), though not reaching statistical significance in this preliminary analysis. Physicians reported that standardised, evidence-based reports enhanced clarity and increased trust in the pharmacy team. Data collection is ongoing; six-month post-implementation data will be available prior to presentation.

Conclusion: A GAS-based TDM platform effectively bridges the gap between pharmacy education and clinical practice. By linking EPA assessments with clinical data, this study demonstrates that effective digital teaching tools not only enhance trainee skills but translate into real improvements in patient safety. The platform successfully standardised processes, minimised human errors, and strengthened the professional role of clinical pharmacists. Further multi-centre studies are warranted to confirm generalisability. This model provides a practical, low-cost digital solution for pharmacy departments aiming to optimise both education and clinical services.

Patient Safety in Pharmacy Education: Analysis of Curricula in Public Universities of the Brazilian Northeast

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Background: Patient safety (PS) is a cornerstone of healthcare quality. In Brazil, the 2017 National Curriculum Guidelines for Pharmacy programmes mandated the inclusion of PS in professional training. Given the pharmacist's critical role in patient care, particularly regarding safety aspects such as damage prevention and medication-related events, it is essential to evaluate how this competency is being integrated into these curricula. The objective of this study is to analyse the presence and approach of PS-related content in the curricula of Pharmacy programmes at public Higher Education Institutions (HEIs) in the Northeast region of Brazil.

Method: A qualitative, documentary study was conducted, analysing the syllabuses of mandatory modules across 18 Pharmacy programmes at public universities in the Brazilian Northeast with active registration in the e-MEC portal (Ministry of Education). Syllabuses were collected from Pedagogical Political Projects available on official institutional websites or academic management systems. The preliminary analysis was based on the WHO Patient Safety Curriculum Guide recommendations. Syllabuses were read in full and categorised for stratified analysis. The selected texts were analysed using Iramuteq software (version 0.7 alpha 2), employing the Descending Hierarchical Classification (DHC) technique. Final-year dissertations, modules without

available syllabuses, and elective modules were excluded from the analysis.

Results: Out of 1,207 identified modules, 1,173 were analysed, from which 187 syllabuses were classified for software processing. The DHC, with a 75.4% retention rate, revealed four terminal classes structured around two primary axes: Safety Inherent to Care and Safety Inherent to the Product (medicine). In the first axis, content related to the patient as a subject was identified, including themes such as rational medicine use, pharmacovigilance, adverse event prevention, the health-disease process, and health promotion. In the second axis, emphasis was placed on quality control applied to different pharmaceutical practice areas (community pharmacy, cosmetics, industry, compounding, etc.) and the various logistical stages of medicine access (selection, distribution, prescription, etc.).

Conclusion: Given that Patient Safety is a fundamental theme in health education, the pharmacist clearly plays an indispensable role. This analysis demonstrates that PS training in public HEIs in the Brazilian Northeast aligns with national guidelines but reveals a fragmentation between direct patient care and a focus on the product. These findings reinforce the need to better integrate these axes to consolidate the pharmacist's role as a risk manager within complex healthcare systems.

The impact of an orientation program on first-year pharmacy and pharmaceutical science students' sense of belonging

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Background: The transition to university is a pivotal period for students, as it significantly impacts their retention, academic success, and overall well-being. Literature suggests a strong sense of belonging has been linked to improved student retention, engagement, and graduate outcomes, making it a priority area for higher education institutions. Despite the recognised importance of orientation, there is limited research assessing the impact of orientation programs on students' sense of belonging, particularly in the context of faculty-specific orientation programs. At Monash University's Parkville campus, the Faculty of Pharmacy and Pharmaceutical Sciences delivers a structured yet interactive Orientation Day Program designed to support students' transition to university. This program includes sessions such as Meet Your Peer Mentor, Course Introductions, Navigating First Year, Establishing a Foundation for Academic Success, Reflective Practice, Where Can My Degree Take Me?, Campus Tours, Welcome to Country Ceremony, and a Clubs Carnival, providing students with academic, social, and professional insights to help them build connections and confidence in their new learning environment. The purpose of this study was to evaluate the effectiveness of the Parkville campus Orientation Program in fostering students' sense of belonging. This study aimed to identify key program elements that contribute to a strong sense of belonging and areas for improvement.

Method: A cross-sectional online survey was developed and shared to all first-year students who participated in the Parkville Orientation Program in February 2026. The survey included demographics, orientation expectations, evaluations of preparedness for study, social connection, sense of inclusion and overall experiences.

Results: A total of 467 respondents completed the survey in 2026, providing a 71% response rate. Survey responses indicated strong student social connection and belonging, where peer mentoring played a key role, with 99% engaging with a peer mentor. Meeting a peer mentor helped 81% feel more socially connected, and 61% reported a sense of belonging from Day 1. 90% reported their peer mentor was mostly or very helpful in making them feel welcomed and supported. Overall, 61% felt a strong sense of belonging to the Faculty post-Orientation, while only 6% reported little or none. Areas for improvement included more informal peer interaction (24%) and interactive activities (25%), though 32% suggested no changes, highlighting the program's effectiveness. These findings underscore the role of peer mentoring and social engagement in fostering student belonging. Notably, similar findings across each domain were found in the 2025 Orientation program survey.

Conclusion: Overall, the current Orientation Program mostly met the expectations of the first-year Pharmacy and Pharmaceutical Science students. Meeting new people was the most important element that students looked forward to and was identified as the most valuable part of the Orientation Program. More time for socialisation and networking were reported to be key areas of improvement for future Orientation Programs to help new students feel more connected.